CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA

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Twenty-seventh meeting of the Animals Committee
Veracruz (Mexico), 28 April – 3 May 2014

Interpretation and implementation of the Convention

Species trade and conservation

Conservation and management of sharks

IMPLEMENTATION OF RESOLUTION CONF. 12.6 (REV. COP16)

1. This document has been prepared by the Secretariat.

2. In Resolution Conf. 12.6 (Rev. CoP16) on *Conservation and management of sharks*, the Conference of the Parties directs the Animals Committee:

   To examine new information provided by range States on trade and other available relevant data and information, and report their analyses at meetings of the Conference of the Parties;

   To make species-specific recommendations at meetings of the Conference of the Parties if necessary on improving the conservation status of sharks;

   and

   To report progress on shark and ray activities at the meetings of the Conference of the Parties.

   In the same Resolution, Parties are encouraged:

   To obtain information on implementation of National Plans of Action for the Conservation and Management of Shark Stocks (NPOA-Sharks) or regional plans, and to report directly on progress to the CITES Secretariat and at future meetings of the Animals Committee;

Information from range States on trade and other relevant data

3. The Secretariat issued Notification to the Parties No. 2013/056 of 6 December 2012, inviting shark range States to provide new information on trade and other available relevant data and information, and Parties to report on progress on the implementation of NPOA-Sharks or regional plans involving sharks. The Secretariat requested that this information be submitted by 31 January 2014 so as to have sufficient time to collate and summarize the information for consideration by the Animals Committee.

4. At the time of writing (February 2014), the Secretariat had received replies from Canada, Guatemala, South Africa and the European Union (on behalf of its 28 Members States). This information is attached in Annexes 1 to 4 to this document (in the submitted language), and will also be made available on the dedicated CITES sharks web page (see paragraph 10 below).

5. The Food and Agriculture Organization of the United Nations (FAO) informed the Secretariat that it is in the process of publishing a technical paper on the state of the global market for shark commodities, and that it intended to provide a summary of this paper at the present meeting.

6. Additional new information on the making on non-detriment findings for CITES-listed sharks and manta rays is presented in document AC27 Doc. 22.2 (submitted by Germany), and on the development of a rapid management-risk assessment method for fish species through its application to sharks in document AC27 Doc. 22.4 (submitted by the United Kingdom of Great Britain and Northern Ireland).

Information on NPOA-Sharks or regional plans

7. The Animals Committee reported on its ongoing review of the implementation of NPOA-Sharks and related matters at the 16th meeting of the Conference of the Parties (CoP16, Bangkok, March 2013) in document CoP16 Doc. 61 (Rev. 1). This review was based on information provided by Parties in response to Notification to the Parties No. 2010/027 and No. 2011/049, and had benefitted significantly from the review conducted by FAO on the implementation of the International Plan of Action for the Conservation and Management of Sharks (see FAO Fisheries and Aquaculture Circular No. 1076. Rome, FAO. 2012. http://www.fao.org/fishery/ipoa-sharks/publications/en).

8. The Committee may wish to consider the useful information on the implementation of the European Union Plan of Action for Sharks (EUPOA sharks) contained in Document AC27 Doc. 22.2.

Species-specific recommendations

9. At its 26th meeting (AC26, Geneva, 2012), the Animals Committee compiled a list of shark species (Class Chondrichthyes), as indicated below. This list contains species which Parties that responded to Notification to the Parties No. 2011/049 believed required additional action to enhance their conservation and management (see documents AC26 Doc. 16.1 and AC26 Doc. 16.2).

Australia (AC26 Doc. 16.2 Annex AU) School shark (*Galeorhinus galeus*) Gulper sharks (*Centrophorus harrissoni, C. moluccensis, C. zeehaani*)	**Japan** (AC26 Doc. 16.2 Annex JP) Whale shark (*Rhincodon typus*) Basking shark (*Cetorhinus maximus*) Great white shark (*Carcharodon carcharias*)
Colombia (AC26 Doc. 16.2 Annex CO) Silky shark (*Carcharhinus falciformes*) Oceanic whitetip shark (*Carcharhinus longimanus*) Scalloped hammerhead shark (*Sphyrna lewini*)	**Montenegro** (information document) Porbeagle (*Lamna nasus*) Blue shark (*Prionace glauca*)
European Union (AC26 Doc. 16.2 Annex EU) Shortfin (*Isurus oxyrinchus*) and longfin mako (*Isurus paucus*) Porbeagle (*Lamna nasus*) Bigeye thresher shark (*Alopias superciliosus*) Silky shark (*Carcharhinus falciformes*) Scalloped hammerhead shark (*Sphyrna lewini*) Spiny dogfish (*Squalus acanthias*)	**New Zealand** (AC26 Doc. 16.2 Annex NZ) Deepwater nurse shark (*Odontaspis ferox*) Manta ray (*Manta birostris*) Spinetail devil ray/Spinetail mobula (*Mobula japonica*) Shortfin mako (*Isurus oxyrinchus*) Longfin mako (*Isurus paucus*) Porbeagle (*Lamna nasus*) Scalloped hammerhead shark (*Sphyrna lewini*) Great hammerhead shark (*Sphyrna mokarran*) Smooth hammerhead shark (*Sphyrna zygaena*) Oceanic whitetip shark (*Carcharhinus longimanus*)
India (AC26 Doc. 16.2 Annex IN) Whale shark (*Rhincodon typus*) Knifetooth sawfish (*Anoxypristis cuspidate*) Pondicherry shark (*Carcharhinus hemiodon*) Ganges shark (*Glyphis gangeticus*) Speartooth shark (*Glyphis glyphis*) Ganges stingray (*Himantura fluviatilis*) Largetooth sawfish (*Pristis microdon*) Longcomb sawfish (*Pristis zijsron*) Giant guitarfish (*Rhynchobatus djiddensis*) Porcupine ray (*Urogymnus asperrimus*)	**United States of America** (AC26 Doc. 16.2 Annex US) Spiny dogfish (*Squalus acanthias*) Porbeagle (*Lamna nasus*) Freshwater stingrays, Family Potamotrygonidae Sawfishes, Family Pristidae Gulper sharks, genus *Centrophorus* School shark (*Galeorhinus galeus*) Guitarfishes, shovelnose rays, Order Rhinobatiformes Requiem and pelagic sharks Devil rays, Family Mobulidae Leopard shark (*Triakis semifasciata*) Hammerhead sharks (*Sphyrna* spp.) Dusky shark (*Carcharhinus obscurus)*
Israel (AC26 Doc. 16.2 Annex IL) Sharpnose guitarfish (*Glaucostegus granulatus*) Halavi guitarfish (*Glaucostegus halavi*) Clubnose guitarfish (*Glaucostegus thouin*) Common shovelnose ray, Giant shovelnose ray (*Glaucostegus typus*)	

	Thresher sharks (*Alopias* spp.) Shortfin mako (*Isurus oxyrinchus*) Silky shark (*Carcharhinus falciformis*) Oceanic whitetip shark (*Carcharhinus longimanus*) Blue shark (*Prionace glauca*) Sandbar shark (*Carcharhinus plumbeus*) Bull shark (*Carcharhinus leucas*) Tiger shark (*Galeocerdo cuvier*)

9. Several of the species mentioned in the list as requiring more conservation and management actions are included in the CITES Appendices (*Rhincodon typus, Carcharodon carcharias, Cetorhinus maximus* and Pristidae spp.). In its reporting to CoP16 on this species list, the Committee recognized that Parties had interpreted the request in the Notification in different ways, and that the list should not be construed as containing shark and ray species that Parties believed should be included in the CITES Appendices [see document CoP16 Doc. 61 (Rev. 1)]. Several of the species mentioned in the list were nevertheless the subject of listing proposals at CoP16, and subsequently included in the CITES Appendices (*Carcharhinus longimanus, Sphyrna lewini, S. mokarran, S. zygaena* and *Lamna nasus*).

10. With regard to new species-specific information which became available since CoP16 that may be relevant for recommendations at meetings of the Conference of the Parties on improving the conservation status of sharks, the Secretariat notes a few recent publications by the Convention on the Conservation of Migratory Species of Wild Animals and FAO:

    – Ebert, D.A. 2013. Deep-sea Cartilaginous Fishes of the Indian Ocean. Volume 1. Sharks. FAO Species Catalogue for Fishery Purposes. No. 8, Vol. 1. Rome, FAO. 256 pp. (see http://www.fao.org/docrep/019/i3477e/i3477e.pdf

    – Ebert, D.A. and M.F.W. Stehmann. 2013. Sharks, batoids, and chimaeras of the North Atlantic. FAO Species Catalogue for Fishery Purposes. No. 7. Rome, FAO. 523 pp. (see http://www.fao.org/docrep/017/i3178e/i3178e.pdf)

    – Fowler, S. 2014. The conservation status of migratory sharks. UNEP/CMS Secretariat, Bonn, Germany. 30 p. (see http://sharksmou.org/cms-publications).

    – Hall, M. and M. Roman. 2013. Bycatch and non-tuna catch in the tropical tuna purse seine fisheries of the world. FAO Fisheries and Aquaculture Technical Paper No. 568. Rome, FAO. 249 pp. (see http://www.fao.org/docrep/018/i2743e/i2743e00.htm)

11. The Secretariat fully recognizes that additional information and literature may exist that could be of assistance to the Animals Committee in making species-specific recommendations, as requested in Resolution Conf. 12.6 (Rev. CoP16).

Reporting to the Conference of the Parties

12. The Animals Committee should consider how to organize its analyses of new information on trade from range States, as well as other relevant data for reporting to the 17th meeting of the Conference of the Parties (CoP17) in 2016 in South Africa. The Committee is also directed to make species-specific recommendations for consideration at CoP17, and more generally to report "progress on shark and ray activities".

Other information

13. As indicated in document AC27 Doc. 22.2 and in paragraph 9 above, five taxa of sharks and all species of manta rays *Manta* spp. were included in CITES Appendix II at CoP16, with an entry into effect of the inclusion delayed by 18 months until 14 September 2014 to enable Parties to resolve related technical and administrative issues. A range of activities have been undertaken by range States, Parties, intergovernmental organizations, non-governmental organizations and other stakeholders in support of these listings. As detailed in document AC27 Doc. 22.2, this includes a project financed by the European Union and implemented by the Secretariat in close collaboration with FAO's Fisheries Department ("Strengthening capacity in developing countries for sustainable wildlife management and enhanced implementation of CITES wildlife trade regulations, with particular focus on commercially-exploited aquatic

species"). Information on this project and other relevant shark-related activities can be found on the CITES website at http://www.cites.org/eng/prog/shark/index.php. This dedicated, regularly updated webpage contains the following sets of information:

– History of shark listings under CITES; description of current and past CITES-listing of sharks, and CITES Resolutions and Decisions relating to sharks and rays;

– List of identification materials for sharks and rays;

– Calendar of shark- and ray-related events organized by CITES/FAO, Parties, intergovernmental organizations and non-governmental organizations;

– Description of the EU-CITES capacity-building project on sharks;

– CITES-FAO standard PowerPoint presentations on sharks listings and implementation needs;

– Relevant documentation from FAO (Fishfinder, IPOA-Sharks); and

– Other useful links.

The following sections and documents are currently under preparation:

– *List of RFMO management measures for shark conservation and management [Decision 16.128 b)];*

– *Summary of outcomes from sharks-related meetings represented by CITES/FAO;*

– *List of planned or ongoing projects and activities related to sharks (Response to Notification to the Parties No.2013/023);*

– *List of national laws and regulations [Decision 16.128 a)]; and*

– *List of Parties that have designated fishery agencies to act as CITES Management or Scientific Authority.*

Recommendation

15. The Committee is invited to examine the available information that is provided on trade in sharks and other relevant data and information, and the implementation of NPOA-Sharks and regional plans. It is also invited to consider species-specific recommendations on improving the conservation status of sharks that could be prepared for CoP17, and to consider its reporting to CoP17on trade analyses, species-specific recommendations and progress on shark and ray activities.

(English only/únicamente en inglés/seulement en anglais)

Environment Canada Environnement Canada

Canadian Wildlife Service
Ottawa, Ontario
K1A 0H3

21 January 2014

Mr. John Scanlon
Secretary-General, CITES Secretariat
International Environment House
11, Chemin des Anémones
CH-1219 Châtelaine, Geneva
Switzerland

Dear Mr. Scanlon,

With regard to Notification No. 2013/056 Information to be submitted for the 21st meeting of the Plants Committee and 27th meeting of the Animals Committee, please find below our Canadian response.

Please contact the Canadian Scientific Authority at + 1 (819) 953-7592 or cites-science@ec.gc.ca if you have any questions.

Yours sincerely,

Carolina Caceres, Manager
CITES Science
Canadian Wildlife Service, Environment Canada

c.c. Canadian CITES Scientific Authority
Canadian CITES Management Authority
Patrice Simon, Fisheries and Oceans Canada
Ljubica Vuckovic, Fisheries and Oceans Canada

Canada

Canadian Response to CITES Notification 2013/056

The information below is provided by Canada in response to CITES Notification 2013/056, specifically section a) which encourages Parties to obtain information on implementation of NPOA-Sharks or regional plans, and to report directly on progress to the CITES Secretariat and at meetings of the Animals Committee [see Res. Conf. 12.6 (Rev. CoP16)].

Domestic Measures

In March 2007, Canada implemented its *National Plan of Action (NPOA) for Sharks* that contains general and species-specific management measures.

Canada also has a number of legislative measures that are relevant to managing and maintaining the long-term sustainability of shark populations and fisheries. These legislative instruments include:

- Department of Fisheries and Oceans Act;
- Oceans Act;
- Fisheries Act;
- Coastal Fisheries Protection Act; and
- Species at Risk Act.

Canada's NPOA-Sharks and legislative measures incorporate ecological considerations, integrated fisheries management, and the precautionary approach to ensure the long-term sustainability of sharks within Canadian directed and non-directed fisheries.

Shark finning has been prohibited in Canada since 1994 by regulation under the federal *Fisheries Act* through fishing license conditions and as part of the Integrated Fisheries Management Plan for Atlantic sharks. Shark fisheries in Canada, both directed and bycatch, may be monitored at-sea by observers, enforcement officers, and/or at-sea video surveillance and 100% of all shark landings in Canada are monitored and weighed dockside by an independent, third-party contractor.
In 2013, Canada closed its directed fishery for Porbeagle Shark (*Lamna nasus*) to reduce pressure on this species and assist in the on-going efforts to rebuild the Northwest Atlantic stock.

Canada continues to undertake scientific research and data collection related to pelagic sharks and Spiny Dogfish (*Squalus acanthias*), as well as skates and chimaeras. Research areas of focus include recovery potential assessments, population status and trends, and stock dynamics.

Canada has implemented various management and educational consultation mechanisms to engage relevant stakeholders in initiatives related to sharks.

Contribution to Regional and International Measures

Canada has been a Contracting Party to the *International Commission for the Conservation of Atlantic Tunas* (ICCAT) since 1968. In this respect, Canada complies with the following ICCAT Resolutions concerning sharks:

- Resolution 03-10 on the shark fishery;
- Recommendation 04-10 concerning the conservation of sharks caught in association with fisheries managed by ICCAT;
- Recommendation 07-06 Supplemental Recommendation concerning Sharks;
- Resolution 08-08 on Porbeagle Shark;
- Recommendation 09-07 on the conservation of Thresher Sharks caught in association with fisheries in the ICCAT Convention Area;
- Recommendation 10-07 on the conservation of Oceanic White-tip Sharks caught in association with fisheries in the ICCAT Convention Area;
- Recommendation 10-08 on Hammerhead Sharks (Family Sphyrnidae) caught in association with fisheries managed by ICCAT; and
- Recommendation 2010-06 concerning Atlantic Shortfin Mako Sharks caught in association with ICCAT fisheries.
- Recommendation 2011-08 on the conservation of Silky Sharks caught in association with ICCAT fisheries; and
- Recommendation 2013-10 on the biological sampling of prohibited shark species by scientific observers.

As a Member of the *North Atlantic Fisheries Organisation* (NAFO), Canada complies with Article 6 of the NAFO Conservation and Enforcement Measures, 'By-catch Retention on Board of Stocks Identified in Annex I.A as By-catch When No Directed Fisheries is Permitted', Article 12, 'Conservation and Management of Sharks', and Article 13, 'Gear Requirements' of NAFO Conservation and Enforcement Measures.

As a Member of the *Western and Central Pacific Fisheries Commission* (WCPFC), Canada complies with the following WCPFC measures concerning sharks:

- Conservation and Management Measure 2010-07 on Sharks
- Conservation and Management Measure 2011-04 on Oceanic Whitetip Sharks
- Conservation and Management Measure 2013-08 on Silky Sharks
- Conservation and Management Measure 2012-04 on the protection of whale sharks from purse seine operations

Regarding the implementation of the WCPFC measures, Canada has no directed fishery for sharks in the WCPFC Convention Area and is not aware of any interactions by Canadian fishing vessels with sharks in that area.

In terms of the *Inter-American-Tropical-Tuna-Commission* (IATTC), Canada complies with Resolution C-05-03 (Conservation of Sharks Caught in Association with Fisheries in the Eastern Pacific Ocean) and Resolution C-11-10 (Conservation of Oceanic White-tip Sharks). Canada has no directed fishery for sharks nor is it aware of any interactions with sharks in the Eastern Pacific Ocean.

Canada signed the Agreement on Port State Measures to Prevent, Deter, and Eliminate Illegal, Unreported, and Unregulated Fishing on 19 November 2010 and is working towards its ratification.

Gobierno de Guatemala
Consejo Nacional de Áreas Protegidas
CONAP

DVS-0/2014-jm

(Spanish only/únicamente en español/seulement en espagnol)

Guatemala, 29 de Enero de 2,014

Convención Sobre el Comercio Internacional de Especies
Amenazadas de Fauna y Flora Silvestre

Presente

En base a la **NOTIFICACIÓN A LAS PARTES No. 2013/056** con respecto a la Información que ha de presentarse en la 21ª reunión del Comité de Flora y la 27ª reunión del Comité de Fauna, las actividades desarrolladas en el marco del inciso **a) Tiburones**, Guatemala informa lo siguiente:

Durante el primer trimestre del año 2013 se realizaron reuniones de trabajo interinstitucional para el análisis de la inclusión de las especies de tiburón a Apéndice II de CITES, con Instituciones de gobierno involucradas en el manejo del recurso tiburón, asociaciones de pescadores y Academia.

Para la correcta aplicación de la cadena de custodia de los tiburones incluidos en Apéndice II de CITES, se participó del Taller Regional sobre Dictámenes de Extracción No Perjudicial para las Autoridades CITES de Centroamérica y República Dominicana, realizado en San Salvador, El Salvador del 3 al 5 de Septiembre.

Así mismo se participó del Taller Regional de Tiburones incluidos en el Apéndice II de CITES, realizado en Recife, Pernambuco, Brasil, del 3 al 4 de Diciembre, enfocado en la socialización de herramientas para la correcta identificación de las aletas de tiburones enlistados en Apéndice II.

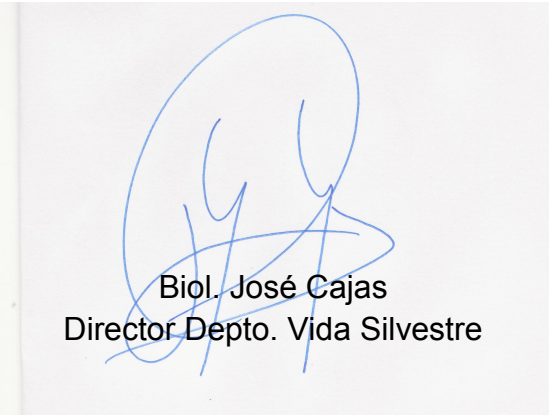
En este tema se han iniciado las coordinaciones interinstitucionales para la realización de reuniones para la correcta aplicación de la emisión de permisos CITES de exportación/importación para productos y derivados de Tiburones incluidos en Apéndice II, para lo cual se iniciará con una reunión interinstitucional entre CONAP y MAGA/DIPESCA (Autoridad de pesca) para coordinar la realización del Primer

“TALLER NACIONAL DE IMPLEMENTACIÓN PROCESOS CITES PARA TIBURONES EN APÉNDICE II”, para el 25 de febrero 2014, el cual se llevará a cabo con el apoyo del Departamento del Interior de los Estados Unidos de Norteamérica, en donde se contará con la participación de las instituciones del Estado de Guatemala involucradas en la aplicación de la normativa para el aprovechamiento del recurso tiburón, autorizaciones de comercialización nacional e internacional.

Como parte de las actividades de dicho Taller se solicitará a las instituciones participantes información referente a la aplicación del Plan de Acción Nacional de Tiburones, información sobre exportaciones/importaciones y comercio en general, y cualquier otra información con que cuentan las instituciones involucradas en el proceso, información que luego podrá ser remitida para complementar la NOTIFICACIÓN A LAS PARTES No. 2013/056.

Sin otro particular me suscribo de usted.

Cordialmente,



Biol. José Cajas
Director Depto. Vida Silvestre

Ref.: Jose Martínez Mencos
Técnico Recursos Hidrobiológicos

29 January 2014

Reply from the EU and its Member States to CITES Notification 2013/056 regarding information to be submitted for the 21st meeting of the Plants Committee and 27th meeting of the Animals Committee

Further to CITES Notification 2013/056, the EU and its Member States are pleased to provide the CITES Secretariat with the following information in relation to the preparation of the upcoming meetings of the Animals and Plants Committee.

a) Sharks

- Capacity-building project on CITES-listed marine species

At CoP16, the European Union and its Member States announced a contribution of EUR 1.2 million (USD 1,7 million) to carry out the project "Strengthening capacity in developing countries for sustainable wildlife management and enhanced implementation of CITES wildlife trade regulations, with particular focus on commercially-exploited aquatic species" that will cover the period 2013-2016. Among a number of priority targets, this project aims to support CITES Scientific Authorities in selected developing countries in making NDFs for sharks and manta rays included in Appendix II at CoP16, based upon stock assessments that define sustainable harvest levels, and using information and tools developed under the project. The project also aims to strengthen cooperation with the FAO's Fisheries Department and with Regional Fisheries Management Organizations (RFMOs) to ensure complementarity of requirements and support collaboration. Through this programme, the CITES Secretariat has created dedicated webpages on its website that provide a number of capacity-building tools and references, including a CITES-FAO PowerPoint presentation on Non-detriment findings, training materials on non-detriment findings in the CITES Virtual College and examples of NDFs for marine species (http://www.cites.org/eng/prog/shark/sustainability.php). The CITES Secretariat, in consultation with FAO, has organized regional consultative meetings on capacity assessments for the implementation of the new CITES listings of sharks and manta rays in early 2014 and will organise additional ones in the coming months.

Study on implementation of CITES measures for commercially-valuable sharks and manta rays

To assist CITES Parties and the Secretariat to obtain a more comprehensive picture of needs and challenges, the European Commission commissioned a study to TRAFFIC, "Into the deep: Implementing CITES measures for commercially-valuable sharks and manta rays" (http://www.traffic.org/home/2013/7/30/new-study-gets-its-teeth-into-shark-trade-regulations.html). The study aimed to gather information on sharks and manta rays listed in CITES at CoP16, including information on the levels of catch and population status of the species, reporting of their trade, assessment and monitoring to determine the impacts of trade on populations. In particular, the report provides an overview of available resources and capacity building initiatives in terms of NDFs. It also identifies needs in relation to data to perform stock assessments for shark species, guidance on NDFs for sharks, as well as issues regarding shared stocks and introduction from the sea, management deficiencies and species caught as bycatch. It provides FAO catch data by shark species for the period 2002-2011; examples of initiatives to collect data on shark catches and fishing effort to inform scientific assessments; examples of scientific data available for NDF development; and available guidance, information and tools to assist the development of NDFs for shark species.

European Union Plan of Action on Sharks

The conservation of sharks and rays is addressed within the framework of the EU Plan of Action (EUPOA) adopted in 2009 which identifies the measures deemed necessary both at EU level (TACs, technical measures, effort and capacity limits, data collection) and under international management regimes (measures taken in the framework of RFMOs, CITES, CMS and the Barcelona Convention).

The European Commission published in 2013 on its website the study "*Provision of scientific advice for the purpose of the implementation of the EUPOA sharks*" (http://ec.europa.eu/fisheries/documentation/studies/sharks/scientific-advice-sharks_en.pdf). The objective of this project is to obtain scientific advice for the purpose of implementing the European Union Plan of Action on Sharks as regards the facilitation of monitoring fisheries and shark stock assessment on a species-specific level in the high seas. The study is focused on major elasmobranch species caught by both artisanal and industrial large pelagic fisheries on the High Seas of the Atlantic, Indian and Pacific areas, which are currently monitored and potentially managed by respective Tuna Regional Fisheries management Organizations (RFMOs). Specifically, the study first aims to collate and estimate historical fisheries data especially on species composition of catches, fishing effort and size frequencies, in order to identify gaps in the current availability of fishery statistics as well as in current knowledge of the biology and ecology of sharks that should be filled in order to support the scientific advice provided to RFMOs on sustainable management of elasmobranch fisheries. Secondly, the project aims to review and prioritise the gaps identified to develop a research programme to fill those gaps in support of the formulation of scientific advice for management of sharks. The data and knowledge gaps identified through Phase I will allow focusing and prioritising the future research. Following Phase I it will be clear as to what data is available for providing management advice for shark species, and where gaps in the data render this task difficult. In a second step, recommendations for data collection improvements as well as research needs and activities will be described. The detailed data provided by the above-mentioned report may be of assistance to Parties wishing to export CITES-listed shark products, and therefore having to perform NDFs. The study has been communicated to the Executive Secretariats of all tuna RFMOs.

Management measures on sharks

Following the adoption of the EUPOA, the EU has actively participated in the negotiation of an instrument on the conservation of migratory sharks under the aegis of the Convention on the Conservation of Migratory Species (CMS), which led to the adoption in February 2010 of a Memorandum of Understanding on the conservation of migratory sharks. The EU signed the Sharks MoU in November 2011.

In the EUPOA, the EU emphasizes the need to support the work of the RFMOs, strengthen the RFMOs that are in place and work for the establishment of RFMOs in areas not yet covered. This commitment is confirmed by the Commission Communication on the External Dimension of the Common Fisheries Policy. Currently there is an increasing number of binding management recommendations adopted by RFMOs to which the European Union is a party. The EU presented several proposals in different RFMOs' annual meetings, to protect a number of shark species, most of them having been adopted, such as thresher sharks, hammerhead sharks and silky shark.

In line with the EUPOA, the EU has either adopted unilateral measures or has instigated proposals for fisheries management measures to be taken at RFMOs level that have direct or indirect effects on the improvement of the conservation of sharks.

Under the Data Collection Framework, the multi-annual Union programme for the period 2011-2013 provides for the collection, management and use of data on sharks, which have been included within the mandatory sampling schemes for data collection. National programmes for data collection include catch, length sampling, sex ratio and maturity information from a list of key species.

At the EU level, it is prohibited for EU vessels to fish for, retain on board, to tranship or to land several shark and ray species (Great white shark, basking shark, Angel shark, common skate, undulate ray, porbeagle, and giant manta ray), both in EU and in international waters. The species shall be promptly released unharmed to the extent of possible. In addition, a zero TAC has been set for 2011 in certain areas for some sharks (spurdog, porbeagle). From 2012, it is also prohibited for EU Member States to

land or to fish Porbeagle anywhere in the world. The EU will keep these measures in place as long as they are deemed appropriate by scientists to protect these species.

Deep sea sharks are protected by various measures. Fishing opportunities in most EU Atlantic waters and international waters are fixed for 2013 and 2014 by Council Regulation (EC) No 1262/2012. For 2013 and 2014 a zero TAC is fixed for all deep-sea sharks.

The Mediterranean Regulation contains various measures that protect various shark and ray species. These include the prohibition to use driftnets, the prohibition to use bottom set nets to catch several groups of sharks, the protection of the coastal zone from trawling, as well as gear requirements such as maximum net dimension and low twine thickness for bottom-set nets that further help to reduce unwanted by-catches of sharks.

In the Skagerrak and North Sea, TACs for demersal elasmobranchs have been agreed since 1999. Since 2009 the TAC has been gradually reduced.

In 2011 TACs were set at zero for common skate and porbeagle in the Skaggerak and the North Sea. Both are prohibited species, requiring that if caught they be promptly released unharmed to the extent practicable.

On 12 June 2013, the EU adopted a Regulation on the removal of fins of sharks on board vessels. The new Regulation obliges operators to land all sharks with their fins naturally attached. This eliminates the special fishing permits which allowed processing on board, using a 5% fin-to-carcass weight ratio, and the possibility of landings of fins and carcasses in separate ports. These changes will facilitate control and eliminate the existing loophole that could allow finning to go undetected. In order to facilitate on-board storage and handling and to ensure safety, operators are allowed to slice partly through the fins and fold them against the carcass to create a cylindrical shape.

Please find enclosed trade data regarding imports into and exports from the EU for a number of shark species, including the Porbeagle shark (*Lamna nasus*) (Annex 1). Please find also attached two ICES reports providing a more general description of the status of stocks, in particular of the Porbeagle shark (Annexes 2 and 3).

Hereafter, you will find the feedback from individual EU Member States:

Germany

1. Fisheries

Germany has no target fisheries for sharks. Sharks taken as by-catch have to be released if they are still alive.

2. Trade

In 2012 in Germany 1.318 t (in 2011: 706 t) of sharks (scyliorhinus species, lamna nasus, squalus spp. and other shark species) had been imported, 1.017 t (in 2011: 483 t) of these had been consumed, 301 t (in 2011: 224 t) had been re-exported. In 2012 0 t (in 2011: 1 t) had been landed by German vessels.

These data do not include Spiny Dogfish (Squalus acanthias), because those are collected separately: In 2012 in Germany 799 t (in 2011: 361 t) of Spiny Dogfish had been imported, 659 t (in 2011: 275 t) of these had been consumed, 141 t (in 2011: 87 t) had been exported. In 2012 1 t (in 2011: 1 t) had been landed by German vessels.

[The consumption of sea food in Germany in 2012 was 1.216.000 t, in 2011 it was 1.240.000 t.]

3. Guidance for the making of CITES NDFs

In 2013 a project has been carried out by the Federal Agency for Nature Conservation on guidelines for the non-detriment-finding process for shark species ("CITES Non-detriment findings guidance for

shark species - A framework to assist Scientific Authorities in making non-detriment findings (NDFs) for species listed in CITES Appendix II"). The project report is currently in the stage of finalization and will be formally submitted by Germany to the 27th Animals Committee meeting for comments.

In order to test these guidelines, a two days follow-up workshop is planned to be held in August 2014 in Germany with invited specialists from scientific and fisheries authorities. The specialists will be asked to carry out NDFs for specific species/stock combinations on the basis of the guidelines, and to report the results to the WS in order to identify possible gaps or problems and to amend the guidelines accordingly.

4. Conservation status of sharks and rays in German waters

In 2013 a project, funded by the Federal Ministry for the Environment, has been launched with the aim to analyze the conservation status of shark and ray species in German waters and to give recommendations for decision-making on how to improve their conservation status.

5. Analysis of population trends of sharks and rays in the German EEZ

The Thünen Institute (which is competent for fisheries) is carrying out several projects which compare historical survey data (1902-1908; 1919-1923; 1930-1932) with today's data regarding population trends of sharks and rays in the German EEZ.

Greece

There is no data of trade in specimens of these species in Greece and the Greek fishery does not target to the fishing of these species. Usually the fishing of these species in our country is rare and incidentally. In addition, we have no implementation of any special national plans for sharks and our country is following all the relevant valid provisions for these species, together with the implementation of the Regulations (EU) 39/2013 and (EU) 40/2013 according to which special measures were taken to prohibit the fishing of specific specimens of sharks.

Netherlands

Attached you will find a summary on fisheries of sharks and rays by the Netherlands (Catch, by-catch and observations) (Annex 4).

United Kingdom

In respect of implementation of National Plans of Action for sharks, the UK government is committed to making sure that all fisheries on elasmobranch species are sustainable, and that endangered species have adequate protection. The UK has in place a Shark Plan of Action

For more information, please see: (http://webarchive.nationalarchives.gov.uk/20130505040140/http://archive.defra.gov.uk/environment/marine/documents/interim2/shark-conservation-plan.pdf) and in 2013 published a review of progress towards its implementation (https://www.gov.uk/government/publications/shark-skate-and-ray-conservation-plan-progress-review-2013).

In addition, please find attached the Isle of Man Government Reporting on Conservation and Management of Sharks (Annex 5).

b) Freshwater stingrays

-

c) East African sandalwood

Hereafter, you will find the feedback from individual Member States:

United Kingdom

There are no reported UK imports or re-exports and an Internet search did not reveal any UK sites offering this species for sale. However, using the common name (East African sandalwood) makes any such searches difficult to ascertain exactly which species are in trade given 'sandalwood' is a term used for many other CITES or non-CITES species used to produce sandalwood, such as *Pterocarpus santalinus* or *Santalum*.

d) Malagasy ebonies

Hereafter, you will find the feedback from individual Member States:

United Kingdom

Diospyros spp. – there have been no reported UK imports or re-exports. From an Internet search there are one or two UK sites offering 'Madagascan ebony' for sale, mainly for the manufacture of musical instruments (e.g. bagpipes).

e) Identification material

Hereafter, you will find the feedback from individual Member States:

Germany

CITES*wood*ID – a practical tool in the control of CITES timber species

A computer aided, interactive identification program, CITES*wood*ID, was developed at the Thünen Institute (which is also competent for wood research) on behalf of the German CITES Scientific Authority. This program can be considered as a practical approach and a basis for a quick simple risk analysis, serving as a first indication as to what an unknown timber might be.

The program enables users to identify CITES listed timber taxa and similar timber species by means of more than 40 macroscopic wood anatomical features, which mostly can be observed with the unaided eye or a handlens.

The program uses a multiple entry key database, which was developed in a special taxonomic description language, the DELTA-INTKEY-System, and includes detailed explanations of all macroscopic features and also program-generated descriptions of the timber species. Additionally, all characters and timbers in the database are accompanied by high-quality colour images illustrating important macroscopic features and character expressions on both transverse and longitudinal surfaces.

The interactive key allows access to the character list, illustrations, full and partial descriptions, diagnostic descriptions, differences and similarities between taxa, lists of taxa exhibiting specified attributes, summaries of attributes within groups of taxa, and geographical distribution.

CITES*wood*ID aims at all institutions and individuals involved in checking compliance and regulation of CITES listed timber and timber products. It has been designed for use by non-timber specialists such as customs officers and field inspectors in timber exporting and importing countries, but has also additional value for timber experts and forest officers who are more familiar with timber identification.

Currently, the third version of CITES*wood*ID is being prepared and updated and will be finished by end of February, 2014. It will again be available in four languages: English, French, Spanish and German.

The new version includes 22 CITES taxa (species or genus) and 34 taxa which can be easily mistaken for CITES-protected timbers due to a very similar appearance and/or wood anatomical structure.

Species, which have been additionally included in the new version, are:

Aniba rosaeodora, Aquilaria spp. and *Gyrinops* spp*., Araucaria araucana, Dalbergia cochinchinensis, Dalbergia* spp. from Eastern Madagascar, *Dalbergia* spp. from Western Madagascar, *Diospyros* spp., *Podocarpus* spp., *Pterocarpus santalinus* and *Taxus* spp.

The program will be available as CD-ROM. An online version of the program is currently in preparation and will be ready in the course of 2014.

Copies of the CD-ROM can be obtained free of charge at the Federal Agency for Nature Conservation, Germany (email to schmitzh@bfn.de).

In the past, the German Scientific Authority organized several national and international training courses aimed at enabling CITES enforcement officers and field inspectors to identify or to exclude CITES timber species by using macroscopic characters, as well as making them familiar with the CITES*wood*ID program. These courses have been proved to be quite successful, because participants having various backgrounds learned to use this ID tool as a short term approach to narrow options and the range of possible timber species when identifying and discriminating CITES timber species.

Based on the experiences made in these workshops and the results achieved, it can be suggested that such training could be easily included in CITES training modules at national, regional and international level.

Greece

Via the Central Greek CITES MA, both the Greek Regional CITES MA's and the Greek Enforcement Authorities have been provided with many identification guides, in order to assist them in identifying both CITES and non-CITES species. From these guides only the following -concerning CITES listed species- are available:

o ΦΩΤΟΓΡΑΦΙΚΟ ΟΔΗΓΟ ΑΝΑΓΝΩΡΙΣΗΣ ΤΩΝ ΕΛΛΗΝΙΚΩΝ ΕΙΔΩΝ CITES (PHOTO IDENTIFICATION GUIDE OF GREEK CITES species), updated versions of which (only in Greek) are posted on our official web site http://www.ypeka.gr (http://www.ypeka.gr/Default.aspx?tabid=596&language=el-GR).

The Greek authorities are using the following guides provided by either the CITES Secretariat, or the EU (EU-TWIX):

o ID Tool Pangolins
o IDENTIFICATION MANUAL FOR RINO HORN AND IVORY
o GUIDE TO THE IDENTIFICATION OF PRECIOUS AND SEMI-PRECIOUS CORALS IN COMMERCIAL TRADE (**Ernest W.T. Cooper, Susan J. Torntore, Angela S.M. Leung, Tanya Shadbolt and Carolyn Dawe - September 2011)**
o Ctenosaura Identification Guide
o CITES Identification Guide – Hunting Trophies
o CITES Identification Guide – Crocodilians
o CITES Identification Guide – Sturgeons and Paddlefish
o CITES Identification Guide – Turtles and Tortoises
o CITES Identification Guide – Amphibians
o CITES Identification Guide – Butterflies
o CITES Identification Guide – Birds
o CITES Identification Guide – Tropical Woods
o The CITES Identification Guide to Falconry Species – Enforcement Edition
o etc

Some other guides concern (also in Greek but unfortunately not available):

o 1ST edition (2014) PHOTO IDENTIFICATION GUIDE for wild fauna species under JMD No. 125188/246/22-01-2013 «*Trade of species of wild fauna and indigenous flora* » (CITES and non-CITES species).

o 1ST edition (2014) PHOTO IDENTIFICATION GUIDE for wild flora species under JMD No. 125188/246/22-01-2013 «*Trade of species of wild fauna and indigenous flora* » (CITES and non-CITES species).

o PHOTO IDENTIFICATION GUIDE «Birds of prey of Greece and their eggs»

Lithuania

Lithuanian enforcement and inspections officers usually do not identify specimens. In case of a suspected violation of CITES requirements specimens are seized and sent to the Scientific authority or other scientific experts for the determination of a species or higher taxon. Our Scientific authority provided the list of identification manuals and indicated the need for some identification trainings, learning material or more information about identification of: skins and small pieces of skins which are used in goods, sometimes combined with other skins of CITES or non-CITES species; tropical snakes; CITES molluscs.

The list of identification manuals used by the Scientific authority is enclosed (Annex 6).

United Kingdom

- Identification and research

FERA and RBG Kew timber isotopes project 2012-14: SITE analysis of Dalbergia and Disopyros species of Madagascar (Royal Botanic Gardens, Kew (RBG Kew), Kew Madagascar Conservation Centre (KMCC),Kew Conventions and Policy Section (CAPS) UK CITES Scientific Authority for Plants and UK Food & Environment Research Agency (FERA)). RBG Kew is supporting FERA in a proof of concept project to verify the declared origin of timber using Stable Isotope and Trace Element (SITE) fingerprinting. KMCC, led by Dr Franck Rakotonosolo, is providing samples of exported timber species from Madagascar and CAPS is providing guidance on CITES legislation and requirements. The aim is to help importing and exporting countries combat illegal trade in CITES listed tree species.

FERA is running the SITE analyses, which with the RBG Kew GIS team will be used to develop SITE fingerprint maps. The project is testing the assumption that the SITE fingerprints are related to geology and not to species. Samples have been collected by KMCC working with Marojejy National Park in North East Madagascar, which has experienced destructive and illegal logging of Dalbergia (rosewood) and Diospyros (ebony). The team have also collected wood samples of trees of other species from throughout Madagascar to build the SITE fingerprint map. The analysis is ongoing on the first batch of samples and about 120 samples have been collected in total. Preliminary results are expected by March 2014.

SITE analysis by FERA includes:

- Strontium Isotope Analysis by Thermal Ionisation Mass Spectrometry
- Multi-element measurements by Inductively Coupled Plasma-Mass Spectrometry
- Carbon Isotope Measurements by Stable Isotope Ratio Mass Spectrometry
- Nitrogen Isotope Measurements by Stable Isotope Ratio Mass Spectrometry
- Oxygen Isotope Measurements by Stable Isotope Ratio Mass Spectrometry

Dalbergia and *Diospyros* timber species from Madagascar are undergoing significant illegal logging including trees from protected areas. The Government of Madagascar is working to halt the illegal logging and successfully proposed these groups for CITES Appendix II at COP16. The aim is to establish reliable methods to critically identify the origin of woods of the rosewoods and ebonies from Madagascar as they are traded. New scientific methods to distinguish the Madgascan species from others through isotope fingerprinting would be a significant contribution to the conservation of these groups and other traded timbers.

RBG Kew and FERA will develop SITE fingerprint maps for Madagascar using a variety of GIS tools, Maxent for niche modelling and data, such as geology, topology and climate. If triangulation of isotopes gives reasonable resolution SITE fingerprint maps will be made available to authorities and researchers in Madagascar. The work is supported by Madagascar National Parks. For more information contact: s.cable@kew.org and n.mcgough@kew.org

- **Identification manual**

The UK government continues to provide funding to the Shark Trust to produce annual fisheries advisories. These provide reference material for enforcement and inspection officers, and fishermen. The advisories can be downloaded from http://www.sharktrust.org/en/fisheries_advisories and the updated 2014 versions should be available by February 2014.

The UK has contributed details on available identification and guidance material produced in the UK and used by the UK to help facilitate implementation of the Convention for the tree species under a project, commissioned by the EU Commission and being currently undertaken by TRAFFIC, to amalgamate such sources of information on institutes and experts able to identify CITES listed timber products to support enforcement. Information on identification and guidance material for CITES listed species (CITES and plants, cacti, cycads, slipper orchids, succulents, *Gonystylus* spp.) is available from the UK CITES Scientific Authority for plants (Royal Botanic Gardens, Kew). Contact Catherine Rutherford c.rutherford@kew.org for more details.

6 Porbeagle in the Northeast Atlantic (Subareas I–XIV)

6.1 Stock distribution

WGEF considers that there is a single-stock of porbeagle *Lamna nasus* in the NE Atlantic that occupies the entire ICES area (Subareas I–XIV). This stock extends from Norway, Iceland and the Barents Sea to Northwest Africa. For management purposes the southern boundary of the stock is 36°N and the western boundary at 42°W.

The information used to identify the stock unit is in the stock annex (WGEF 2011).

A transatlantic migration has been reported (Green, 2007) and more recently a porbeagle tagged with a pop-up archival transmission tag off Ireland crossed over half of the North Atlantic before the tag was released (Bendall *et al*., 2012). Furthermore, a recent work (Pade, 2009) has confirmed that some gene flow occurs across the North Atlantic.

6.2 The fishery

6.2.1 History of the fishery

The main countries catching porbeagle in the last decade were France and, to a lesser extent, Spain, UK and Norway. The only regular, directed target fishery that has existed recently was the French fishery (although there have been occasional targeted fisheries in the UK). However, historically there were important Norwegian, Danish and Faroese target fisheries. In addition, the species is taken as a bycatch in mixed fisheries, mainly in UK, Ireland, France and Spain.

A detailed history of the fishery is in the stock annex.

6.2.2 The fishery in 2012

No fishery has been allowed since the implementation of a zero TAC in 2010. However, some landings are reported in 2012 as in the previous two years (Table 6.1a). The 2012 best working group estimate (48 t) is the highest figure since the zero TAC was implemented. However, it is thought that the previous two years data are underestimates, due to misreporting. Furthermore, all data since 2010 must be considered as unrepresentative of removals, as dead discards are not quantified. The landings in 2012, are reported mainly by France (27 t), with smaller contributions from Norway (17 t), Denmark (3 t) and Iceland (2 t). Landings of less than 1 t were reported by the UK, Germany and Spain, a likely consequence of bycatch in mixed fisheries.

6.2.3 ICES advice applicable

The advice is biennial and consequently the 2012 advice remains valid for 2013 and 2014:

"ICES advises on the basis of the precautionary approach that no fishing for porbeagle should be permitted. Landings of porbeagle should not be allowed. A rebuilding plan should be developed for this stock."

Prior to this advice, in 2008 and 2010, ICES reiterated the precautionary advice of:

"Given the state of the stock, no targeted fishing for porbeagle should be permitted and bycatch should be limited and landings of porbeagle should not be allowed."

In 2010, ICES also advised that there was no catch option that would be compatible with the ICES MSY framework. In 2012, stock status was unknown, with a qualitative evaluation indicating that the stock is depleted. No reliable quantitative assessment (or reference points) could be presented for this stock; therefore, fishing possibilities could not be projected.

6.2.4 Management applicable

Since 2012, EC Regulations 23/2010, 57/2011 and 44/2012 have prohibited fishing for porbeagle in EU waters and, for EU vessels, to fish for, to retain on board, to tranship and to land porbeagle in international waters.

EC Regulation 40/2008 established a TAC for porbeagle taken in EC and international waters of I, II, III, IV, V, VI, VII, VIII, IX, X, XII and XIV of 581 t. In 2009, the TAC was reduced to 436 t (a decrease of 25%) and regulations stated that "*A maximum landing size of 210 cm (fork length) shall be respected*" (EC Regulation No 43/2009).

It is forbidden to catch and land porbeagle in Sweden since 2004.

EC Regulation 1185/2003 prohibits the removal of shark fins of this species, and subsequent discarding of the body. This regulation is binding on EC vessels in all waters and non-EC vessels in Community waters.

In 2007 Norway banned all direct fisheries for porbeagle, based on the ICES advice. In the period 2007–2011, specimens taken as bycatch could be landed and sold. Since 2011, live specimens must be released, whereas dead specimens can be landed (but this is not mandatory). The number of specimens landed must be reported in addition to weight. From 2011, the regulations also include recreational fishing. However, since 2012, landings of porbeagle are not remunerated.

6.3 Catch data

6.3.1 Landings

Tables 6.1a, b and Figures 6.1–6.2 show the historical landings of porbeagle in the Northeast Atlantic. From 1971 upwards, France remained the major contributor.

Note that these data need to be treated as underestimates and with some caution (see Section 6.3.3).

More detailed information on landings is presented in the stock annex.

6.3.2 Discards

No information is available on the discards of the non-targeted fishery, although as a high value species, it is likely that specimens caught as bycatch were landed and not discarded before quota was restrictive.

Discards are thought to have been limited, although some métiers (e.g. gillnet fisheries in the Celtic Sea) can be seasonally important.

Because of the EU adoption of a maximum landing size, some large fish were discarded by boats of the directed fishery in 2009 but there is no account of the number these discards.

6.3.3 Quality of catch data

Landings data are incomplete and further studies are required to better collate or estimate historical catch data (more information is available in the stock annex). Recent data are lacking as dead bycatch is discarded (i.e. removals from the stock).

6.4 Commercial catch composition

Only limited length–frequency data are available for porbeagle. However, length distributions by sex are available for 2008 and 2009 (Hennache and Jung, 2010) for the French target fishery (Figure 6.3). They can be considered to be representative of the international catch length distribution in these years, given the high contribution of the French fishery to these catches.

The composition by weight class (<50 kg and ≥50 kg) of the French fishery catches reveals that the proportion of large porbeagle in the landings has decreased since 1993 (Table 6.2).

Sampling of the catches of the French fishery carried out in 2009 highlighted the dominance of porbeagle (89% of catch weight), with other species including blue shark (10%), common thresher (0.6%) and tope (0.3%).

6.4.1 Conversion factors

Length–weight relationships are available from different areas and for different periods (Table 6.3). The conversion factors collected from the French targeted fishery landings have been updated using data from the 2009 sampling.

6.5 Commercial catch-effort data

A cpue series was presented at the 2009 WGEF for the French targeted fishery (Biais and Vollette, 2009). It was based on 17 boats which had landed more than 500 kg of porbeagle per year for more than six years after 1972 and more than four years from 1999 onwards (to include a boat which has entered recently in the fishery, given the limited number of boats in recent years). This series is longer than the previous ones (in stock annex) and it provides catch and effort (days at sea) by vessel and month. A GLM analysis was carried out at 2009 ICCAT-ICES porbeagle stock assessment meeting to get a standardized cpue series.

At the 2009 ICCAT-ICES meeting standardized catch rates were also presented for North Atlantic porbeagle during the period 1986–2007, caught as low prevalent bycatch in the Spanish surface longline fishery targeting swordfish in the Atlantic Ocean (Mejuto *et al.*, 2009). The analysis was performed using a GLM approach that considered several factors such as longline style, quarter, bait and also spatial effects by including seven zones.

The nominal and the standardized catch rate series of the French fleet demonstrate higher values occurring at the end of the 1970s (Figure 6.4). Since then, cpue has varied between 400–900 kg per day without displaying any trend.

This absence of trend in the last part of the times-series has been confirmed by an analysis of the effect of porbeagle aggregating behaviour, as well as an effect of cooperation between skippers. The analysis was carried out for years 2001–2008 for which period detailed data were available (Biais and Vollette, 2010). This analysis showed also that local abundance in the French fishing area may likely be multiplied/divided by two between successive years. Consequently, short term changes must be consid-

ered with caution when using French cpue to assess a stock abundance trend of the Northeast Atlantic stock.

Spanish data were more variable (Figure 6.5), possibly as porbeagle is only a bycatch in this fishery, and so the fleet may operate in areas where there are fewer porbeagle.

6.6 Fishery-independent surveys

No fishery-independent survey data are available for the NE Atlantic, although records from recreational fisheries may be available. Tagging studies are the only fishery-independent data currently available (see Section 6.8).

6.7 Life-history information

The life-history information (including habitat description) is presented in stock annex.

Saunders *et al.* (2011) report on the migration of three porbeagles tagged off Ireland with archival pop-up tags (PAT) in 2008 and 2009. One shark migrated 2400 km to the northwest of Morocco, residing around the Bay of Biscay for about 30 days. The other two remained more localized in off-shelf regions around the Celtic Sea/Bay of Biscay and off western Ireland. They occupied a vertical depth range of 0–700 m in waters of 9–17°C. They were positioned higher in the water column by night than by day. The Irish tagging programme is continuing.

The United Kingdom (Cefas) launched a tagging programme in 2010 to address the issue of bycatch of porbeagle and to further promote the understanding of their movement patterns in UK marine waters. Altogether, 21 satellite tags were deployed between July 2010 and September 2011, and 15 tags popped off after two to six months. However, four tags failed to communicate. The tags attached to sharks in the Celtic Sea generally popped off to the south of the release positions while those to sharks off the northwest coast of Ireland popped off in diverse positions. One of them popped off in the western part of North Atlantic, one close to the Gibraltar Straits and another in the North Sea. Several tags popped off close to the point of release (Bendall *et al*., 2012).

In June–July 2011, France (Ifremer and IRD) joined this international tagging effort in cooperation with Cefas by a survey on the shelf edge in the West of Brittany. Three PATs were deployed by Ifremer-IRD and three by Cefas (results in Bendall *et al*., 2012). Pop off dates were set at 12 months for three Ifremer-IRD PSATs which were all used to tag large females (LT>2 m). One has popped off prematurely in February 2012 near Norway, a bit north of the Arctic Circle. The two others popped off after 12 months according to schedule, rather close to the tagging position. They revealed large migrations of these sharks; going westwards up to Mid-Atlantic Ridge for one of them and from latitudes comprise between 60°N and 36°S (Gibraltar). The French tagging programme have deployed nine more PATs in June 2013, again attached on large females (mean LT= 2.35 m) and for a planned release at twelve months.

Information on sex-ratio segregations, the likelihood of a nursery ground in the Saint Georges Channel, the diet and on life-history parameters were provided by a research programme carried out by the NGO APECS (Hennache and Jung, 2010) and are available in the stock annex.

Since the cessation of target fisheries, there are some limited data (n=19) available for bycaught porbeagle in the Celtic Sea (Bendall *et al*., 2012). The length–frequencies ranged from 117–250 cm total length (Figure 6.6), with corresponding body weights

of 12–94 kg. There was an even sex ratio, indicating that in this area (during September 2011) the sexes mixed, with fully mature males, but no fully mature female fish represented in the bycatch.

6.7.1 Genetic information

A preliminary study of the genetic diversity (mitochondrial DNA haplotype and nucleotide diversities) was carried out recently on 156 individuals from the Northeast Atlantic and Northwest Atlantic, demonstrating no significant population structure across the North Atlantic. It has shown mtDNA haplotype diversity is very high, and sequence diversity is low, suggesting that most females breed, indicating the stock is likely to be genetically robust (Pade, 2009), although further confirmation is required.

6.8 Exploratory assessment models

6.8.1 Previous studies

The first assessment of the NE Atlantic stock was carried out in 2009 by the joint ICCAT/ICES meeting using a Bayesian Surplus Production (BSP) model (Babcock and Cortes, 2009) and an age structured production (ASP) model (Porch *et al.*, 2006).

6.8.2 Stock assessment

The 2009 assessments have not been updated since.

* BSP model

The BSP model uses catch and standardized cpue data (see Section 6.5.2 in ICES, 2009 (WGEF) report and ICCAT, 2009). Because the highest catches occurred in the 1930s and 1950s, long before any cpue data were available to track abundance trends, several variations of the model were tried, either starting the model run in 1926 or 1961, and with a number of different assumptions. An informative prior was developed for the rate of population increase (r) based on demographic data of the NW Atlantic stock. The prior for K was uniform on log K with an upper limit of 100 000 t. This upper limit was set to be somewhat higher than the total of the catch series from 1926 to the present (total catch= 92 000 t). All of the trials demonstrated that the population continued to decline slightly after 1961, consistent with the trend in the French cpue series.

The model runs used the most biologically plausible assumptions about unfished biomass or biomass in 1961. The relative 2008 biomass (B2008/BMSY) can be estimated between 0.54 and 0.78 and the relative 2008 fishing mortality rates ($F_{2008/FMSY}$) between 0.72 and 1.15.

*ASP model

An age-structured production model was also applied to the NE Atlantic stock of porbeagle to provide contrast to the BSP model (see ICCAT, 2009). The same input data used in the BSP model were applied but incorporating age-specific parameters for survival, fecundity, maturity, growth, and selectivity. The stock–recruitment function is also parameterized in terms of maximum reproductive rate at low density.

Depending on the assumed F in the historic period (the model estimated value was considered to be unrealistic), the 2008 relative spawning–stock fecundity (SSF2008/SSFMSY) was estimated between 0.21 and 0.43 and the 2008 relative fishing mortality rate (F_{2008} /F_{MSY}) between 2.54 and 3.32.

The conclusions of these assessments were that the exploratory assessments indicate that current biomass is below B_{MSY} and that recent fishing mortality is near or possibly above F_{MSY}. However, the lack of cpue data for the peak of the fishery adds considerable uncertainty in identifying the current status relative to virgin biomass.

6.8.3 Stock projections

The projections (using the BSP model) were that sustained reductions in fishing mortality would be required if there is to be any stock recovery. Recovery of this stock to B_{MSY} under zero fishing mortality would take ca. 15–34 years. Although model outputs suggested that low catches (below 200 t) may allow the stock to increase under most credible model scenarios, the recovery to B_{MSY} could be achieved within 25–50 years under nearly all model scenarios (Table 6.4).

Yield and biomass per recruit

A yield-per-recruit analysis using FLR (ww.flr-project.org) was conducted by the ICCAT/ICES WG.

The effects of different selection patterns on the NE Atlantic porbeagle stock were evaluated: flat-topped and dome-shaped curves and with maximum selectivity at either age 5 or 13 (age 13 corresponds to age-at-maturity of females and to the current maximum landing length of 210 cm fork length).

The analysis demonstrates that both potential stock size and yields are increased if fishing mortality is reduced on immature fish. If the fishing mortality on individuals greater than 210 cm is reduced to 0, the stock levels are slightly improved at expense of yield (Table 6.5).

6.8.4 Population dynamics model

A recent analysis by Campana *et al.* (2013), utilising a forward-projecting age- and sex-structured population dynamics model found that the Canadian porbeagle population could recover from depletion, even at modest fishing mortalities. The population is projected forward from an equilibrium starting abundance (assumed an unfished equilibrium at the beginning of 1961–prior to directed commercial fisheries) and age distribution by adding recruitment and removing catches. All models predict recovery to 20% of spawning stock numbers before 2014 if the fishing mortality rate is kept at or below 4% of the vulnerable biomass. Under the low productivity model, recovery to spawning stock numbers at maximum sustainable yield (SSNMSY) was predicted to take over 100 years at exploitation rates of 4% of the vulnerable biomass.

6.9 Quality of assessments

The assessments (and subsequent projections) conducted at the joint ICCAT/ICES meeting that are summarized in this report must be considered exploratory assessments, using several assumptions (carrying capacity for the SSB model, F in the historic period in the ASP model).

Hence, it must be noted that:

- There was a lack of cpue data for the peak of the fishery.
- Catch data are considered underestimates, as not all nations have reported catch data throughout the time period.
- The cpue index used in the assessment was French fleet catch per day. An analysis carried out on years 2001–2008 shows that local abundance varies

likely a lot between consecutive years in the French fishing area. Hence, this series may not be reflective of stock abundance.

Consequently, the model outputs should be considered highly uncertain (ICCAT report).

6.10 Reference points

No reference points have been proposed for this stock.

ICCAT uses F/F_{MSY} and B/B_{MSY} as reference points for stock status of pelagic shark stocks. These reference points are relative metrics rather than absolute values. The absolute values of B_{MSY} and F_{MSY} depend on model assumptions and results and are not presented by ICCAT for advisory purposes.

6.11 Conservation considerations

At present, the porbeagle shark subpopulations of the NE Atlantic and Mediterranean are listed as Critically Endangered in the IUCN red list (Stevens *et al*., 2006a, b).

In 2010, Sweden (on behalf of the member states of the European Union) proposed that porbeagle be added to Appendix II of CITES. This proposal did not get the support of the required majority at the fifteenth CITES Conference of Parties in Doha.

In 2013, a renewed proposal to list porbeagle shark on Appendix II of CITES was accepted at the Conference of Parties (16) Bangkok. However, the implementation of this listing has been delayed by 18 months (14 September 2014) to enable Range States and importing States to address potential implementation issues.

6.12 Management considerations

WGEF/ICCAT considered all available data in 2009. This included updated landings data and cpue from the French and Spanish fisheries. An analysis of the French cpue was undertaken in 2010. It showed that large changes of local abundance may occur in the fishing area and consequently, these cpue should be used with caution to get an abundance index as long as information on porbeagle spatial distribution remains limited.

Using the French cpue series as well as the Spanish cpue series (Figure 6.5), stock projections based on the BSP model demonstrated that low catches (below 200 t) may allow the stock to increase under most credible model scenarios and that the recovery to B_{MSY} could be achieved within 25–50 years under nearly all model scenarios. However, management should account for both the uncertainty in the input parameters for this assessment and the low productivity of the stock.

WGEF reiterates that this species has a low productivity, and is highly susceptible to overexploitation.

The Norwegian and Faroese fisheries have ceased and have not resumed. That no fisheries had developed before restrictive quotas were put in place is considered by WGEF to indicate that the stock had not recovered. However, the time that has elapsed since the end of the northern fisheries is probably longer than the generation time of the stock, so recovery may have taken place although not detected. However, the social and economic environment may have changed too much to allow fisheries resumption in the same countries and fisher knowledge may have been lost. Furthermore, feeding grounds may have moved in relation with changes in prey abundance and distribution. But, in the absence of any quantitative data to demonstrate

stock rebuilding, and in regard of this species' low reproductive capacity, WGEF considers the stock is probably still depleted.

WGEF considers that target fishing should not proceed without a programme to evaluate sustainable catch levels. However, WGEF underlined that the present fishing ban hampers any quantitative assessment in the near future.

The maximum landing length (MLL) was adopted by the EC. It constituted a potentially useful management measure in targeted fisheries, as it should deter targeting areas with mature females. However, there are potential benefits from reducing fishing mortality on juveniles. Given the difficulties in measuring (live) sharks, other body dimensions (height of the first dorsal fin and pre-oral length) should be preferred. The correlation with fork length is high (Bendall *et al*., 2012) but further studies, so as to better account for natural variation (e.g. potential ontogenetic variation and sexual dimorphism) in such measurements, are needed to identify the most appropriate options for managing size restrictions.

Further ecological studies on porbeagle, as highlighted in the scientific recommendations of ICCAT (2009), would help to further develop management measures for this species. Such work could usefully build on recent and ongoing tagging projects.

Studies on porbeagle bycatch should be continued to get operational ways to reduce bycatch and to improve the post-release survivorship of discarded porbeagle.

All fisheries-dependent data should be provided by the member states having fisheries for this stock as well as other countries longlining in the ICES area.

There are no fishery-independent survey data. In the absence of target fisheries, a dedicated longline survey covering the main parts of the stock area could usefully be initiated if stock recovery is to be monitored appropriately.

6.13 References

Babcock, B. A., and Cortes, E. 2009. Bayesian surplus production model applied to porbeagle catch, cpue and effort data. ICCAT, Collective Volume of Scientific Papers, SCRS/2009/068, 7pp.

Bendall, V. J., Ellis, J. R., Hetherington, S. J., McCully, S. R., Righton, D., and Silva, J. R. 2012. Preliminary observation on the biology and movements of porbeagle *Lamna nasus* around the British Isles. Working document to the ICES Working Group on Elasmobranch Fishes, Lisbon, June 19–26 2012.

Biais, G., and Vollette, J. 2009. Cpue of the French porbeagle fishery. WGEF Working Document. 3 pp.

Biais, G., and Vollette, J. 2010. The use of the French long line cpue to provide an abundance index for porbeagle in the North East Atlantic. ICES Annual Science Conference, Nantes, 20–24 September 2010, Poster ICES CM 2010 / E:42.

Campana, S.E., Gibson, A.J.F., Fowler, M., Dorey A. and Joyce, W. 2013. Population dynamics of Northwest Atlantic porbeagle (*Lamna nasus*), with an assessment of status and projections for recovery. Canadian Science Advisory Secretariat. Research Document 2012/096: 88 p.

Ellis, J. R., and Shackley, S. E. 1995. Notes on porbeagle sharks, *Lamna nasus*, from the Bristol Channel. Journal of Fish Biology, 46: 368–370.

Green, P. 2007. Central Fisheries Board Tagging Programme 1970 to 2006. Working document to WGEF 2007 (PowerPoint display).

Hennache, C. and Jung, A. 2010. Etude de la pêche palangrière de requin taupe de l'île d'Yeu. Rapport Final. Association pour l'étude et la conservation des sélaciens (APECS), http://www.asso-apecs.org/IMG/pdf/APECS_EPPARTIY_Rapport_ final_BD.pdf. 64pp.

ICCAT. 2009. Report of the 2009 Porbeagle Stock Assessments Meeting. Copenhagen, Denmark, 22–27 June, 2009. ICCAT, Collective Volume of Scientific Papers, SCRS/2009/014. 42pp.

ICES. 2011 Report of the Working Group on Elasmobranch Fishes (WGEF), 20–24 June 2011, Copenhagen, Denmark. ICES CM 2011/ACOM:19.

ICES. 2009. Report of the Joint Meeting between ICES Working Group on Elasmobranch Fishes (WGEF) and ICCAT Shark Subgroup, 22–29 June 2009, Copenhagen, Denmark. ICES CM 2009/ACOM:16. 90 pp.

Kohler, N. F., Casey, J. G., and Turner, P. A. 1995. Length–weight relationships for 13 species of sharks from the western North Atlantic. Fishery Bulletin, 93: 412–418.

Mejuto, J., and Garcés, A. G. 1984. Shortfin mako, *Isurus oxyrinchus*, and porbeagle, *Lamna nasus*, associated with longline swordfish fishery in NW and N Spain. ICES CM 1984/G:72 Demersal Fish Committee.

Mejuto, J., Ortiz, J., García-Cortés, B., Ortiz de Urbina, J. and Ramos-Cartelle, A. M. 2009. Historical data and standardized catch rates of porbeagle (*Lamna nasus*) caught as bycatch of the Spanish surface longline fishery targeting swordfish (*Xiphias gladius*) in the Atlantic Ocean. ICCAT, Collective Volume of Scientific Papers , SCRS/2009/053. 23 pp.

Pade, N. 2009. Molecular and Spatial Ecology of Porbeagle Sharks, *Lamna nasus* (Bonnaterre, 1788), in the North Atlantic Ocean. Unpublished PhD thesis, University of Aberdeen, Scotland.

Porch, C. E., Eklund, A-M. and Scott, G. P. 2006. A catch-free stock assessment model with application to goliath grouper (*Epinephelus itajara*) off southern Florida. Fishery Bulletin, 104(1): 89–101.

Saunders, R. A., Royer, F., and Clarke, M. W. 2011. Winter migration and diving behaviour of porbeagle shark, *Lamna nasus*, in the Northeast Atlantic. ICES Journal of Marine Science, 68(1): 166–174.

Stevens, J. D. 1990. Further results from a tagging study of pelagic sharks in the Northeast Atlantic. Journal of the Marine Biological Association of the United Kingdom, 70: 707–720.

Stevens, J., Fowler, S. L., Soldo, A., McCord, M., Baum, J., Acuña, E. and Domingo, A. 2006a. *Lamna nasus* (Northeast Atlantic subpopulation). In: IUCN 2010. IUCN Red List of Threatened Species. Version 2010.2. www.iucnredlist.org.

Stevens, J., Fowler, S. L., Soldo, A., McCord, M., Baum, J., Acuña, E., and Domingo, A. 2006b. *Lamna nasus* (Northwest Atlantic subpopulation). In: IUCN 2010. IUCN Red List of Threatened Species. Version 2010.2. <www.iucnredlist.org>.

Table 6.1a. Porbeagle in the NE Atlantic. Working Group estimates of porbeagle landings data (tonnes) by country (1971–2012). Data derived from ICCAT, ICES and national data. Data are considered an underestimate.

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Denmark	311	523	158	170	265	233	289	112	72	176	158	84	45	38
Faroe Is	1		5			1	5	9	25	8	6	17	12	14
France	550	910	545	380	455	655	450	550	650	640	500	480	490	300
Germany			6	3	4	.	.	.	.	.	.	.	.	.
Iceland			2	2	4	3	3	.	1	1	1	1	1	1
Ireland			.	.	.	.	.	.	.	.	.	.	.	.
Netherlands			.	.	.	.	.	.	.	.	.	.	.	.
Norway	111	293	230	165	304	259	77	76	106	84	93	33	33	97
Portugal			.	.	.	.	.	.	.	.	.	.	.	.
Spain	11	10	12	9	12	9	10	11	8	12	12	14	28	20
Sweden			.	.	3	.	.	5	1	8	5	6	5	9
UK (E,W, Nl)		4	14	15	16	25	.	.	1	3	2	1	2	5
UK(Scot)	7	15	13	.	.	.	.	.	.	.	.	.	.	.
Japan			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total	991	1755	985	744	1063	1185	834	763	864	932	777	636	616	484

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Denmark	72	114	56	33	33	46	85	80	91	93	86	72	69	85
Faroe Is	12	12	33	14	14	14	7	20	76	48	44	8	9	7
France	196	208	233	341	327	546	306	466	642	824	644	450	495	435
Germany	.	.	.	.	.	.	.	.	1	.	.	.	.	2
Iceland	1	1	1	1	1	.	.	1	3	4	5	3	2	3
Ireland	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Netherlands	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Norway	80	24	25	12	27	45	35	43	24	26	28	31	19	28
Portugal	.	.	3	3	2	2	1	0	1	1	1	1	1	1
Spain	23	26	30	61	40	26	46	15	21	49	17	39	23	22
Spain (Basque Country)	.	.	.	.	.	.	.	.	.	.	.	20	12	27
Sweden	10	8	5	3	3	2	2	4	3	2	2	1	1	1
UK(Eng, Wal & Nl)	12	6	3	3	15	9	.	.	.	.	0	.	.	1
UK(Scot)	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Japan	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3	2	NA
Total	406	399	389	471	462	690	482	629	862	1047	827	628	633	612

Table 6.1a. (continued). Porbeagle in the NE Atlantic. Working Group estimates of porbeagle landings data (tonnes) by country (1971–2012). Data derived from ICCAT, FAO, ICES and national data. Data are considered an underestimate.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Denmark	107	73	76	42	21	20	4	3	2	2	4	0	2	3
Faroe Is	10	13	8	10	14	5	19	21	13	11	13	14	NA	0
France	273	361	339	439	394	374	246	185	347	239	305	9	2	27
Germany	0	17	1	3	5	6	5	0		2	0	0	0	0
Iceland	3	2	4	2	0	1	0	1	0	1	1	1	1	2
Ireland	8	2	6	3	11	18	3	4	8	7	3	0	0	0
Netherlands	.	0			0		0		0	0	0	0	0	0
Norway	34	23	17	14	19	24	11	27	10	12	10	12	10	17
Portugal	0	15	4	11	4	57	10	6	2	1	0	0	0	0
Spain	15	11	23	49	22	9	10	26	6	143	73	60	2	0
Sweden	1	1	1	.	.	5	0	.	1	0	0	0	0	0
Spain (Basque Country)	41	38	45	16	22	10	11	5	16	13	3	0	0	0
UK(Eng, Wal & Nl)	6	7	10	7	25	24	24	11	26	14	11	0	0	0
UK(Scot)	.	.	1	.	.	.	.	.	.	1	0	2	0	0
Japan	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	0
Total	498	563	535	596	537	553	343	289	431	446	423	98	17	48

Table 6.1b. Porbeagle in the NE Atlantic. Working Group estimates of porbeagle landings data (tonnes) by country (1926–1970). Data derived from ICCAT, ICES and national data. Data are considered an underestimate.

Year	Estimated Spanish data	Denmark	Norway (NE Atl)	Scotland
1926			279	
1927			457	
1928			611	
1929			832	
1930			1505	
1931			1106	
1932			1603	
1933			3884	
1934			3626	
1935			1993	
1936			2459	
1937			2805	
1938			2733	
1939			2213	
1940			104	
1941			283	
1942			288	
1943			351	
1944			321	
1945			927	
1946			1088	
1947			2824	
1948			1914	
1949			1251	
1950	4	1900	1358	
1951	3	1600	778	
1952	3	1600	606	
1953	4	1100	712	
1954	1	651	594	
1955	2	578	897	
1956	1	446	871	
1957	3.	561	1097	
1958	3	653	1080	7
1959	3	562	1183	9
1960	2	362	1929	10
1961	5	425	1053	9
1962	7	304	444	20
1963	3	173	121	17
1964	6	216	89	5
1965	4	165	204	8
1966	9	131	218	6
1967	8	144	305	7
1968	11	111	677	7
1969	11	100	909	3
1970	10	124	269	5

Table 6.2. Porbeagle in the NE Atlantic. Proportion of small (<50 kg) and large (≥50 kg) porbeagle taken in the French longline fishery 1992–2009 (Source Hennache and Jung, 2010).

	% Weight of in the catches of porbeagle:	
Year	< 50 kg	>50 kg
1992	26.0	74.0
1993	29.7	70.3
1994	33.1	66.9
1995	49.9	53.1
1996	31.9	68.1
1997	39.2	60.8
1998		
1999		
2000	Data not available by weight category	
2001		
2002		
2003	53.7	46.3
2004	44.0	56.0
2005	40.0	60.0
2006	44.3	55.7
2007	44.9	55.1
2008	45.9	54.1
2009	51.8	48.2

Table 6.3. Porbeagle in the NE Atlantic. Length–weight relationships of porbeagle from scientific studies.

Stock	L–W relationship	Sex	n	Length range	Source
NW Atlantic	W = (1.4823 x 10–5) LF 2.9641	C	15	106–227 cm	Kohler *et al.*, 1995
NE Atlantic (Bristol Channel)	W = (1.292 x 10–4) LT 2.4644	C	71	114–187 cm	Ellis and Shackley, 1995
NE Atlantic (N/NW Spain)	W = (2.77 x 10–4) LF 2.3958	M	39		Mejuto and Garcés, 1984
	W = (3.90 x 10–6) LF 3.2070	F	26		
NE Atlantic (SW England)	W = (1.07 x 10–5) LT 2.99	C	17		Stevens, 1990
NE Atlantic (Biscay / SW England/W Ireland)	W = (4 x 10–5) LF 2.7316	M	564	88–230 cm	Hennache and Jung, 2010
	W = (3 x 10–5) LF 2.8226	F	456	93–249 cm	
	W = (4 x 10–5) LF 2.7767	C	1020	88–249 cm	

Table 6.4. Average probabilities across the five most credible BSP model runs for the Northeast Atlantic porbeagle population (ICCAT, 2009).

Total catch in tons	Probability of some increase within 10 years	Probability of stock rebuilding to BMSY within:	
		20 years	50 years
0	1.00	0.478	0.946
100	1.00	0.414	0.872
200	0.98	0.368	0.754
300	0.89	0.326	0.596
400	0.72	0.286	0.464

Table 6.5. Fishing mortality, yield, biomass and SSB relative to that achieved at the effort level corresponding to the $F_{0.1}$ level for a flat-topped selection pattern with maximum selection-at-age 3.

Selection Pattern	Age Max Selection	Maximum Landing Length	F	Yield	Biomass	SSB
Domed	5	No	211%	68%	202%	120%
Flat	13	No	211%	79%	280%	176%
Domed	13	No	279%	68%	295%	178%
Flat	5	Yes	150%	84%	134%	105%
Domed	5	Yes	217%	67%	206%	120%
Flat	13	Yes	698%	35%	377%	191%
Domed	13	Yes	698%	35%	377%	191%

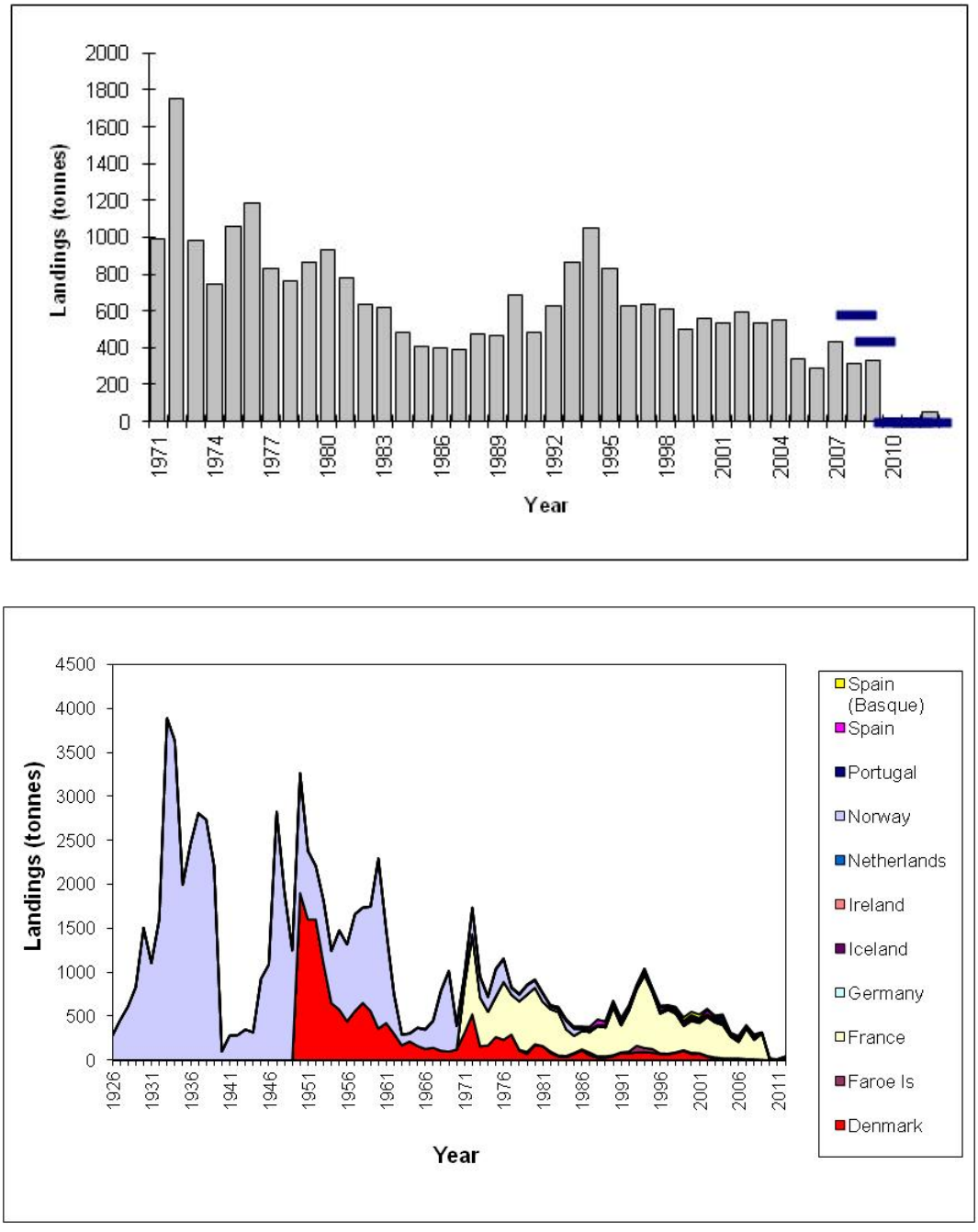


Figure 6.1. Porbeagle in the NE Atlantic. Working Group estimates of landings of porbeagle in the NE Atlantic for 1971–2012 (top, black lines indicates 2008–2012 TAC) and longer term trend in landings (1926–2012) for those fleets reporting catches.

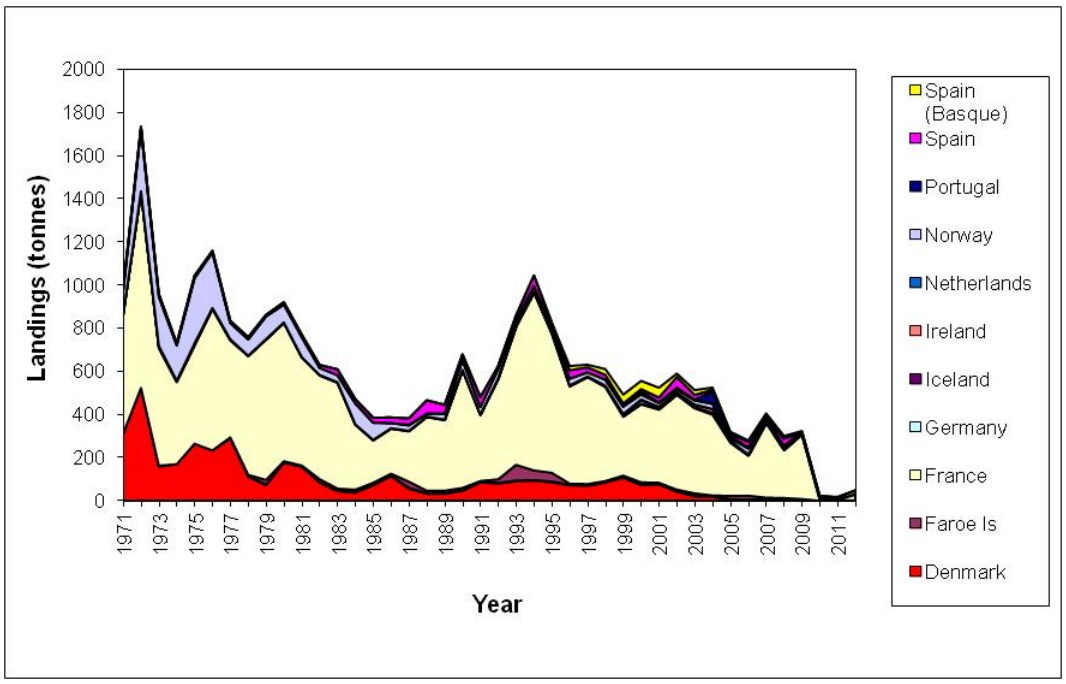


Figure 6.2. Porbeagle in the NE Atlantic. Working Group estimates of landings of porbeagle in the NE Atlantic for 1971–2012 by country.

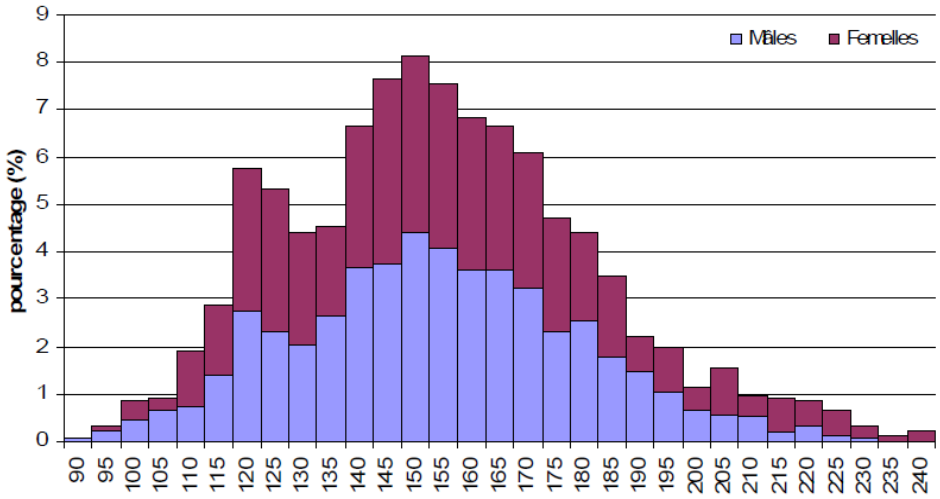


Figure 6.3. Porbeagle in the NE Atlantic. Length–frequency distribution of the landings of the Yeu porbeagle targeted fishery in 2008–2009 (n =1769). Source: Hennache and Jung, 2010.

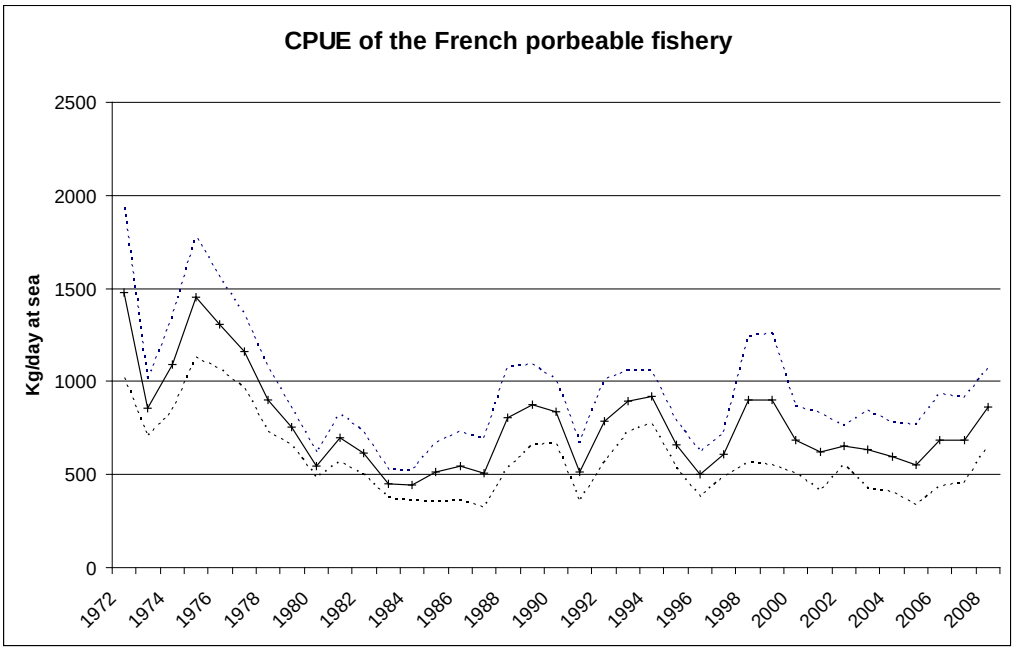


Figure 6.4. Porbeagle in the NE Atlantic. Nominal cpue (kg/day at sea) for porbeagle taken in the French fishery (1972–2008) with confidence interval (±2 SE of ratio estimate). From Biais and Vollette, 2009.

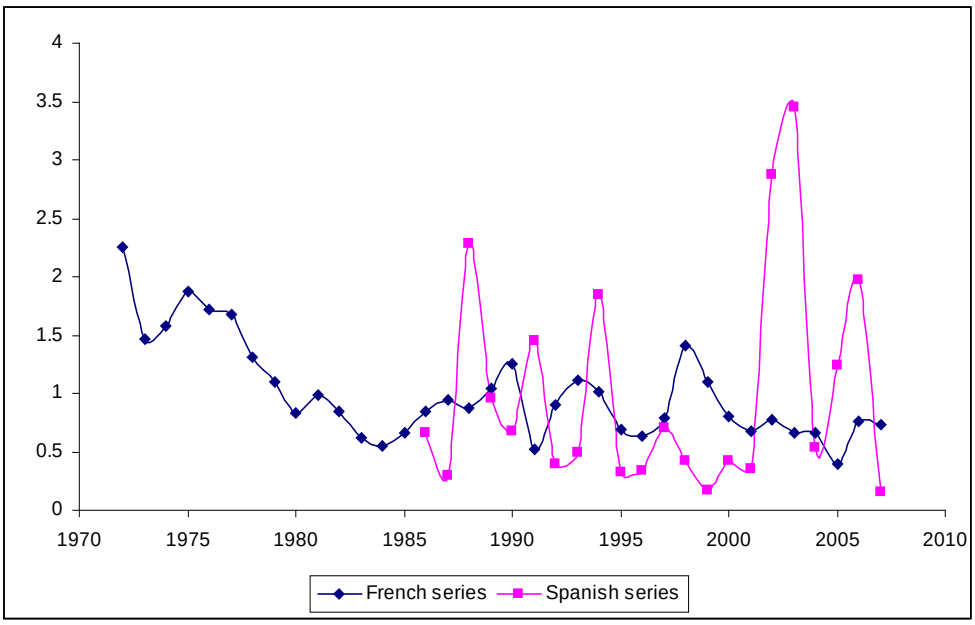


Figure 6.5. Porbeagle in the NE Atlantic. Temporal trends in standardized cpue for the French target longline fishery for porbeagle (1972–2007) and Spanish longline fisheries in the NE Atlantic (1986–2007).

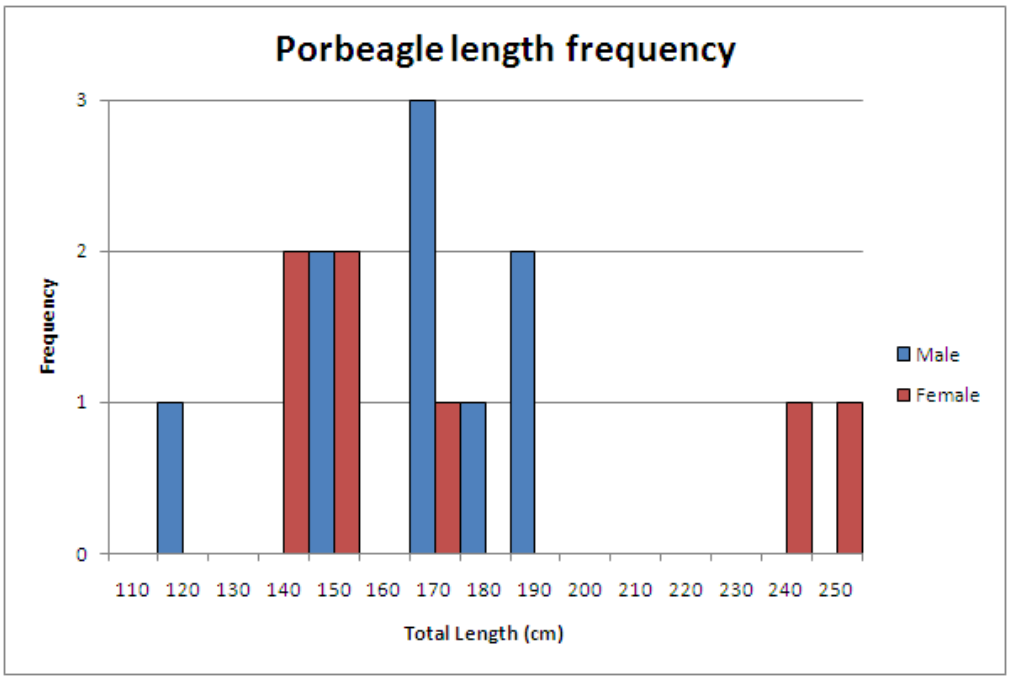


Figure 6.6. Length–frequency distribution of male and female porbeagle bycaught in fixed gill-nets within ICES Divisions VIIf–h during September 2011 (Bendall *et al.*, 2012).

Contents

12 Other pelagic sharks in the Northeast Atlantic

12.1 Ecosystem description and stock boundaries

In addition to the pelagic species discussed in previous sections (see Sections 6–11), several other pelagic sharks and rays occur in the ICES areas, including:

Lamniformes	White shark	*Carcharodon carcharias*
	Longfin mako	*Isurus paucus*
Carcharhiniformes	Spinner shark	*Carcharhinus brevipinna*
	Silky shark	*Carcarhinus falciformis*
	Oceanic whitetip	*Carcharhinus longimanus*
	Dusky shark	*Carcharhinus obscurus*
	Sandbar shark	*Carcharhinus plumbeus*
	Night shark	*Carcharhinus signatus*
	Tiger shark	*Galeocerdo cuvier*
	Scalloped hammerhead	*Sphyrna lewini*
	Great hammerhead	*Sphyrna mokarran*
	Smooth hammerhead	*Sphyrna zygaena*
Myliobatiformes	Pelagic stingray	*Pteroplatytrygon violacea*
	Devil ray	*Mobula mobular*

Many of these taxa, including many of the hammerhead sharks (*Sphyrna* spp.) and requiem sharks (*Carcharhinus* spp.) are mainly tropical to warm temperate species, and often coastal, pelagic species. There is limited information with which to examine the stock structure of these species, and the ICES area would only be the northern extremes of their NE Atlantic distribution range.

Other species, including *I. paucus, C. falciformis* and *C. longimanus* are truly oceanic, and are likely to have either North Atlantic or Atlantic stocks, although once again, data are lacking. Within the ICES area, these species are also found mostly in the southern parts of the ICES areas (e.g. off the Iberian Peninsula), though some may occasionally occur further north. Some of these species also occur in the Mediterranean Sea.

12.2 The fishery

12.2.1 The history of the fishery

These pelagic sharks and rays are taken as bycatch in tuna and swordfish fisheries (mainly by longliners, but also by purse-seiners). Some of them, like the hammerheads and the requiem sharks, could constitute a noticeable component of the bycatch and are landed, but others are only sporadically recorded (e.g. white shark, tiger shark, pelagic stingray and devil ray). Some of these species are an important bycatch in high seas fisheries (e.g. silky shark and oceanic whitetip) and others are taken in continental shelf waters of the ICES area (e.g. various requiem sharks and hammerhead sharks).

12.2.2 The fishery in 2012

No new information.

12.2.3 ICES advice applicable

ICES does not provide advice on these stocks.

12.2.4 Management applicable

EC Regulation No. 1185/2003 prohibits the removal of shark fins of these species, and subsequent discarding of the body. This regulation is binding on EC vessels in all waters and non-EC vessels in Community waters.

EC Regulation No 43/2009 prohibits Community vessels to fish for, to retain on board, to tranship and to land white shark (*Carcharodon carcharias*) in all Community and non-Community waters; and also prohibits third-country fishing vessels to fish for, to retain on board, to tranship and to land white shark in all Community waters.

12.3 Catch data

12.3.1 Landings

No reliable estimates of catch are available for all of these species, as many nations that land various other species of pelagic sharks will record them under generic landings categories. Species specific landings reported to ICES are given in Table 12.1 and amount to 765 t from 1999–2012. However, 98% (751 t) of these landings were made between 1999 and 2004. The main country reporting catch of these species during this period was Portugal, with 51 t of *Sphyrna* spp. and 331 t of *Carcharhinus* spp across all areas. During the same period France also reported 331 t of *Carcharhinus* spp, and Spain reported 2 t of *Sphyrna* spp. Post 2004, Portugal has only reported 10 t of *Sphyrna zygaena* (2007–2011), and Spain 4 t of pelagic stingray this year.

Since 1997, landings are also recorded in the ICCAT database (Table 12. 2), and these data provide the best catch estimates available, with a total of 28 614 t between 1997 and 2011. In the Northeast Atlantic, Spain and Portugal are the main countries reporting these species, with Portugal giving catches of 809 t and Spain 3562 t between 1997 and 2011. For Spain, the main catch is reported as *Sphyrna* spp., totalling 2431 t across the time-series. Other countries reporting catch to ICCAT are Senegal (23 420 t), France (518 t), Netherlands (37 t), the UK (12 t) and Chinese Taipei (4 t). Requiem sharks comprise the largest proportion of the catch at 69% (22 434 t), followed by hammerhead sharks at 30% (5950 t) and longfin mako sharks at 1% (173 t).

There are few catch data for the other pelagic species (e.g. tiger shark, devil ray and pelagic stingray) in national datasets, nor in the ICCAT database, except for some sporadic records of tiger sharks (45 t of which 37 t was made by the Netherlands in 2007, and the rest by Spain) in the ICCAT database between 1997 and 2011.

Catch data are provided by Castro *et al*., 2000 and Mejuto *et al.*, 2002 for the Spanish longline swordfish fisheries in the NE Atlantic in 1997–1999 (Table 12.3). They show that 99% of the bycatch of offshore longline fisheries consist of pelagic sharks (Table 12.3), although the bulk of them are blue sharks (87%).

Available landings data from FAO FishStat (Atlantic, Northeast) are presented Table 12.4. These values are considered to be underestimates, as a consequence of the inconsistent reporting of catches; however this is the only database to report devil ray landings (17 t by Spain 2004–2011).

12.3.2 Discards

No data available. Some species are usually retained, although pelagic stingray is most often discarded.

12.3.3 Quality of catch and biological data

Catch data are of poor quality, except for some occasional studies, such as those of Castro *et al*., 2000 and Mejuto *et al*., 2002, which relate to the Spanish swordfish longline fishery in the Atlantic. Biological data are not collected under the Data Collection Regulations, although some generic biological data are available (see Section 12.7). Species-specific identification in the field within some of these genera (e.g. *Carcharhinus* and *Sphyrna*) can be problematic.

Methods developed to identify shark species from fins (Sebastian *et al*., 2008; Holmes *et al*., 2009) could help in the near future to gather data on species targeted by illegal fishers, this information will greatly assist in management and conservation.

12.4 Commercial catch composition

Data on the species and length composition of these sharks are limited.

12.5 Commercial catch–effort data

No cpue data are available for these pelagic sharks in the ICES area. However Cramer and Adams, 1998; Cramer *et al*., 1998 and Cramer, 1999 provided catch rates for the Atlantic US longline fishery targeting tunas and swordfish; where cpue ranged from 2.7 individuals/1000 hooks in 1996 to 0.35 ind./1000 hooks in 1997.

12.6 Fishery-independent surveys

No fishery-independent data are available for these species.

12.7 Biological parameters

A summary of the main biological parameters is given in Table 12.5.

Little information is available on nursery or pupping grounds. Silky shark are thought to use the outer continental shelf as primary nursery ground (Springer, 1967; Yokota and Lessa, 2006), and young oceanic whitetip have been found offshore along the SE coast of the USA, suggesting offshore nurseries over the continental shelf (Seki *et al*., 1998). The scalloped hammerhead nurseries are usually in shallow coastal waters.

The overall biology of several species has been reviewed, including white shark (Bruce, 2008), silky shark (Bonfil, 2008), oceanic whitetip (Bonfil *et al*., 2008) and pelagic stingray (Neer, 2008).

Other biological information is available in Branstetter, 1987; 1990; Stevens and Lyle, 1989; Shungo *et al*., 2003 and Piercy *et al*., 2007.

The wet-fins to carcass mass ratio was estimated for *Carcharhinus longimanus*, *Carcharhinus falciformis*, *Prionace glauca*, *Sphyrna lewini*, *Sphyrna mokarran* and *Sphyrna zygaena* by Biery and Pauly (2012).

12.8 Stock assessment

12.8.1 Previous studies

No previous assessments have been made of these stocks in the NE Atlantic. Cortés *et al.* (2010) undertook a level 3 quantitative Ecological Risk Assessment (ERA) for eleven pelagic elasmobranchs (blue shark, shortfin mako, longfin mako, bigeye thresher, common thresher, oceanic whitetip, silky, porbeagle, scalloped and smooth hammerhead, and pelagic stingray). Of these species, silky shark were found to be high risk (along with shortfin mako and bigeye thresher sharks), and oceanic whitetip and longfin mako sharks were also considered to be highly vulnerable. McCully *et al*. (2012) undertook a level 2, semi-quantitative ERA for pelagic species in the Celtic Sea area, and of the 19 species considered (eight of which were elasmobranchs), porbeagle and shortfin mako sharks were found to be at the highest risk in longline and setnet fisheries, followed by common thresher shark. However, a comparable analysis examining the pelagic ecosystem for the whole Northeast Atlantic would be a useful exercise.

12.8.2 Stock assessment

No assessment was undertaken, as a consequence of insufficient data.

12.9 Quality of the assessment

No assessment was undertaken, as a consequence of insufficient data.

12.10 Reference points

No reference points have been proposed for these stocks.

12.11 Management considerations

Retaining on board, transhipping or landing any part or whole carcass of oceanic whitetip sharks (*Carcharhinus longimanus*) and silky shark (*Carcharhinus falciformis*) taken in any fishery is prohibited in the ICCAT area by the EU regulation n° 44/2012.

There is a paucity of the fishery data on these species, and this hampers the provision of management advice. Some of the species have conservation status: for example white shark is listed on Appendix II of the Barcelona Convention, Appendix II of the Bern Convention, Appendices I/II of the CMS and Appendix I of CITES.

In 2013, *Carcharhinus longimanus*, *Sphyrna lewini*, *Sphyrna mokarran*, *Sphyran zygaena*, *Manta birostris and Manta alfredi* were listed on Appendix II of CITES (Conference of Parties 16, Bangkok). However, the implementation of this listing has been delayed by 18 months (14 September 2014) to enable Range States and importing States to address potential implementation issues.

The following species are also included in the Memorandum of Understanding for Sharks (MoU-Sharks) of the Convention of Migratory Species (CMS): *Carcharodon carcharias*, *Isurus paucus* and *Manta birostris*.

In 2012, a consortium of scientific institutions (AZTI, IEO, IRD and Ifremer) obtained a contact from the EC to review the fishery and biological data on major pelagic shark and ray species. The aim was to identify the gaps that could be filled up in the frame of the implementation of the EU shark action plan (EUPOA-Sharks) in order to improve the monitoring of major elasmobranch species caught by both artisanal and

industrial large pelagic fisheries on the high seas of the Atlantic, Indian and Pacific Oceans. It reviews and prioritises the gaps identified to develop a research programme to fill them in support for the formulation of scientific advice for management of sharks. Main gaps concern the fishery statistics often not broken down by species, the lack of size–frequency data and regional biological/ecological information. The group was informed about this consortium and that final report was given to the DG-Mare of the EU in May 2013 (DG-Mare, in press).

In 2013, the shark species group of ICCAT proposed the framework of a Shark Research and Data Collection Program (SRDCP) to fill up the gaps in our knowledge on pelagic sharks that are responsible for much of the uncertainty in stock assessments, and have caused constraints to the provision of scientific advice. The final report is available at ICCAT website (ICCAT, 2013).

12.12 References

Biery, L., and Pauly, D. 2012. A global review of species-specific shark fin to body mass ratios and relevant legislations. *J. Fish. Biol*., 80 : 1643–1677.

Bonfil, R. 2008. The biology and ecology of the silky shark, *Carcharhinus falciformis*. In *'Sharks of the Open Ocean: Biology, Fisheries and Conservation'* (M.D.Camhi, E.K.Pikitch and E.A.Babcock, Eds). Blackwell Publishing, Oxford, UK, 114–127.

Bonfil, R., Clarke, S. and Nakano, H. 2008. The biology and ecology of the oceanic whitetip shark, *Carcharhinus longimanus*. In *'Sharks of the Open Ocean: Biology, Fisheries and Conservation'* (M.D.Camhi, E.K.Pikitch and E.A.Babcock, Eds). Blackwell Publishing, Oxford, UK, 128–139.

Branstetter, S. 1987. Age, growth and reproductive biology of the silky shark, *Carcharhinus falciformis* and the scalloped hammerhead, *Sphyrna lewini,* from the northwestern Gulf of Mexico. *Environmental Biology of Fishes*, 19: 161–173.

Branstetter, S. 1990. Early life-history implications of selected *Carcharinoid* and *Lamnoid* sharks of the Northwest Atlantic. *NOAA Technical Report NMFS*, 90: 17–28.

Bruce, B. D. 2008. The biology and ecology of the white shark, *Carcharodon carcharias*. In *'Sharks of the Open Ocean: Biology, Fisheries and Conservation'* (M.D.Camhi, E.K.Pikitch and E.A.Babcock, eds). Blackwell Publishing, Oxford, UK, 69–81.

Castro, J., de la Serna, J.M., Macias, D., and Mejuto J. 2000. Estimaciones centificas preliminares de los desembarcos de especies asociadas realizados por la flota española de palange de superficie en 1997 y 1998. ICCAT SCRS/1999/082, Collection of Scientific Papers, 51(6): 1882–1893.

Cortés, E. Arocha, F. Beerkircher, L. Carvalho, F. Domingo, A. Heupel, M., Holtzhausen, H. Santos, M.N., Ribera, M. and Simpfendorfer C. 2010. Ecological Risk Assessment of pelagic sharks caught in Atlantic pelagic longline fisheries. *Aquatic Living Resources,* 23: 25–34.

Cramer, J. 1999. Pelagic longline bycatch. ICCAT Working document SCRS/99/90.

Cramer J., Bertolino A. and Scott G.P. 1998. Estimates of recent shark bycatch by US vessels fishing for Atlantic tuna and tuna-like species. ICCAT SCRS/1997/058, Collection of Scientific Papers, 48(3): 117–128.

Cramer, J., and Adams H. M. 1998. Pelagic longline bycatch. ICCAT Working document SCRS/98/113.

DG-Mare. In press. Studies for Carrying out the Common Fisheries Policy (Reference: Mare/2010/11) LOT 2: Provision of scientific advice for the purpose of the implementation of the EUPOA sharks. Final report for the Directorate-General for Maritime Affairs and Fisheries. AZTI, IRD, Ifremer, IEO, 31st May 2013, 474 p.

Holmes B. H., Steinke D., Ward R. D. 2009. Identification of shark and ray fins using DNA barcoding Fisheries Research 95:280–288.Hueter, R. E. And. Simpfendorfer, C. 2008. Case Study: Trends in Blue Shark Abundance in the Western North Atlantic as Determined by a Fishery-Independent Survey. In: Sharks of the Open Ocean; M. D. Chami, E. K. Pikitch and E. Babcock (eds.) 236–241.

ICCAT. 2013. Report of the 2013 inter-sessional meeting of the shark species group. Mindelo, Cape Verde, April 8–12, 2013. 81 pp.

ICES. 2007. Report of the Working Group for Regional Ecosystem Description (WGRED), 19–23 February 2007, ICES Headquarters, Copenhagen. ICES CM 2007/ACE:02. 153 pp.

McCully, S. R., Scott, F., Ellis, J. R. and Pilling, G. M. 2012. Productivity and susceptibility analysis: Application and suitability for data poor assessment of UK elasmobranchs. ICCAT SCRS/2012/079.

Mejuto, J., Garcia-Cortes, B., and de la Serna, J. M. 2002. Preliminary scientific estimations of by-catches landed by the Spanish surface longline fleet in 1999 in the Atlantic Ocean and Mediterranean Sea. ICCAT SCRS/2001/049, Collection of Scientific Papers, 54(4): 1150–1163.

Neer, J.A. 2008. The biology and ecology of the pelagic stingray, *Pteroplatytrygon violacea* (Bonaparte, 1832). In *'Sharks of the Open Ocean : Biology, Fisheries and Conservation'* (M.D.Camhi, E.K.Pikitch and E.A.Babcock, eds). Blackwell Publishing, Oxford, UK, 152–159.

Piercy, A. N, Carlson, J. K, Sulikowski, J. A., and Burgess, G. H. 2007. Age and growth of the scalloped hammerhead shark, *Sphyrna lewini*, in the Northwest Atlantic Ocean and Gulf of Mexico. *Marine and Freshwater Research*, 58: 34) 40.

Sebastian H., Haye P. A. and Shivji M. S. 2008. Characterization of the pelagic shark-fin trade in north-central Chile by genetic identification and trader surveys. Journal of Fish Biology 73, 2293–2304 Skomal, G.B. 1990. Age and growth of the blue shark, *Prionace glauca*, in the North Atlantic. Master's Thesis. University of Rhode Island, Kingston, RI. 82 pp.

Shungo, O., Hideki, N. and Sho, T. 2003. Age and growth of the silky shark *Carcharhinus falciformis* from the Pacific Ocean. *Fisheries Sciences*, 69(3): 456.

Spinger, S. 1967. Social organizations of shark populations. *In*: Gilbert P.W. (ed.) Sharks, Skates and Rays. John Hopkins Press, Baltimore, 149–174.

Seki, T., Taniuchi, T., Nakano, H., and Shimizu, M. 1998. Age, growth and reproduction of the oceanic whitetip shark from the Pacific Ocean. *Fisheries Sciences*, 64: 14–20.

Stevens, J. D., and Lyle, J. M. 1989. Biology of three hammerhead sharks (*Eusphyrna blochii, Sphyrna mokarran* and *S. lewini*) from northern Australia. *Australian Journal of Marine and Freshwater Research*, 40: 129–146. Yellow marked ref not in text.

Yokota, L. and Lessa, R. P. 2006. A nursery area for sharks and rays in Northeastern Brazil. *Environmental Biology of Fishes*, 75: 349–360.

Table 12.1. Other pelagic sharks in the Northeast Atlantic. Summary of landing data reported to WGEF of hammerhead and requiem sharks in the ICES Subareas from 1999 to 2011; reported landings post 2004 are limited.

Species	Country	ICES area	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Hammerhead sharks (*Sphyrna* spp.)	Portugal	VIIIc	1											0	0	0
		IX	6	8	4	5	5							0	0	0
		IXa						18						0	0	0
		X	1				2	1								
	Spain	IX a, b						2						0	0	0
Sphyrna zygaena	Portugal	X									3	1	2	2	1	1
Total Sphyrna			8	8	4	5	7	21			3	1	2	2	1	1
Requiem sharks (*Carcharhinus* spp.)	Portugal	VIb		1		1										
		IX		1		7	129	2								
		IXb						3								
		X	9	24	31	47	16	43								

Species	Country	ICES area	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
		IX a, b						17								
	Spain	VIIIa														
	France		9	26	31	55	145	65								
Total Requiem			17	34	35	60	152	86								
Pelagic stingray	Spain	IXa													4	
Total pelagic sharks (all areas)			34	68	70	120	304	155	0	0	3	1	2	2	5	1

Table 12.2. Other pelagic sharks recorded in the ICCAT Task I Catch database for the Northeast Atlantic (1997-2011). Catches of <0.5 t are indicated by a +.

Country	Scientific Name	Species Code	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Spain	*Carcharhinidae*	RSK		158	60		100	80	86	97				28			
	Carcharhinus altimus	CCA		1													
	Carcharhinus brachyurus	BRO												+	+		
	Carcharhinus falciformis	FAL		10			1			4			59		20		
	Carcharhinus galapagensis	CCG													1		
	Carcharhinus limbatus	CCL					+									5	
	Carcharhinus longimanus	OCS		2		+	4	+							18	56	
	Carcharhinus obscurus	DUS		+													
	Carcharhinus plumbeus	CCP													4	+	
	Carcharhinus signatus	CCS		2			+			+						2	
	Galeocerdo cuvier	TIG	1	3		1	1	1	+	+			+		1		
	Isurus paucus	LMA		3		4	16	24	24	28			16		37	20	
	Sphyrna lewini	SPL		3					+	2							
	Sphyrna mokarran	SPK		1													

Country	Scientific Name	Species Code	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
	Sphyrna spp	SPN	353	343		312	249	363	231	364			103		113		
	Sphyrna zygaena	SPZ		3		1	4	1		12			2		+		
	Sphyrnidae	SPY												124			
France	*Carcharhinidae*	RSK												507	2	+	3
	Carcharhinus albimarginatus	ALS														+	+
	Carcharhinus brevipinna	CCB													+		
	Carcharhinus leucas	CCE													+		
	Carcharhinus limbatus	CCL													+		
	Carcharhinus longimanus	OCS													1		
	Carcharhinus obscurus	DUS													1	+	+
	Carcharias taurus	CCT													+	1	3
	Carcharodon carcharias	WSH															+
	Sphyrna lewini	SPL													+		
	Sphyrna spp	SPN															+
	Sphyrnidae	SPY															+
Portugal	*Carcharhinidae*	RSK							155			18	5			+	

Country	Scientific Name	Species Code	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
	Carcharhiniformes	CVX											483				
	Carcharhinus falciformis	FAL													+	+	30
	Carcharhinus limbatus	CCL															+
	Carcharhinus longimanus	OCS										+		1	1	18	
	Carcharhinus plumbeus	CCP														+	
	Isurus paucus	LMA														1	+
	Sphyrna spp	SPN				+	+		6			17	6	5	10	42	
	Sphyrna zygaena	SPZ							1			4			+	6	
United Kingdom	*Sphyrna lewini*	SPL													12	+	
Netherlands	*Galeocerdo cuvier*	TIG											37				
Maroc	*Carcharhinus obscurus*	DUS															6
	Carcharodon carcharias	WSH															92
	Sphyrna lewini	SPL															1
	Sphyrna zygaena	SPZ															153
Senegal	*Carcharhinidae*	RSK	239	827	972	1714	1806	1045	1387	1651	5401	1035	1221	1253	375	426	898
	Carcharhinus plumbeus	CCP											+				

Country	Scientific Name	Species Code	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
	Carcharias taurus	CCT												49			
	Carcharodon carcharias	WSH														18	
	Sphyrna spp	SPN	126	94	117	57	1464	36	71	168	318	173	154	110	101	56	51
	Sphyrna zygaena	SPZ									7						
Chinese Taipei	*Carcharhinus falciformis*	FAL												1	3		
***Carcharhinus* spp. Total**			239	1000	1032	1714	1910	1125	1629	1752	5401	1053	1768	1838	425	526	1032
***Sphyrma* spp. Total**			479	443	117	370	1717	400	310	546	325	194	265	239	236	104	205
All species Total			720	1449	1149	2089	3644	1550	1963	2327	5726	1247	2087	2077	699	650	1237

Table 12.3. Other pelagic sharks in the Northeast Atlantic. Sharks bycatches of the Spanish swordfish longline fisheries in the NE Atlantic. Data from Castro *et al.*, 2000 and Mejuto *et al.*, 2002.

Shark bycatches of the Spanish longline swordfish fishery								
NE Atlantic	*Carcharhinus* spp.	*Sphyrna* spp.	*Galeocerdo cuvier*	*Isurus paucus*	*Mobula* spp.	Total bycatches	% sharks	% blue shark
1997	148	382	3	8		28 000	99.4	87.5
1998	190	396	5	8	7	26 000	99.4	86.5
1999	99	240	4	18	1	25 000	98.6	87.2

Table 12.4. Other pelagic sharks in the Northeast Atlantic. Reported landings (t) by country (Source FAO Fish-Stat) for Atlantic, Northeast fishing area.

FAO FISHSTAT (2012)		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Country	**Species**														
Portugal	*Sphyrna zygaena*			8	8	4	5	7	20	3	13	9	7	5	4
Spain	*Mobula mobular*								1	3	3	2	1	3	4
	Sphyrna zygaena								5	10	< 0,5	3	2	1	< 0,5
	Galeocerdo cuvier								2	4	5	3	2	-	< 0,5
TOTAL		0	0		8	4	5	7	28	20	21	17	12	9	8

Table 12.5. Other pelagic sharks in the Northeast Atlantic. Preliminary compilation of life-history information for NE Atlantic sharks.

	Distribution Depth range	Max. TL cm	Egg development	Maturity size cm	Age at maturity (years)	Gestation period (months)	Litter size	Size at birth (cm)	Lifespan years	Growth	Trophic level
White shark *Carcharodon carcharias*	Cosmopolitan 0–1280 m	720	Ovoviviparous+ oophagy	372–402	8–10	?	7–14	120–150	36	L∞ = 544 K= 0.065 T0 = –4.40	4.42–4.53
Longfin mako *Isurus paucus*	Cosmopolitan	417	Ovoviviparous	> 245 F			2	97–120			4.5
Silky shark *Carcharhinus falciformis*	Circumtropical 0–500 m	350	Viviparous	210–220 M 225 F	6–7 7–9	12	2–15	57–87	25	L∞ = 291/315 K= 0.153 / 0.1 T0 = –2.2 / –3.1	4.4–4.52
Spinner shark *Carcharhinus brevipinna*	Circumtropical 0–100 m	300	Viviparous	176–212	7.8–7.9	10–12	Up to 20	60–80		L∞ = 214 FL K= 0.210 T0 = –1 .94	4.2–4.5
Oceanic whitetip *Carcharhinus longimanus*	Cosmopolitan 0–180 m	396	Viviparous	175–189	4–7	10–12	1–15	60–65	22	L∞ = 245 / 285 K= 0.103 / 0.1 T0 = 2.7 / – 3.39	4.16–4.39
Dusky shark *Carcharhinus obscurus*	Circumglobal	420	Viviaparous	220–280	14–18	22–24	3–14	70–100	40	L∞ = 349 / 373 K= 0.039/ 0.038 T0 = –7.04/ –6.28	4.42–4.61
Sandbar shark *Carcharhinus plumbeus*	Circumglobal 0–1800 m	250	Viviparous	130–183	13–16	12	1–14	56–75	32	L∞ = 186 FL K= 0.046 T0 = –6.45	4.23–4.49

	Distribution Depth range	Max. TL cm	Egg development	Maturity size cm	Age at maturity (years)	Gestation period (months)	Litter size	Size at birth (cm)	Lifespan years	Growth	Trophic level
Night shark *Carcharhinus signatus*	Atlantic 0–600 m	280	Viviparous	185–200	8–10	~12	4–12	60		L∞ = 256 / 265 K= 0.124 / 0.114 T0 = –2.54 / – 2.7	4.44–4.5
Tiger shark *Galeocerdo cuvier*	Circumglobal 0–350 m	740	Ovioviviparous	316–323	8–10	13–16	10–82	51–104	50	L∞ = 388 / 440 K= 0.18 / 0.107 T0 = –1.13 / –2.35	4.54–4.63
Scalloped hammerhead *Sphyrna lewini*	Cosmopolitan 0–512 m	430	Viviparous	140–250	10–15	9–10	13–31	45–50	35	L∞ = 320 / 321 K= 0.249 / 0.222 T0 = –0.41 / – 0.75	4.0–4.21
Great hammerhead *Sphyrna mokarran*	Circumglobal 1–300 m	610	Viviparous	250–292		11	13–42	60–70		L∞ = 264 / 308 (FL) K= 0.16 / 0.11 T0 = -1.99 / -2.86	4.23–4.43
Smooth hammerhead *Sphyrna zygaena*	Circumglobal 0–200 m	500	Viviparous	210–265		10–11	20–50	50–60			4.32–4.5
Pelagic stingray *Pteroplatytrygon violacea*	Cosmopolitan 37–238	160	Ovoviviparous	35–40 DW	2–3	2–4	4–9	15–25 DW	~10	L∞ = 116 DW K= 0.0180	4.36
Devil ray *Mobula mobular*	NE Atl. + Med. epipelagic	520	Ovoviviparous			25	1	≤ 166 DW			3.71

DOGFISH OF THE SPECIES "*Squalus acanthias & Scyliorhinus spp.*"

Frozen, fillets

CN 0304 29 61 (2010-2011) & CN 0304 89 51 (2012-2013)

1. EU28 IMPORT

ORIGIN	2010		2011		2012		2013 (1 - 10)		Average 2010 - 2012	
	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)
United States	55.30	163.60	96.70	229.94	189.50	390.57	210.20	563.94	113.83	261.37
Canada	46.30	133.92	5.50	15.52	44.00	133.48	0.00	0.00	31.93	94.31
New Zealand	23.80	44.13	18.90	32.13	28.60	80.10	2.00	2.69	23.77	52.12
China	0.00	0.00	10.00	8.32	0.00	0.00	0.00	0.00	3.33	2.77
Norway	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.02
Total	125.40	341.65	131.10	285.91	262.10	604.22	212.20	566.63	172.87	410.59

1. EU28 EXPORT

DESTINATION	2010		2011		2012		2013 (1 - 10)		Average 2010 - 2012	
	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)
Extra EU28	16.1	40.43	158.4	1236.64	0.0	0.00	10.0	16.65	58.17	425.69

Tab. Ref : DOGFISH&OTHERSHARKS01 (sheet "Dogfish, frozen fillets")

Data source: EUROSTAT COMEXT 28.01.2014

EU DG MARE DG
29.01.2014

PORBEAGLE SHARK (*Lamna nasus*)

Frozen Fillets

CN 0304 29 65 (2010-2011) & CN 0304 89 55 (2012-2013)

1. EU28 IMPORT

ORIGIN	2010		2011		2012		2013 (1 - 11)		Average 2010 - 2012	
	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)
New Zealand	0.0	0.00	2.2	5.40	1.0	2.58	0.1	0.26	1.07	2.66
Japan	0.0	0.00	0.0	0.00	0.0	0.00	0.6	2.71	0.00	0.00
Total	0.0	0.00	2.2	5.40	1.0	2.58	0.7	2.97	1.1	2.7

1. EU28 EXPORT

DESTINATION	2010		2011		2012		2013 (1 - 10)		Average 2010 - 2012	
	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)
Extra EU28	0.0	0.00	1.4	4.78	0.2	0.61	1.0	2.42	0.53	1.80

Tab. Ref : DOGFISH&OTHERSHARKS01 (sheet "Porbeagle sharks, frozen fillets")

Data source: EUROSTAT COMEXT 28.01.2014

EU DG MARE DG
29.01.2014

OTHER SHARKS (excl. *Squalus acanthias, Scyliorhnus* spp.& Porbeagle)

Frozen fillets

CN 0304 29 68 (2010-2011) & CN 0304 89 59 (2012-2013)

1. EU28 IMPORT

ORIGIN	2010		2011		2012		2013 (1 - 11)		Average 2010 - 2012	
	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)
Vietnam	301.9	556.90	457.3	1,227.42	215.7	542.94	188.3	381.28	324.97	775.75
Namibia	87.0	254.81	51.4	82.07	128.5	226.29	83.2	151.55	88.97	187.72
Taiwan	51.7	79.47	45.5	55.87	95.5	135.01	0.0	0.00	64.23	90.12
Ecuador	52.0	119.66	65.5	160.89	31.7	85.47	0.0	0.00	49.73	122.01
Argentina	74.3	310.80	53.0	235.67	6.0	27.91	0.1	0.21	44.43	191.46
Senegal	12.5	42.16	34.7	133.88	3.4	13.56	0.0	0.00	16.87	63.20
Indonesia	3.2	7.93	39.9	109.76	0.0	0.00	3.5	7.06	14.37	39.23
Thailand	25.0	110.67	14.4	44.35	0.0	0.00	0.0	0.00	13.13	51.67
South Korea	27.0	75.47	11.0	30.53	0.1	0.07	0.0	0.00	12.70	35.36
New Zealand	9.3	21.96	21.4	48.42	4.2	11.11	6.4	14.62	11.63	27.16
China	5.4	24.23	8.6	10.90	20.1	84.95	116.1	191.52	11.37	40.03

Sri Lanka	21.3	53.27	0.0	0.00	0.0	0.00	0.0	0.00	7.10	17.76
United States	0.0	0.00	0.0	0.00	18.1	49.33	33.3	85.60	6.03	16.44
Panama	0.0	0.00	11.4	109.75	0.0	0.00	0.0	0.00	3.80	36.58
Nl Antilles	0.0	0.00	9.1	8.96	0.0	0.00	0.0	0.00	3.03	2.99
India	6.2	18.52	0.8	3.24	0.0	0.00	1.7	3.51	2.33	7.25
Peru	4.1	10.67	0.0	0.00	0.0	0.00	0.0	0.00	1.37	3.56
Costa Rica	0.0	0.00	0.8	1.23	0.0	0.00	0.0	0.00	0.27	0.41
Brazil	0.0	0.00	0.6	2.76	0.0	0.00	0.0	0.00	0.20	0.92
Fiji	0.0	0.00	0.0	0.00	0.6	1.42	0.0	0.00	0.20	0.47
Ghana	0.0	0.00	0.4	1.56	0.0	0.00	0.0	0.00	0.13	0.52
Suriname	0.3	0.44	0.0	0.00	0.0	0.00	0.0	0.00	0.10	0.15
Mauritania	0.0	0.00	0.2	0.38	0.0	0.00	0.5	0.52	0.07	0.13
Total	681.2	1,686.96	826.0	2,267.64	523.9	1,178.06	433.1	835.87	677.0	1,710.9

1. EU28 EXPORT

DESTINATION	2010		2011		2012		2013 (1 - 10)		Average 2010 - 2012	
	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)
Extra EU28	2,963.8	41,126.98	3,147.5	53,841.46	1,728.5	18,877.20	161.1	416.38	2,613.27	37,948.55

Tab. Ref : DOGFISH&OTHERSHARKS01 (sheet "Other sharks, frozen fillets")

Data source: EUROSTAT COMEXT 28.01.2014

SHARK FINS, smoked
CN 0305 71 10 (2012 - 2013)

1. EU28 IMPORT

All data are ZERO !

1. EU28 EXPORT

DESTINATION	2010		2011		2012		2013 (1 - 10)		Average 2010 - 2012	
	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)
Extra EU28					0.0	0.00	0.1	1.76	0.00	0

Tab. Ref : DOGFISH&OTHERSHARKS01 (sheet "Shark fins, smoked")

Data source: EUROSTAT COMEXT 28.01.2014

SHARK FINS, dried, salted or in brine
CN 0305 71 90 (2012 - 2013)

1. EU28 IMPORT

ORIGIN	2010		2011		2012		2013 (1 - 11)		Average 2010 - 2012	
	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)
Iceland					32.7	54.71	5.0	8.84	10.90	18.24
Norway					276.3	543.51	230.4	434.87	92.10	181.17
Faroe Islands					256.1	381.49	216.8	308.16	85.37	127.16
Turkey					154.4	201.21	0.0	0.00	51.47	67.07
Morocco					329.1	1,148.92	357.2	1,069.67	109.70	382.97
Algeria					0.0	0.00	0.0	0.00	0.00	0.00
Mauritania					87.2	210.44	256.2	584.36	29.07	70.15
Cape Verde					85.2	110.26	150.0	233.30	28.40	36.75
Senegal					619.2	835.87	216.7	306.17	206.40	278.62
Ghana					97.0	117.19	0.0	0.00	32.33	39.06
Angola					0.0	0.00	108.2	137.14	0.00	0.00
Eritrea					0.0	0.00	0.0	0.00	0.00	0.00
Mozambique					296.0	615.45	211.8	501.26	98.67	205.15

Madagascar				0.0	0.00	0.0	0.00	0.00	0.00
Mauritius				0.0	0.00	0.0	0.00	0.00	0.00
South Africa				372.0	780.59	398.0	993.54	124.00	260.20
Namibia				1,977.0	2,643.96	1,960.1	3,381.43	659.00	881.32
United States				2,305.0	6,836.23	2,340.5	6,586.58	768.33	2,278.74
Canada				250.6	896.15	84.9	313.33	83.53	298.72
Belize				842.3	1,211.61	1,236.2	2,278.18	280.77	403.87
Costa Rica				0.0	0.00	0.0	0.00	0.00	0.00
Panama				178.5	207.29	170.1	318.74	59.50	69.10
Granada				0.0	0.00	0.7	1.53	0.00	0.00
Nl Antilles				0.0	0.00	0.0	0.00	0.00	0.00
Venezuela				0.0	0.00	0.2	0.40	0.00	0.00
Suriname				34.7	71.78	27.2	47.97	11.57	23.93
Ecuador				88.9	181.87	214.0	384.36	29.63	60.62
Peru				0.0	0.00	0.0	0.00	0.00	0.00
Brazil				3.2	15.36	15.0	19.19	1.07	5.12
Uruguay				0.0	0.00	0.0	0.00	0.00	0.00
Argentina				120.9	381.39	100.6	305.93	40.30	127.13
Oman				9.5	14.05	6.3	8.51	3.17	4.68
Yemen				62.5	123.81	19.9	54.77	20.83	41.27
India				42.9	38.63	26.0	24.01	14.30	12.88
Bangladesh				0.0	0.00	0.0	0.00	0.00	0.00
Sri Lanka				0.0	0.03	1.6	4.43	0.00	0.01
Myanmar				0.0	0.00	0.0	0.00	0.00	0.00
Thailand				0.0	0.00	0.0	0.00	0.00	0.00
Vietnam				967.5	2,239.42	982.7	1,977.29	322.50	746.47
Indonesia				80.0	145.19	58.2	114.93	26.67	48.40
Singapore				0.0	0.00	0.0	0.00	0.00	0.00
Philippines				2.4	5.84	0.0	0.00	0.80	1.95
China				103.9	192.95	185.9	285.58	34.63	64.32

South Korea					37.4	46.71	15.0	22.27	12.47	15.57
Japan					1,337.3	934.35	725.6	388.29	445.77	311.45
Taiwan					153.1	245.98	0.0	0.00	51.03	81.99
New Zealand					56.9	162.71	31.7	74.35	18.97	54.24
Fiji					0.6	1.42	0.0	0.00	0.20	0.47
French Polynesia					0.0	0.00	0.0	0.00	0.00	0.00
French Southern Territories					0.6	0.52	0.0	0.00	0.20	0.17
Not determined					47.9	87.78	43.3	85.88	15.97	29.26
Total	0.0	0.00	0.0	0.00	11,308.8	21,684.67	10,396.0	21,255.26	3,769.6	7,228.2

1. EU28 EXPORT

DESTINATION	2010		2011		2012		2013 (1 - 10)		Average 2010 - 2012	
	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)
Extra EU28					3.76	1,326.43	156.6	3,433.41	1.25	442.14

Tab. Ref : DOGFISH&OTHERSHARKS01 (sheet "Shark fins, dried, salted or in brine")

Data source: EUROSTAT COMEXT 28.01.2014

DOGFISH and OTHER SHARKS

Sum of all CN positions identified in CN 2010 - 2013

1. EU28 IMPORT

ORIGIN	2010		2011		2012		2013 (1 - 11)		Average 2010 - 2012	
	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)	Quantity (.000 kgs)	Value (.000 €)
Iceland	51.8	113.34	35.0	84.06	32.7	54.71	5.0	8.84	39.83	84.04
Norway	550.7	1,102.84	239.9	519.19	276.3	543.51	230.4	434.87	355.63	721.85
Faroe Islands	215.6	265.60	129.4	188.38	256.1	381.49	216.8	308.16	200.37	278.49
Turkey	0.0	0.00	4.4	23.67	154.4	201.21	0.0	0.00	52.93	74.96
Morocco	734.7	1,964.03	527.4	1,580.79	329.1	1,148.92	357.2	1,069.67	530.40	1,564.58
Algeria	0.0	0.00	3.9	6.70	0.0	0.00	0.0	0.00	1.30	2.23
Mauritania	317.8	669.75	349.6	801.29	87.2	210.44	256.2	584.36	251.53	560.49
Cape Verde	0.0	0.00	0.0	0.00	85.2	110.26	150.0	233.30	28.40	36.75
Senegal	390.8	709.78	1,282.1	1,792.74	619.2	835.87	216.7	306.17	764.03	1,112.80
Ghana	173.6	161.77	51.2	66.59	97.0	117.19	0.0	0.00	107.27	115.18
Angola	0.0	0.00	0.0	0.00	0.0	0.00	108.2	137.14	0.00	0.00
Eritrea	0.0	0.05	0.0	0.00	0.0	0.00	0.0	0.00	0.00	0.02
Mozambique	92.7	184.58	203.0	462.38	296.0	615.45	211.8	501.26	197.23	420.80

Madagascar	12.1	18.08	0.0	0.00	0.0	0.00	0.0	0.00	4.03	6.03
Mauritius	106.6	235.48	5.5	8.64	0.0	0.00	0.0	0.00	37.37	81.37
South Africa	605.6	1,462.24	624.8	1,449.72	372.0	780.59	398.0	993.54	534.13	1,230.85
Namibia	2,402.7	3,633.71	3,175.1	4,726.83	1,977.0	2,643.96	1,960.1	3,381.43	2,518.27	3,668.17
United States	2,061.5	5,668.37	3,086.4	8,999.06	2,305.0	6,836.23	2,340.5	6,586.58	2,484.30	7,167.89
Canada	807.5	2,711.60	216.8	719.00	250.6	896.15	84.9	313.33	424.97	1,442.25
Belize	343.5	298.50	536.0	564.00	842.3	1,211.61	1,236.2	2,278.18	573.93	691.37
Costa Rica	0.0	0.00	46.4	84.86	0.0	0.00	0.0	0.00	15.47	28.29
Panama	488.8	506.00	424.3	639.15	178.5	207.29	170.1	318.74	363.87	450.81
Granada	0.5	1.14	0.0	0.06	0.0	0.00	0.7	1.53	0.17	0.40
Nl Antilles	0.0	0.00	282.7	178.50	0.0	0.00	0.0	0.00	94.23	59.50
Venezuela	0.0	0.00	0.0	0.00	0.0	0.00	0.2	0.40	0.00	0.00
Suriname	19.2	33.73	46.9	73.54	34.7	71.78	27.2	47.97	33.60	59.68
Ecuador	55.0	125.54	200.4	324.72	88.9	181.87	214.0	384.36	114.77	210.71
Peru	73.3	181.99	2.0	5.64	0.0	0.00	0.0	0.00	25.10	62.54
Brazil	2.7	5.98	42.2	99.97	3.2	15.36	15.0	19.19	16.03	40.44
Uruguay	0.0	0.00	12.0	25.12	0.0	0.00	0.0	0.00	4.00	8.37
Argentina	265.8	740.05	212.2	655.27	120.9	381.39	100.6	305.93	199.63	592.24
Oman	0.0	0.00	0.0	0.00	9.5	14.05	6.3	8.51	3.17	4.68
Yemen	35.5	67.26	30.4	50.79	62.5	123.81	19.9	54.77	42.80	80.62
India	37.9	127.11	30.3	93.99	42.9	38.63	26.0	24.01	37.03	86.58
Bangladesh	487.0	1,679.15	321.7	1,006.15	0.0	0.00	0.0	0.00	269.57	895.10
Sri Lanka	21.3	53.27	0.0	0.00	0.0	0.03	1.6	4.43	7.10	17.77
Myanmar	895.4	889.96	592.0	531.02	0.0	0.00	0.0	0.00	495.80	473.66
Thailand	181.4	401.02	384.5	576.20	0.0	0.00	0.0	0.00	188.63	325.74
Vietnam	1,419.0	2,684.27	1,713.0	4,091.82	967.5	2,239.42	982.7	1,977.29	1,366.50	3,005.17
Indonesia	3.2	7.93	160.7	342.63	80.0	145.19	58.2	114.93	81.30	165.25
Singapore	16.2	64.65	48.0	110.54	0.0	0.00	0.0	0.00	21.40	58.40
Philippines	0.0	0.00	24.5	34.73	2.4	5.84	0.0	0.00	8.97	13.52
China	149.7	224.51	254.1	340.12	103.9	192.95	185.9	285.58	169.23	252.53

South Korea	260.1	568.55	173.6	353.00	37.4	46.71	15.0	22.27	157.03	322.75
Japan	742.3	832.32	1,101.4	1,258.49	1,337.3	934.35	725.6	388.29	1,060.33	1,008.39
Taiwan	70.7	125.03	90.3	146.35	153.1	245.98	0.0	0.00	104.70	172.45
New Zealand	291.1	613.55	105.0	206.48	56.9	162.71	31.7	74.35	151.00	327.58
Fiji	0.0	0.00	0.0	0.00	0.6	1.42	0.0	0.00	0.20	0.47
French Polynesia	0.9	9.17	0.0	0.00	0.0	0.00	0.0	0.00	0.30	3.06
French Southern Territories	0.0	0.00	0.0	0.00	0.6	0.52	0.0	0.00	0.20	0.17
Not determined	0.0	0.00	93.6	153.68	47.9	87.78	43.3	85.88	47.17	80.49
Total	14,384.2	29,141.90	16,862.7	33,375.86	11,308.8	21,684.67	10,396.0	21,255.26	14,185.2	28,067.5

1. EU28 EXPORT

DESTINATION	**2010**		**2011**		**2012**		**2013 (1 - 10)**		**Average 2010 - 2012**	
	Quantity (.000 kgs)	**Value (.000 €)**	**Quantity (.000 kgs)**	**Value (.000 €)**	**Quantity (.000 kgs)**	**Value (.000 €)**	**Quantity (.000 kgs)**	**Value (.000 €)**	**Quantity (.000 kgs)**	**Value (.000 €)**
Extra EU28	7,215.2	47,411.60	7,268.7	60,680.54	9,981.3	40,029.50	4,089.3	15,076.01	8,155.07	49,373.88

Tab. Ref : DOGFISH&OTHERSHARKS01 (sheet "Consolidation")

Data source: EUROSTAT COMEXT 28.01.2014

Summary on fisheries of sharks and rays by The Netherlands.
Catch, by-catch and observations.

Used sources:

- ICES WGEF REPORT, 2013
- Kennisvraag haaien: wat is er bekend over haaien voor de voor Nederland relevante gebieden? IMARES (H.M.J. van Overzee, I.J. van Beek, M. de Graaf, O.A. Debrot, N.T. Hintzen, A. Coers & O.G. Bos), Rapport C113/2012.

Other info:
http://www.ices.dk/community/groups/Pages/WGEF.aspx

Landing of sharks and rays.

NORTH EAST ATLANTIC

The landing of sharks and rays occurs in the EU as by-catch on professional fishing trawlers and as main catch by fishing as leisure activity (hired boats, from the shore). On behalf of the Ministry of Economics, IMARES started the Recreational Fisheries Programme in 2009.

Each two years ICES gives an advice on the catch of Porbeagle. In 2012 advice given for 2013 en 2014: "*ICES advises on the basis of the precautionary approach that no fishing for porbeagle should be permitted. Landings of porbeagle should not be allowed. A rebuilding plan should be developed for this stock.*".

Policy:

- Quota Porbeagle: 2010-2013 is zero.

Legislation:

- Retaining on board, transhipping or landing any part or whole carcass of oceanic whitetip sharks (*Carcharhinus longimanus*) and silky shark (*Carcharhinus falciformis*) taken in any fishery is prohibited in the ICCAT area (EU regulation n° 44/2012.
- The legal framework for collection of recreational fisheries data by EU Member States is given by the EU Data Collection Framework (Council Regulation (EC) No 199/2008 and Council Decision 2008/949/EC). The Netherlands are obliged to report on cod, eel, sharks and rays.

NORTH EAST ATLANTIC (PORBEAGLE):

A report on Porbeagle is made by the Elasmobranchen Working Group (ICES). The report shows that there is no Porbeagle caught in the Netherlands (Explanation: (1) No numbers for Porbeagle mentioned in table 6.1a below, (2) Specie Porbeagle missing in table 6, (3) Table 7 shows a limited catch of 0,2 ton in 2007 and 2010, though).

Table 6.1a. Porbeagle in the NE Atlantic. Working Group estimates of porbeagle landings data (tonnes) by country (1971–2012). Data derived from ICCAT, ICES and national data. Data are considered an underestimate.

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Denmark	311	523	158	170	265	233	289	112	72	176	158	84	45	38
Faroe Is	1		5			1	5	9	25	8	6	17	12	14
France	550	910	545	380	455	655	450	550	650	640	500	480	490	300
Germany			6	3	4	.	.	.	.	.	.	.	.	.
Iceland			2	2	4	3	3	.	1	1	1	1	1	1
Ireland			.	.	.	.	.	.	.	.	.	.	.	.
Netherlands			.	.	.	.	.	.	.	.	.	.	.	.
Norway	111	293	230	165	304	259	77	76	106	84	93	33	33	97
Portugal			.	.	.	.	.	.	.	.	.	.	.	.
Spain	11	10	12	9	12	9	10	11	8	12	12	14	28	20
Sweden			.	.	3	.	.	5	1	8	5	6	5	9
UK (E,W, NI)		4	14	15	16	25	.	.	1	3	2	1	2	5
UK(Scot)	7	15	13	.	.	.	.	.	.	.	.	.	.	.
Japan			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total	991	1755	985	744	1063	1185	834	763	864	932	777	636	616	484

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Denmark	72	114	56	33	33	46	85	80	91	93	86	72	69	85
Faroe Is	12	12	33	14	14	14	7	20	76	48	44	8	9	7
France	196	208	233	341	327	546	306	466	642	824	644	450	495	435
Germany	.	.	.	.	.	.	.	.	1	.	.	.	.	2
Iceland	1	1	1	1	1	.	.	1	3	4	5	3	2	3
Ireland	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Netherlands	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Norway	80	24	25	12	27	45	35	43	24	26	28	31	19	28
Portugal	.	.	3	3	2	2	1	0	1	1	1	1	1	1
Spain	23	26	30	61	40	26	46	15	21	49	17	39	23	22
Spain (Basque Country)	.	.	.	.	.	.	.	.	.	.	.	20	12	27
Sweden	10	8	5	3	3	2	2	4	3	2	2	1	1	1
UK(Eng, Wal & NI)	12	6	3	3	15	9	.	.	.	.	0	.	.	1
UK(Scot)	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Japan	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3	2	NA
Total	406	399	389	471	462	690	482	629	862	1047	827	628	633	612

Table 6.1a. (continued). Porbeagle in the NE Atlantic. Working Group estimates of porbeagle landings data (tonnes) by country (1971–2012). Data derived from ICCAT, FAO, ICES and national data. Data are considered an underestimate.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Denmark	107	73	76	42	21	20	4	3	2	2	4	0	2	3
Faroe Is	10	13	8	10	14	5	19	21	13	11	13	14	NA	0
France	273	361	339	439	394	374	246	185	347	239	305	9	2	27
Germany	0	17	1	3	5	6	5	0		2	0	0	0	0
Iceland	3	2	4	2	0	1	0	1	0	1	1	1	1	2
Ireland	8	2	6	3	11	18	3	4	8	7	3	0	0	0
Netherlands	.	0			0		0		0	0	0	0	0	0
Norway	34	23	17	14	19	24	11	27	10	12	10	12	10	17
Portugal	0	15	4	11	4	57	10	6	2	1	0	0	0	0
Spain	15	11	23	49	22	9	10	26	6	143	73	60	2	0
Sweden	1	1	1	.	.	5	0	.	1	0	0	0	0	0
Spain (Basque Country)	41	38	45	16	22	10	11	5	16	13	3	0	0	0
UK(Eng, Wal & NI)	6	7	10	7	25	24	24	11	26	14	11	0	0	0
UK(Scot)	.	.	1	.	.	.	.	.	.	1	0	2	0	0
Japan	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	0
Total	498	563	535	596	537	553	343	289	431	446	423	98	17	48

Survey on by-catch on Dutch fishing trawlers is done for a selection of the total trips.
See below: number of sampled trips in 2nd column. Total number of trips/year see 3rd column.

Tabel 5: Overzicht aantal bemonsterde reizen aan boord van pelagische vriestrawlers en het totaal aantal reizen dat is uitgevoerd door de Nederlandse pelagische vriestrawler vloot voor de periode 2003-2011 (Van Overzee & van Helmond, 2010; 2012; Van Helmond & van Overzee 2009; 2010)

Jaar	Aantal bemonsterde reizen	Totaal aantal reizen Nederlandse vloot
2003	5	131
2004	6	131
2005	12	142
2006	12	122
2007	12	124
2008	12	110
2009	11	93
2010	8	91
2011	15	77

Tabel 6: Bycatch of sharks on fishing trawlers (in ton (1000 kg) or numbers (individu) (Van Overzee & van Helmond, 2012; 2011; Van Helmond & van Overzee 2010; 2009)

Tabel 6: Overzicht van de waargenomen haaien bijvangsten (uitgedrukt in tonnage of aantallen) gedurende de waarnemersreizen aan boord van pelagische vriestrawlers (Van Overzee & van Helmond, 2012; 2011; Van Helmond & van Overzee 2010; 2009)

Engelse naam	Wetenschappelijke naam	2003	2004	2005	2006	2007	2008	2009	2010	2011
Common thresher	*Alopias vulpinus*									<0.1 ton
Basking shark	*Cetorhinus maximus*						1 individu			1 individu
Smooth-hound	*Mustelus sp.*									<0.1 ton
Blue shark	*Prionace glauca*									1 individu
Lesser-spotted dogfish	*Scyliorhinus canicula*									<0.1 ton
Spurdog	*Squalus acanthias*					<0.1 ton				0.1 ton

Fishermen are obligatory to report numbers and duration of the fishing trips on sea as well the number of caught fishes. Sharks and rays are usually caught only as by-catch.

Since 2008 it is obligatory for Dutch fishermen to report species and weight of caught rays. See below: table 7 for shark species, table 8 for ray species (numbers are in tonnes):

Tabel 7: Overzicht van de Nederlandse aanlandingsgegevens van haaien (uitgedrukt in ton)

Engelse naam	Wetenschappelijke naam	2007	2008	2009	2010	2011
Common thresher	*Alopius vulpinus*	0.1				
Coral catshark	*Atelomycterus marmoratus*				5.4	
Dusky shark	*Carcharhinus obscurus*		0.1	0.8		0.1
Kitefin shark	*Centroscymnus coelolepis*				1.4	0.4
Portuguese dogfish	*Dalatias licha*				2.9	
Tiger shark	*Galeocerdo cuvier*			37.1	36.3	47.3
Tope	*Galeorhinus galeus*				2.1	17.7
Porbeagle	*Lamna nasus*	0.2			0.2	
Common smooth-hound	*Mustelus mustelus*				134	568
Smooth-hound	*Mustelus* sp.			2.4	8.4	2.6
Blue shark	*Prionace glauca*	0.7	0.1	0.7		
Catsharks	*Scyliorhinidae*					0.1
Lesser-spotted dogfish	*Scyliorhinus canicula*	31.6	29.2	0.1	0.8	0.6
Catsharks	*Scyliorhinus* sp.					0.8
Dogfish	*Squalidae* sp.				5.2	0.8
Spurdog	*Squalus acanthias*	24.8	18.4	5.1	6.5	0.7

Tabel 8: Overzicht van de Nederlandse aanlandingsgegevens van roggen (uitgedrukt in ton)

Engelse naam	Wetenschappelijke naam	2007	2008	2009	2010	2011
Thorny skate	*Amblyraja radiata*			<0.1		
Common skate	*Dipturus batis*		<0.1			<0.1
Sandy ray	*Leucoraja circularis*		0.1			
Cuckoo ray	*Leucoraja naevus*		0.2	0.4	0.3	
Blonde ray	*Raja brachyura*		16.9	8.2	11.0	13.5
Thornback ray	*Raja clavata*		196.6	178.3	205.1	97.6
Spotted ray	*Raja montagui*		240.6	199.7	182.4	108.2
	Rajidae sp.	677.4	64.1	2.6	4.2	5.2

CARRIBEAN ISLANDS (total catch in tons, this can be: landings but also caught fish which is not landed, not harvested):

Tabel 16: Overzicht haaienvangsten in CRFM gebied (2000-2009), zoals gerapporteerd aan ICCAT (Singh-Renton 2010)

Engelse naam	Vangst (t) (gesommeerd voor de periode 2000-2009)
Dogfish sharks, unclassified	16821
Atlantic sharpnose shark	3849
Smooth hounds, unclassified	2499
Various sharks, unclassified	1210
Blacktip shark	850
Blue shark	770
Smalltail shark	753
Smooth hammerhead	320
Shortfin mako	93
Ground sharks	60
Hammerhead sharks, unclassified	57
Tiger shark	32
Thresher sharks, unclassified	18
Nurse shark	14
Thresher shark	10
Longfin mako	7
Sand tiger shark	6
Great hammerhead	3
Lemon shark	3
Oceanic whitetip shark	2
Bull shark	1
Nurse sharks, unclassified	1

OBSERVATIONS OF SHARK AND RAY SPECIES:

CARRIBEAN SEA:

Tabel 1: Voorkomende haaiensoorten in de Caribisch Nederlandse EEZ en hun status volgens internationale (CITES, CMS) en regionale (SPAW) verdragen en de IUCN Rode Lijst van bedreigde soorten. X=waargenomen soorten (27 soorten, zie referenties), *=overige potentieel aanwezige soorten volgens de IUCN Shark Specialist Group (4 haaiensoorten en 2 roggensoorten, N.Dulvy pers. comm.). Omdat de referenten in Caribisch Nederland expliciet gevraagd was naar haaien, ontbreken hun waarnemingen van roggen.
Zie voor een toelichting van de categorieën van CITES en CMS Bijlage IV van dit rapport. Zie voor toelichting van SPAW in paragraaf "regionale wetgeving" van dit rapport. IUCN Red List categorieën van met uitsterven bedreigde soorten zijn: CR=Critically Endangered; EN=Endangered; VU=Vulnerable. Overige categorieën zijn: NT=Near Threatened; LC=Least Concern en DD=Data Deficient. De leefomgeving geeft aan welke soorten een pelagische leefomgeving hebben. P=oceanic en SP=Semipelagic (Camhi et al. 2009). Een pelagische leefomgeving is een indicatie dat waarnemingen van deze soorten zeldzamer zijn en dat het migrerende soorten betreft die kwetsbaarder zijn voor (bij)vangst in de pelagische visserij.

		Aanwezige haaiensoorten per eiland						Status per soort				
Populaire naam (Engelse 'common name')	**Wetenschappelijke naam**	**Aruba**	**Bonaire**	**Curaçao**	**Saba**	**St. Eustatius**	**St. Maarten**	**CITES** [13]	**CMS**	**SPAW** [14]	**IUCN**	**Leefomgeving**
Family: Whale sharks – *Rhincodontidae*												
1. Whale shark	*Rhincodon typus*	X(1,2)	X(1,3)	X (1)	X (1)	X (1)	X(1,9)	II	II	(II)	VU	P
Family: Nurse sharks – *Ginglymostomatidae*												
2. Nurse shark	*Ginglymostoma cirratum*	X (2)	X (3)	X (4)	X(7,8)	X (10)	X[1](9)				DD	
Family: Requiem sharks – *Carcharhinidae*												
3. Caribbean reef shark	*Carcharhinus perezi*	X (2)	X (3)		X(7,8)	X (10)	X[2](9)			(II)	NT	
4. Blacktip shark	*Carcharhinus limbatus*	X (2)			X (8)		X[3](9)				NT	SP
5. Lemon shark	*Negaprion brevirostris*	X (2)		X (4)			X[4](9)				NT	
6. Bull Shark	*Carcharhinus leucas*	X (2)	X (3)		X (8)	X (10)	X[5](9)				NT	SP
7. Tiger Shark	*Galeocerdo cuvier*	X (2)	X (12)		X(7,8)	X (10)	X[6](9)				NT	SP
8. Oceanic white-tip shark	*Carcharhinus longimanus*	X (2)		X (4)						(II)	VU	P
9. Silky shark	*Carcharhinus falciformis*			X (4)							NT	P
10.Blue shark	*Prionace glauca*			X (4)							NT	P
*Blacknose reef shark	*Carcharhinus acronotus*	*	*	*	*	*	*				NT	
*Brazilian sharp-nose shark	*Rhizoprionodon lalandii*	*	*	*	*	*	*				DD	
*Caribbean sharp-nose shark	*Rhiziprionodon porosus*	*	*	*	*	*	*				LC	

Tabel 1: Vervolg

Populaire naam (Engelse 'common name')	Wetenschappelijke naam	Aanwezige haaiensoorten per eiland						Status per soort				Leefomgeving
		Aruba	Bonaire	Curaçao	Saba	St. Eustatius	St. Maarten	CITES (13)	CMS	SPAW (14)	IUCN	
Family: Hammerhead sharks – *Sphyrnidae*												
11.Smooth hammerhead	*Sphyrna zygaena*	X (2)								(II)	VU	SP
12.Scalloped hammerhead	*Sphyrna lewini*	X (2)		X (11)				III		(II)	EN	SP
13.Greater hammerhead	*Sphyrna mokarran*	X (2)					X?(9)			(II)	EN	SP
14.Bonnethead shark	*Sphyrna tiburo*	X (2)		X (5)							LC	
Hammerhead unspecified	*Sphyrna spp.*		X (3)	X (4)	X (8)							
Family: Mackerel sharks – *Lamnidae*												
15.Shortfin mako	*Isurus oxyrinchus*	X (2)							II	(II)	VU	P
Family: Thresher sharks – *Alopiidae*												
16.Thresher shark	*Alopias vulpinus*	X (2)								(II)	VU	P
17.Bigeye thresher	*Alopias superciliosus*	X (2)								(II)	VU	P
Family: Six/sevengill sharks – *Hexanchidae*												
18.Big-eyed sixgill shark	*Hexanchus nakamurai*			X(4,5)	X (8)						DD	
Family: Sawfishes – *Pristidae*												
19.Smalltooth sawfish	*Pristis pectinata*			X(4,6)				I		(II)	CR	
Family: Dogfish sharks – *Squalidae*												
20.Cuban dogfish shark	*Squalus cubensis*			X (4)	X (7)						DD	
Family: Kitefin sharks – *Dalatiidae*												
21.Cookiecutter shark	*Isistius brasiliensis*			X (5)							LC	P
Family: Lantern sharks – *Etmopteridae*												
22.Lined lanternshark	*Etmopterus bullisi*				X (7)						LC	SP
Family: Houndsharks – *Triakidae*												
23.Houndshark unspecified	Triakis spp.			X (4)								

Tabel 1: Vervolg

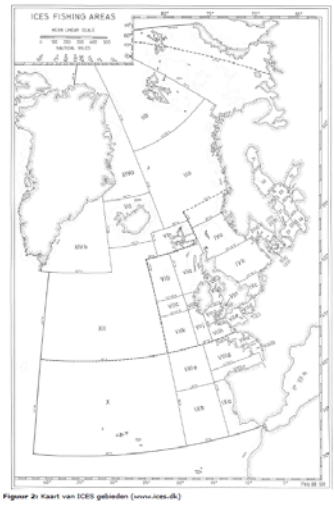
Populaire naam (Engelse 'common name')	Wetenschappelijke naam	Aanwezige haaiensoorten per eiland						Status per soort				Leefomgeving
		Aruba	Bonaire	Curaçao	Saba	St. Eustatius	St. Maarten	CITES (13)	CMS	SPAW (14)	IUCN	
Family: Catsharks - *Scyliorhinidae*												
24.Hoary catshark	Apristurus canutus	*	*	X (5)	*	*	*				DD	
*Boa catshark	Scyliorhinus boa	*	*	*	*	*	*				DD	
Family: Stingrays - *Dasyatidae*												
*Chupare stingray	Himantura schmardae	*	*	*	*	*	*				DD	
*Bluntnose stingray	Dasyatis say	*	*	*	*	*	*				LC	
25.Spotted eagle ray	*Aetobatus narinari*	X	X (5)	X (5)	X	X	X				DD	
26.Southern stingray	*Dasyatis americana*	X	X (5)	X (5)	X	X	X				DD	
Family: Manta/devil rays - *Myliobatidae*												
27.Giant manta ray	Manta birostris	*	X (9)	*	*	*	*		I,II	(II)	VU	P

(1) 24 waarnemingen in de afgelopen 50 jaar, 4 op de Bovenwindse Eilanden en 20 op de Benedenwindse Eilanden, waarvan het merendeel (67%) in de laatste 5 jaar (Debrot et al. in press)
(2) Waarnemingen door de afdeling Visserij op Aruba in de afgelopen 20 jaar. Deze soorten waren bijvangst en zijn officieel geïdentificeerd door de afdeling Visserij. Er zijn meldingen van meer soorten, maar deze zijn niet met zekerheid geïdentificeerd en niet opgenomen in deze lijst (B. Boekhoudt, pers. comm.)
(3) Waarnemingen door de Bonaire National Marine Park Manager in de afgelopen 15 jaar. Details van tijd en plaats: Whale sharks in 2001 (Klein Bonaire en 18th Palm), Hammerheads in 2000 (Oostkust) en 2002 (Belnem), Bull sharks in 2002 (Oostkust en Lac) en 2012 (ingang Harbour Village Marine), 15-20 Caribbean reef sharks in de afgelopen 15 jaar, 25-30 Nurse sharks in de afgelopen 15 jaar (vooral aan de Oostkust en Washington Slagbaai National Park), niet geïdentificeerde grote groep van 40-50 haaien in 2010 (3 mijl uit de kust van Cargil) (R. de Leon, pers. comm.)
(4) Waarnemingen door het afdelingshoofd Visserij op Curaçao. Details van tijd en plaats: Oceanic white tip in de jaren 60 (bij de haven) en in de jaren 70 (op zee), Silky sharks voorheen regelmatig, Lemon sharks (Oostpunt lagune), Hammerhead sharks dagelijks in de jaren 70 en soms tegenwoordig, Tiger shark in 2011 (Patrick). Cuban dogfish shark, houndshark species, Sixgill shark species en soms Nurse sharks worden gevangen als bijvangst (G. van Buurt, pers. comm.). Overige waarnemingen door G. van Buurt: Smalltooth sawfish in de jaren 70 (St. Jorisbaai), Blue shark en Bigeyed sixgill shark (A. Debrot, pers. comm.)
(5) Waarnemingen door A. Debrot op Curaçao en Bonaire tussen 1990 en 1995. Details van tijd en plaats: Big-eyed sixgill shark en Cuban dogfish shark in 2000 met de Johnson Sea-Link submarine duikcruise op de Benedenwindse Eilanden (A. Debrot, pers. comm. en cruise reports). Cookiecutter shark (Debrot en Barros 1991)

(6) Waarneming door Boeke in 1904 in Schottegat Curaçao (A. Debrot, pers. comm.)
(7) (Williams et al. 2010)
(8) Waarnemingen op Saba en de Saba Bank door I. van Beek, A. Debrot en M. de Graaf en op Bonaire door I. van Beek.
(9) Waarnemingen door de St. Maarten Nature Foundation Marine Park Manager. Details van frequenties: Whale shark in oktober 2010 (gemeld, maar niet met zekerheid vastgesteld). Overige soorten worden minstens eenmaal per jaar waargenomen, waarbij de notatie $X^{1,2,,3,\text{etc.}}$ de frequentie van de waarnemingen van hoog naar laag weergeeft (T.Bervoets, pers. comm.)
(10) Waarnemingen door de St. Eustatius National Park Foundation Manager tussen 2003 en 2010 (N. Esteban, pers. comm.)
(11) Antilliaans Dagblad 19 maart 2007
(12) Gevangen door A. Debrot Sr. in de jaren 50 in Washington Slagbaai (A. Debrot, pers. comm.)
(13) CITES bijlagen I, II en III bevatten 3 haaiensoorten die in Caribisch Nederland voorkomen. De Scalloped hammerhead in bijlage III is toegevoegd aan de aangepaste bijlagen per 25 September 2012 door Costa Rica.
(14) SPAW bijlagen vermelden momenteel geen haaiensoorten. De revisie van de lijst met beschermde soorten die ter overweging wordt genomen in de COP7 in oktober 2012 bevat wel diverse haaiensoorten in bijlage II (vermeldt tussen haakjes).

NOTH EAST ATLANTIC OCEAN:

Map:



Figuur 2: Kaart van ICES gebieden (www.ices.dk)

SHARKS:

Tabel 3: Overzicht van alle haaiensoorten die in het rapport van de Elasmobranchen Werkgroep (WGEF) van ICES genoemd worden (ICES, 2012) en de daarbij behorende IUCN rode lijst status (NE="Not Evaluated", DD="Data Deficient", LC="Least Concern", NT="Near Threatened", VU="Vulnerable", EN="Endangered", CR="Critically Endangered", EW="Extinct in the Wild", n.a.=not yet assessed) (www.iucnredlist.org) en hun status volgens internationale verdragen CMS en CITES. Zie voor een toelichting van de verdragen Bijlage IV van dit rapport.

Engelse naam	Wetenschappelijke naam	IUCN rode lijst	CMS	CITES
Familie *Alopiidae* (Thresher sharks)				
Bigeye thresher	*Alopias superciliosus*[3]	VU		
Common thresher	*Alopias vulpinus*[3]	VU		
Familie *Carcharhinidae* (Requiem sharks)				
Spinner shark	*Carcharhinus brevipinna*[3]	NT		
Silky shark	*Carcharhinus falciformis*[3]	NT		
Oceanic whitetip shark	*Carcharhinus longimanus*[3]	VU		
Dusky shark	*Carcharhinus obscurus*[3]	VU		
Sandbar shark	*Carcharhinus plumbeus*[3]	VU		
Night shark	*Carcharhinus signatus*[3]	VU		
Tiger shark	*Galeocerdo cuvier*[3]	NT		
Blue shark	*Prionace glauca*[3]	NT		
Familie *Centrophoridae* (Gulper sharks)				
Gulper shark	*Centrophorus granulosus*[1]	VU		
Leafscale gulper shark	*Centrophorus squamosus*[1]	VU		
Birdbeak dogfish	*Deania calcea*[1]	LC		
Rough longnose dogfish	*Deania hystricosa*[1]	DD		
Arrowhead dogfish	*Deania profundorum*[1]	LC		
Familie *Centorhinidae* (Basking sharks)				
Basking shark	*Cetorhinus maximus*[3]	VU	Appendix I,II	Appendix II
Familie *Chlamydoselachidae* (Frilled sharks)				
Frilled sharks *nei*	*Chlamydoselachus* spp.[1]			
Familie *Dalatiidae* (Sleeper sharks)				
Kitefin shark	*Dalatias licha*[1]	NT		
Familie *Etmopteridae* (Lantern sharks)				
Black dogfish	*Centroscyllium fabricii*[1]	LC		
Great lanternshark	*Etmopterus princeps*[1]	DD		
Velvet belly shark	*Etmopterus spinax*[1]	LC		
Lantern sharks *nei*	*Etmopterus* spp.[1]			

Tabel 3: Vervolg

Engelse naam	Wetenschappelijke naam	IUCN rode lijst	CMS	CITES
Familie *Hexanchidae* (Cow sharks)				
Bluntnose sixgill shark	*Hexanchus griseus*[1]	NT		
Familie *Lamnidae* (Mackerel sharks or white shark)				
White shark	*Carcharodon carcharias*[3]	VU	Appendix I,II	Appendix II
Shortfin mako	*Isurus oxyrinchus*[3]	VU	Appendix II	
Longfin mako	*Isurus paucus*[3]	VU	Appendix II	
Porbeagle	*Lamna nasus*[3]	VU	Appendix II	Appendix III
Familie *Pseudotriakidae* (False catsharks)				
False catshark	*Pseudotriakis microdon*[1]	DD		
Familie *Scyliorhinidae* (Catsharks)				
Iceland catshark	*Apristurus* spp.[1]			
Smalleye catshark	*Aspisturus microps*[1]	LC		
Blackmouth catshark	*Galeus melastomus*[1]	LC		
Mouse catshark	*Galeus murinus*[1]	LC		
Lesser-spotted dogfish	*Scyliorhinus canicula*[2]	LC		
Nursehound	*Scyliorhinus stellaris*[2]	NT		
Familie *Somniosidae* (Sleeper sharks)				
Portuguese dogfish	*Centroscymnus coelolepis*[1]	NT		
Longnose velvet dogfish	*Centroselachus (Centroscymnus) crepdiater*[1]	LC		
Smallmouth velvet dogfish	*Scymnodon obscurus*[1]	n.a.		
Knifetooth dogfish	*Scymnodon ringens*[1]	DD		
Greenland shark	*Somniosus microcephalus*[1]	NT		
Velvet dogfish	*Zameus squamulosus*[1]	DD		
Familie *Sphyrnidae* (Hammerhead, bonnethead, or scoophead sharks)				
Scalloped hammerhead	*Sphyrna lewini*[3]	EN		Appendix III
Great hammerhead	*Sphyrna mokarran*[3]	EN		
Smooth hammerhead	*Sphyrna zygaena*[3]	VU		
Familie *Squalidae* (Dogfish)				
Spurdog	*Squalus acanthias*[4]	VU	Appendix II	
Familie *Oxynotidae* (Rough sharks)				
Sailfin roughshark	*Oxynotus paradoxus*[1]	DD		

Tabel 3: Vervolg

Engelse naam	Wetenschappelijke naam	IUCN rode lijst	CMS	CITES
Familie Squatinidae (Angel sharks)				
Angel shark	*Squatina squatina*[2]	CR		
Familie Triakidae (Houndsharks)				
Tope	*Galeorhinus galeus*[3]	VU		
Starry smooth-hound	*Mustelus asterias*[2]	LC		
Common smooth-hound	*Mustelus mustelus*[2]	VE		

[1]Diepwater haai
[2]Demersale haai
[3]Pelagische haai
[4]Bentho-pelagische haai

RAYS:

Tabel 4: Overzicht van alle roggen die in het rapport van de Elasmobranchen Werkgroep (WGEF) van ICES genoemd worden (ICES, 2012) en de daarbij behorende IUCN rode lijst status (NE="Not Evaluated", DD="Data Deficient", LC="Least Concern", NT="Near Threatened", VU="Vulnerable", EN="Endangered", CR="Critically Endangered", EW="Extinct in the Wild", n.a.=not yet assessed) (www.iucnredlist.org) en hun status volgens internationale verdragen CMS (www.cms.int) en CITES (www.cites.org). Zie voor een toelichting van de verdragen Bijlage IV van dit rapport.

Engelse naam	Wetenschappelijke naam	IUCN rode lijst	CMS	CITES
Familie *Dasyatidae* (Stingrays)				
Common stingray	*Dasyatis pastinaca*	DD		
Familie *Rajidae* (Skates)				
Arctic skate	*Amblyraja hyperborea*	LC		
Jensen's skate	*Amblyraja jenseni*	LC		
Thorny skate	*Amblyraja radiata*	VU		
Pallid skate	*Bathyraja pallida*	LC		
Richardson's skate	*Bathyraja richardsoni*	LC		
Spinytail skate	*Bathyraja spinicauda*	NT		
Common skate	*Dipturus batis* (complex)	CE		
Sailray	*Dipturus linteus*	LC		
Norwegian skate	*Dipturus nidarosiensis*	NT		
Longnose skate	*Dipturus oxyrinchus*	NT		
Sandy ray	*Leucoraja circularis*	VU		
Shagreen ray	*Leucoraja fullonica*	NT		
Cuckoo ray	*Leucoraja naevus*	LC		
Krefft's skate	*Malacoraja kreffti*	LC		
Roughskin skate	*Malacoraja spinacidermis*	LC		
Blue pygmy skate	*Neoraja caerulae*	DD		
Blonde ray	*Raja brachyura*	NT		
Thornback ray	*Raja clavata*	NT		
Madeiran ray	*Raja maderensis*	DD		
Small-eyed ray	*Raja microocellata*	NT		
Brown ray	*Raja miraletus*	LC		
Spotted ray	*Raja montagui*	LC		
Undulate ray	*Raja undulata*	EN		
Deep-water skate	*Rajella bathyphila*	LC		
Bigelow's skate	*Rajella bigelowi*	LC		
Round skate	*Rajella fyllae*	LC		

Tabel 4: Vervolg

Engelse naam	Wetenschappelijke naam	IUCN rode lijst	CMS	CITES
Familie *Rajidae* (Skates)				
Mid-Atlantic skate	*Rajella kukujevi*	DD		
White skate	*Rostroraja alba*	EN		
Familie *Torpedinidae* (Electric rays)				
Marbled electric ray	*Torpedo marmorata*	DD		
Electric ray	*Torpedo nobiliana*	DD		

MAURITANIA:

Map: MEEZ

Tabel 9 below: Number of observations of sharks en rays as by-catch ("aantal geobserveerde trekken" = number of accompanied trips / hamerhaaien = hammerhead sharks / andere haaien = other sharkspecies). There is a difference in number of observations between researchers ("waarnemers") and trawlercrew ("bemanning")..

Tabel 9: Bijvangst van haaien (in aantallen) per 1000 trekken en het aantal geobserveerde trekken (Tabel 3.3 uit Heessen et al., 2007). De gegevens voor de periode 2001-2004 (ook gerapporteerd door Zeeberg et al. (2006)) zijn gebaseerd op waarnemingen gemaakt door (i) waarnemers van het RIVO en IMROP en (ii) de bemanning. De gegevens voor 2005-2006 zijn alleen gebaseerd op waarnemingen door de bemanning (Heessen et al., 2007).

	2001-2004		2005-2006
	Waarnemers	Bemanning	Bemanning
Devil ray[1]	142.9	49.3	13.1
Hamerhaaien	508.7	194.5	72.8
Andere haaien	179.4	92.0	16.8
Aantal geobserveerde trekken	574	761	1072

[1]Zeeberg et al. (2006) heeft ten onrechte waarnemingen van *Manta birostris* gerapporteerd, dit moet devil-ray *Mobula mobula* zijn.

Tabel 10 below: observations of shark species in Mauretania.

Tabel 10: Overzicht van alle haaiensoorten die tijdens het waarnemingsprogramma in de periode 2001-2006 zijn waargenomen (ter Hofstede et al., 2004)

Engelse naam	Wetenschappelijke naam
Familie *Alopiidae* (Thresher sharks)	
Bigeye thresher	*Alopias profundus**
Thresher	*Alopias* sp.
Common thresher	*Alopias vulpinus*
Familie *Carcharhinidae* (Requiem sharks)	
Requiem shark	*Carcharhinidae*
Blacktip shark	*Carcharhinus limbatus*
Dusky shark	*Carcharhinus obscurus*
Blue shark	*Prionace glauca*
Milk shark	*Rhizoprionodron acutus*
Familie *Hexanchidae* (Cow sharks)	
Sharpnose sevengill shark	*Heptranchias perlo*
Bluntnose sixgill shark	*Hexancheus griseus*
Familie *Lamnidae* (Mackerel sharks or white sharks)	
Shortfin mako	*Isurus oxyrinchus*
Familie *Leptochariidae* (Barbeled houndsharks)	
Barbeled houndshark	*Leptocharias smithii*
Familie *Sphyrnidae* (Hammerhead, bonnethead, or scoophead sharks)	
Scalloped hammerhead	*Sphyrna lewini*
Great hammerhead	*Sphyrna mokarran*
Hammerhead	*Sphyrna* sp.
Smooth hammerhead	*Sphyrna zygaena*
Familie *Somniosidae* (Sleeper sharks)	
Smallmouth velvet dogfish	*Scymnodon obscurus*
Familie *Triakidae* (Houndsharks)	
Common smooth-hound	*Mustelus mustelus*

* Ookwel: *Alopias superciliosus*

Tabel 11 below: observations of ray species in Mauretania.

Tabel 11: Overzicht van alle roggensoorten die tijdens het waarnemingsprogramma in de periode 2001-2006 zijn waargenomen (ter Hofstede et al., 2004)

Engelse naam	Wetenschappelijke naam
Familie *Dasyatidae* (Stingrays)	
Roughtail stingray	*Dasyatis centroura*
Familie Myliobatidae (Eagle and manta rays)	
Devil-ray	*Mobula mobula*
Devil-ray	*Mobula* sp.
Lusitanian cownose ray	*Rhinoptera marginata*
Familie *Rajidae* (skates)	
Brown ray	*Raja miraletus*
Skates	*Rajidae* sp.
Familie *TorpinidaeI* (Electric rays)	
Common torpedo	*Torpedo torpedo*
Electric ray	*Torpinidae*

PACIFIC (CHILE a.o.)

EU By-catch by trawlers from Netherlands, Germany, Lithuania and Poland.

Tabel 12: Officieel aan SPRFMO (*South Pacific Regional Fisheries Management Organisation*) gerapporteerde vangsten , nr = niet gerapporteerd, na = niet beschikbaar.

Engelse naam	Wetenschappelijke naam	2007	2008	2009	2010	2011
Widenose guitarfish	*Rhinobatos obtusus*	13 ton	nr	478 ton	nr	na
Bony fish & kitefinshark	*Osteichthyes & Dalatias licha*	nr	916 ton	2277 ton	292 ton	na

Reported by-catch by Chile:

Tabel 13: Overzicht van Chileense haaienvangsten (Bron: IFOP)

Engelse naam	Wetenschappelijke naam
Shortfin mako	*Isurus oxyrinchus*
Porbeagle	*Lamna nasus*
Pelagic stingray	*Pteroplatytrygon violacea*
Blue shark	*Prionace glauca*
Crocodile shark	*Pseudocarcharias kamoharai*
Common thresher	*Alopias vulpinus*
Bigeye thresher	*Alopias supercilliosus*

Reported by-catch by Peru:

Tabel 14: Overzicht van Peruaanse haaienvangsten voor de periode 1997-2011 (Bron: IMARPE)

Engelse naam	Wetenschappelijke naam	% van totale haaienvangst
Blue shark	*Prionace glauca*	38.4
Shortfin mako	*Isurus oxyrinchus*	18.4
Smooth hammerhead	*Sphyrna zygaena*	13.9
Humpback smooth-hound	*Mustelus whitneyi*	6.0
Peruvian eagle ray	*Myliobatis peruvianus*	6.3
Common thresher	*Alopias vulpinus*	5.5
Chilean eagle ray	*Myliobatis chilensis*	2.5
Other		9

Tabel 10: Overzicht van alle haaiensoorten die tijdens het waarnemingsprogramma in de periode 2001-2006 zijn waargenomen (ter Hofstede et al., 2004)

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Blacktip shark	*Carcharhinus limbatus*
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Milk shark	*Rhizoprionodron acutus*
Familie *Hexanchidae* (Cow sharks)	
Sharpnose sevengill shark	*Heptranchias perlo*
Bluntnose sixgill shark	*Hexancheus griseus*
Familie *Lamnidae* (Mackerel sharks or white sharks)	
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Barbeled houndshark	*Leptocharias smithii*
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Familie *Somniosidae* (Sleeper sharks)	
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Familie *Triakidae* (Houndsharks)	
Common smooth-hound	*Mustelus mustelus*

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Brown ray	*Raja miraletus*
Skates	*Rajidae* sp.
Familie *TorpinidaeI* (Electric rays)	
Common torpedo	*Torpedo torpedo*
Electric ray	*Torpinidae*

CITES Scientific Authority The Netherlands
Pieter Joop, 29 January 2014.

(English only/únicamente en inglés/ seulement en anglais)

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Ref: 16/6/5/3/4
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Mr J Scanlon
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Switzerland

Fax: +41-(0)22-797-34-17

Dear Mr Scanlon

REPORT ON THE NATIONAL PLAN OF ACTION (NPOA) FOR THE CONSERVATION AND MANAGEMENT OF SHARKS IN SOUTH AFRICA IN RESPONSE TO CITES NOTIFICATION 2013/056

CITES Notification 2013/056 refers.

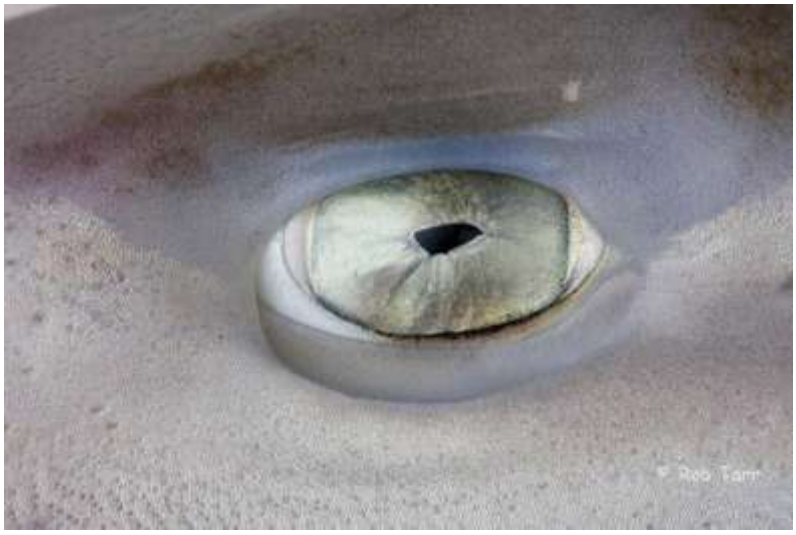
Please find attached the South African NPOA (draft) for the Conservation and Management of Sharks which was published for public comment in August 2012 and was launched at the gala dinner of the International Commission for the Conservation of Atlantic Tunas (ICCAT) Commission meeting held in Cape Town in November 2013. The implementation thereof is now being planned by all relevant directorates within the Department of Agriculture, Forestry and Fisheries, who is responsible for commercial fisheries management in South Africa. As soon as the final NPOA,as adopted has been published, a copy will be send to you.

Yours sincerely

Ms Nosipho Ngcaba
Director-General
Department of Environmental Affairs
Letter signed by: Ms Thea Carroll
Designation: Director: TOPS and CITES
Date: 2014-01-31

South Africa's National Plan of Action for the Conservation and Management of Sharks 2012

DRAFT 20.03.2012



agriculture,
forestry & fisheries

Department:
Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

SOUTH AFRICA

NATIONAL PLAN OF ACTION for the Conservation and Management of Sharks (NPOA-Sharks)

1 EXECUTIVE SUMMARY

The global increase of shark catches raises concern about the sustainability of these resources. Sharks share live history characteristics that make them susceptible to overexploitation. Not only are sharks often caught as by-catch in fisheries that are managed for species that can sustain a higher fishing pressure, sharks form a large part of the unwanted by-catch that is discarded at sea, much of which is unrecorded and unregulated, which complicates the management of these resources. Taking cognisance of these concerns, the FAO committee on Fisheries held a number of expert meetings in 1998 and developed an International Plan of Action for Conservation and Management of Sharks (IPOA sharks). The guideline is to promote the conservation and management of sharks and their long term sustainable use, and is based on principles of the Code of Conduct for Responsible Fisheries, to which South Africa is a signatory. To achieve this goal the IPOA-Sharks recommended that member states of the FAO should develop a voluntary National Plan of Action for the Conservation and Management of Sharks (NPOA-Sharks). South Africa has one of the most diverse shark faunas in the world and many species are caught in appreciable quantities in directed and non-directed shark fisheries. South Africa has well developed fisheries management systems for most of its fisheries and many challenges with regard to the sustainable management and conservation of sharks have already been indentified and addressed in individual fisheries policies and management measures. The South African National Plan of Action for sharks (NPOA-Sharks) provides information on the status of chondrichthyans in South Africa and examines structure, mechanisms and regulatory framework related to research, management, monitoring, and enforcement associated with shark fishing and trade of shark product in the South African context. This information is then used to identify, group and prioritize issues particular to the South African chondrichthyan resources that require intervention in the form of specific actions with associated responsibilities and time frames. Once adopted, this voluntary guideline will provide a mechanism for identifying and resolving the outstanding issues around management and conservation of sharks to ensure their optimal, long-term, sustainable use for the benefit of all South Africans.

2 ACRONYMS

CCAMLR:	Commission for the Conservation of Antarctic Marine Living Resources
CCSBT:	Commission for the Conservation of Southern Bluefin Tuna
COFI:	FAO Committee on Fisheries
DAFF:	Department of Agriculture, Forestry and Fisheries
EAF WG:	Ecosystem Approach to Fisheries Working Group
EEZ:	Exclusive Economic Zone
FAO:	Food and Agriculture Organisation
ICCAT:	International Commission for the Conservation of Atlantic Tunas
IOTC:	Indian Ocean Tuna Commission
IPOA-Sharks:	International Plan of Action for the Conservation and Management of Sharks
IUU Fishing:	Illegal, Unregulated and Unreported Fishing
MCS:	Monitoring, Compliance and Surveillance
MLRA	Marine Living Resources Act
MLRF:	Marine Living Resources Fund
MRM:	Marine Resources Management
MSC:	Marine Stewardship Council
NPOA-Sharks:	National Plan of Action for Sharks
PEI:	Prince Edward Islands
RR:	Resources Research
SABS:	South African Bureau of Standards
SAR:	Shark Assessment Report
TAC:	Total Allowable Catch
TAE:	Total Allowable Effort
VMS:	Vessel Monitoring System

3 GLOSSARY

ABUNDANCE: Degree of plentifulness. The total number of fish in a population or a stock.

BIODIVERSITY: the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems. [Convention on Biological Diversity].

BIOMASS: or standing stock. The total weight of a group or stock of living organisms, or of some defined fraction of it, in an area at a particular time.

BY-CATCH: Part of a catch of a fishing unit taken incidentally in addition to the target species towards which fishing effort is directed. Catch may be retained or returned to the ocean as discards, usually dead or dying.

CATCH: The total number (or weight) of fish caught by fishing operations. Catch should include all fish killed by the act of fishing, not just those landed.

COLLAPSE: Reduction of a stock abundance by fishing and / or other causes to levels at which the production is negligible compared to historical levels.

CONSERVATION: Of natural resources. The protection, improvement, and use of natural resources according to principles that will assure their highest economic or social benefits for man and his environment now and into the future.

DEMERSAL: Living in close relation with the bottom and depending on it. Example: Cods, Groupers and lobsters are demersal resources. The term "demersal fish" usually refers to the living mode of the adult.

DIRECTED FISHERY: Fishing that is directed at a certain species or group of species. This applies to both sport fishing and commercial fishing.

DISCARD: To release or return fish to the sea, dead or alive, whether or not such fish are brought fully on board a fishing vessel.

ECOTOURISM: Travel undertaken to witness the unique natural or ecological quality of particular sites or regions, including the provision of services to facilitate such travel.

FINNING: The practice of removing fins and discarding the carcass, usually pertaining to sharks.

FISHING EFFORT: Measure of the amount of fishing.

HABITAT: means any area which contains suitable living conditions for a species.

HIGHLY MIGRATORY SPECIES OR STOCKS: Marine species whose life cycle includes lengthy migrations, usually through the EEZ of two or more countries as well as into international waters.

JOINT PRODUCT: Term used to describe the utilisation of by-catch species.

LONGLINE: A fishing gear in which short lines carrying hooks are attached to a longer main line at regular intervals. Longlines are either laid on the bottom or suspended horizontally at a predetermined depth with the help of surface floats.

MANAGMENT: The art of taking measures affecting a resource and its exploitation with a view to achieving certain objectives, such as the maximization of the production of that resource. Management includes, for example, fishery regulations such as catch quotas or closed seasons.

MIGRATION: Systematic (as opposed to random) movement of individuals of a stock from one place to another, often related to season. A knowledge of the migration patterns helps in targeting high concentrations of fish and managing shared stocks.

MIGRATORY SPECIES: Species that move over national boundaries, and hence require international cooperation to enable their management.

NON-CONSUMPTIVE USE: Refers to cases where one person's enjoyment does not prevent others from enjoying the same resource. For example, the viewing of marine mammals or other wildlife does not prevent another from enjoying the same resources.

OPTIMAL: Most favourable or desirable.

PELAGIC: Sharks that frequents surface waters or occur in the water column, not associated with the bottom but may make diurnal migrations between the surface and the ocean floor.

PRECAUTIONARY APPROACH: The precautionary principle is that lack of full scientific certainty should not be used as a reason for postponing a measure to prevent degradation of the environment where there are threats of serious or irreversible environmental damage.

REQUIEM SHARKS: Any shark of the family Carcharhinidae, predominantly grey in appearance, live-bearing and migratory.

SHARKS: For the purpose of this document the term "sharks" is used to describe all chondricthyans (sharks, skates, chimeras and rays).

STAKEHOLDER: An actor having a stake or interest in a physical resource, ecosystem service, institution, or social system, or someone who is or may be affected by a public policy.

STOCK: Fish stocks are subpopulations of a particular species of fish, for which intrinsic parameters (growth, recruitment, mortality and fishing mortality) are the only significant factors in determining population dynamics, while extrinsic factors (immigration and emigration) are considered to be insignificant.

4 TABLE OF CONTENTS

5 INTRODUCTION

There is international concern over the global increase of shark catches. Sharks are particularly vulnerable to overexploitation due to closed stock-recruitment relationships, low biological productivity, and complex spatial structures. Sharks are often caught as by-catch in fisheries that are managed for species that can sustain a higher fishing pressure and sharks form part of the unwanted by-catch that is discarded at sea, much of which is unrecorded and unregulated. Fishing is therefore regarded as the single largest threat to shark populations. Noting these concerns, the FAO Committee on Fisheries (COFI) developed in 1998 an International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks) within the framework of the Code of Conduct for Responsible Fisheries to which South Africa is a signatory. The IPOA-sharks is a voluntary instrument which encourages states to conduct a Shark Assessment Report (SAR) and adopt a National Plan of Action for Sharks (NPOA- sharks) if their vessels conduct shark-directed fishing or if their vessels regularly catch sharks in non-directed fisheries. The objective of the IPOA-Sharks is to ensure the conservation and management of sharks and their long-term sustainable use, with the following specific aims:

i. Ensure that shark catches from directed and non-directed fisheries are sustainable;
ii. Assess threats to shark populations, determine and protect critical habitats and implement harvesting strategies consistent with the principles of biological sustainability and rational long-term economic use;
iii. Identify and provide special attention, in particular to vulnerable or threatened shark stocks;
iv. Improve and develop frameworks for establishing and coordinating effective consultation involving all stakeholders in research, management and educational initiatives within and between States;
v. Minimize unutilized incidental catches of sharks;
vi. Contribute to the protection of biodiversity and ecosystem structure and function;
vii. Minimize waste and discards from shark catches in accordance with article 7.2.2.(g) of the Code of Conduct for Responsible Fisheries (for example, requiring the retention of sharks from which fins are removed);
viii. Encourage full use of dead sharks;
ix. Facilitate improved species-specific catch and landings data and monitoring of shark catches;
x. Facilitate the identification and reporting of species-specific biological and trade data.

The IPOA-Sharks requires each state to develop, implement and monitor its NPOA-Sharks. These plans were required to be submitted to COFI in 2001 and a progress report on implementation is required every two years.

South Africa has a responsibility to develop a SAR and to adopt a NPOA-Sharks as good practice and consistent with its role as a signatory to the FAO Code of Conduct for Responsible Fisheries, it is Member Party of the International Commission for the Conservation of Atlantic Tunas (ICCAT), the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), a Co-operating Non-Contracting Party of the Indian Ocean Tuna Commission (IOTC) and the Commission for the Conservation of Southern Bluefin Tunas (CCSBT). Moreover, South Africa has one of the most diverse faunas of cartilaginous fishes (Class Chondrichthyes) in the world, accounting for 181 species (15% of the world's shark species) (Appendix 1, Species Summary) of which 27.1% are endemic to Southern Africa (Appendix 1, Species Summary). Most species are poorly understood and constitute stocks of relatively low biomass (Appendix

1, Species Summary) However, a number of species are caught in appreciable quantities in directed and non-directed shark fisheries. Directed fisheries for sharks include the demersal shark longline, St Joseph (Elephantfish) net fishery, the traditional linefish fishery, recreational linefishery, and the Kwazulu Natal Bather Protection Programme (Table 1, section 7). Important non-directed fisheries for retained shark include the tuna/swordfish longline fishery, and inshore/ offshore trawl.

The South African National Plan of Action for sharks (NPOA-Sharks) provides information on the status of chondrichthyans in South Africa as well as on structure, mechanisms and regulatory framework related to research, management, monitoring, and enforcement associated with shark fishing and trade of shark product in the South African context. This information is contained in section 7 and provides the baseline for South Africa as required by the IPOA-Sharks in terms of a Shark Assessment Report.

This information is then used to identify, group and prioritize issues particular to the South African chondrichthyan resources that require intervention in the form of specific actions with associated responsibilities and time frames in order to attain the goals set out in the vision statement:

6 VISION

"The effective conservation and management of sharks that occur in the South African EEZ to ensure their optimal, long-term, sustainable use for the benefit of all South Africans, including both present and future generations."

The NPOA-Sharks recognizes the need to determine and implement harvesting strategies consistent with the principles of biological sustainability, attained through scientifically based management, and consistent with a Precautionary Approach*. Furthermore, it strives to identify and direct attention, in particular, to vulnerable or threatened shark stocks, minimize unutilized incidental capture of sharks and contribute to the protection of biodiversity and ecosystem structure and function.

The NPOA-Sharks recognizes the potential of non-consumptive use of sharks through ecotourism activities. These aspects of use need to be explored so as to find an optimum balance between consumptive and non consumptive use, maximizing their benefits with low impact on the marine ecosystem.

Although the NPOA further recognizes that pollution, coastal development and climate change might negatively impact on sharks, the focus of the first NPOA-Sharks is fisheries related, including fisheries where sharks are caught as by-catch but not retained. The Plan is intended to have an initial implementation period of four years (2012-2015) with an annual review scheduled to determine progress. The final consultative review in year four would be used to provide the basis for a revision of the NPOA-Sharks, taking into account any new changes in fisheries.

7 BASELINE INFORMATION

7.1 SPECIES INFORMATION

The South African EEZ straddles two oceans and, if one considers the sub Antarctic Prince Edward Islands, includes all marine bio-zones, from tropical to polar. Consequently, South Africa has one of the most diverse faunas of cartilaginous fishes (Class Chondrichthyes) in the world. South African chondrichthyofauna include representatives from all 10 orders of cartilaginous fishes, 44 of the 60 families (73%), 100 out of 189 genera (53%), over 181 of the 1171 world species (15%) and 34 endemic species to southern Africa (27%) (Appendix 1) (Compagno 2000). This high level of diversity and endemism engenders South African responsibility in conserving and managing sharks that occur in South African waters and protecting those that enter South African waters periodically.

7.2 MANAGEMENT AGENCIES AND LEGISLATION

The Branch Fisheries Management, of the Department of Agriculture, Forestry and Fisheries is the lead governmental agency responsible for the management of sharks caught in South African fisheries. Fisheries Management is legally mandated to manage sharks in terms of the Marine Living Resources Act (MLRA), 1998 (Act No 18 of 1998) and the Regulations promulgated thereunder. Other additional acts that have relevance to the conservation of sharks include the National Environmental Management: Biodiversity Act, 2004 (Act No 10 of 2004), the National Environmental Management: Protected Areas Act, 2003 (Act No 57 of 2003), Dumping at Sea Control Act, 1980 (Act No 73 of 1980). Fisheries Management, in managing sharks, is supported by a number of agencies/ institutions, namely Oceans and Coast (Department of Environmental Affairs), South African National Biodiversity Institute (SANBI), Kwazulu-Natal Sharks Board, Ezemvelo KZN Wildlife, Oceanographic Research Institute, South African National Parks, Cape Nature, Bayworld, Iziko Museum of Natural History and the South African Institute for Aquatic Biodiversity (SAIAB).

7.3 CURRENT MANAGEMENT TOOLS

Fisheries Management uses various management tools which have contributed to the conservation and sustainable fishing of many shark species. Some species due to their compromised conservation status have been afforded special protection status under the Regulations of the MLRA, e.g. the great white shark and the sawfish (Pristiophoridae). In addition, spotted gully and raggedtooth sharks have been commercially delisted in terms of the Regulations of the MLRA (Appendix 2). Entry into any commercial fishery is limited by a rights allocation process, which is managed by Fisheries Management. The allocation takes into account scientific recommendations in limiting the number of vessels, crew and Total Allowable Catch (TAC) or Total Allowable Effort (TAE) for target species as well as precautionary catch limits for by-catch species. A number of coastal Marine Protected Areas (MPAs) have also been promulgated along the South African coastline with the aim of conserving biodiversity hot spots and providing harvest refuges for highly resident fishes. In so doing partial protection is afforded to some coastal shark species such as ragged tooth sharks, cow sharks, smooth hounds, cat sharks and juvenile requiem sharks. The impact of fisheries on some shark species has been reduced through permit conditions in certain fisheries e.g. tuna

pole, which prohibit the landing of shark. Recreational bag limits have been reduced to one shark per fisher per day.

7.4 HARVESTING OF SHARKS IN SOUTH AFRICA

The total South African shark catch is estimated at 3 500 t per annum (Appendix 3) and is derived from fisheries that can be divided into two principle components, that of directed and by-catch fisheries (Table 1). The first component represents fishing activities that target sharks –the demersal shark longline-, traditional line-, and St. Joseph shark net-fishery as well as the bather protection program and shark fishing for the aquarium trade. Sharks are also caught as both by-catch and as a targeted species in the large pelagic longline fishery and the recreational linefishery. For the purpose of this document, the large pelagic longline and the recreational linefishery are also regarded as targeting sharks due to the relatively high shark catch that are retained in these fisheries. The second component is represented by fisheries that catch sharks as a component of their by-catch, e.g. hake longline, inshore trawl, offshore trawl, mid-water trawl/ purse seine fishery, and the beach seine ('treknet') fishery. Appreciable shark by-catches are also made in the tuna pole, prawn trawl, patagonian toothfish and in the rock lobster trap fisheries, but the animals are not necessarily retained. In the interest of clarity, catches from fisheries that target sharks and those with appreciable by-catch are discussed separately.

Table 1. South African fisheries that have a shark component.

Fishery	Area	Main Shark Species	Target / By-catch
Demersal Shark Longline	West and South Coast	Smoothhound spp and soupfin sharks	Target
Large Pelagic Longline	Offshore to beyond EEZ	Blue and mako sharks	Target and By-catch
Bather Protection Program	East Coast	Large Carcharhinids species	Target
Traditional Linefish	Inshore to 200 m	Smoothhound spp and soupfin sharks	Target
St Joseph net	West Coast	St Joseph sharks	Target
Recreational Linefishery	Inshore to 200m	Large Carcharhinids	Target
Tuna Pole	Offshore to beyond EEZ	Blue and Mako sharks	By-catch
Hake Longline	West and South Coast to	Common smoothhound and soupfin sharks	By-catch

	500 m		
Inshore Trawl	South and East Coast to 200 m	Squalidae, Scyliorhinidae, smoothhounds spp, soupfin sharks, St Joseph and Rajids .	By-catch
Offshore Trawl	West Coast, Agulhas Bank to shelf edge (600 m depth)	Squaliform, Scyliorhinidae, soupfin sharks, Rajids and Chimeara .	By-catch
Prawn Trawl	Natal East Coast to 600 m	Carcharhinid and Sphyrnid species	By-catch
Midwater trawl	South and East Coat	Pelagic sharks	By-catch
Gill net / Beach Seine (legal and illegal)	West and South Coast	Smoothhound spp, soupfin and St. Joseph sharks	Target and by-catch
Patagonian Tooth fishery (Experimental)	Prince Edward Islands	Deep water scyliorhinids, six gills, Rajidae	By-catch
Rocklobster trap		Scyliorhinid spp	By-catch
Aquarium trade		Small Carcharhinids and Scyliorhinidae	Target

7.4.1 DIRECTED FISHERIES

7.4.1.1 DEMERSAL SHARK LONGLINE

In the 1990s, over 30 permits were issued to target shark (pelagic and demersal species combined). Many of the permits were, however, not utilized as permit holders generally held permits in other more lucrative fisheries. The initial incentive to obtain these permits was to exploit loopholes in the regulations to catch hake by longline, banned in 1990 (Crawford et al., 1993). Due to poor performance the number of permits was decreased to 11 in 2004 and finally 6 permits in 2005. Due to the steep learning curve in catching and marketing demersal sharks catches of soupfin (*Galeorhinus galeus*) and common smoothhound sharks (*Mustelus mustelus*) only increased in this fishery in 2006. In 2010 catches of sharks were as follows: soupfin (106 t), common smoothhound (110 t), bronze whaler sharks (*Carcharhinus brachyurus*) (32 t) and skates (Rajidae.) (33 t).

The current demersal shark longline is restricted to coastal waters and uses weighted longline with hooks to target soupfin, smoothhound spp, dusky (*C. obscurus*) and bronze whaler sharks. The fishery is currently restricted to a Total Applied Effort (TAE) of 6 vessels. As a precautionary measure the fishery is prohibited from fishing North of East London, where biodiversity increases and the continental shelf narrows up the East Coast of South Africa. Vessels are tracked by a Vessel Monitoring System (VMS) that directly links to the Fisheries Management base station. All landings are independently monitored and skippers are required to complete logbooks per longline set. There is generic reporting of skates and carcharhinid species. There is an overlap of species caught in this fishery with the traditional linefish fishery and the recreational fishery.

7.4.1.2 LARGE PELAGIC LONGLINE FISHERY

The large pelagic longline fishery was established in 1997 as an experimental fishery. This fishery uses pelagic longline to target swordfish (*Xiphias gladius*), yellowfin tuna (*Thunnus albacores*) and bigeye tuna (*Thunnus obesus*) along the entire coastline of South Africa. Sharks accounted for 30-40% of the catch. Blue shark (*Prionace glauca*) is the most common shark species caught followed by shortfin mako sharks (*Isurus oxyrinchus*). Other sharks caught include silky shark (*Carcharhinus falciformis*), thresher shark (*Alopias vulpinus, A. pelagicus and A. superciliosus*), oceanic whitetip (*Carcharhinus longimanus*), scalloped hammerhead (*Sphyrna lewini),* and other Carcharhinid species. The large pelagic fishery was formalized into a commercial fishery in 2005 with the allocation of 18 swordfish and 26 tuna-directed long-term fishing rights. One of the goals of the allocation was also to terminate the directed pelagic shark fishery by issuing large pelagic rights to the shark fishers. Due to an administrative oversight the amalgamation of the fisheries never occurred and seven shark fishers were granted exemptions until March 2011 to target pelagic sharks (mainly targeting blue and shortfin mako sharks). For the period 2005 to March 2011 there were two fisheries which caught pelagic shark species. During this period the large pelagic fishery was restricted to a 10% by-catch limit of sharks (i.e. sharks landings could not exceed 10% of the weight of the targeted swordfish and tuna species) and wire traces were banned. In 2010 the pelagic shark fishery landed 515 t of shortfin mako, 198 t of blue sharks, 25 t of bronze whalers and 9 t of skates. In the same year the large pelagic longline fishery landed 66 t shortfin mako and 100 t of blue sharks. In April 2011 the directed pelagic shark fishery was terminated when six shark fishers were allocated large pelagic rights.

In the current large pelagic fishery, sharks are managed under a Precautionary Upper Catch Limit (PUCL) of 2 000t per annum, based on shark catch ratios during the experimental fishery when no shark by-catch restrictions applied and extrapolating for the development of the tuna/swordfish fleet. In addition foreign charter vessels are restricted to a 10% shark by-catch limit and these vessels have 100% observer coverage. Observer coverage was targeted at 20% for domestic vessels, but due to the expiry of the observer contract with the service providers no observer coverage could be obtained for domestic vessels during 2011. Observers typically record species composition, length frequencies, live releases, and discards. All vessels in this fishery are monitored by VMS. All landings are weighed and independently monitored. Logbooks are required to be completed on set-by-set basis. All fisheries data pertaining to pelagic sharks are submitted to ICCAT and IOTC on an annual basis but South Africa's capacity to send experts to RFMO scientific meetings is still a concern. Shark finning is banned in terms of permit conditions. Landings of certain shark species are banned due to concern over their conservation status namely, silky sharks, oceanic whitetip, all thresher sharks, and all hammerhead sharks. The correct identification of some shark species by fishers and MCS personnel remain a challenge.

KWAZULU_NATAL BATHER PROTECTION PROGRAM

The bather protection fishery uses shark nets and drumlines from Richards bay to Port Edward monitored by the KZN Sharks Board. The KwaZulu-Natal shark control program is managed by the Natal Sharks Board (NSB). The objective of the program is to protect bathers and other resource users from shark attack

– principally, from those sharks that are regarded as potentially dangerous. This is achieved by reducing the local populations of the target species in designated bathing beach areas. In order to achieve this, large mesh gillnets are set off a number of designated bathing beaches along the coast of KwaZulu-Natal (KZN). Between 2005 and 2007 79 drumlines were introduced and tested to replace selection sections in an attempt minimize capture of undesired species without compromising bather protection. The species targeting include large Carcharhinids and lamnids, however other shark species, turtles and dolphins are also caught. Total average annual catch is less than 10 t. All mortalities are biologically sampled and have contributed sustantially to life-history studies. One of the problems with this fishery is that the target reference level for the fishery is set at the level that minimises attacks on bathers, without reference to biological sustainability. This target reference level may be below biological sustainable level.

7.4.1.3 TRADITIONAL LINEFISHERY

The linefishery is considered the oldest fishery to have historically targeted sharks, predominantly soupfin in the 1940's as a source for vitamin A. Post World War II sharks were targeted as a cheap source of protein for African countries. More recent catches have been driven by market demand and the seasonal availability of target teleost species. The linefish fishery was an open-access fishery until 1984. In 1985 the fishery was capped at around 3200 vessels. Focused research on linefish species in the ensuing decade had identified that many of the target teleost species were compromised. Subsequently effort levels were reduced in the fishery to a the current level of 450 vessels (and a maximum crew of 3 450), all of whom which retain access to sharks. Species targeted include soupfin, common smoothhound, hardnose smoothhound (*M. mosis*) and whitespotted smoothhound (*M. palumbes*), Carcharhinid spp. smooth hammerhead (*S. zygaena*) and Rajidae. Major shark catches in 2010 were reported as soupfin (89 t), houndsharks (25 t), Carcharhinid sharks (64 t), blue sharks (13 t) and skates (59 t).

The traditional linefish fishery operates along the entire length of the South African coastline. Vessel movements are monitored by VMS. Discharge of landings are not monitored, but land-based observers have been placed at primary harbours/ slipways to determine species composition, biological samples, and length frequencies. Daily catches are recorded in logbooks and are submitted on a monthly basis. Logbook data is not verified and is considered a considerable under-estimate of the total shark catch. Furthermore, catches are not reported on species level. Shark species caught in this fishery are the same as those targeted by the demersal longline fishery and the recreational linefish fishery.

7.4.1.4 ST JOSEPH FISHERY

A directed shark fishery for Ploughnose chimeras, locally referred to as St. Joseph sharks (Callorhinchus capensis), operates on the west Coast of South Africa and is managed on a TAE of 162 rights holders. Landing of other sharks is not allowed due to a history of illegal fishing in this sector. The St Joseph shark net fishery employs 178 mm stretched mesh, monofilament, bottom-set gill nets. The nets have a fall of 3m and are no longer than 150m. The fishery is an effort based fishery confined to the west coast. The fishery is intrinsically associated with the "harder (cape mullet) fishery. Only 80 of the 177 gillnet permits available in 2002 allowed the use of Joseph nets, all within the St Helena Bay fishing Area. The permit entitles the holder to have in their possession 2 St Joseph and 2 mullet-directed (haarder: Liza spp.) gill nets at any-one time. Those individuals that have permits that are restricted to "haarder" may only be in possession of 2 "haarder" gill nets. They are however entitled to retain any St Joseph by-catch. Originally catches were in the order of 650 tons of St Joseph per annum. The St Joseph catches by the gillnet fishery may be linked to increased trawl catches, but could also be due to the gillnet fishery targeting breeding aggregations. The time series of abundance indices from west coast surveys shows a decline in St Joseph from 1997 to 2004 followed by an increase in the last few years so that the overall trend is slightly negative however the slope is not significantly different from zero.

7.4.1.5 RECREATIONAL LINEFISHERY

The recreational linefishery includes shore anglers, boat-based fishers and estuarine fishers (all of which use rod and reel), as well as spearfishers. An estimated 850 000 people participate in the shore-based recreational fishery alone. Recreational fishing in South Africa is regulated by output control in terms of bag-, size and area limits and requires the purchase of a permit. Catches of most sharks are restricted by a bag limit of one shark per day and the sale of the catch is not permitted. Illegal sale of shark catches are of concern together with the exceeding of bag limits. Recreational fishers are not required to report any catches to Fisheries Management. Another challenge is posed by recreational tournament fishing, which remains unregulated. The catch and release of sharks in these tournaments may also pose a problem as there is little information on post-release survival.

7.4.2 BY-CATCH FISHERIES

7.4.2.1 TUNA POLE

The commercial tuna pole fishery started in 1979 with the initial targeting of yellowfin tuna in the first year. Thereafter albacore has been the primary target species of this fishery. The fishery operates from September to May along the west coast of South Africa. In 2006, 191 long-term fishing rights were allocated to use 198 vessels and a crew of 2950 to target albacore and yellowfin tuna. The fishery does not have a history in catching shark, but the increase use of rod and reel gear since 2003 to target yellowfin tuna has resulted in increased encounters with pelagic sharks. The current landing of sharks is banned in terms of permit conditions and hence all sharks are required to be released at sea. There is no on board observer coverage for this fishery and hence it is unknown whether proper release procedures are implemented to ensure the post-release survival of sharks. The tuna pole fishery is monitored by VMS and

skippers are required to record catches in a daily logbook, which is submitted to Fisheries Management on a monthly basis. There is no monitoring of discharges in this fishery.

7.4.2.2 HAKE LONGLINE

The demersal hake long-line fishery was initiated in 1994, and has since attained commercial status with the first 50 rights being allocated in 1998. The fishery comprises two zones: the West Coast fishery that targets the deep water hake *Merluccius paradoxus*, and the South Coast fishery that targets the shallow water hake *Merluccius capensis*. An observer by-catch program is operational in this fishery. Unfortunately, the shark by-catch component is recorded at a group level – species identification is not undertaken. Nevertheless, the shark by-catch usually comprises less than 0.5% of the total catch. A kingklip (*Genypterus capensis*) directed fishery was initiated in 1983, however a subsequent stock collapse curtailed operations, and the fishery had to be closed in 1990. Nevertheless, while in operation, there was an appreciable shark by-catch component to this fishery (D.Japp, per. comm.). A total of 4 tons of unidentified "sharks, skates and rays" was reported in 2010.

7.4.2.3 TRAWL

There are several trawl fisheries in South Africa the largest of which is the south and west coast demersal component targeting the Cape hakes *Merluccius capensis and M. paradoxus* and other lucrative benthic species; the demersal prawn trawl fishery situated on the east coast along Kwa-Zulu Natal and a midwater trawl fishery targeting horse mackerel along the south coast. The trawl fishery for Cape hakes can be separated into two distinct fishery sectors, namely the offshore and inshore trawl components. Trawl fisheries targeting hake provide over half of the value of all fisheries in South Africa and account for more than 50% of the total value of the combined South African fisheries. The development of trawling in SA commenced in 1890 and remains centered on the South African hake resource which comprises two species, the shallow-water Cape hake and the deep-water Cape hake. Prior to the declaration of the 200 nautical mile South African EEZ in 1977, the Cape hakes were subjected to increasing levels of exploitation after the First World War, with the incursion of foreign fleets during the 1960s culminating in a peak catch of close to 300 000 t in the early 1970s. Subsequent to 1977 and the declaration of the EEZ, South Africa implemented a relatively conservative management strategy by imposing Total Allowable Catches (TACs) set at levels aimed to rebuild the hake stocks, and annual catches have subsequently remained relatively stable in the 120 000 – 150 000 t range. The hake TAC is determined annually by the application of an Operational Management Plan (OMP). In 2004 the South African demersal trawl fishery obtained Marine Stewardship Council (MSC) certification and this eco-labeling has resulted in additional focus on the management of by-catch species.

7.4.2.3.1 INSHORE TRAWL

The inshore fishery targets primarily both hake species and East-coast sole (*Austroglossus pectoralis*) and is restricted to the area between Cape Agulhas (20° E) in the west and the Great Kei River in the east. The vessels operating in the inshore fishery are wetfish trawlers which are smaller than those active in the offshore fishery. These vessels may not be larger than 30 m. Although there are ecosystem-based management measures being developed for this fishery, there are significant by-catch issues which

including sharks. Shark by-catch in this fishery is common, and includes considerable quantities of a large number of species, including Squalus spp, Scyliorhinids, soupfin sharks, smoothhound spp and rays and skates being caught (Attwood et al 2011).

In the past decade the number of vessels in this sector has dropped from a historic level of around 32 vessels to 24 vessels operating currently. All vessels in this sector are monitored by VMS and all the landed catch is monitored. A proportion of the operations at sea is subjected to monitoring via the Scientific Observer Programme which has attained a maximum coverage of 4.4% of trawls (Attwood et al., 2011). (Attwood et al., 2011). All discharges from the inshore demersal trawl fleet are subject to discharge monitoring but generic categorization of products remains challenging.

7.4.2.3.2 OFFSHORE TRAWL

The offshore hake trawl industry in South Africa is one of the largest sectors of the marine fishery. Offshore vessels are restricted from operating deeper than 110m on the south coast. There is no restriction on the west coast, but they do not operate shallower than 200m.Therefore, the vessels used in this fishery are mostly large, powerful, ocean-going stern trawlers. A comprehensive Scientific Observer Programme has collected information on target and non-target species, the results of which have been used in management advice. Furthermore, measures to reduce impacts on benthic habitat have been introduced, including 'ring-fencing' existing trawling grounds to reduce the amount of habitat affected. Surveillance capacity has also increased, and the entire hake fishing fleet is now covered by a Vessel Monitoring System (VMS). Trawling is a particularly unselective fishing method, and thus produces a high level of by-catch. Species caught include deepwater sharks, skates and rays. Low value shark species are discarded only once the main catch has been sorted, potentially resulting in an increased mortality of released by-catch species. Generic reporting of species is a common occurrence. Presently the offshore trawl landings are largely not monitored during discharge and catch information is thus seldom verified.

7.4.2.3.3 MIDWATER TRAWL

Historically adult Cape horse mackerel (*Trachurus capensis*) have been caught as by catch within the offshore hake trawl sector. In the 1960s the bulk of the adult horse mackerel catch was taken by purse-seine on the west coast, but that resource has disappeared. A Japanese midwater trawl fishery operated off the South Coast during the 1980s and 1990s .The annual catch limit varied from 34 000t to 54 000 t during that period. In the late 1990s the Japanese fleet was replaced with South African vessels with a catch limit of 34 000 t divided between midwater trawl and demersal trawl. In about 2010 the Precautionary Upper Catch Limit (PUCL) was raised to 44 000 t (31 500t – allocated to Right Holders for targeted midwater trawl fishing and 19 500 held in reserve to cover incidental by-catch in the demersal trawl fishery). (The bulk of the catch is made by one vessel of 121 meters with a gross tonnage of 7628t using a midwater trawl capable of making catches of up to 100t per trawl. The horse mackerel fishery is restricted to the south coast (west of Cape Agulhas). A midwater trawl fishery for round herring (*Etrumeus whiteheadi*) and anchovy (*Engraulis encrasicolus*) has been recently established on the west coast (actually it may still be an experimental fishery). The vessels use excluder devices to prevent the capture of marine mammals and pelagic sharks.

A number of species of pelagic shark are recorded in the by-catch all of which is discarded once the main catch has been sorted, potentially resulting in an increased mortality of released by-catch species. Permit conditions require a scientific observer be present on all trips.

7.4.2.3.4 PRAWN TRAWL

The South African prawn trawl fishery operates around the Tugela Bank (KwaZulu-Natal), and between Cape Vidal and Amanzimtoti. Catches (by mass) of the prawn fishery consist of roughly 20 percent target species, 10 percent retained by-catch and 70 percent discarded by-catch. The vessels employed in the fishery tend to be small (24-33m length), and use 38mm stretched cod-end mesh nets. Shark by-catch include stingrays (Dasyatidae), hammerhead sharks (Sphyrnidae), requiem sharks (Carcharhinidae), angelsharks (*Squatina africana*) and catsharks (Scyliorhinidae). The fishery is managed on a TAE basis with seasonal area restrictions designed to mitigate catches of juvenile linefish (Anon, 2010). As fishing activity is concentrated in a region recognized as a shark biodiversity hotspot, by-catch of regionally endemic demersal shark species is of concern. Some data have been collected by a scientific observer program during the past 5 years.

7.4.2.4 BEACH SEINE FISHERIES

The beach seine fishery has operated traditionally since 1652 and operates from False Bay to Port Nolloth. In 2001, a reallocation of rights saw a reduction in fishing effort from around 200 to 28 beach seine operations. Nets range from 120m to 275m in length with net depths varying according to fishing area, but may not exceed 10m (Anon, 2010b). Nets have a stretched mesh of 48mm and minimum cod end size of 44mm. This fishery primarily targets teleosts; however considerable quantities of shark are also caught (Lamberth, 2006). With the exception of protected shark species status such as great white sharks (*Carcharhinus carcharias*), raggedtooth sharks (*Carcharias taurus*), spotted gully sharks (*Triakis megalopterus*), pyjama sharks (*Poroderma africanum*), and leopard catsharks (*Poroderma pantherinum*) no by-catch restrictions for sharks exist within this fishery.

7.4.2.5 PATAGONIAN TOOTHFISHERY

The Patagonian Toothfish fishery started as an experimental fishery in 1996 and targeted toothfish (*Dissostichus eleginoides*) using Spanish longline around Prince Edward and Marion Islands (an extension of South Africa's EEZ). Five permit holders used two vessels to fish their experimental allocation of 3 000 t. The fishery was formalized into a commercial fishery in 2005 where five long-term rights were allocated on board two vessels. Only one vessel has been fishing up until 2011. In 2011 a second vessel joined the fishery and the fishing method changed to trot lines. The current TAC is 400 t of Patagonian toothfish. As the fishery is not permitted to retain sharks all sharks are released at sea. The fishery is stringently managed with VMS reporting, observer coverage (two observers per vessel) and monitoring of all landings. Daily logbooks are required to be completed by set. Shark catches are considered small, but there is concern regarding the identification of shark species and the impact the fishery could have on species that are long-lived and sensitive to fishing pressure. Hence, protocols for shark release procedures are needed and require enforcement.

7.4.2.6 ROCKLOBSTER FISHERY

The West Coast rocklobster (*Jasus lalandii*) fishery is separated into an inshore fishery using hoopnets and an offshore component using traps. No sharks are caught in the hoopnets, however catches in the offshore component may be significant. Sharks caught in traps include Scyliorhinids which may not be sold for commercial purposes and are consequently discarded. The main concerns therefore relate to fishery mortality and handling mortality.

7.4.2.7 AQUARIUM TRADE

Limited trade of raggedtooth sharks, small Carcharhiniformes and rays exists in South Africa. Sharks are caught with rod and line and transported to the aquarium or holding facility. A small number of sharks are exported to international aquariums per year. This trade is currently managed on an *ad-hoc* basis and a formal regulatory framework might be needed.

7.4.3 MARKETS

The Marine Living Resources Act (MLRA, 1998) regulates all fisheries in South Africa, including aspects of the processing, sale and trade of most marine living resources. In terms of the MLRA, sharks may not be landed, transported, transshipped or disposed of without the authority of a permit. The market is divided into three separate components, (1) processing and filleting demersal shark carcasses or "logs", (2) fin drying, and (3) processing and exporting of pelagic shark steaks. Each component operates separately although fins are contributed by both the demersal and pelagic sharks. In the demersal shark fillet trade processed "logs" are separated depending on the value of the flesh determined by the handling, cleaning processes and mercury content. In general, sharks between 1.5kg-12kg are considered ideal as mercury levels of sharks over 12 kg exceed permissible limits (da Silva and Bürgener, 2007). In the past decade, the export market for South African shark meat has grown considerably. The majority of processed shark is sold to Australia, where there is high consumer demand for shark fillets. Big and/or low value animals are dried and sold as dried fish sticks. All fins are dried and exported to Asian markets. The increased fin price provides strong incentives for the targeting of large sharks regardless of fillet value. Pelagic shark carcasses are mainly exported to Europe with some species, namely shortfin mako and porbeagle, exported to Asia.

A recent analysis of trade data between South Africa and Australia indicated discrepancies in import versus export statistics. Thus, it does not currently appear feasible to use trade data as a proxy indicator for shark catches in South Africa. A detailed description of the South African shark meat harvest, including processing, handling and export information, can be found in Da Silva and Bürgener (2007).

8 FROM ISSUES TO ACTION

Although South Africa has come a long way in the development and implementation of shark management since the conception of the IPOA in 2001, the following issues need to be addressed to achieve the goals set out in the vision of the NPOA-Sharks. The broad challenges identified here mirror those identified in the

IPOA and in NPOAs of other countries. The Challenges are clustered around seven broad groups: *Data and reporting, Classification and assessment, Sustainable management, Optimum use, Capacity and infrastructure, Enforcement of compliance and Regulatory tools.* The individual issues are specific to the South African context and require particular actions by one or more stakeholder groups. Suggesting responsibilities for remedial actions will enable South Africa to effectively implement these actions within the suggested timeframes. As many issues are interlinked and require a particular sequence of actions, the actions were prioritized to make the execution of this plan viable within its four –year life span. Priorities are given on four levels*, Immediate, High, Medium and Low* and required timeframes are indicated to facilitate progress monitoring and evaluation. As there is limited budget dedicated to the implementation of this plan, the actions are expected to be achievable within existing allocations of funds to research, management and conservation agencies. As the lack of shark-specific funding has been identified as one of the issues, the application for additional funding from international agencies should be facilitated after the formal adoption of this plan.

Table 2. An overview of issues facing particular fisheries divided into clusters with proposed action, responsibilities, priorities and timeframes.

Issue cluster	Issue	Description	Fishery sector	Action	Respon-sibility	Priority	Time-frame
Data and reporting	Shark species identification and reporting	In catch statistics, sharks are often lumped into generic categories.	All Fisheries excluding the KZN bather protection program	Create a identification guide	FR	Immediate	1
				Develop permit conditions	MRM	Immediate	1
				Education and Implementation	MRM Working Groups	High	2
				Review progress	FR and MRM	Medium	3-4
	Observer coverage	There is currently no observer coverage except for the foreign flagged pelagic tuna longline fleet.	All sectors	Re-establish, re - assess and expand observer coverage	FR	Immediate	1
		Observer programmes do not collect data that are adequate to	All sectors	Define and set sampling requirements per fishery sector	FR	Immediate	1-2

		assess impact of fishing on species that are not landed.		Initiate new sampling strategy	FR	High	2-4
	Discharge monitoring	Discharge of fish is only monitored in selected fisheries. Catch reporting is not verified.	Offshore trawl, traditional linefish, tuna pole,	Review discharge monitoring coverage and quality of information	FR, MCS	High	1-2
				Establish additional discharge monitoring requirements	FR and MCS	High	2-3
	Reporting of directed catch and "joint product'"	Directed catches of sharks are only reported for commercial sectors.	Recreational linefish	Develop and implement a land based monitoring program expanding coverage	FR	High	1-2
		Landed catch is not weighed	Line, net fish and recreational linefish	Instigate monitoring of landings	FR, MRM and MCS	Medium	2-4
		There is no mandatory reporting	Recreational fishery	Engage with recreational initiative for web-based catch recording	FR and Recreational MRM Working Group	Medium	2-4
		There is no routine collection of length frequencies and conversion factors do not exist for most species.	All except Large Pelagic longline	Set target for observer coverage	FR	High	1
				Develop morphometric relationships to allow for conversion factors	FR	High	1-2

		Shared stocks	All fisheries	Identify overlaps	FR and MRM	High	1-2
				Engage with neighbouring countries and set-up data sharing agreements	MRM	Medium	3-4
	Estimation of discards	Unable to quantify total shark mortality associated with by-catch fisheries	All fisheries	Identify short falls	FR	High	1
				Develop monitoring procedures and implement through observer programme	FR	High	1-3
Classification and assessment of shark species	Gaps in taxonomy	Taxonomical classification is uncertain for a number of shark species	All fisheries that catch rays, skates and deepwater shark species	Reclassification of all rays, skates and deepwater shark species using genetics and morphometrics (Barcoding of Life Programmes)	FR	Immediate	Ongoing
	Stock delineation	There are several stocks that might be genetically distinct to areas in SA, while others are appear to be shared with other countries.	All fisheries	Collection of additional genetic material through national research surveys and observer programme	FR	Medium	Ongoing
	Gaps in the knowledge of life	For many species, basic information	All fisheries	Gap analysis example South African marine status reports	FR	Immediate	1

	history	on life history i.e. age and growth and reproductive capacity is not available or fragmented.		Prioritise species	FR	High	1
				Source research capacity i.e. students	FR	High	1
				Collect and work up biological material from national research surveys and observer programme	FR	High	1-3
	Spatio-temporal behaviour	Information gaps exist around spatio-temporal behaviour i.e. identification of nursery and mating areas for live-bearing sharks.	All fisheries	Reference gap analysis	FR	Immediate	1
				Prioritise species	FR	High	1
				Source research capacity i.e. students	FR	High	1
				Collect and work up biological material from national research surveys and observer programme	FR	High	1-3
	Ecosystem changes induced by fishing	Habitat alteration through Fishing activities i.e. pupping grounds of demersal sharks.	Inshore and offshore trawl	Engage with EcoFish project that is investigating the trawl effects of the benthos	FR	Medium	ongoing

		Cascading effects on the ecosystem by the removal of apex predators	All fisheries	Ecosystem modeling using ecosym and ecopath	FR	Low	Ongoing
	Lack of formal assessments	Only two of the 98 species have been assessed, a further 14 species were assessed for the KZN region.	All fisheries	Prioritize species for assessment	FR	High	1-2
				Identify suitable assessment models	FR	High	1-4
				Collect and collate relevant material	FR	High	1-4
				Undertake assessments	FR	High	1-4
Sustainable management	Lack of formal management protocol for target and "joint product species"	Two species were assessed in terms of a per- recruit and an ASPM, respectively, according to the available data. There is no formal protocol on assessments and recommendations in any of the fisheries.	All fisheries	Develop management protocol	FR and MRM	High	1-2
				Implement management protocol	FR	Medium	2-3
				Management action based on protocol	MRM	Medium	2-4
	Lack of coordination of shark fishery management	Most sharks are caught by more than one fishery. Currently there is no formal mechanism	All fisheries	Review fisheries and non-extractive impacts on sharks	MRM	High	1
				Integrate into management protocol	MRM	High	1-2

		for shark management across fisheries. Furthermore, no formal mechanism to consider non-extractive use i.e. tourism. Inter-sector conflict					
				All fisheries that involve sharks take the NPOA into account during the development and implementation of species specific management plans	MRM	High	4
Optimum use	Concern around health risk of shark meat consumption	High levels of heavy metal contamination are suspected for many top predators, including most shark species, making them potentially unsafe for human consumption.	All fisheries	Collect material from national research surveys and observers for priority species	FR	Medium	1-2
				Analyze data	FR	High	1-2
				Minimize catch as a safety precaution	FR and MRM		
	Lack of knowledge or mechanisms to reduce fishery	Mitigation measures for unwanted species Proper release protocols for	All fisheries	Review existing mitigation measures	FR	Medium	2-4
				Develop best practice release protocols per fishery	FR	Medium	2-4

	mortality	unwanted by-catch		Incorporate best practice release protocols into Permit conditions	MRM	Medium	2-4
	Retained sharks are not fully utilized	Finning. Dumping of carcasses, killing of unwanted by-catch, no by-catch mitigation. There is no investigation into value adding and development of products i.e. shark leather etc. Large sharks are caught for fins and fillets not utilized.	All fisheries	International review of potential shark products	FR		
				Engage Technicons and Universities to develop possible shark products, meat as well as leather and Review possible Pharmaceutical products	FR and MRM	Medium	2-4
				Engage with relevant sections within DAFF regarding developing alternate livelihoods through full utilization of shark products ie. Leather, markets for unwanted low value species such as St. Joseph sharks	MRM	Medium	2 weeks
	Traceability of shark products from catch to sale	Product names cannot be matched with species names i.e. generic white fish	All fisheries	Introduce standardization of product codes/names	SASSI	High	1-2

		Custom HS codes only reflect generic sharks and not the individual species.		Engage with Customs to review product codes for export/import	MRM/Traffic	High	1-3
		Fillet identification is a problem	All Fisheries	Review of genetic coding tools.	FR Traffic	Medium	2-3
		Fins cannot always be identified to species level Illegal recreational sale		Fin identification guide	Research	Medium	2-3
Capacity and infrastructure	Lack of awareness	Lack of awareness and education to change misconceptions about sharks and shark fisheries Fishery pollution eg. discard of bait box packaging	All fisheries	Determine requirements for educational material	Research and Management	Medium	2-3
				Implement training and awareness program	Management	Medium	3-4
				Ensure compliance with permit conditions	Compliance and Management	High	1-2
				Develop responsible fisheries programs	DAFF	Medium	3-4

				pertaining to sharks			
	Lack of capacity	Lack of scientific capacity to timeously complete assessments and biological analysis		Develop departmental capacity and where necessary outsource shortfalls	DAFF	High	1-2
		Representation at shark international scientific working groups and stock assessment working groups of relevant RFMO	Large Pelagic Fishery	Shark expert from Fisheries Research attend relevant meetings	DAFF	Immediate	Ongoing
	Lack of funding	Funding for shark fisheries directed research and management is therefore limited		Explore funding opportunities from International agencies.	DAFF	Medium	2-3
Compliance	Lack of enforcement	Finning of pelagic sharks Inability to identify shark species Recreational sale of commercially valuable shark	All Fisheries	Develop of a monitoring and enforcement strategy	DAFF: compliance with input from research and management	High	1-2

		species Exceeding recreational bag limits Interpretation and knowledge of permit conditions pertaining to sharks					
Regulatory Tools	Inadequate regulatory Reference to sharks	Shark fishing competitions are not regulated adequately Fisheries specific permit conditions pertaining to sharks are not informed by overarching regulatory frameworks	All Fisheries	Review and develop regulatory tools	Legal with input from Research and Management	Immediate	1

668

669 **9 MONITORING AND EVALUATION**
670

671 The Fisheries Management Branch at DAFF has been the lead agency for drafting the NPOA-Sharks and
672 will remain responsible for coordinating its implementation. Collectively, the Chief Directorates Marine
673 Resource Management and Fisheries Research will be responsible for assessing the overall
674 implementation of NPOA-Sharks during its operational period. The structure of the plan, with actions
675 prioritized by a delivery timeline, should enable the Fisheries Management Branch to iteratively monitor
676 progress. Progress will be evaluated annually by the EAF-working group. Upon conclusion of the four-year
677 operational period of the plan, the overall progress of the NPOA-Sharks will be evaluated against its goals
678 and objectives. The layout allows for an assessment of individual actions, their outputs and their outcome in

terms of the overall vision. If an action is not completed, an explanation for the lack of completion should also be included.

Table 3. Assessment framework for NPOA-Sharks.

Action	Responsible agencies	Original Timeframe	Output	Outcome	Challenges/Reasons for not completing the action

10 REFERENCES

Anon, 2010. Status of South African Marine Fishery Resources., p. 55. Inshore Resource Research, Fisheries, Department of Agriculture, Forestry and Fisheries.

Attwood, C.G., Peterson, S.L., Kerwath, S.E., 2011. Bycatch in South Africa's inshore trawl fishery as determined from observer records. ICES Journal of Marine Science In press.

Crawford, R.J.M., Wilkinson, I.S., David, J.H.M., Leslie, R.W., Stander, G.H., Oosthuizen, W.H., Schulein, F.H., 1993. Progress towards the development of an integrated management approach to fisheries for sharks and other chondrichthyans in South African waters. , pp. 1-31. Sea Fisheries Research Institute Task Group, Cape Town.

da Silva, C., Bürgener, M., 2007. South Africa's demersal shark meat harvest. Traffic Bulletin 21, 55-56.

Lamberth, S.J., 2006. White sharks and other chondrichthyan interactions with the beach-seine (treknet) fishery in False, Bay, South Africa. African Journal of Marine Science 28, 723-727.

Myers, R.A., Worm, B., 2003. Rapid worldwide depletion of predatory fish communities. Nature 423, 280-283.

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12 APPENDIX

APPENDIX 1

SHARKS IN SOUTH AFRICA

L.J.V. Compagno

1. SPECIES COMPOSITION OF SOUTH AFRICA SHARKS

Despite its relatively short coastline, South Africa has one of the most diverse faunas of cartilaginous fishes (Class Chondrichthyes) in the world. South Africa possesses representatives from all of the 10 orders, and most of the living families of cartilaginous fishes. Cartilaginous fishes are primarily marine, with about 5% penetrating fresh water. Most species are known from the intertidal to the epipelagic zone and the mid-slope, there are however a few deep slope (below 1500 m) and mesopelagic or bathypelagic taxa.

2. CLASSIFICATION OF TAXA

Cartilaginous fishes are divided into two subclasses, Elasmobranchii for sharks and rays and Holocephalii for the chimaeras. The major features of the synthetic classification include the subdivision of the living elasmobranch fishes or neoselachians into two superorders: the Galeomorphii and the Squalomorphii. The Galeomorphii includes four orders, the Heterodontiformes (bullhead sharks), the Lamniformes (mackerel sharks), the Orectolobiformes (carpet sharks), and the Carcharhiniformes (ground sharks). The Squalomorphii include the Hexanchiformes (cow and frilled sharks), the Squaliformes (dogfish sharks), the Squatiniformes (angel sharks), the Pristiophoriformes (sawsharks), and the Rajiformes (batoids). While living elasmobranchs were usually subdivided into two major groups, Selachii (sharks) and Batoidea (rays); phyletic studies suggest that the batoids are best included as a large and diverse order of 'flat sharks' (Rajiformes) within the Squalomorphii. The Rajiformes are the immediate sister group of the Pristiophoriformes, and with them forms the sister group of the Squatiniformes.

South African chondrichthyofauna include representatives from all 10 orders of cartilaginous fishes, 44 of the 60 families (73%), 100 out of 189 genera (53%), and over 181 of the 1171 world species (15%) (Table 2.1). With respect to world Chondrichthyan fauna, South Africa has similar relative numbers of species of chimaeroids, but has higher numbers of squaloids, lamnoids, hexanchoids, carcharhinoids, and lower numbers of orectoloboids (which are most diverse in the Western Pacific). The batoids (Rajiformes) are the largest order of sharklike fishes, but with respect to the world fauna, are found in far fewer relative numbers off South Africa (37%). In addition, batoids outnumber other chondrichthyans by 54%. The approximately nine batoid suborders also show divergence between Southern Africa and the world, with South Africa having relatively more Pristoids and fewer Rhinobatoids, Rajoids and Myliobatoids. In addition, there is no representation of the small suborders Zanobatoidei (West Africa) and Platyrhinoidei (North Pacific). In part, this suggests that batoid diversity, particularly of deep-water rajoids and tropical East Coast myliobatoids, may increase with further exploration of the South African chondrichthyofauna. There are many species of cartilaginous fishes currently known from Namibia and Mozambique waters that in the future, are likely to be found in South African waters.

767
768 Table 1. Comparison of relative numbers of species of South African
769 and world chondrichthyan fauna
770

Taxa	World		South Africa	
	No. species	% total	No. species	% total
Class Chondrichthyes	1171	100.0	181	100.0
Subclass Elasmobranchii	1121	95.7	172	95.6
Superorder Galeomorphii	336	28.6	66	37.1
Order Heterodontiformes	9	0.8	1	0.6
Order Lamniformes	15	1.3	12	6.6
Order Orectolobiformes	34	2.9	3	1.7
Order Carcharhiniformes	278	23.7	51	28.2
Superorder Squalomorphii	785	67.0	106	58.7
Order Hexanchiformes	6	0.5	5	2.8
Order Squaliformes	119	10.2	33	18.2
Order Squatiniformes	18	1.5	1	0.6
Order Pristiophoriformes	9	0.8	1	0.6
Order Rajiformes	633	54.1	66	36.5
Suborder Pristoidei	7	0.6	3	1.7
Suborder Rhinoidei	1	0.1	1	0.6
Suborder Rhynchobatoidei	6	0.5	1	0.6
Suborder Rhinobatoidei	47	4.0	5	2.8
Suborder Platyrhinoidei	3	0.3	0	0.0

Suborder Zanobatoidei	4	0.3	0	0.0
Suborder Torpedinoidei	77	6.6	6	3.3
Suborder Rajoidei	286	24.4	24	13.3
Suborder Myliobatoidei	202	17.3	26	14.4
Subclass Holocephali				
Order Chimaeriformes	50	4.3	8	4.4

The Prince Edward Islands (Marion and Prince Edward Islands) are isolated South African possessions in the Southern Indian Ocean. Their sub-Antarctic chondrichthyan fauna is little known, and has only been elucidated through the activities of international long-line vessels fishing for Patagonian toothfish (*Dissostichus eleginoides*, Family Nototheniidae). So far, two of the three species recorded (*Hydrolagus* sp. and *Lamna nasus*) are also known from South Africa but the third, *Amblyraja* sp. is presently not recorded, and is of uncertain identity. It is probable that additional collections will reveal more species around the Prince Edward Islands, and include *Somniosus antarcticus*, which occurs nearby on the Crozet Plateau about 500 km NNE of Prince Edward Island. In addition, it is likely that other species of skates and possibly squaloid sharks, chimaeras, and other taxa will be discovered in the area.

3. DISTRIBUTION PATTERNS

The South African chondrichthyan fauna is zoogeographically complex, and includes a variety of unique species. These include wide ranging species, local endemics and regional Southern African endemics that have minimal overlap with adjacent areas. South Africa, and by extension Southern Africa, is a center of endemism for a variety of taxa, most notably members of the catsharks (Family Scyliorhinidae), finback catsharks (Proscylliidae), houndsharks (Triakidae), sawsharks (Pristiophoridae), dogfish (Squaliformes), skates (Rajoidei) and chimaeras (Chimaeriformes).

Distribution and habitat data are listed for all South African cartilaginous fishes.Distributions are based on those described by Compagno *et al.* (1989). Additional data is presented on range and depth extensions, and catch data on sharks and rays provided by the KwaZulu-Natal Sharks Board (G. Cliff and S. Dudley, *pers. comm.).* In essence, 38.7% of the species are wide-ranging, 27.1% are endemics, and 16.6% Indo-Pacific species. There are lesser contributions from other areas (Table 2).

798

799

800 Table 2. Distribution types for South African cartilaginous fishes.

801

Distribution type	No. species	% total
Eastern Atlantic to South-Western Indian Ocean	8	4.4
Atlantic	7	3.9
Eastern Atlantic and Mediterranean	5	2.8
Atlantic coast of Africa	2	1.1
Southern African endemics	34	18.8
Subequatorial African endemics	5	2.8
South-eastern African endemics	1	0.6
South African endemics	15	8.3
Indo-Pacific	30	16.6
Western Indian Ocean	4	2.2
Wide-ranging	70	38.7
Total	181	100.0

802

803 While there may be some overlap in distribution, shelf chondrichthyans, and to some extent deep-slope
804 species, can further be subdivided into cool-temperate, warm-temperate and subtropical-tropical
805 species.Cool-temperate areas include the Northern Cape and Western Cape to Cape Point; warm
806 temperate areas include the south coast of the Western Cape from False Bay to East London in the
807 Eastern Cape; subtropical-tropical areas include the Transkei coast and KwaZulu-Natal. South African

808 species are listed below by distribution off the provincial coasts (Table 3). Diversity increases from west to
809 east, and from the Northern Cape to KwaZulu-Natal.

810
811 Table 3. Distribution categories for South African cartilaginous fishes.
812

Distribution category	No. species	% total
Eastern Cape	1	0.6
Eastern Cape to KwaZulu-Natal	15	8.3
KwaZulu-Natal	51	28.2
Northern Cape	4	2.2
Northern and Western Cape	10	5.5
Northern, Western Eastern Cape	16	8.8
Northern Cape to KwaZulu-Natal	29	16.0
Northern and Western Cape, KwaZulu-Natal	2	1.1
Western Cape	13	7.2
Western and Eastern Cape	10	5.5
Western and Eastern Cape, KwaZulu-Natal	25	13.8
Western Cape, KwaZulu-Natal	5	2.8
Total	181	100

813
814 **4. HABITAT PATTERNS**
815

816 Cartilaginous fishes are broadly divisible by habitat into species of the *continental shelves* (the intertidal to
817 about 200 m), the *continental slopes* (below 200 m to the ocean floor), and the *oceanic zone* (beyond the
818 shelves and above the slopes and sea bottom). In comparison with some other areas - including the
819 Eastern North Pacific - South Africa has a remarkably rich slope fauna. The slope fauna forms the largest
820 habitat category (Table 4), followed by the continental shelf fauna. A few species penetrate fresh water.
821 Very few South African cartilaginous fishes are oceanic, and the low diversity of cartilaginous fishes found
822 in the oceanic zone reflects this. A few large sharks including the bluntnosed sevengill and white sharks
823 have a wide range of habitats, and occur oceanically, on the slopes, and inshore. Some shelf species
824 favour muddy bays or sandy beaches, while others favour coral or rocky reefs.

825 Table 4. Habitat categories of South African cartilaginous fishes.
826

Habitat category	No. species	% total

Oceanic	13	7.2
Continental shelves	59	32.6
Shelves, fresh-water	6	3.3
Shelves to oceanic	10	5.5
Shelves to slopes	17	9.4
Continental slopes	67	37.0
Slopes to oceanic	3	1.7
Shelves to semi-oceanic	4	2.2
Wide range in habitats	2	1.1
Total	181	100.0

5. KNOWLEDGE OF THE FAUNA

The South African chondrichthyan fauna is not well known. Compagno (2000) noted that the discovery of Southern African and South African cartilaginous fishes lagged behind those of the rest of the world, and that prior to being recorded off South Africa, wide-ranging species were usually described from other regions. There are extralimital species that include Southern African and other wide-ranging species, that may be recorded off South Africa in the future - in particular, those from the inshore tropical, deep slope, and oceanic environments. Several undescribed South African species are known, but have not been formally described. In addition, further exploration may reveal new undescribed species. In 1998, the deep-slope ghost catshark (*Apristurus manis*) was found off Cape Town, and was identified as such in 1999. Recently a long-standing record of the North Atlantic skate *Amblyraja radiata* was found to be based on an Antarctic and Southern Indian Ocean species, *A. taaf*, which had only been described in 1987 (M. Endicott, *pers. comm.*). A rare megamouth shark (*Megachasma pelagios*) was stranded on a beach in the Eastern Cape in 2002, and was the first specimen collected in South Africa, southern Africa, and the African continent (Smale *et al.* 2002). In retrospect, it seems obvious that our basic knowledge of the chondrichthyan fauna has increased markedly only when active interest in the ichthyofauna, and vigorous field explorations have occurred. For example, during the period in which Andrew Smith, John Gilchrist, his colleagues, and contemporary researchers were engaged in collecting specimens and examining material in systematic collections. Conversely, there was a reduction in the rate of discoveries when there was limited or no interest in the fauna or its exploration.

Table 5 presents an estimate of how well the South African chondrichthyan fauna is known. A score of 0 is essentially unknown. Scores of 1 and 2 are intermediate and somewhat arbitrary. 3 is scored where extensive long-term sampling programs have been undertaken - such as Marine and Coastal Management's offshore demersal surveys of the west and southeast coast hake zones, the Natal Sharks Board's sampling that have yielded relatively few surprises in the last decade or two, and anglers in most parts of South Africa that intensively sample the inshore shelf from the intertidal to 50 m.

Table 5. Knowledge of South African cartilaginous fishes by habitats.

Habitat category	Ranking
Inshore (0 to 50 m)	1 to 3
Offshore (50 to 200 m)	1 to 3
Upper slope (200 to 600 m)	0 to 3
Mid slope (600 to 1200 m)	0 to 3
Lower slope (below 1200 m)	0 to 2
Epipelagic zone	0 to 2

Knowledge of the inshore (0 to 50 m) benthic and littoral chondrichthyan fauna is patchy, and areas like the Northern Cape coast are sketchily known. In contrast, the larger inshore elasmobranchs of KwaZulu-Natal - particularly large elasmobranchs that are caught in antishark nets and fished by anglers - are very well known. However, small species that can slip through the meshes of shark nets, and those that are of no interest to anglers or commercial fishers are sketchily known. Likewise, the reef-dwelling species in the far north that are not caught in shark nets are also relatively unknown. The offshore shelf (50-200 m) and upper slope (200-600 m) fauna on the West and Southwest coasts includes some of the best known demersal and epibenthic chondrichthyan faunas. In contrast, on the East Coast, the upper slope faunas are sketchily known. The middle slope between 600 to 1200 m is best known from the West coast and from limited parts of the South coast of South Africa. This is primarily a result of sampling by the *Africana*. The fauna in those areas that have not been sampled are sketchily or poorly known. Lower slope faunas below 1200 m are sketchily known on the West coast of South Africa - due to early collections by the RV *Pickle*, the current *RV Africana*, and commercial exploratory trawling and deep-set long-lining - but are poorly known elsewhere. Some wide-ranging deep slope species such as the false cat shark (*Pseudotriakis microdon*), the bigeye sand tiger (*Odontaspis noronhai*), and the smallspine spookfish (*Harriotta haeckeli*) have not been collected, but are to be expected in very deep water. The deepwater skate *Cruriraja durbanensis* was collected once by the RV *Pickle* off the Northern Cape and not seen since; while *Amblyraja robertsi* was described in 1970 from a single specimen found in the Western Cape (taken by the German research trawler, *Walter Herwig*). In the 1990s, the *RV Africana* recovered a few additional specimens from the same locality.

As elsewhere, the South African oceanic elasmobranch fauna is undiverse, and is well known to poorly

known in the epipelagic zone. It is poorly known in the mesopelagic and bathypelagic zones. New records are expected for certain wide-ranging species that have not currently been recorded from South Africa, or for that matter Southern Africa. These include the bigeye sand tiger (*Odontaspis noronhai*), largetooth cookiecutter shark (*Isistius plutodus*), and spined pygmy shark (*Squaliolus laticaudus*). Pelagic long-liners have found the whitetail dogfish (*Scymnodalatias albicauda*) in the Southern Ocean well Southwest and Southeast of South Africa. It may be recorded in South African waters in the future. Some dwarf oceanic species such as the taillight shark (*Euprotomicroides zantedeschia*) and the longnose pygmy shark (*Heteroscymnoides marleyi*) are rarely found, as are the pigmy shark (*Euprotomicrus bispinatus*), cookiecutter shark (*Isistius brasiliensis*), and the semipelagic broadband lanternshark (*Etmopterus gracilispinis*). The longfin mako (*Isurus paucus*) may occur off South Africa, however confirmation is required.

In most areas, there is little knowledge of the distribution of large common offshore oceanic sharks. These include the blue (*Prionace glauca*), silky (*Carcharhinus falciformis*), oceanic whitetip (*Carcharhinus longimanus*), bigeye and pelagic threshers (*Alopias superciliosus* and *A. pelagicus*), and shortfin mako (*Isurus oxyrinchus*). In comparison with the Northern Hemisphere, there are astonishingly few offshore records of these large pelagic sharks, and for that matter the associated pelagic stingray (*Pteroplatytrygon violacea*). What little we know of the distribution of the shortfin mako and pelagic thresher in Southern African waters is primarily from the KwaZulu-Natal shark nets. These samples are derived from individuals that occasionally wander close inshore. Important offshore commercial species such as the silky, blue, and oceanic whitetip sharks are not caught in the shark nets, and thus records are few and far between. This is an unfortunate situation, particularly when consideration is given to the intensity of epipelagic long-line fisheries in the South Atlantic and Southern Indian Ocean that are targeting scombroids, large non-batoid sharks, and the pelagic stingray (by-catch species). In addition, there is the burgeoning trade in the fins of the large pelagic sharks. Unfortunately, there have been few pelagic long-line surveys of sharks in the epipelagic zone of Southern Africa to match demersal work that has been undertaken off the West and South coast of South Africa and Namibia. The distribution of the large oceanic batoids of the Family Mobulidae (devil rays) is poorly known off South Africa. The relatively few records that exist are derived from either strandings or catches in the KwaZulu-Natal shark nets. Devil rays are rarely caught by long-lines, but were susceptible to giant pelagic gill nets during the past few decades.

The white shark (*Carcharodon carcharias*) is well-known from coastal records off the southwest and east coasts of South Africa, where it regularly occurs close inshore, but this species is poorly known north of Saldanha Bay on the west coast of South Africa, Namibia, Angola and Mozambique. In addition, it is poorly known in the epipelagic zone, which it apparently readily penetrates, as do other members of the Family Lamnidae. Such inadequate knowledge of its distribution and movements makes protecting this threatened species problematic.

6. ABUNDANCE OF THE FAUNA

A simple scale of the relative abundance of South African cartilaginous fishes is presented in Table 6. *Rare* species are those with 1-10 examples collected or otherwise sampled (photographed, observed, etc.). Species that are *infrequent* are known from 10 to 100 examples; *Unabundant* species from 100 to 1000; and *Common* species from 1000 or more examples. About half (52%) of known species are rare or unabundant, while slightly more than a quarter are common (including important fisheries species). An additional category, *abundant*, might be used for those species in which more than 100 000 specimens are

known, and *common* restricted to 1000 to 100000. However, the current data set is insufficient, and thus at present these categories cannot be distinguished.

Table 6. Abundance of the South African cartilaginous fishes.

Abundance Category	Nº. Species	% Total
Rare	64	35.4
Infrequent	30	16.6
Unabundant	39	21.5
Common	48	26.5
Total species	181	100.0

It is important to note that despite a high level of species diversity in the South African chondrichthyofauna, stock sizes remain relatively small. This low abundance is a function of the limited but diverse habitats that effectively compress the ranges of many species. Concomitant with the low abundance is a limited potential to sustain fishing pressure, and thus, these resources are vunerable to over exploitation.

7. REFERENCES

Compagno, L.J.V., 2000. An overview of chondrichthyan systematics and biodiversity in southern Africa. . Transactions of the Royal Society South Africa 1999 54, 75-120.

Compagno, L.J.V., Ebert, D.A., Smale, M.J., 1989. Guide to the sharks and rays of southern Africa. Struik Publishers, Cape Town.

Smale, M.J., Compagno, L.J.V., Human, B.A., 2002. First megamouth shark from the western Indian Ocean and South Africa. South African Journal of Marine Science 98, 349-350.

APPENDIX 2

CURRENT FISHING REGULATIONS PERTAINING TO SHARKS

Table 1. Sharks currently listed in Annexures 4, 5 and 6 of the Regulation gazette No. 6284, 2 September 1998 – listings presented here only refer to sharks and rays.

Annexure	List	Common name	Species
4 - Regulation 21	Non-saleable recreational list	Leopard catshark	*Poroderma pantherinum*
		Ragged tooth	*Carcharias taurus*
		Spotted gully	*Triakis megalopterus*
		Striped catshark	*Poroderma africanum*
5 – Regulation 22	Specially protected list	Great white	*Carcharodon carcharias*
		Sawfishes	Pristidae
8 – Regulation 22	Exploitable list	Elasmobranchs	*Elasmobranchii*
	Excluding	Great white	*Carcharodon carcharias*
		Leopard catshark	*Poroderma pantherinum*
		Ragged tooth	*Carcharias taurus*
		Spotted gully	*Triakis megalopterus*
		Striped catshark	*Poroderma africanum*

950 **APPENDIX 3**

951 SYNOPSIS OF SHARK SPECIES TARGETED BY SOUTH AFRICAN FISHERIES AND POTENTIALL SOURCES OF FISHERY DEPENDENT
952 AND INDEPENDENT SURVEY DATA

Superorder/Family	Species	Estimated catch 2010 (t)	Commercial linefishery	Recreational linefishery	Demersal shark longline	Pelagic shark longline	Tuna and swordfish pelagic longline	Gill and beach seine net fisheries	Offshore /inshore demersal trawl fishery	Small pelagic fishery	Hake longline fishery	Bather protection	Prawn trawl fishery	Fishery-dependant data	Fishery- independent data	Biological Data	Stock assessments
Squalomorphea	unidentified	1-10									■						
Hexanchidae	*Heptranchias perlo*	0													X		
	Notorynchus cepedianus	<1-10	■	Δ	○									X	X	A	
	Hexanchus griseus	<1									■				X		
	Chlamydoselachidae spp	<1							■						X		
Squalidae	*Centrophorus* spp	<1							■						X		
	Centroscyllium fabricii	<1							■						X		
	Centroscymnus spp	<1							■						X		
	Deania spp	<1							■		Δ			X	X		
	Etmopterus spp	<1							■		Δ			X	X		

	Isistius brasiliensis	<1							●	●				X	X		
	Squalus acanthias	<1	Δ		Δ			Δ	■					X	X		
	*Cirrhigaleus asper (squalas asper)**	<1											■		X		
	Squalus megalops	11-100							Δ		■			X	X	D	
	Squalus mitsukurii	<1							■		Δ			X	X		
Carcharhinidae	*Carcharhinus amboinensis*	<1										■					E
	Carcharhinus brachyurus	101-200	●	Δ	○	○	Δ	Δ	Δ	Δ		Δ	Δ	X	X	F;G;H	E
	Carcharhinus brevipinna	1-10	○		⊘	○	○		⊘			○	Δ	X			E
	Carcharhinis falciformis	1-10				●	●		●				Δ	X			
	Carcharhinus leucas	1-10	○		○	○	○		Δ			○		X		B;I;G	E
	Carcharhinus limbatus	1-10	●		⊘	⊘	⊘				⊘	⊘	Δ	X		B;C;J;K	E
	Carcharhinus longimanus	1-10				●	●						Δ	X			
	Carcharhinus melanopterus	1-10	○		○	○	○					○	Δ	X	X		
	Carcharhinus plumbeus	<1										■	Δ				
	Carcharhinus obscurus	1-10	○		○	○		○			○	○	Δ	X	X	L;C;M	
	Galeocerdo cuvier	1-10	●									●		X			E
	Prionace glauca	301-400	⊘	Δ	Δ	□	●			Δ	Δ					N	

Triakidae	*Galeorhinus galeus*	301-400	●	Δ	●	Δ		Δ	●	Δ	Δ			X	X	A; O	O
	Mustelus mustelus	101-200	○	Δ	□	⊘			○	Δ	Δ			X	X	P;Q	Q
	Mustelus palumbes	11-100	⊘		⊘				■			⊘		X	X	A	
	Mustelus mosis	1-10	○	○	○				●					X			
	Rhizoprionodon acutus	<1	Δ	Δ									Δ	X			
	Triakis megalopterus	1-10	●								●			X	X	R	R
Scyliorhinidae	*Apristurus saldanha*	<1							■					X			
	Halaelurus natalensis	1-10	●						●		●			X	X		
	Halaelurus lineatus	<1							■						X		
	Haploblepharus edwardsii	1-10	●		●				●					X	X		
	Haploblepharus fuscus	1-10	●						●					X			
	Haploblepharus pictus	1-10	●						●					X			
	Holohalaelurus regani	1-10							●		●			X			
	Poroderma africanum	1-10	●		●									X	X	A	
	Poroderma pantherinum	1-10			●				●					X	X	A	
	Scyliorhinus capensis	1-10	⊘		⊘				■					X	X		
Sphyrnidae	*Sphyrna lewini*	1-10	○			○	○			○	○	○	Δ	X	X		E
	Sphyrna mokarran	1-10	○			○	○					○		X	X		E

	Sphyrna zygaena	1-10	○	⊘	○	⊘	○		⊘	⊘		⊘		X	X		E
Lamnidae	*Carcharadon carcharias*	<1										■		X	X	S	E
	Isurus oxyrinchus	501-600				■	○							X	X	A;B	E
	Lamna nasus	<1					■								X		
Alopiidae	*Alopias pelagicus*	1-10	○			○	○		○	○		○		X			
	Alopias superciliosus	1-10	○			○	○		○	○		○		X	X		
	Alopias vulpinus	1-10	●			○	○	○	○	○		○		X	X	A	
Pseudocarchariidae	*Pseudocarcharias kamoharai*	1-10				●	●							X			
Odontaspididae	*Carcharias taurus*	1-10	○			○	○		○		○	○		X	X	B;T	E
Pristiophoridae	*Pliotrema warreni*	1-10							■		Δ			X	X		
Squatinidae	*Squatina africana*	<1										■		X	X		
Torpedinidae	*Torpedo fuscomaculata*	1-10							■		Δ			X	X		
	Torpedo nobiliana	1-10							■		Δ			X	X		
	Torpedo sinuspersici	1-10							■					X			
	Heteronarce garmani	<1							■					X	X		
	Narke capensis	1-10							■		Δ			X	X		
Rajidae	*Bathyraja smithii*	11-100							■		Δ			X	X		
	Cruriraja spp	11-100							■		Δ			X	X		

	Raja spp	11-100	Δ		Δ				■		Δ			X	X		
	Rostroraja alba	11-100	●		●				●		Δ			X	X		
	Raja caudaspinosa	11-100							■		Δ			X	X		
	Raja confundens	1-10							■					X	X		
	Raja leopardus	11-100							■								
	*Raja miraletus**	11-100	Δ						■		Δ			X	X		
	Raja pullopunctata	11-100							■		Δ			X	X		
	Raja ravidula	1-10							●		●			X	X		
	Raja spinacidermis	11-100							■								
	Raja springeri	10-100							■		Δ			X	X		
	Raja straeleni	201-300	Δ		Δ				■		Δ			X	X		
	Raja wallacei	11-100	Δ		Δ				■		Δ			X	X	U	
Rhinobatidae	*Rhinobatos annulatus*	11-100	⊘	⊘	⊘			⊘	■		⊘			X	X		
	Rhinobatos blochii	1-10	○		○			○	○		○			X		V;W	
	Rhinobatus holcorhynchus	<1							■					X	X		
	Rhinobatos leucospilus	1-10	●	Δ	●									X			
	Rhinobatus occellatus	<1							■						X		
	Rhynchobatus djiddensis	<1							■					X	X		

Myliobatidae	*Aetobatus narinari*	1-10	Δ						■				Δ	X				
	Myliobatis aquila	1-10	○						□		○		Δ	X	X			
	Pteromylaeus bovinus	1-10	●						●		●				X			
	Mobula spp	<1						●		●			●		X			
	Manta spp	<1						●		●			●		X			
Dasyatidae	*Dasyatis brevicaudata*	<1	■										Δ	X	X			
	Neotrygon kuhlii (Dasyatis kuhlii)	1-10	●		●								Δ	X				
	Dasyatis chrysonata	1-10	○		○				○		○		Δ	X		X;Y		
	Dasyatis violacea	11-100				□	○		○					X	X			
	Gymnura natalensis	1-10	○		○				○		○		Δ	X				
	Himantura gerrardi	<1	■										Δ	X	X			
	Himantura uarnak	<1	■											X				
	Taeniura lymma	<1	■											X				
Chimaeridae	*Hydrolagus* spp.	<1							■						X			
Rhinochimaeridae	*Harriotta raleighana***	<1							■						X			
	*Neoharriotta pinnata***	<1							■						X			
	Rhinochimaera spp	<1							■						X			

Callorhinchidae	*Callorhinchus capensis*	801-900						⦸	■					X	X	Z	

%catch per species: Δ <1 ⦸ 1-10 ○ 11-25	 ● 26-50 □ 51-75 ■ 76-100	Sources of institutional data: A-Department of Agriculture, Forestry and Fisheries: Inshore Resource Research, superscripts 1: National fisheries data, 3: Research data.; B- ORI tagging data, C-KZN Sharks Board.

A:DAFF unpublished	F:Walter and Ebert (1991)	K:Dudley and Cliff (1993)	P:Goosen and Smale (1997)	U:Walmsley-Hart (1999)	Z:Freer and Griffiths (1993b)
B:Oceonographic Research Institute	G:Cliff and Dudley (1992)	L:Natanson and Kohler (1996)	Q:da Silva (2007)	V:Dunn (2010)	
C:KZN Sharks board	H:Smale (1991)	M:Govender et al (1991)	R:Booth and Foulis (2010)	W:Rossouw (1984)	
D:Watson and Smale (1999)	I:Bass et al (1973)	N:Jolly (2011)	S:Wintner and Cliff (1999)	X:Cowley (1990)	
E:Dudley and Simpfendorfer (2006)	J:Wintner and Cliff(1996)	O:McCord (2005)	T:Govender et al (1991)	Y:Cowley (1997)	

953 *Species currently being re-described; **Species identification remains an issue for these species however DAFF databases record both species
954 separately

References:

Booth, A.J., Foulis, A.J., Smale, M.J., 2011. Age validation, growth, mortality and demographic modelin. Fishery Bulletin 109, 101-112.

Cowley, P.D., 1990. The taxonomy and life history of the blue stingray Dasyatis marmorata capensis (Batoidea: Dasyatidae) from southern Africa. MSc thesis, Rhodes University, Grahamstown.

Cowley, P.D., 1997. Age and growth of the blue stingray Dasyatis chrysonata chrysonata from the south-eastern Cape coast of South Africa. South African Journal of Marine Science 18, 31-38.

da Silva, C., 2007. The status and prognosis of the smoothhound shark (Mustelus mustelus) fishery in the southeastern and southwestern Cape coasts, South Africa, MSc thesis. Rhodes University, Grahamstown.

Dudley, S.F.J., Cliff, G., 1993. Sharks caught in the protective nets off Natal, South Africa. 7. The blacktip shark Carcharhinus limbatus (Valenciennes). South African Journal of Marine Science 13, 237-254.

Dudley, S.F.J., Simpfendorfer, C.A., 2006. Population status of 14 shark species caught in the beach protection program of KwaZulu-Natal, South Africa, 1978-2003. Marine and Freshwater Research 57, 225-240.

Dunn, K.J., 2010. The age, growth, diet and reproduction biology of the bluntnose guitarfish Rhinobatus blochii in Saldanha Bay, South Africa, MSc thesis University of Cape Town, Cape Town.

Freer, D.W.L., Griffiths, C.L., 1993. Estimation of age and growth in the St Joseph Callorhinchus capensis [Dumeril], pp. 75-81.

Goosen, A.J.J., Smale, M.J., 1997. A preliminary study of age and growth of the smoothhound shark Mustelus mustelus (Triakidae). South African Journal of Marine Science 18, 11-18.

Govender, A., Birnie, S.L., 1997a. Age and growth of captive spotted ragged-tooth sharks. South African Journal of Marine Science 11, 15-20.

Govender, A., Birnie, S.L., 1997b. Mortality estimates for juvenile dusky sharks Carcharhinus obscurus in South Africa using mark-recapture data. South African Journal of Marine Science 18, 11-18.

Govender, A., Kistnasamy, N., van der Elst, R.P., 1991. Age and growth of captive spotted ragged-tooth sharks. South African Journal of Marine Science 11, 15-20.

Jolly, K.A., 2011. Aspects of the biology and fishery of the blue shark (Prionace glauca) in the South African waters., In Zoology Department. MSc thesis, University of Cape Town, Cape Town.

McCord, M.E., 2005. Aspects of the ecology and management of the soupfin shark (Galeorhinus galeus) in South Africa, In Department of Ichthyology and Fisheries Science. MSc thesis, Rhodes University, Grahamstown.

Natanson, L.J., Kohler, N.E., 1996. A preliminary estimate of the age and growth of the dusky shark Carcharhinus obscurus from the south-western Indian Ocean with comparisons with western North Atlantic population. South African Journal of Marine Science 17, 217.

Rossouw, G.J., 1984. Age and growth of the sandshark Rhinobatus annulatus in Algoa Bay, South Africa. Journal of Fish Biology.

Walmsley-Hart, S.A., Sauer, W.H., Buxton, C.D., 1999. The biology of the skates Raja wallacei and R. pullopunctata (Batiodea: Rajidae) on the Agulhas Bank, South Africa. South African Journal of Marine Science 21, 165-179.

Walter, J.P., Ebert, D.A., 1991. Preliminary estimates of the age of the bronze whaler Carcharhinus brachyurus (Chondrichthyes: Carcharhinidae) from southern Africa, with a preliminary review of some life history parameters. South African Journal of Marine Science 10, 37-44.

Watson, G., Smale, M.J., 1999. Age and growth of the shortnose spiny dogfish Squalus megalops from the Agulhas Bank, South Africa. South African Journal of Marine Science 21, 9-18.

Wintner, S.P., Cliff, G., 1999. Age and growth determination of the great white shark Carcharadon carcharias, for the east coast of South Africa. Fishery Bulletin 97, 153-169.