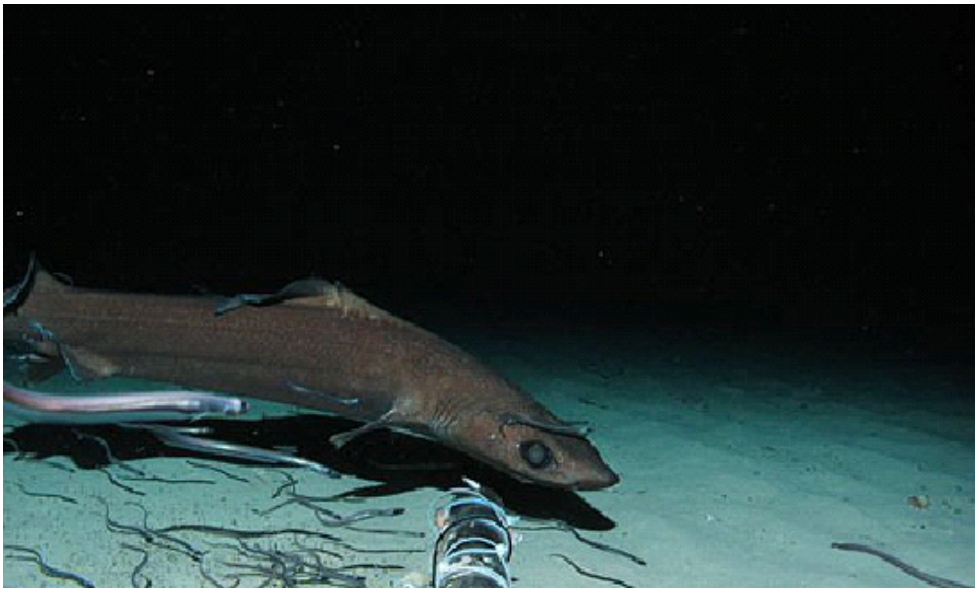
OSPAR COMMISSION

Background Document for Leafscale gulper shark *Centrophorus squamosus*



Biodiversity Series

2010

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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Photo acknowledgement

Cover page: © Oceanlab, University of Aberdeen

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Executive Summary

This Background Document on the Leafscale gulper shark *Centrophorus squamosus* 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.squamosus* 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.squamosus*, 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 Petit squale 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 Petit squale 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 petit squale, 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

Leafscale gulper shark (*Centrophorus squamosus*) Bonnaterre, 1788.

2. Original evaluation against the Texel-Faial selection criteria

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

OSPAR Regions:	The OSPAR List indicates that *C. Squamosus* occurs in I, II, III, IV, V. This updated assessment found no evidence that *C. squamosus* occurs in Region II and concludes that it is absent from this Region.
Biogeographic Zones:	South Iceland-Faeroe Shelf, Boreal, Boreal-Lusitanean, Lusitanean-Boreal, Cool Lusitanean subprovince, Azores subprovince (Macaronesian province), Atlantic Subregion (North Atlantic province).

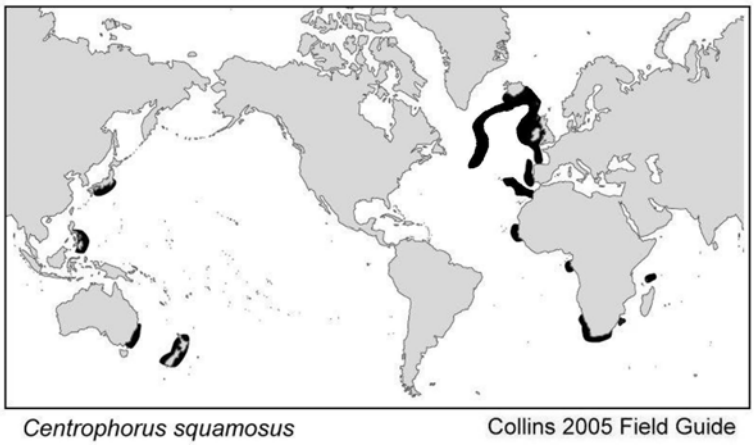

Figure 1: Global distribution of Leafscale gulper shark *Centrophorus squamosus*
Source: Compagno *et al*. 2005

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

OSPAR Regions: All where it occurs

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

C.squamosus was nominated for inclusion in the OSPAR List in 2006 by Germany and WWF.

Table 1. Summary assessment of Leafscale gulper shark (Centrophorus squamosus) against Texel-Faial criteria.

Criterion	Comments	Evaluation
Global importance	Widely distributed in the Atlantic, Indian and Pacific Oceans.	Does not qualify
Regional importance	There is assumed to be a single migratory stock of *C. squamosus* in the OSPAR Area, probably linked to the western African populations. The OSPAR Area is likely of regional importance at a stock level, but not at species level.	Does not qualify
Rarity	Not rare.	Does not qualify
Sensitivity	Life history characteristics are poorly known, but genus *Centrophorus* is considered to be among the deepwater sharks most sensitive to depletion by fisheries because of their life history characteristics (very slow growth, late maturity, long intervals between litters, and extreme longevity) and adaption to a very stable, cold, low-productivity environment. Preliminary age estimates suggest that this is the longest-lived shark species yet examined.	Qualifies – very sensitive
Keystone species	No information	Unknown
Decline	Steep declines have been reported in virtually all fisheries for this species within the OSPAR Area where catch per unit effort (CPUE) data are available. These declines frequently took place in only a few years. ICES considers that the stock is depleted and likely to be below any candidate limit reference point. Recent landings have been much lower than the Total Allowable Catch (TAC) available and declining landings may reflect an overall decline in stocks, particularly in the north. Declines in deepwater fisheries for *Centrophorous* species are also reported from elsewhere in their global range.	Qualifies

3. Current status of the species

Distribution in OSPAR Maritime Area

Centrophorus squamosus is widely distributed in the OSPAR Area from Iceland and the Faroes on the Atlantic slope to Africa, including Madeira and Azores, on the Mid-Atlantic Ridge from Iceland to the Azores (Hareide and Garnes 2001), and on the Hatton Bank (Heessen 2003) (Figure 1). It lives on or near the seabed at depths of 230–2400 m on continental slopes, and is also reported from the upper 1250 m of oceanic water, well above the seabed in ocean depths of around 4000 m (Compagno and Niem, 1998). The species appears to be highly migratory (Clarke *et al*. 2001, 2002). Pregnant females and pups are found in mainland Portugal and Madeira, with only pre-pregnant and spent females in northern areas and the Faeroes (Moura *et al.* 2006; ICES WGEF 2007, 2009).

Population (current/trends/future prospects)

There is no population estimate for *C. squamosus* in the OSPAR Area, but abundance has been declining steeply during the past 10–15 years, and is likely less than 10 % of baseline. 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. Where data are available on catch per unit effort (CPUE) in *Centrophorus* fisheries, these are initially high but almost invariably decline quickly (Figure 2). Because fishing effort moves rapidly between fishing grounds, overall catch and CPUE data for the whole of the ICES/OSPAR areas do not reflect overall stock status.

This decline will continue for as long as fisheries continue to exploit deepwater sharks within the species' range. 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. Recovery of depleted populations will be slow and take longer than 25 years, even if deepwater fisheries close and all bycatch ceases. Wilson *et al*. (2009) noted that, given the slow recovery rates for Gulper sharks, rebuilding of populations will not even be measurable for at least several decades.

Condition (current/trends/future prospects)

The population of *C. squamosus* in the OSPAR Area is severely depleted, to less than 10 % of the baseline. Fortunately, pregnant females are only rarely seen in commercial landings, indicating that they segregate in areas that are not fished, and the species is therefore only assessed as "Endangered" regionally in the IUCN Red List of Threatened Species (Blasdale, T., Hareide, N.R., Crozier, P., in preparation). Exploitation effort has been significantly reduced, but is continuing as bycatch continues, with deepwater fisheries moving between fishing grounds in response to depletion or the introduction of management measures. Exploitation of the grounds used by pregnant females would be extremely damaging to the population. 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).

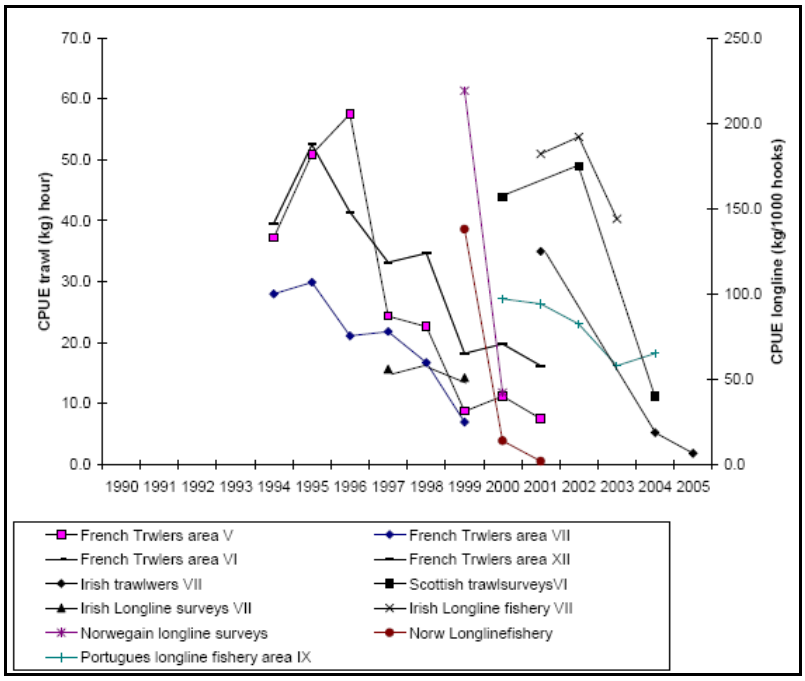

Figure 2: CPUE series for Leafscale gulper shark *Centrophorus squamosus* from trawl and longline fisheries and surveys
Source: ICES WGEF 2005

Limitations in knowledge

Many countries exploiting deepwater fisheries in the OSPAR Area record 'siki' shark landings for *Centrophorus squamosus* and *Centroscymnus coelolepis* combined. Other countries report landings in generic categories such as 'various sharks nei'. Distribution, catch and catch per unit effort (CPUE) data are therefore incomplete for this species. The ICES Working Group on Elasmobranch Fishes (ICES WGEF) compiled and reconstructed catch data in order to develop the estimates of recent and historic catches illustrated in Figure 2. It is unclear how commercial time series data are affected by changes in fishing patterns so estimates of exploitation rates are uncertain. Information on age and growth is also incomplete for these long-lived sharks 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, ICES WGDEEP made recommendations for the coordination of deep-water 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) noted that species-specific landings data are still not presented for the two species of 'siki' shark by all ICES member countries, and that ICES considers that fisheries should not proceed in the absence of adequate data to assess their status, including reliable estimates of current exploitation rates and stock productivity, and that deepwater sharks should be managed in a multi-species context.

4. Evaluation of threats and impacts

The only known threat to this species is capture in unsustainable deepwater fisheries. This is a biologically highly-sensitive species with extremely low resilience to exploitation and very slow recovery. It has been targeted and by-catch is also utilised for its valuable meat and other products (fins, liver oil). Local populations are rapidly depleted and fishing effort is rapidly redirected to other areas when catches fall or regulations are introduced. A decline of 90 % has been estimated by ICES in the region since 1995. Recovery of depleted populations will be slow and rebuilding is unlikely to become measurable 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 by-catch 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) notes that there are no obvious measures that could mitigate by-catch of sharks in commercial deepwater 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. Nevertheless, 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 Leafscale gulper shark (*Centrophorus squamosus*)

Type of impact	Cause of threat	Comment
Fisheries	Target and utilised bycatch fisheries; Ghost fishing from discarded nets	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.

Technical measures for deepwater fisheries

EU Council Regulation (EC) No 2347/2002 sets maximum capacity and power (kW) ceilings on individual Member State fleets fishing for deepwater species. Council Regulation (EC) No 27/2005 limited effort (kilowatt days) at 90% of the 2003 level for 2005, and 80% for 2006.

Council Regulation (EC) No 1568/2005 bans the use of trawls and gillnets in waters deeper than 200 m in the Azores, Madeira and Canary Island areas. Council Regulation (EC) No 41/2007 banned the use of gillnets by Community vessels at depths greater than 600 m in ICES Divisions VI a, b, VII b, c, j, k and Subarea XII (parts of OSPAR Regions III and V) because of concerns over the unsustainable and environmentally damaging nature of this fishery.

A maximum bycatch of deepwater shark of 5 % is allowed in hake and monkfish gillnet catches. This ban does not cover Subareas VIII or IX (OSPAR Region IV). In 2006, the ban on gillnetting applied to waters deeper than 200 m, but this was revised to 600 m in 2007, thus permitting fishing to recommence in the upper part of this species' range where mature females are most vulnerable. NEAFC ordered the removal of all gillnets from waters deeper than 200 m in the NEAFC Regulatory Area (all international waters of the ICES Area, OSPAR Region V) during early 2006. This gillnet ban below 200 m continues.

These gill net bans have resulted in the redirection of fishing effort to other areas of ICES Areas IV a, VIII and IX and to West Africa. IX b is a new, previously unexploited area. ICES WGEF (2008) expressed "concern that new fisheries are developing in VIII and IX b without prior evaluation of sustainable catches having been carried out."

It also noted that "IUU fishing is known to take place in international waters". ICES advice is that these fisheries should not proceed, nor expand, unless they can be demonstrated to be sustainable for deep-water sharks.

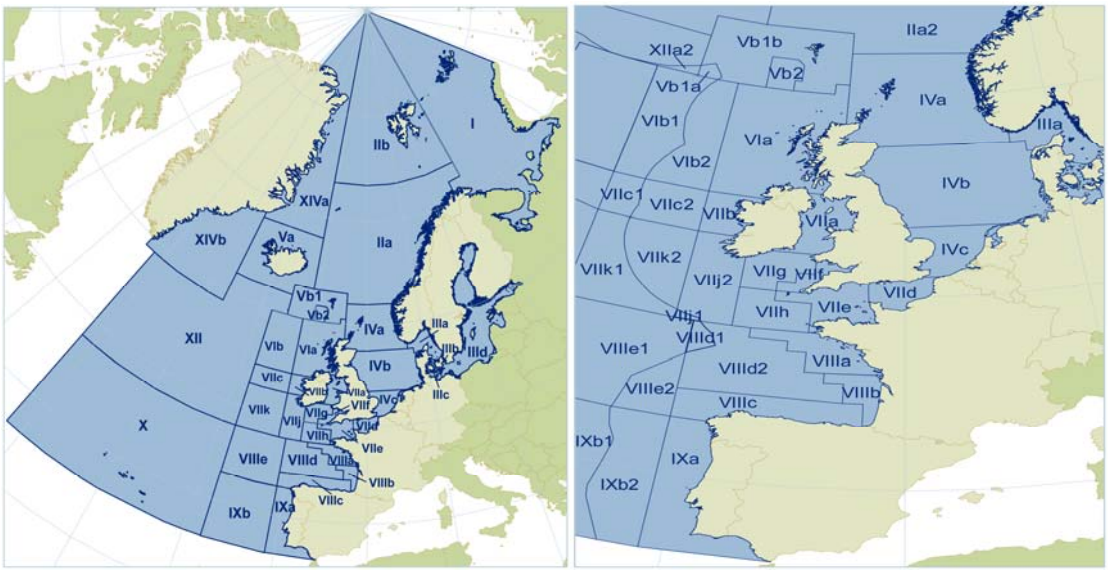

Figure 3: Map of ICES Fishing Areas

Total Allowable Catch (TAC)

In 2006, ICES advised that no target deepwater shark fisheries should be permitted unless there were reliable estimates of current exploitation rates and stock productivity. The TAC should therefore be set at zero for the entire distribution area of the stocks and additional measures should be taken to prevent by catch in fisheries targeting other species. No ICES advice was provided in 2007. A zero quota was again recommended in 2008 (for 2009).

In 2007, the combined TAC for 11 deepwater shark species, including Leafscale 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 by-catch 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 by-catch of up to 10 % of the 2009 quota will still be permitted – a total of about 85 t for all species, compared with landings of around 10,000 t for deepwater 'siki' sharks in 2001.

6. Conclusion on overall status

This species is 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. squamosus* is assessed on the IUCN Red List of Threatened Species as "Vulnerable" globally and "Endangered" in the North-East Atlantic.

7. Action to be taken by OSPAR

C. squamosus cannot support the intensive fisheries that have resulted in such 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 mitigate by-catch of sharks in commercial deepwater fisheries. Preventing bycatch 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[1], 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. squamosus* and other threatened deepwater shark species) to adopt or support the adoption of ICES advice for deepwater sharks through:

1. 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;
2. the designation of offshore marine protected areas;
3. 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
4. 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, it is proposed that OSPAR should communicate to the European Commission the Endangered status of *C. squamosus* and its Annex V status, 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.

[1] Australian research has demonstrated good discard survival rates for gulper sharks taken on longlines and de-hooked manually.

Table 3: Summary of key priority actions and measures which could be taken for Leafscale gulper shark (*C.squamosus*). 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	- EC and Council of Fisheries Ministers (Common Fisheries Policy, Regulations, TACs) - OSPAR Contracting Parties - NEAFC and ICES	
Already protected? **Measures adequate?**	EU: TAC, effort regulation and gill net bans	- 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.
	NEAFC: gill net ban	- Covers all international waters below 200 m, thus protecting *C. squamosus*.
	EU: species-specific catch records	- The majority of Member States are not providing species-specific data for deepwater sharks. IUU fishing is taking place in international waters.
Recommended Actions and Measures	**OSPAR Commission**	- Monitor information and advice of the ICES Working Group on Elasmobranch Fisheries and bring this to the attention of CPs.
	Contracting Parties	- 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.
	Research needs	- 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 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 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 weblinks
Belgium	N	N	
Denmark	N	Y- Review of Draft	
France	Y	Y – Review of Draft	
Germany	N	Y – Review of Draft	
Iceland	Y	N	
Ireland	Y	N	
Netherlands	N	N	
Norway	N	N	
Portugal	Y	N	
Spain	Y	Y – Review of Draft	Bañón, R., C. Piñeiro and M. Casas, 2006. Biological aspects of deep-water sharks *Centroscymnus coelolepis* and *Centrophorus squamosus* in Galician waters (north-western Spain). *J. Mar. Biol. Ass. U.K.*, 86: 843-846. 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). *J. Northw, Atl. Fish. Sci*. NAFO SCR01/121. Figueiredo, I., T. Moura, A. Neves and I. Gordo, 2008. Reproductive strategy of leafscale gulper shark *Centrophorus squamosus* and the portuguese dogfish *Centroscymnus coelolepis* on the Portuguese continental slope. *Journal of Fish Biology*, 73: 206-225. Piñeiro, C.G, M. Casas and R. Bañón, 2001. The deep water fisheries exploited by Spanish fleets in the northeast Atlantic: a review of the current status. *Fisheries Research*, 51: 311-320.
Sweden	N	Y – Review of Draft	
United Kingdom	Y	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

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