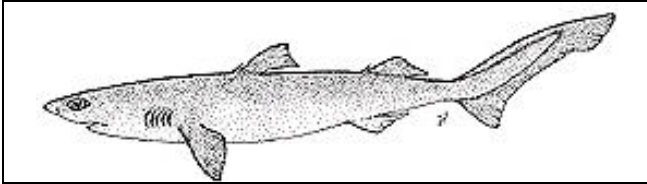


## Nomination

*Centroscymnus coelolepis*, Portuguese  
Dogfish

**Portuguese Dogfish *Centroscymnus coelolepis*  
(Barbosa du Bocage & Brito Capello, 1864)**



## Geographical extent

- OSPAR Regions: I, (II, III), IV, V
- Biogeographic zones:  
8,10,11,12,13,14,15,16,17,18,19
- Region & Biogeographic zones specified for  
decline and/or threat: as above

Widely distributed in the Atlantic, Indian Ocean and Western Pacific (see Figure 1). It inhabits continental and insular slopes and abyssal plains, on or near the bottom at depths of 270-3,675 m, at temperatures of 5-13°C (this is one of the deepest-living shark species). In the OSPAR Area it occurs from Greenland to Iceland and the Faeroe Banks south along the east Atlantic continental slope to Portugal, primarily in the deep waters of OSPAR regions I, IV and V. There appears to be some vertical migration and females move to shallower waters for parturition (Clarke *et al.* 2001).

Elsewhere, *C. coelolepis* occurs off northwest Africa; in the western Mediterranean; the Canary Islands, Azores and Madeira; the Northwest Atlantic; South Africa; on submarine seamounts between Australia and Africa; Australia and New Zealand; Japan and the South China Sea (Froese *et al.* 2006; Compagno 1984 & in preparation; Compagno *et al.* 2005).

## Application of the Texel-Faial criteria

### Global importance

This species is widely distributed, occurring in the Atlantic, Indian and Pacific Oceans. The OSPAR population is not of global importance.

### Regional importance

The IUCN WGEF (2006, in prep) considers there to be a single stock of *C. coelolepis* in the ICES/OSPAR Area, probably linked to the Northwest Atlantic and western African populations. There may also be some distinct local populations within this stock. At a stock level, the OSPAR Area

is likely of regional importance, but not at species level.

### Rarity

*C. coelolepis* is not rare, is becoming increasingly scarce in the northern part of the OSPAR Area.

### Sensitivity

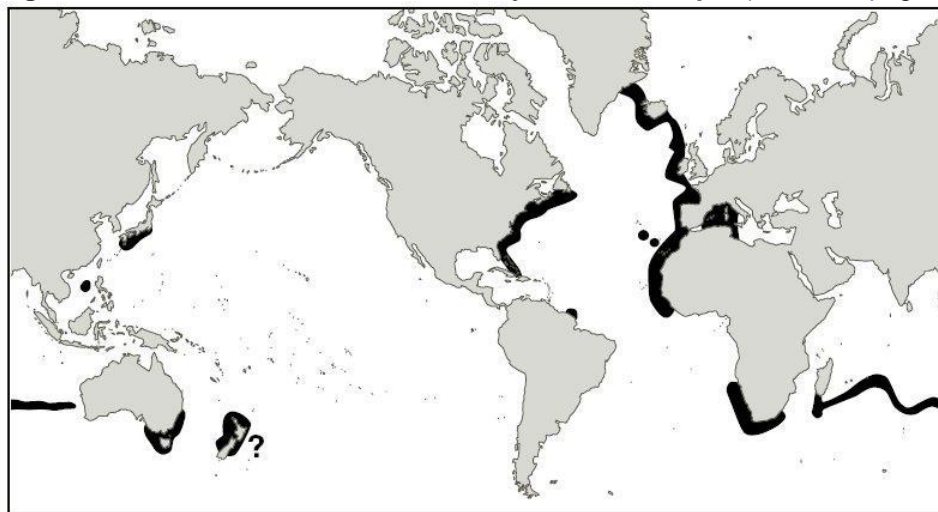
*C. coelolepis* is considered to be very sensitive to depletion by fisheries because of the severely limiting life history characteristics, particularly a low reproductive output, that are common to this and other deepwater elasmobranch species. These characteristics result in a very low resistance to depletion by fisheries. It is ovoviviparous, giving birth to litters of 13 to 29 young, born at 27-31 cm in length. Though age, growth and gestation period are not yet known, these are likely to be similar to that of related species, with very slow growth, late maturity, long intervals between litters, and extreme longevity. All reproductive stages, including mature and pregnant females, occur together in the OSPAR Area, but the largest mature females are found in slightly shallower water, where they are more likely to be targeted by longline and gillnet fisheries; exploitation of this reproductively-active sector of the population is particularly damaging to the stock. Where data are available on catch per unit effort (CPUE), these are initially high, then decline quickly. The very similar patterns of decline recorded in different areas in different years suggest that this species is sedentary (ICES WGEF 2006).

The sensitivity of this species to deepwater fishing activity and its low intrinsic rate of population increase mean that recovery of depleted populations will be slow and likely take longer than 25 years even if deepwater fisheries close and all bycatch ceases. If the species is sedentary, recolonisation of depleted stocks from neighbouring areas will also be extremely slow, and most unlikely to take place within 25 years.

### Keystone species

No information.

**Figure 1: Global distribution of *Centroscymnus coelolepis*** (from Compagno *et al.* 2005)



*Centroscymnus coelolepis*

From Compagno *et al.* 2005

#### *Decline*

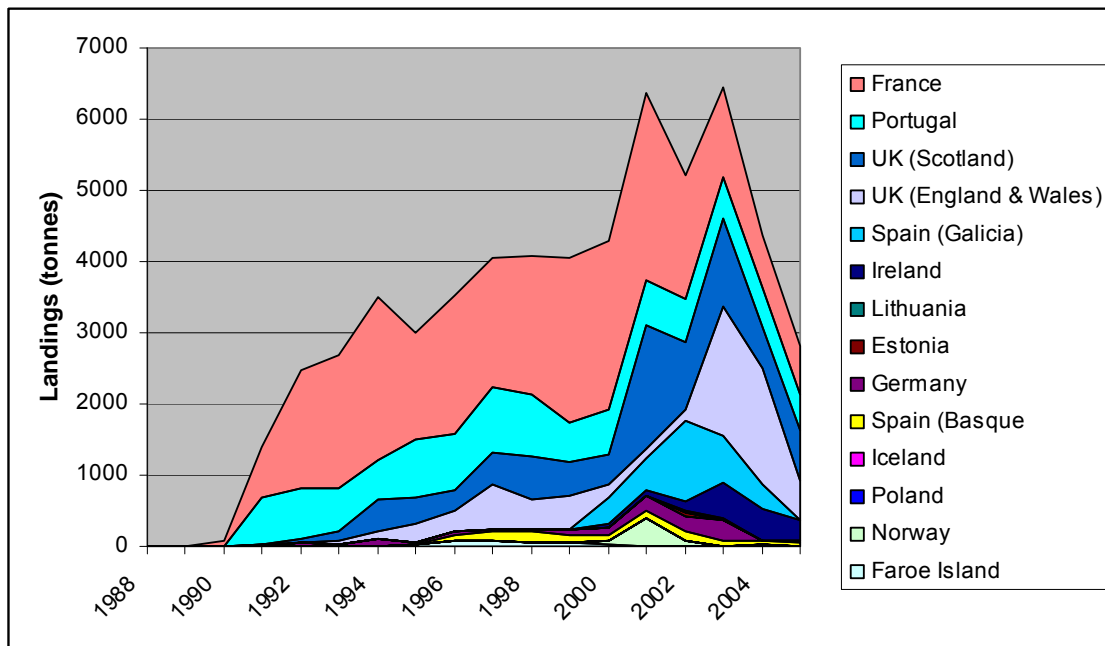
There have been significant declines in this species within the OSPAR Area, estimated conservatively as greater than 50% and possibly greater than 80% across the whole population. These declines are stronger in the north than the south. For example, there has been a consistent overall decline in CPUE in all ICES subareas exploited by French commercial trawlers since 1995, to 10% or less of the 1995 level by 2005. This is supported by CPUE data from Irish trawlers (ICES WGEF 2006), and by some fishery-independent data. Basson *et al.* (2002) estimated that the proportion of non-zero hauls (the hauls where at least one specimen was caught) from surveys conducted by the Scottish Association for Marine Science between 1975 and 1999 had reduced from 72% to 12% in the northeast Atlantic. Declines in populations of this sensitive species are also reported from elsewhere in its global range where deepwater shark fisheries have taken place (Stevens and Correia 2003; IUCN SSC Shark Specialist Group in prep.).

This species is taken in multi-species deepwater fisheries in the OSPAR Area. Most landings of deepwater sharks are not recorded to species level, but as 'siki', combining records of *C. coelolepis* and *Centrophorus squamosus*. This means that catch and catch per unit effort (CPUE) data for both species are incomplete. The ICES Working Group on Elasmobranch Fishes has, however, compiled and reconstructed data for this species in order to develop estimates of recent and historic catches (Figure 2). It is unclear how the commercial time series information is affected by any changes in

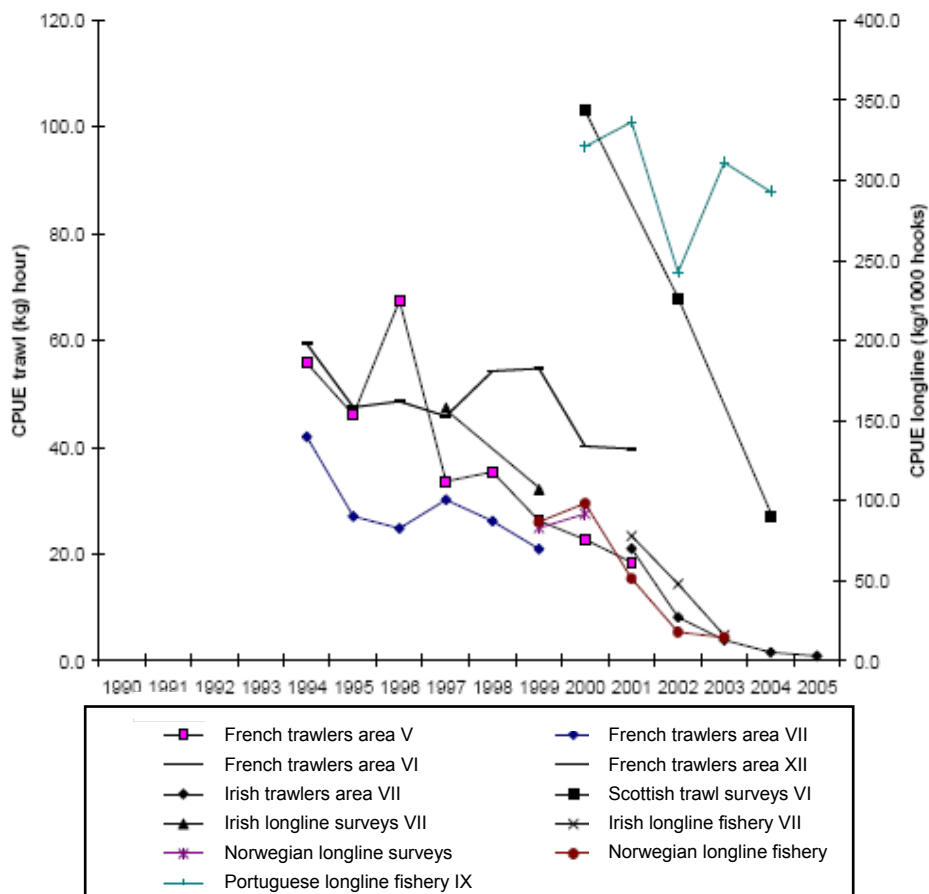
fishing patterns. Because fishing effort moves rapidly from fished to unfished grounds as stocks decline or restrictive management measures are introduced (the latter in recent years), overall catches and CPUE data for the whole of the ICES/OSPAR areas do not reflect overall stock status. The decline in landings from around 10,000 t during 2001 to 2004, to about 2000 t in 2006 (Figure 2) is partly due to quota restrictions and partly to gillnet bans in ICES Areas V, VII and ICES international waters. Recent landings are, however, now much lower than the Total Allowable Catches (TACs) available (7,100 t), although TACs are restrictive in some areas, and declining landings may also reflect an overall decline in stocks, particularly in the north.

It is necessary to consider CPUE trends by fishery and area in order to quantify declines. Figure 3 presents *Centroscymnus coelolepis* CPUE data collated by ICES WGEF (2005) from several different fisheries and fishery independent surveys. They concluded that there had been a strong decline in CPUE in northern areas, but that the fishery in the south appears more stable.

**Figure 2: ICES WGEF estimate of species-specific landings (t) of Portuguese dogfish *Centroscymnus coelolepis*, 1998–2005 (from ICES WGEF 2006).**



**Figure 3: CPUE series for *Centroscymnus coelolepis* from trawl and longline fisheries and surveys (ICES WGEF 2005).**



The status of Portuguese dogfish outside the fishing grounds illustrated in Figure 3 is unknown. It is also unclear how the commercial time series information is affected by any changes in fishing patterns. Fishing effort is continuing to move into new areas before stock assessments are undertaken and sustainable catches evaluated (for example as a result of the redirection of effort following a ban on gillnet fishing in other areas).

#### *Threat*

*Centroscymnus coelolepis* is an important component of mixed trawl fisheries, and mixed and directed longline and gillnet shark fisheries on the continental slope to the west of Ireland, Spain, Portugal and France (ICES WGEF 2005). The flesh and liver are marketed from this species in many areas. The fresh meat is in high demand as 'siki' in Europe and is also utilized as fishmeal, dried and salted for human consumption. The liver oil is a source of squalene (Compagno in prep.). Discarding was negligible after the early years of the fishery, once markets had developed for the flesh, but may be increasing now as a result of restrictive quotas for deepwater sharks in some southern areas, where deepwater mixed fisheries are still underway and these sharks are still fairly commonly taken as bycatch. Some discard of decaying carcasses occurs from deepwater net fisheries when soak times are excessive (STECF 2006).

Deepwater shark fisheries in the OSPAR Area were described in detail by ICES WGEF (2005, updated in 2006 and in prep.) and Hareide *et al.* (2004). Most catches have been from the northern area (ICES subareas V-VII, OSPAR Regions I and the northern part of V). Some 12 countries report landings (Figure 2). IUU fishing also occurs in international waters (ICES WGEF in prep.).

In 2005, ICES WGEF advised that the current level of these fisheries is unsustainable, and should cease. In 2006, this advice was repeated: no target fisheries should be permitted unless there are reliable estimates of current exploitation rates and stock productivity. The TAC should be set at zero for the entire distribution area of the stocks and additional measures should be taken to prevent bycatch of Portuguese dogfish and leafscale gulper shark in fisheries targeting other species. In 2007, the WGEF noted that management measures had resulted in diversion of effort to previously unexploited fishing grounds inside and outside the OSPAR/ICES Area, and expressed concern that these new fisheries are developing without prior

evaluation of sustainable catches having been carried out (ICES WGEF in preparation).

### **Relevant additional considerations**

#### *Sufficiency of data*

As noted above, species-specific data on *Centroscymnus coelolepis* are limited; the species is often recorded with other deepwater shark species (particularly *Centrophorus squamosus*), with no separate statistics available. However, the ICES WGEF has provided sufficient species-specific data on the declines caused by unsustainable fisheries exploitation to demonstrate the urgent need for conservation measures for this species.

#### *Changes in relation to natural variability*

Nothing has been published on natural variability, but the low intrinsic rate of population increase in this species and its apparently largely sedentary nature demonstrate that population size and distribution are unlikely to fluctuate naturally. Nothing is known about the population genetics of *Centroscymnus coelolepis*. Studies of the population genetics of this species are urgently needed to determine whether populations in different areas are genetically distinct.

#### *Expert judgement*

The shortage of information on population size and trends for this species in the OSPAR Maritime Area means that expert judgement has also played a part in this nomination. It rests on recognition that the threats to this deepwater shark are known, that such threats occur in the OSPAR Maritime Area, that they have already led to significant declines in the number of this and other deepwater shark species in this Area and elsewhere, and that further declines are likely to take place as fishing effort moves to previously un-exploited grounds – unless new management measures are introduced and enforced.

#### *ICES Evaluation*

The DELASS Report (Heessen 2003) presented the first stock assessment for this species. The ICES Working Group on Elasmobranch Fisheries reviewed information on this and other important species of deepwater shark in 2005, 2006 and 2007. *C. coelolepis* and other deepwater sharks are mostly caught in mixed trawl fisheries for deepwater species, particularly in northern areas of the Northeast Atlantic, as well as in directed shark fisheries using longlines and gillnets. Gillnet and longline fisheries targeting sharks and deepwater crab are now developing in previously unexploited

fishing grounds due to displacement of effort from areas where gillnet fishing has been banned. In northern areas, catches have increased, but catch per unit effort has decreased. Landings and CPUE in southern areas are more stable.

Since 2005, the ICES Advisory Committee on Fisheries Management (ACFM) has advised that stocks of Portuguese dogfish and leafscale gulper shark are depleted and likely to be below any candidate limit reference point. They have recommended that the total allowable catch (TAC) for deep water sharks in mixed fisheries should be set at zero for the entire distribution area of the stocks, with no target fisheries permitted unless there are reliable estimates of current exploitation rates and stock productivity. Catches of sharks are generally not recorded to the species level; they should be. Additional measures should be taken to prevent by catch of Portuguese dogfish and leafscale gulper shark in fisheries targeting other species. ICES WGEF (in prep.) notes that there are no obvious measures that could mitigate by-catch of this shark in commercial fisheries.

Preventing bycatch mortality will be very difficult to achieve, requiring the identification and implementation of measures to avoid any by-catches of deep water sharks in these fisheries. If this is not possible, reduction of catches in the mixed fisheries that take deep water sharks as a by-catch will require a reduction in overall fishing effort to the lowest possible level. Current quotas are higher than total catches and only restrict the catches of deepwater sharks in a few areas.

ICES WGEF (in prep.) reviewed an earlier draft of this nomination, concluding that it is appropriate to list Portuguese dogfish as a Threatened and Declining species in OSPAR regions I-V.

### **Threat and link to human activities**

*Cross-reference to checklist of human activities in OSPAR MPA Guidelines*

*Relevant human activity:* Fishing, hunting, harvesting; *Category of effect of human activity:* Biological – removal as target and non-target species by fisheries.

Where catch per unit effort data are available for this species, these demonstrate that steep population declines have taken place in several OSPAR Regions. These declines result directly from unsustainable target and bycatch fisheries. Since total catches are significantly lower than total quotas available, and fisheries management is not underway in all fishing areas, declining deepwater

shark catches in the Northeast Atlantic are also believed to represent falling yields from declining stocks in many regions, rather than a reduction in overall fishing effort. The population decline is therefore a threat that is linked to human activity.

This pattern of steeply declining catches is also familiar in other fisheries for sharks where there are better records of catch per unit effort.

Preliminary information from retrieval surveys of gillnets suggests that excessive soak time leads to high discard rates of sharks. Lost or discarded gillnets (ghost fishing) may also add to deepwater shark mortality (ICES ACFM 2005).

### **Management considerations**

There is no agreed management plan for these stocks. They are managed by a combination of TACs, effort regulations and technical measures (fishing gear restrictions) in different OSPAR/ICES areas.

In 2007, the TAC for deepwater sharks in international waters of ICES Sub-areas V, VI, VII, VIII and IX (parts of OSPAR regions IV and V) is 2,472 t. In 2008, the TAC for these species in these areas will be reduced to 1,646 t. In 2007 and 2008, the TAC for deepwater sharks is set at 20 t annually in ICES Sub-area X, and 99 t in Sub-area XII (part of OSPAR region V). These TACs apply to a list of 13 deepwater shark species, including Portuguese dogfish. They are not restrictive in all sub-areas, but quota restrictions have contributed towards the decline in landings from around 10,000 t in 2004, to about 2000 t in 2006. Gillnet bans have also resulted in a decline in the proportion of international landings from the gillnet fishing countries (UK and Germany). Overall, recent landings are the lowest since the fishery reached full development in the early 1990s, and much lower than the total 7,100 t of TACs available. (ICES WGEF in prep.) ICES ACFM has, since 2005, recommended a zero quota for deepwater sharks.

European Council Regulations have regulated effort in deepwater fisheries. Regulation (EC) No 2347/2002 set maximum capacity and power (kW) ceilings on individual Member States' fleets fishing for deepwater species, and Regulation (EC) No 27/2005 set a limit of effort (kilowatt days) at 90% of the 2003 level for 2005, and 80% for 2006.

Regulation (EC) 1568/2005 banned the use of trawls and gillnets in waters deeper than 200 m in the Azores, Madeira and Canary Island areas. In 2006, a ban on gillnetting was applied to waters

deeper than 200 m in ICES Divisions VIa, b, VII b, c, j, k and Sub-area XII following concern over excessive deepwater shark mortality. Following a review by STECF in 2006, Regulation (EC) No 41/2007 revised this measure, banning the use of gill nets by Community vessels at depths greater than 600 m (thus permitting hake and monk netting, but protecting many deepwater shark stocks previously targeted). A maximum by-catch of deepwater shark of 5% is allowed in hake and monkfish gillnet catches above 600 m. This ban does not cover Sub-areas VIII or IX.

A gillnet ban in waters deeper than 200 m is also in operation in the NEAFC regulatory Area (international waters of the ICES/OSPAR Areas).

Bycatch mortality, whether discarded or utilised, poses a particular challenge for the management of deepwater sharks; these species cannot be returned alive following capture in 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 bycatch mortality (Hareide *et al.* 2005). There are no obvious measures that could mitigate the by-catch of this shark in these commercial fisheries

This species was classified as Near Threatened globally on the 2003 IUCN Red List (Stevens & Correia 2003). It is currently in the process of being uplisted to Vulnerable globally and Endangered in the Northeast Atlantic (IUCN SSC Shark Specialist Group in prep.).

## Further information

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