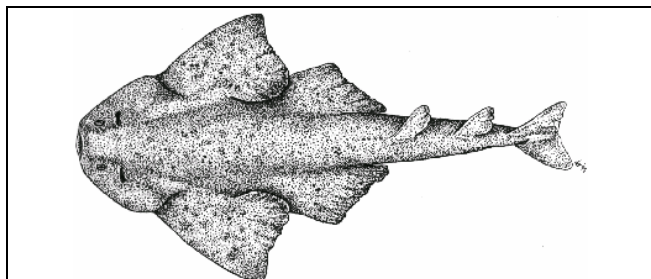


Nomination

Squatina squatina, Angel shark

Angel shark, *Squatina squatina* (Linnaeus, 1758)



Geographical extent

- **OSPAR Regions:** II, III, IV
- Biogeographic zones: 10,11,12,13,14,15,16
- Region & Biogeographic zones specified for decline and/or threat: as above

This species was historically common over large areas of the coastal, continental and insular shelf of Northeast Atlantic, from southern Norway, Sweden and the Shetland Islands to Morocco, West Sahara and the Canary Islands, and in the Mediterranean and Black Seas. It occurs on or near mud or sandy seabed from close inshore to the outer shelf (5 m to at least 150 m depth) and may penetrate estuaries and brackish water. It rests on the seabed by day and is active by night. Seasonal migrations occur in the northern part of its range. (Compagno in preparation; Compagno *et al.* 2005.)

Its distribution has contracted significantly over the past 50–100 years; intensive demersal fishing pressure has resulted in local extirpations and some contractions in range both inside and outside the OSPAR Area (Morey *et al.* 2006, Dulvy *et al.* 2003).

Inside the OSPAR Area: the species is now considered to be locally extinct in the North Sea (ICES ACFM 2005), Bay of Biscay (Quero 1998), and Irish Sea/Bristol Channel (Rogers and Ellis 2000).

Outside the OSPAR Area: Records of the species occurring inside the Baltic Sea, north along the coast of Sweden into the Bothnian Sea (e.g. Compagno 1984; Compagno *et al.* 2005), may be mistaken, rather than a former historic distribution.

Confirmed occurrences are recorded only in the Kattegat and Skagerrak (Helcom 2005), inside the OSPAR Area.

It is no longer encountered in most areas of the northern Mediterranean, where it is extirpated or at least commercially-extinct (Froese & Pauly 2006; Morey *et al.* 2006). The last record from the Adriatic Sea was in 1948 (Jukic-Peladic *et al.* 2001). No recent records have been identified from its former Black Sea range. It is also now extremely uncommon throughout most of the remainder of its range for which data are available, with the exception of the Canary Islands. Its current status in the southern Mediterranean and northwest Africa is unknown, but it may still be more common off parts of the North Africa coastline (e.g. Tunisia (Bradai 2000)) than elsewhere.

Squatina species were common in Russian surveys off Northwest Africa during the 1970s and 1980s (F. Litvinov pers. comm. to IUCN SSG 2006). They are reportedly now very rare in this area, where intensive artisanal and industrial fisheries operate over much of the coastline (Morey *et al.* in prep.),

Figure 1: Historic distribution of *Squatina squatina* (updated from Compagno *et al.* 2005).



Squatina squatina

Updated from Compagno *et al.* (2005)

Application of the Texel-Faial criteria

Global importance

Populations of *Squatina squatina* occur in OSPAR areas II, III and IV, which encompass close to half of the historic global distribution of this species, and likely over half of its current distribution. The global historic distribution outside the OSPAR Area lies within the adjacent Atlantic off Morocco, Western Sahara and the Canary Islands, and in the Mediterranean and Black Seas. Although information on the current distribution of *S. squatina* is limited, best available information indicates that some populations that historically occurred outside the OSPAR Area, in the Northern Mediterranean and Black Seas, have since been extirpated.

Off the North Africa Mediterranean coastline the species may be more common, e.g., as reported off the coast of Tunisia (although considered rare in the Gulf of Gabès) (Bradai 2000), and was found to be extremely rare near Tabarca (Fricke, pers. comm., observed in 1998). Catch and survey data indicate serious depletion of *Squatina* stocks off the Northwest coast of Africa (Morey *et al.* in prep.).

Although populations have also been seriously depleted (and in some locations extirpated) within the OSPAR Area, it is possible that the remaining stocks here now represent 75% of the global population. Current distribution and abundance data are, however, inadequate to confirm this.

Looking into the future, the ongoing declines and extirpations that have occurred outside the OSPAR Area, particularly on the North and West coast of Africa, are unlikely to cease or be reversed under current or foreseeable management regimes. The exception to this is in the Canary Islands, where the species is reportedly still relatively common. In contrast, there is potential for management to improve the status of *S. squatina* within the OSPAR Area, making the latter increasingly likely to become globally important for this species under the Texel-Faial Criteria.

Regional importance

Since this species is reported to be locally abundant (ICES WGEF 2007), it is possible that the surviving populations within the OSPAR Area could be of Regional importance under the Texel-Faial Criteria. Lack of information on the current distribution and abundance of *S. squatina* makes it impossible, however, to determine whether 90% of the population in the OSPAR Area is now restricted to a small number of locations.

Rarity

This species is now only very rarely recorded within its historic distribution in the OSPAR Area and elsewhere. ICES WGEF (2007) noted that this species could be considered as now being rare due to its absence in research vessel surveys (ICES WGFE 2006) and extremely scarce in commercial catches (ICES WGEF 2006).

Sensitivity

Very sensitive. *Squatina squatina* has many of the limiting life history characteristics common to elasmobranch species and hence a very low resistance to human activity. Angel sharks reach maturity at a large size (128–169 cm in females) and likely several years old (life history information is lacking). Once mature, they give birth to a

relatively small number (7–25) of large pups after an 8–10 month gestation (litter size increases with the size of the female). Their large size, flattened bodies and expanded pectoral fins make angel sharks highly vulnerable to bycatch in trawl and net fisheries from birth. Trawl fisheries are also likely to damage their benthic habitat. Elasmobranchs also have a very low resilience because of their low intrinsic rate of population increase, meaning that recovery of depleted populations will be slow and likely take longer than 25 years even if all bycatch ceases.

Genetic and tagging studies have demonstrated that another species of *Squatina* exhibits significant genetic divergence over relatively small geographic distances, and a high site-specificity consistent with isolated sub-populations (Gaida 1997; Standora and Nelson 1977). Despite records of some long-distance movements of tagged *Squatina* within the OSPAR Area (Green 2007), the same may be true to some extent for *S. squatina*. If so, recolonisation of extirpated stocks will also be extremely slow, and most unlikely to take place within 25 years.

Keystone species

Squatina squatina may formerly have been sufficiently common and important a demersal predator to have had a controlling influence upon its community, but is now probably ecologically-extinct throughout the OSPAR Area.

Decline

Severely declined in all three of the OSPAR regions where this species occurs during the past 50–100 years. It has now been declared extinct in the substantial areas of its former range in the OSPAR Area, and is now extremely uncommon throughout most of the remainder of this range. The population is clearly becoming increasingly fragmented and records are now extremely infrequent. Declines are also reported from elsewhere in its global range.

Squatina squatina was reported to be common, or at least frequently or regularly recorded, in many areas during the 19th and early 20th Centuries. For example, it was particularly common on the south and east English coasts (Yarrell 1835-36, Day 1880-84), and also common in the North Sea, on the Dogger Bank, in the Bristol Channel and Cornwall, and 'by no means uncommon' in the Firth of Clyde (Day 1880-84). It was still being caught regularly and considered common in the UK at the beginning of the 20th Century (Garstang, 1903). Although more common off the Atlantic Iberian coasts, *Squatina squatina* was also reported as

frequent in the Mediterranean during the first half of the 20th century by Lozano Rey (1928).

Steep population declines have, however, now been reported from several parts of this species' range in OSPAR waters, including in the North Sea (ICES ACFM 2005), UK coastal waters (Rogers and Ellis 2000), and on the French coast (Quero and Cendrero 1996; Quero 1998; Capapé *et al.* 2000). During the early 1900s, an average of one specimen was taken during every ten hours of trawl survey on the British coast, but in recent years the species has virtually vanished (Rogers and Ellis 2000). CEFAS surveys recorded angel sharks in low numbers in Cardigan Bay during the 1980s (Ellis *et al.* 1996) but report just one individual in the last 15 years.

Commercial landings data compiled by ICES WGEF (2007) (Figure 2) demonstrate a decline in Celtic Seas landings from over 30 t in the 1970s to less than one tonne in recent years. French landings have declined from > 20 t in 1978 to 1 t in 2000.

Historically, *Squatina* has been caught in Tralee Bay and Clew Bay, Ireland, where it was also, until recently, caught by recreational anglers. The Irish Central Fisheries Board has recorded effort by charter-angling vessels in Tralee Bay since 1981. Catches of *Squatina* by two vessels have declined from over 100 per year in 1981, to 20 in 1984, before increasing to 100 again in the late 1990s. Catches subsequently declined to very low levels in the 1990s and there have been none at all in the most recent years (ICES WGEF 2007, Figure 3). It was taken off the Irish Specimen Fish List in 2005.

Declines have also occurred in parts of its global range outside the OSPAR area, including the Mediterranean and Black Seas (see above and Morey *et al.* 2006), and Northwest African coast. Vacchi *et al.* (2002) reported a decline in catches of *Squatina* species in a tuna trap in the Northern Tyrrhenian Sea from an average of 134 specimens from the period 1898-1905, to 95 between 1906-1913, and 15 between 1914-1922. The last record from the Adriatic Sea was in 1948 (Jukic-Peladic *et al.* 2001). Off the Balearic Islands, *Squatina squatina* was historically documented in checklists (Delaroché, 1809; Ramis, 1814; Barceló i Combis, 1868; Fage, 1907; De Buen, 1935). Captures of *S. squatina* spp. were relatively frequent until the 1970's, becoming increasingly sporadic during the 1980's in coastal artisanal fisheries (trammel nets and gillnets), lobster tanglenets, trawls and bottom longline fisheries. Since the mid 1990's no reports of *Squatina* spp. have been reported in the area and it may be absent (Gabriel Morey, pers. comm.).

Recently, Massutí and Moranta (2003) reported no captures of *Squatina* spp. from four bottom trawl fishing surveys (131 hauls, at a depth range of 46-1,800m) carried out between 1996 and 2001 around the Balearic Islands.

Squatina species were common in Russian surveys off Northwest Africa during the 1970s and 1980s (F. Litvinov pers. comm. to IUCN SSG 2006), but are reportedly now very rare in this area (Morey *et al.* in prep.). Portuguese landings data from the fleet operating off Morocco and Mauritania, aggregated for *S. squatina* and the other two *Squatina* species occurring in this region, peaked at 35 t in 1990. When the fishery was closed in 1998 the total landings had declined to 1.7 t, but the pattern of effort associated with these landings is unknown. Intense fishing pressure appears to have significantly affected other *Squatina* species off Senegal and Sierra Leone, where artisanal fishermen remember them as common in catches 30 years ago. They have now almost disappeared and catches are very rare, according to artisanal fishermen and industrial demersal trawl fleet observers (M. Ducrocq pers. comm. to IUCN SSG 2006). Although *Squatina squatina* does not occur south of the Western Sahara, intensive fisheries operate throughout the Northwest African coast and this species has presumably been similarly affected there (Morey *et al.* in prep.).

Threat

Capture mortality in target and bycatch fisheries poses the greatest threat to *Squatina squatina*. Its meat is/was consumed fresh, salted or dried, its skin used as sand-paper, and its liver used for oil (Lozano Rey 1928; Notarbartolo di Sciarra and Bianchi 1998). It is also sometimes taken as 'curios' for fishmongers stalls, for display in public aquaria, and by trophy anglers.

This was formerly a common and important demersal predator over much of the coastal and outer continental shelf sediment habitat in the OSPAR Area. Most of this region is now subject to intense demersal fisheries, and the species is highly vulnerable from birth onwards to bycatch in the benthic trawls, set nets and bottom longlines operating through most of its range and habitat. Its abundance has declined dramatically during the past 50-100 years during a period of steadily increasing fishing effort and capacity. As a result, *Squatina* has changed from being a utilised commercial target species, to a bycatch species of low or no commercial value in those areas where it has not been completely extirpated. Although

commercial fisheries pose the greatest threat to this species, sport angling also has the potential to damage relict populations if animals are not carefully released alive.

Relevant additional considerations

Sufficiency of data

Despite the efforts of the ICES Working Group on Elasmobranch Fishes and the IUCN Species Survival Commission's Shark Specialist Group to collate available information for this species, population data are limited and declines not fully quantified within the OSPAR Area. Such a lack of data is very common for severely depleted fish species. There are a few historical assessments on landings as target or bycatch species, but most reports are anecdotal (particularly for OSPAR regions II and IV). Semi-quantitative data are available for OSPAR region III. However, given the observed pattern of severe depletion of most stocks, there is sufficient evidence that declines have been severe and are due to human activity.

Changes in relation to natural variability

Nothing has been published on natural variability, but the likely low intrinsic rate of population increase in this species means that populations are unlikely to fluctuate naturally. In the northern part of its range, this species has been recorded as undertaking short-distance seasonal migrations. Tagging data have also demonstrated some long-distance migrations (Figure 4, Green 2007), but this does not necessarily preclude a low capacity for dispersal and recolonisation.

The population genetics of the species requires further study in order to determine whether there are genetic differences between populations, as identified for *Squatina californica* (Gaida 1997).

Expert judgement

The absence of precise information on the population size of this species in the OSPAR Maritime Area means that expert judgement has played a significant part in this nomination. It rests on recognition that the threats to the angel shark are known, that such threats occur in the OSPAR Maritime Area and that they have led to significant declines in the number of angel sharks in the area and elsewhere.

ICES Evaluation

The ICES Working Group on Elasmobranch Fishes (WGEF 2007) considered that there was a justifiable rationale in the nomination for listing

angel shark as a Threatened and Declining species in OSPAR regions II-IV. The WGEF also stated, in 2006 and 2007, that, "given the concern over *S. squatina* in this and adjacent ecoregions, and that it is not subject to any conservation legislation, a zero TAC for Subareas VII-VIII may benefit this species".

Threat and link to human activities

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

Relevant human activity: Fishing, harvesting.
Category of effect of human activity: Biological – removal of target species, removal of non-target species, physical damage to species and its habitat.

The decline in catches of angel shark fisheries, including the NE Atlantic fishery, is believed to be an indication of a decline in the populations and therefore a threat that is linked to human activity.

Although no catch per unit effort data are available, other than in a single sports fishery in Ireland, the declining catches in the NE Atlantic are believed to represent falling yields from declining stocks rather than declining fishing effort.

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

Management considerations

Management actions essential for the conservation of this species are control and monitoring of fisheries mortality and trade in angel sharks. As noted by the ICES WGEF, this inshore species is distinctive and may have a relatively good discard survivorship. It is important that the scientific advice from the ICES Working Group on Elasmobranch Fisheries (ICES WGEF 2006 & 2007) be adopted and a zero TAC established. Neither fisheries nor trade in this species should be allowed in the OSPAR Maritime Area, and fishing techniques should be designed to minimise angel shark bycatch. Angel sharks incidentally caught as bycatch or by sports anglers should be immediately returned alive to the sea.

This species is classified as critically endangered in the IUCN Red List (Morey *et al.*, 2006). It is also listed as critically endangered in Turkey (Fricke *et al.* in press), and as endangered under IUCN criteria in HELCOM area (Fricke 2007).

Figure 2: Landings in the Celtic Seas compiled by ICES WGEF (2007) from 1973 to 2006.
The UK record in 1997 is most likely misrecorded anglerfish (*Lophius*)

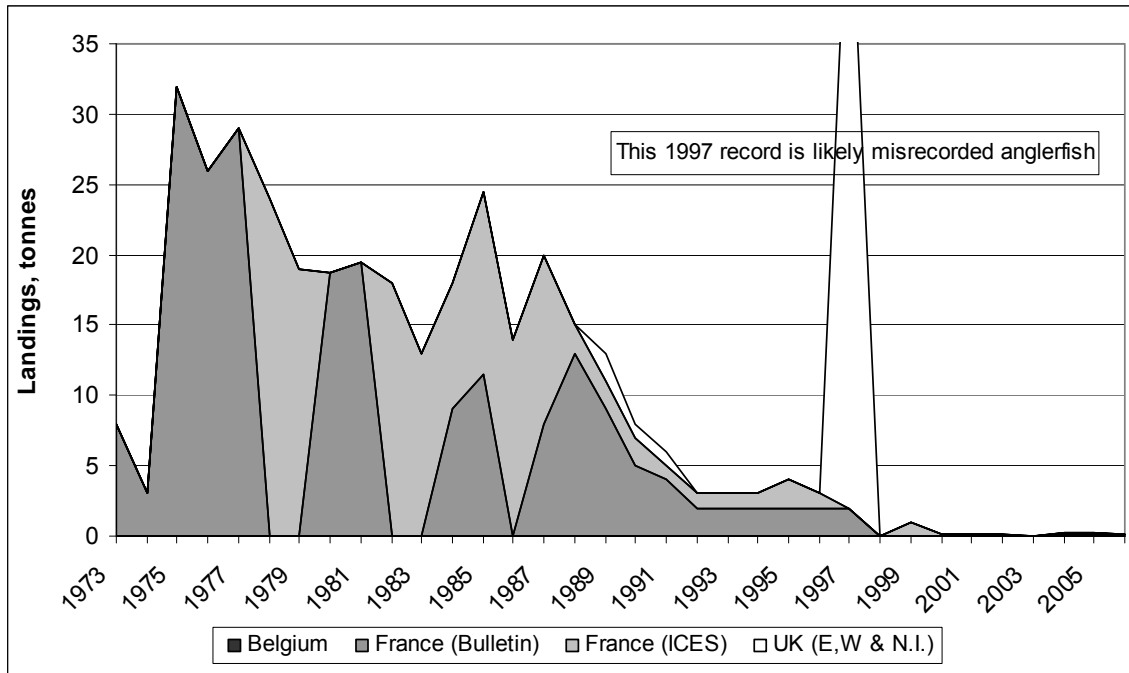


Figure 3: Captures by two charter boats in Tralee Bay 1981–2005 of angel shark *Squatina squatina*.
Source: Irish Central Fisheries Board, from ICES WGEF 2007.

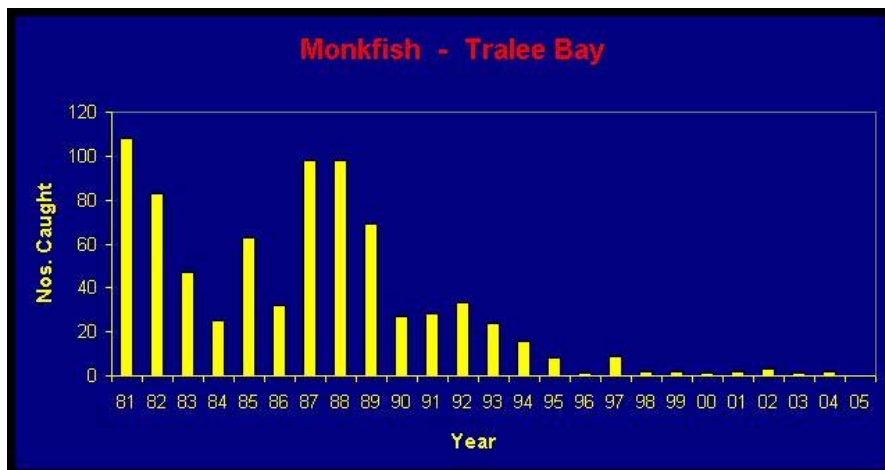
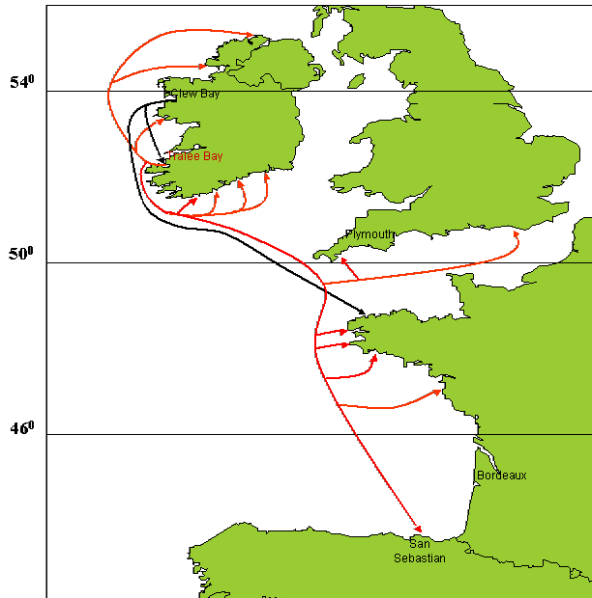


Figure 4: Angel shark *Squatina squatina* migration patterns, 1970–2006. n=190. Source Irish Central Fisheries Board, from ICES WGEF 2007.



Further information

Nominated by:
Germany

Contact Persons
Jeff Ardron, Bundesamt für Naturschutz,
Außenstelle Insel Vilm, 18581 Putbus, Germany;

Ronald Fricke, Ichthyology, Staatliches Museum für
Naturkunde, Rosenstein 1, D-70191 Stuttgart,
Germany;

Christian Pusch, Bundesamt für Naturschutz,
Außenstelle Insel Vilm, 18581 Putbus, Germany.

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