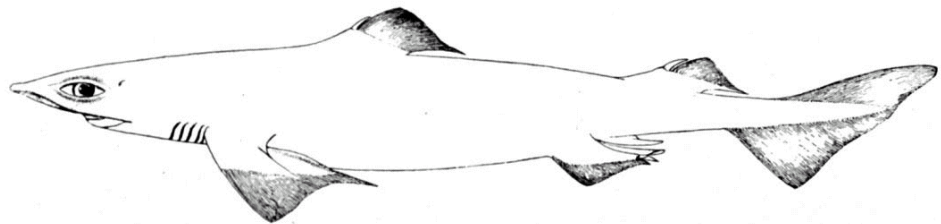




Background Document for Gulper shark
Centrophorus granulosus



OSPAR Convention

The Convention for the Protection of the Marine Environment of the North-East Atlantic (the “OSPAR Convention”) was opened for signature at the Ministerial Meeting of the former Oslo and Paris Commissions in Paris on 22 September 1992. The Convention entered into force on 25 March 1998. It has been ratified by Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, Netherlands, Norway, Portugal, Sweden, Switzerland and the United Kingdom and approved by the European Community and Spain.

Convention OSPAR

La Convention pour la protection du milieu marin de l'Atlantique du Nord-Est, dite Convention OSPAR, a été ouverte à la signature à la réunion ministérielle des anciennes Commissions d'Oslo et de Paris, à Paris le 22 septembre 1992. La Convention est entrée en vigueur le 25 mars 1998. La Convention a été ratifiée par l'Allemagne, la Belgique, le Danemark, la Finlande, la France, l'Irlande, l'Islande, le Luxembourg, la Norvège, les Pays-Bas, le Portugal, le Royaume-Uni de Grande Bretagne et d'Irlande du Nord, la Suède et la Suisse et approuvée par la Communauté européenne et l'Espagne.

Acknowledgement

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Background Document for Gulper shark *Centrophorus granulosus*

Executive Summary

This Background Document on the Gulper shark *Centrophorus granulosus* has been developed by OSPAR following the inclusion of this species on the OSPAR List of threatened and/or declining species and habitats (OSPAR Agreement 2008-6). The document provides a compilation of the reviews and assessments that have been prepared concerning this species since the agreement to include it in the OSPAR List in 2008. The original evaluation used to justify the inclusion of *C.granulosus* in the OSPAR List is followed by an assessment of the most recent information on its status (distribution, population, condition) and key threats prepared during 2009-2010. Chapter 7 provides proposals for the actions and measures that could be taken to improve the conservation status of the species. In agreeing to the publication of this document, Contracting Parties have indicated the need to further review these proposals. Publication of this background document does not, therefore, imply any formal endorsement of these proposals by the OSPAR Commission. On the basis of the further review of these proposals, OSPAR will continue its work to ensure the protection of *C.granulosus* where necessary in cooperation with other competent organisations. This background document may be updated to reflect further developments or further information on the status of the species which becomes available.

Récapitulatif

Le présent document de fond sur le Squale-chagrin commun a été élaboré par OSPAR à la suite de l'inclusion de cette espèce dans la liste OSPAR des espèces et habitats menacés et/ou en déclin (Accord OSPAR 2008-6). Ce document comporte une compilation des revues et des évaluations concernant cette espèce qui ont été préparées depuis qu'il a été convenu de l'inclure dans la Liste OSPAR en 2008. L'évaluation d'origine permettant de justifier l'inclusion du Squale-chagrin commun dans la Liste OSPAR est suivie d'une évaluation des informations les plus récentes sur son statut (distribution, population, condition) et des menaces clés, préparée en 2009-2010. Le chapitre 7 fournit des propositions d'actions et de mesures qui pourraient être prises afin d'améliorer l'état de conservation de l'espèce. En se mettant d'accord sur la publication de ce document, les Parties contractantes ont indiqué la nécessité de réviser de nouveau ces propositions. La publication de ce document ne signifie pas, par conséquent que la Commission OSPAR entérine ces propositions de manière formelle. A partir de la nouvelle révision de ces propositions, OSPAR poursuivra ses travaux afin de s'assurer de la protection du Squale-chagrin commun, le cas échéant avec la coopération d'autres organisations compétentes. Ce document de fond pourra être actualisé pour tenir compte de nouvelles avancées ou de nouvelles informations qui deviendront disponibles sur l'état de l'espèce.

1. Background information

Name of species

Gulper shark (*Centrophorus granulosus*) (Bloch & Schneider, 1801)

2. Original evaluation against the Texel-Faial selection criteria

List of OSPAR Regions and Dinter biogeographic zones where the species occurs

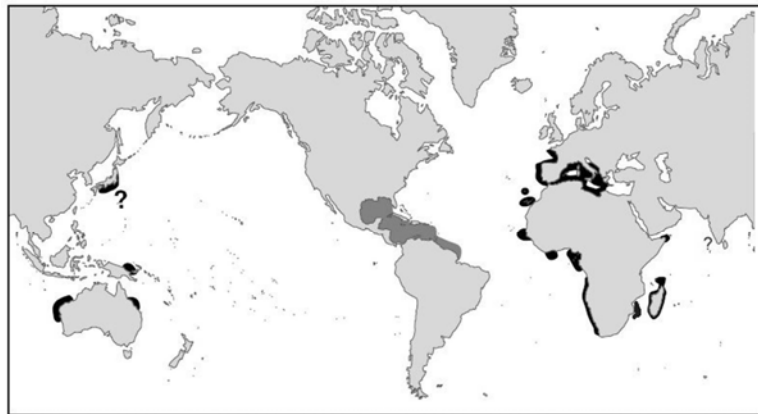
OSPAR Regions: IV, V

Biogeographic zones: Boreal-Lusitanian, Lusitanian-Boreal, Warm Lusitanian subprovince, Cool Lusitanian subprovince, Azores subprovince, (Macaronesian province), Atlantic Subregion (North Atlantic province)

Figure 1 :

Global distribution of *Centrophorus granulosus*

Source: Compagno *et al.* 2005.
Records from the Azores are not shown.



Centrophorus granulosus

Collins 2005 Field Guide

List of OSPAR Regions where the species is under threat and/or in decline

OSPAR Regions: IV, V

Original evaluation against the Texel-Faial criteria for which the species was included on the OSPAR List

C. granulosus was nominated for inclusion in the OSPAR List in 2006 by Germany

Table 1: Summary assessment of Gulper shark (*Centrophorus granulosus*) against Texel-Faial criteria

Criterion	Comments	Evaluation
Global importance	Widely distributed in tropical and temperate seas.	Does not qualify
Regional importance	There is no information about genetic differentiation of regional populations The OSPAR Area not of regional importance at stock or species level.	Does not qualify
Rarity	<i>C. granulosus</i> is considered by ICES WGEF (2007) to be rare in deepwater north of Portugal.	Does not qualify
Sensitivity	Very sensitive to depletion by deepwater fisheries (primarily taken by longline and gillnet) and stocks very slow to rebuild because of its severely limiting life history characteristics (late maturity, a single pup born after a two year gestation).	Qualifies – very sensitive
Keystone species	No information	Unknown
Decline	Where catch per unit effort (CPUE) data are available, these are initially high, then decline quickly. A decline of 80-95% from baseline has been estimated in the OSPAR Area, based on data from the Portuguese target long line fishery within the main distribution range of this species. Declines in deepwater fisheries for <i>Centrophorous</i> species are also reported from elsewhere in their global range.	Qualifies
Citations from the original proposal: Capapé 1985; Fischer <i>et al.</i> 1987; Guallart <i>et al.</i> 2006; ICES WGEF 2006, 2007; Tortonese 1956;		

3. Current status of the species

Distribution in OSPAR Maritime Area

This species is apparently widely distributed in temperate and tropical seas. In the North-East Atlantic, *Centrophorus granulosus* occurs in the southern part of the OSPAR Area on the upper continental slopes and outer continental shelf off France, Spain and Portugal. It is also recorded in the Mediterranean and in other regions illustrated in Figure 1, although it is often misidentified as *C. uyato* and its distribution outside the OSPAR area is uncertain. (Compagno 1984; Compagno *et al.* 2005; Froese *et al.* 2006; Guallart *et al.* 2006).

Population (current/trends/future prospects)

There is no population estimate for *C. granulosus* in the OSPAR Area, but abundance has been declining very steeply during the past two decades, following the establishment of a directed longline fishery for deepwater sharks. Where catch per unit effort (CPUE) data are available, these are initially high, then decline quickly. A decline of 80-95% from baseline has been estimated in the OSPAR Area, based on data from the Portuguese target long line fishery within the main distribution range of this species (Figure 2).

Species of *Centrophoridae* are believed to have the lowest reproductive potential of all elasmobranch species (Irvine 2004, Kyne and Simpfendorfer 2007), and therefore the highest risk of overfishing.

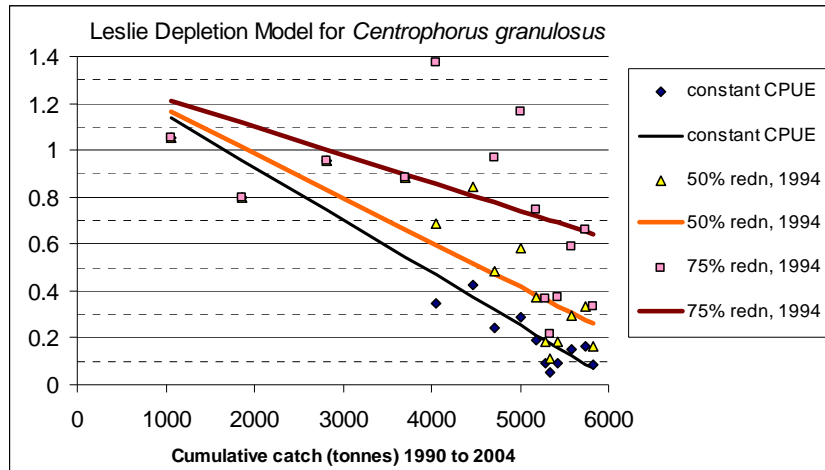
The population will continue to decline for as long as fisheries continue to target deepwater sharks, or take them as bycatch within this species' range. Recovery of depleted populations will be slow and take longer than 25 years, even if all exploitation ceases.

Wilson *et al.* (2009) noted that, given the slow recovery rates for gulper sharks, rebuilding of populations will not be measurable for at least several decades.

Figure 2:

Estimates of depletion of *Centrophorus granulosus* off the Portuguese coast, 1990–2004

(Model developed at IUCN SSC Shark Specialist Group North-East Atlantic Red List Workshop, 2006)



Condition (current/trends/future prospects)

The population of *C. granulosus* in the OSPAR Area is severely depleted. The North-East Atlantic population is assessed as Critically Endangered in the IUCN Red List of Threatened Species. Targeted exploitation effort has been significantly reduced, but bycatch continues, with deepwater fisheries moving between fishing grounds in response to depletion or the introduction of management measures. As noted above, the very low productivity of this species means that, even if/when all deepwater fisheries mortality ceases, recovery will be extremely slow (in the order of many decades).

Limitations in knowledge

C. granulosus can be confused with other deepwater shark species, and species-specific statistics are generally lacking. Many countries exploiting deepwater fisheries in the OSPAR Area combine records of several species as ‘siki’ shark. In recent years, this category has been dominated by Leafscale gulper shark *Centrophorus squamosus* and Portuguese dogfish *Centroscymnus coelolepis*, also listed in Annex V, which are of greater importance to fisheries. Alternatively, Gulper shark records are included in generic categories such as ‘various sharks nei’. Distribution, catch and catch per unit effort (CPUE) data are therefore incomplete. Information on age and growth is also incomplete and estimates of stock productivity are uncertain. The ICES WGEF has, for this reason, not been able to assess the stock and has noted that studies of biology and stock discrimination are required.

In response to a request from NEAFC in 2007 and building on the response given to an EC request in 2006, WGDEEP made recommendations for the coordination of deepwater surveys in the NEAFC Convention Area (ICES WGEF 2007). These surveys will, it is hoped, provide better information for the assessment of the deepwater shark stocks present.

Meanwhile, ICES WGEF (2008) has advised that no target fisheries should be permitted without reliable estimates of current exploitation rates and stock productivity for deepwater sharks and that

these species should be managed in a multi-species context, with particular attention to *C. squamosus*, *C. coelolepis* and Kitefin shark *Dalatias licha*.

4. Evaluation of threats and impacts

The only known threat to this deepwater species is mortality in unsustainable deepwater fisheries. This is a biologically highly-sensitive species with extremely low resilience to exploitation. Literature reviews by Wilson *et al.* (2009) and Kyne and Simpfendorfer (2007) indicate that many deepwater sharks are unable to endure catches exceeding 5% of their virgin biomass. This species has been targeted and bycatch is also utilised for its valuable meat and other products (fins, liver oil). Local populations are depleted rapidly and fishing effort may quickly be redirected to other areas when catches fall or regulations are introduced. A decline of 80-95% from baseline has been estimated in the OSPAR Area, based on data from the Portuguese target longline fishery within the main distribution range of this species. This fishery started in 1983. Catches declined 90% from 1990 to 2004 before the fishery closed after harvesting some 5,000 to 6,000 t. A Delury depletion model, (Figure 2), suggests that the stock has declined since fishing began by between 80% (if effort fell by 50%) and 95% (if effort remained constant). Recovery of depleted populations will be slow and rebuilding is unlikely to become measureable for at least several decades (Wilson *et al.* 2009), even if all exploitation ceases.

By-catch mortality, whether discarded or utilised, poses a particular challenge for the management of deepwater sharks; these species cannot be returned alive following capture in many commercial fisheries. Deepwater trawls, in particular, are not species-selective and take a bycatch of non-commercial species, including deepwater sharks (Allain *et al.* 2003). The long soak times and discards of nets from gillnet fisheries increase by-catch mortality (Hareide *et al.* 2005). ICES WGEF (2007) noted that there are no obvious measures that could mitigate by-catch of sharks in commercial deep-water fisheries. Preventing by-catch mortality will therefore be very difficult or impossible to achieve while fisheries continue. Wilson *et al.* (2009), however, report that CSIRO tagging research has clearly shown that Gulper sharks taken on longline gear and handled appropriately before being released (without using automatic de-hooking gear) have a high rate of survival. Reduction of all catches in the mixed fisheries that take deepwater sharks as a by-catch will require a cut in overall fishing effort to the lowest possible level.

Table 2: Summary of key threats and impacts to Gulper shark (*Centrophorus granulosus*)

Type of impact	Cause of threat	Comment
Fisheries	Target and utilised bycatch fisheries	See above.

5. Existing management measures

A number of fisheries regulations have been applied to deepwater shark species over the past seven years. These are implemented by ICES Area, not OSPAR Region (ICES Areas and Sub-areas are illustrated in Figure 3). These regulations control fishing gears, depths and effort (technical measures), and set TACs. Fishing opportunities for most deepwater species are decided on a bi-annual basis. They are becoming increasingly restrictive. ICES advice is that these fisheries should not proceed, nor expand, unless they can be demonstrated to be sustainable for deepwater sharks.

In 2007, the combined TAC for 11 deepwater shark species, including Gulper Shark, was 2472 t in ICES Sub-areas V, VI, VII, VIII and IX, reducing to 1646 t in 2008. In 2007 and 2008, a TAC of 20 t was set for 13 species of deepwater sharks combined in Sub-area X, and 99 t for 11 species in Sub-area XII. The deepwater shark quotas for 2009 are for bycatch only and have been reduced to 824 t for Sub-areas V, VI, VII, VIII and IX, 10 t in Sub-area X, and 12 t in XI (Council Regulation (EC) No. 1359/2008). These quotas will all fall to zero in 2010, although a bycatch of up to 10% of the 2009 quota will still be permitted – a total of about 85 t, compared with landings of around 10,000 t for deepwater ‘siki’ sharks in 2001.

6. Conclusion on overall status

This species has been seriously depleted by deepwater fisheries. Management regulations introduced over the past decade do not cover the whole of the OSPAR Maritime Area and have caused effort to be redirected to new fishing grounds, where depletion continues. Although TACs for deepwater sharks are being reduced to zero, by-catch will continue to be a problem in other deepwater fisheries and IUU fishing is occurring in international waters. *C. granulosus* is assessed on the IUCN Red List of Threatened Species as vulnerable globally, but critically endangered in the North-East Atlantic.

7. Action to be taken by OSPAR

C. granulosus, like other Gulper shark species, cannot support fisheries. Exploitation has resulted in rapid depletion of its population in the OSPAR Maritime Area. The conservation objective for this species should be to protect remaining portions of the stock in order to allow population recovery.

Action/measures that OSPAR could take, subject to OSPAR agreement

As set out in Article 4 of Annex V of the Convention, OSPAR has agreed that no programme or measure concerning a question relating to the management of fisheries shall be adopted under this Annex. However where the Commission considers that action is desirable in relation to such a question, it shall draw that question to the attention of the authority or international body competent for that question. Where action within the competence of the Commission is desirable to complement or support action by those authorities or bodies, the Commission shall endeavour to cooperate with them.

Scientific advice on the management of deepwater sharks is available from ICES. OSPAR should endeavour to support the adoption of this advice by all of its Contracting Parties and on the High Seas through NEAFC. ICES WGEF (2007) noted that there are no obvious measures that could be used to mitigate by-catch of sharks in commercial deepwater fisheries. Preventing by-catch mortality is very difficult or impossible to achieve when fisheries are taking place in deepwater shark habitat. Action at an OSPAR level would therefore include not only supporting the closure of target fisheries and introduction of a zero by-catch TAC, but also minimising by-catch through depth and effort restrictions, gear controls and area closures, as appropriate, and restricting overall fishing effort in deepwater shark habitat to the lowest possible level. Many of these actions will also provide conservation benefits for other deepwater commercial species.

It is proposed that OSPAR should encourage relevant Contracting Parties to OSPAR and NEAFC (those whose flag vessels are engaged in the deepwater fisheries that take *C. granulosus* and other threatened deepwater shark species) to adopt or support the adoption of ICES advice for deepwater sharks through:

- national, European and regional (NEAFC) fisheries conservation and management measures, including provisions within the Community Plan of Action on Sharks and prohibitions on target fishing, retention, landing and sale;

- the designation of offshore marine protected areas;
- national, European and international protected species legislation (including the Bern Convention on the Conservation of European Wildlife and Natural Habitats and Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora); and
- marine species and fisheries research.

It is proposed that OSPAR should draw to the attention of Contracting Parties the requirement for catches of deepwater sharks by their vessels to be reported at the species level and this information made available to ICES and NEAFC.

To complement the above, the OSPAR Commission should communicate to the European Commission the Critically Endangered status of *C. granulosus* and its Annex V status in the OSPAR Area, and encourage urgent consideration of the species as a candidate for listing on relevant European and international biodiversity conventions and for special attention under the Community Plan of Action for Sharks.

Table 3: Summary of key priority actions and measures which could be taken for Gulper shark (*Centrophorus granulosus*). Where relevant, the OSPAR Commission should draw the need for action in relation to questions of fisheries management to the attention of the competent authorities. Where action within the competence of the Commission is desirable to complement or support action by those authorities or bodies, the Commission shall endeavour to cooperate with them.

Key threats	Fisheries mortality (target and bycatch) in unsustainable deepwater fisheries	
Other responsible authorities	<ul style="list-style-type: none"> - EC and Council of Fisheries Ministers (Common Fisheries Policy, Regulations, TACs) - OSPAR Contracting Parties - NEAFC and ICES 	
Already protected? Measures adequate?	<p>EU: TAC, effort regulation and gill net bans</p> <p>NEAFC: gill net ban</p> <p>Species-specific catch records</p>	<ul style="list-style-type: none"> - Grouped bycatch TACs for deepwater sharks are restrictive in some areas and will fall to near zero (10% of 2009 TAC) in 2010. - An observer programme is in place for deepwater fisheries. - Gill net bans do not cover all OSPAR areas and depths where deepwater sharks occur. - Trawl fisheries are regulated through a fishing effort management programme. - Covers all international waters below 200 m, thus protecting <i>C. granulosus</i>. - The majority of EU Member States are not providing species-specific data for deepwater sharks. IUU fishing is taking place in international waters.
Recommended Actions and Measures	<p>OSPAR Commission</p> <p>Contracting Parties</p> <p>Research needs</p>	<ul style="list-style-type: none"> - Monitor information and advice of the ICES Working Group on Elasmobranch Fisheries and bring this to the attention of CPs. - Make identification guides available to industry and agencies to ensure that accurate species-specific catch records are collected; - Support ICES and EC recommendations in the Council of Ministers and NEAFC. - Improve observer coverage on deepwater fishing vessels. - Life history, biology, stock discrimination and trend data

Brief summary of proposed monitoring system (see annex 2)

Fishery-independent surveys are monitoring this species in part of its range and an observer programme for deepwater fisheries is in place. Greater observer coverage utilising accurate species identification guides would significantly improve monitoring and collection of scientific data. The mandatory requirement for species-specific landings data from EU MS is not being met, but is essential for monitoring the status of fisheries for and stocks of this and other deepwater shark species.

Annex 1: Overview of data and information provided by Contracting Parties

Contracting Party	Feature occurs in CP's Maritime Area	Contribution made to the assessment (e.g. data or information provided)	National reports References or web links
Belgium	N	N	
Denmark	N	Y - Review of Draft	
France	Y	Y Review of Draft	
Germany	N	Y Habitat destruction due to pollution/eutrophication is considered another threat to this species (Fricke <i>et al.</i> 2007).	Fricke, R. & Eschmeyer, W.N. 2009. A guide to fish collections in the Catalogue of fishes. Online version, updated 2 July 2009.– Internet publication, San Francisco (California Academy of Sciences). http://research.calacademy.org/research/lchthyology/catalog/collections.asp
Iceland	N	N	
Ireland	N	N	
Netherlands	N	N	
Norway	N	N	
Portugal	Y	N	
Spain	Y	Y Review of Draft	Bañón, R., C. Piñeiro and M. Casas, 2008a. Biological observations of the gulper shark <i>Centrophorus granulosus</i> (Chondrichthyes: Centrophoridae) off the coast of Galicia (north-western Spain, eastern Atlantic). <i>Journal of Marine Biological Association of U.K.</i> , 88(2): 411-414. Casas, J.M., C. Piñeiro and R. Bañón, 2001. Maturity and other biological aspects of main deep-water squaloid sharks, in the north and northwest of the Iberian Peninsula (ICES Div VIIIc, IXa and IXb). <i>J. Nortw. Atl. Fish. Sci.</i> NAFO SCR01/121. Piñeiro, C.G, M. Casas and R. Bañón, 2001. The deepwater fisheries exploited by Spanish fleets in the North-East Atlantic: a review of the current status. <i>Fisheries Research</i> , 51: 311-320.

Sweden	N	Y Review of Draft	
United Kingdom	N	Y Review of Draft	

Summaries of country-specific information provided

Spain: *Centrophorus granulosus* (Gulper shark) and *Centrophorus squamosus* (Leafscale gulper shark) in the Cantabrian Sea:

These two species are rarely caught in the series of bottom trawl surveys carried out in the continental shelf of Galicia and Cantabrian Sea. The depth range of these surveys (70-500) is not suitable to catch these species. Nowadays there are no target fisheries on these species although there were some vessels in the 1970's (Piñeiro *et al.*, 2001). These species have been caught in Galicia waters (IXb) and some biological information have been recorded (Bañón *et al.*, 2008a; Casas *et al.*, 2001). No fishery statistics are available for these species. Landings of these species are not at specific level and *C. granulosus* can be confused with other deepwater sharks.

Annex 2: Detailed description of the proposed monitoring and assessment strategy

Rationale for the proposed monitoring

Monitoring is essential to provide management advice and to evaluate future trends, including bycatch and stock recovery following cessation of target fisheries.

Use of existing monitoring programmes

Regular fishery independent surveys of deepwater areas are undertaken by research vessels and chartered vessels in the OSPAR Area. This species should now also be reported accurately in landings by EU Member States. The ICES Working Group on Elasmobranch Fishes uses these and all other available sources to report regularly on the status of this species in the OSPAR Area.

Synergies with monitoring of other species or habitats

Monitoring of other deepwater fish species on the OSPAR list require the same strategy.

Assessment criteria

It is not considered necessary to develop assessment criteria or triggers for additional monitoring of this species at the present time.

Techniques/approaches

As already underway, with the addition of more accurate identification guides for use by industry and at landing sites.

Selection of monitoring locations

n/a

Timing and Frequency of monitoring

As already underway.

Data collection and reporting

As already undertaken with improvements as required (e.g. species-specific catch and landings data).

Quality assurance

n/a

Annex 3: References

- Allain, V., Biseau, A. & Kergoat, B. 2003. Preliminary estimates of French deepwater fishery discards in the North-East Atlantic Ocean. *Fisheries Research*, 60(1): 185-192.
- Compagno, L.J.V. 1984. *Sharks of the world. FAO Species Catalogue for Fisheries Purposes*. FAO Fisheries Synopsis No. 125. Vol 4 Part I. FAO, Rome, Italy.
- Compagno, L.J.V. In prep. *Sharks of the world. An annotated and illustrated catalogue of shark species known to date. Part 1. Hexanchiformes to Pristiophoriformes*. FAO Fish Synop. FAO, Rome, Italy.
- Compagno, L.J.V., Dando, D., and Fowler, S. 2005. *Field Guide to Sharks of the World*. HarperCollins, London.
- Fricke, R., Bilecenoglu, M., Sari, H.M. & Kaya, M. 2007. Annotated checklist of fish and lamprey species of Turkey, including a Red List of threatened and declining species. *Stuttgarter Beiträge zur Naturkunde, (A) 706*: 1 – 169.
- Froese, R. and D. Pauly. Editors. 2006. FishBase. World Wide Web electronic publication. www.fishbase.org , version (05/2006).
- Guallart, J., Serena, F., Mancusi, C., Casper, B.M., Burgess, G.H., Ebert, D.A., Clarke, M. & Stenberg, C. 2006. *Centrophorus granulosus*. In: IUCN 2006. 2006 IUCN Red List of Threatened Species. <www.iucnredlist.org>.
- Gubbay, S. 2001. Review of proposals for an initial list of threatened and declining species in the OSPAR maritime area. Volume 1. Review. 51pp.
- ICES ACFM, 2005. Report of the ICES Advisory Committee on Fishery Management, Advisory Committee on the Marine Environment and Advisory Committee on Ecosystems, § 1.4.1, Deepwater sharks in the northeast Atlantic (ICES Sub-areas V-XIV, mainly Portuguese dogfish and leafscale gulper shark). ICES Advice, Volumes 1-11, 1,403 pp. <http://www.ices.dk/products/icesadvice.asp>
- ICES ACFM, 2008. Report of the ICES Advisory Committee on Fishery Management, Advisory Committee on the Marine Environment and Advisory Committee on Ecosystems, 9.4.20. Portuguese dogfish (*Centroscymnus coelolepis*) and leafscale gulper shark (*Centrophorus squamosus*) in the Northeast Atlantic (ICES Areas I XIV). ICES Advice, Book 8, pp. 186–190. <http://www.ices.dk/products/icesadvice.asp>
- ICES WGEF 2004. Report of the Working Group on Elasmobranch Fishes (WGEF). ICES Living Resources Committee ICES CM 2004/G:11. International Council for the Exploration of the Sea, Denmark.
- ICES WGEF, 2005. Report of the Study Group on Elasmobranch Fishes, ICES Headquarters 6-10 May 2002, ICES CM 2002/G:08.
- ICES WGEF. 2006. Report of the Working Group of the Elasmobranch Fishes (WGEF). 14–21 June 2006, ICES, Copenhagen. ICES CM 2006/ACFM:31 Ref. LRC.
- ICES WGEF. 2007. Report of the Working Group of the Elasmobranch Fishes (WGEF). 22–28 June 2007, ICES CM 2007 /ACFM:27
- ICES WGEF. 2008. Report of the Working Group of the Elasmobranch Fishes (WGEF). 3–6 March 2008, ICES, Copenhagen, Denmark. ICES CM 2008/ACOM:16.

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

ICES WGFE. 2006. Report of the Working Group on Fish Ecology (WGFE), 13–17 March 2006, ICES, Copenhagen. ICES CM 2006/LRC:06, 154 pp.

Irvine SB (2005) Report of the Workshop on Conservation and Management of Deepwater Chondrichthyan Fishes. Report on Deep Sea 2003, an International Conference on Governance and Management of Deep Sea Fisheries. New Zealand, December 2003. FAO, Rome.

Kyne PM and Simpfendorfer CA (2007). A collation and summarization of available data on deepwater chondrichthyans: biodiversity, life history and fisheries. A report prepared by the IUCN SSC Shark Specialist Group for the Marine Conservation Biology Institute. February 2007.

STECF. 2003. Commission Working Paper. Report of the *ad hoc* Working Group on Elasmobranch Fisheries. SEC(2003)1427.

Wilson, D.T., H.M. Patterson, R. Summerson and P.I. Hobsbawn. 2009. Information to support management options for upper-slope gulper sharks (including Harrison's dogfish and southern dogfish). Final Report to the Fisheries Research and Development Corporation Project No. 2008/65. Bureau of Rural Sciences, Canberra.



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**OSPAR's vision is of a clean, healthy and biologically diverse
North-East Atlantic used sustainably**

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