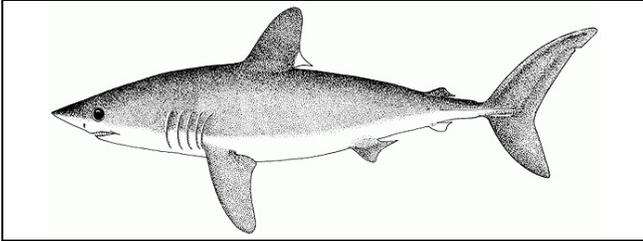


Nomination

Lamna nasus, Porbeagle shark

Porbeagle shark (*Lamna nasus*) (Bonnaterre, 1788)



Geographical extent

- OSPAR Regions: I, II, III, IV, V
- Biogeographic zones: 8,9,10,11,12,13,14,15,16,17,22,23
- Region & Biogeographic zones specified for decline and/or threat: as above

Lamna nasus is a wide-ranging, coastal and oceanic shark, but with apparently little exchange between adjacent populations. It has an antitropical distribution in the North Atlantic and Mediterranean Sea, and in the Southern Oceans (Figure 1; Compagno 2001; Compagno *et al.* 2005). There are generally considered to be two separate stocks in the Northeast and the Northwest Atlantic, on the basis of tagging studies (Heessen 2003; Campana *et al.*, 1999, 2001), although a trans-Atlantic migration has been recorded (Green 2007 in ICES WGEF in prep.) and there is minimal genetic population differentiation across the North Atlantic (Pade *et al.* 2006). FAO (2007) noted that evidence from Japanese catches in high seas longline fishing fleets (Matsumoto 2005) indicates the potential for a third North Atlantic stock off Iceland (if correct, two stocks will occur within the OSPAR Area). The species is very rare in the Mediterranean, which is considered to be a separate stock.

Application of the Texel-Faial criteria

Global importance

Lamna nasus is a wide-ranging, coastal and oceanic shark. Most of its distribution lies outside the OSPAR Area, which is not of global importance for the whole species.

Regional importance

Despite very occasional trans-Atlantic migrations, at least one stock of *L. nasus* (possibly two) is largely restricted to the OSPAR Area. If the Texel-Faial criteria applied to stocks, the OSPAR Area would be of regional, if not global importance.

Rarity

This species is very seriously depleted and only rarely encountered over most of its former OSPAR range although, because of its aggregating nature, seasonal target fisheries are still possible. It is not possible to estimate its population size in the OSPAR Area, and there is no guidance for the application of this criterion to highly mobile species.

Sensitivity

Very Sensitive. *Lamna nasus* is relatively slow growing, late maturing, and long-lived, bears small litters of pups and has a generation period of 20–50 years and an intrinsic rate of population increase of 5–7% per annum. It is also of high commercial value at all age classes (mature and immature). These factors, combined with its aggregating habit, make it highly vulnerable to over-exploitation and population depletion by target and incidental fisheries. Its resilience is also very low. The Canadian Recovery Assessment Report for the Northwest Atlantic stock of *Lamna nasus* (DFO 2005) projected that a recovery to maximum sustainable yield would take some 25 to 55 years if the fishery is closed, or over 100 years if fisheries mortality remained at 4%. ICES WGEF (in prep.) confirmed that this species is biologically sensitive and highly susceptible to exploitation.

Keystone species

L. nasus is an apex predator, occupying a position near the top of the marine food web (it feeds on fishes, squid and small sharks (Compagno 2001; Joyce *et al.* 2002)). Under natural conditions, it may have a role in ecosystem function and regulation. As in the Northwest Atlantic, however, its greatly reduced abundance in the OSPAR Area is presumably now too low for this species still to have any indirect value through its role in ecosystem function or regulation (Fisheries and Oceans Canada 2006) Stevens *et al.* (2000) warn that the removal of populations of top marine predators may have a disproportionate and counter-intuitive impact on trophic interactions and fish population dynamics, including by causing decreases in some of their prey species.

Decline

Lack of data and fisheries stock assessment make it difficult to quantify the decline of *Lamna nasus* in the OSPAR Area, but both ICES and STECF consider stocks to be depleted. The species is listed by IUCN as Critically Endangered in the Northeast Atlantic because of stock declines (Stevens *et al.* 2006). BfN (2007) summarised declines in catches in the Northeast Atlantic (Table 1).

ICES WGEF (2006) describes the unregulated *Lamna nasus* fisheries in the OSPAR Area and the trends observed. Porbeagle has been fished by many countries, principally Denmark, France, Norway and Spain. The Northeast Atlantic fishery began when Norway started targeting porbeagle in 1926, using longlines. Catches were about 500 t in the early years, then peaked at around 4,000 t in 1933, before declining. The fishery was reopened after the Second World War by Norwegian, Faeroese and Danish vessels, with Norway taking about 3,000 t in 1947, followed by a progressive decline to about 1,200-1,900t from 1953–1960, then 500 t per annum by the mid 1970s. The decline of this fishery led to the redirection of fishing effort by Norwegian and Danish longline shark fishing vessels into the Northwest Atlantic, where most of the stock was harvested during the mid-1960s before that fishery also collapsed. Norwegian landings from the Northeast Atlantic continued to decrease to only 10–40t/year in the late 1980s/early 1990s. Norway closed their target fishery in 2007, following ICES advice. The Danish target longline fishery in the North Sea displayed declining landings from about 2,000 t in the early 1950s to around 200 t in the 1970s. Landings fluctuated around 80 t in the 1980s, and this fishery has now closed.

Although opportunistic target fisheries may arise from time to time, targeting aggregations of *L. nasus* as these appear, the only remaining regular, directed target fishery is the French fishery. Data presented by the ICES WGEF (2006 and in prep.) suggest that the number of vessels landing more than 5 t has been stable since 1990, at between 8 and 11 vessels. Landings and catch per unit effort both increased to a peak of over 700 t and about 3 t/vessel, respectively, in 1994. CPUE then declined to about 1 t per vessel by 1999. The decline since 1999 has been more marked, despite the relatively constant number of vessels involved. Most recent CPUE is the lowest since the early years of the fishery (Figure 2). ICES WGEF (in prep.) considers that the stock in this southern area has declined.

In the high seas of the North Atlantic (including OSPAR Region V), standardized Japanese longline CPUE from bycatch declined at a rate equivalent to a 60% decline over 10 years during 1993–2000 (Matsunaga and Nakano 2002). High seas North Atlantic catches during 1994–2003 were low but catches from 1999–2003 were near zero compared to catches of near 1000 individuals per year 1994–1997 (Matsunaga and Nakano 2005).

Overall, annual landings in the ICES/OSPAR areas have declined ~90%, from near 4,000 t in the 1930s to <400 t (disregarding anomalous high catch reports from Spain in the 1970s & 2000).

There are more accurate data and stock assessments available for the Northwest Atlantic stock. Trends reported here may also be applicable in the Northeast Atlantic, although the area occupied and fishing effort differ. The Northwest Atlantic fishery in the 1960s removed most of the original biomass in about six years. Some recovery took place during the 1970s and 1980s, but renewed fishing pressure in the 1990s led to a decline to some 11–17% of virgin biomass. Other than in the 1960s, the Northwestern stock has never been subject to intensive fishing pressure. In contrast, the stock in the OSPAR Area, where fishing effort remains unregulated, could be more seriously depleted.

Threat

Porbeagle is a highly migratory and aggregating species. Its aggregating habit makes it particularly vulnerable to target fisheries, particularly in the absence of fisheries regulation. Although the former large target fisheries for this species within the OSPAR Area have collapsed (see above), much smaller and sporadic targeted fisheries still regularly develop on aggregations. Such fisheries are highly profitable. ICES WGEF (in prep.) states: “Given the high value of the species, these fisheries are likely to continue”.

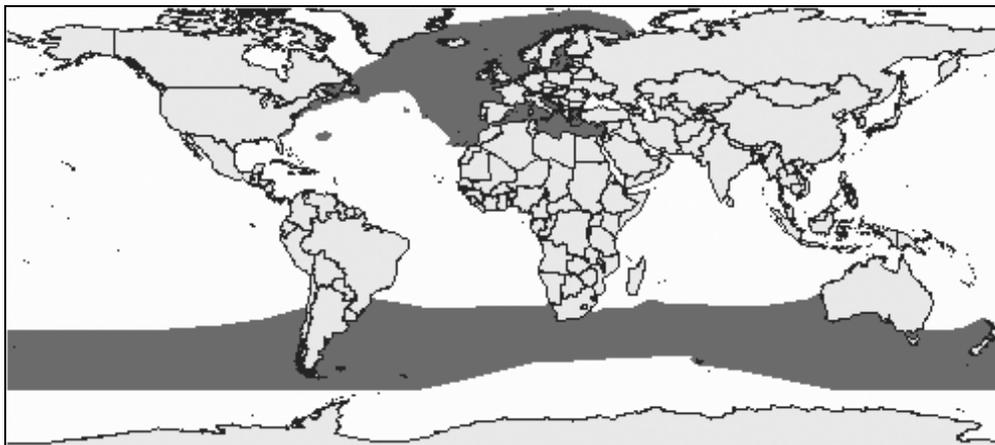


Figure 1: Global distribution of *Lamna nasus* (FAO FIGIS 2007)

Table 1. Summary of population and catch trend data in the Northeast Atlantic (BfN 2007)

Year	Data used	Trend	Source
1936–2005	Norwegian landings	99% decline from baseline	Norwegian and ICES data
1936–2005	Target fishery catches	90% decline from baseline	Norwegian, French & ICES data
1936–2005	All landings data	85% decline from baseline	Norwegian (pre-1973) & ICES
1978–2005	French landings	~50% decline in ~30 yrs	French & ICES data
1994–2005	Landings per vessel	~70% decline in ~10 years	French data

Figure 2: Total catch per unit effort (kg per vessel) in the French porbeagle fishery, 1989–2005. (Source: Biseau 2006, cited in ICES WGEF in prep.)

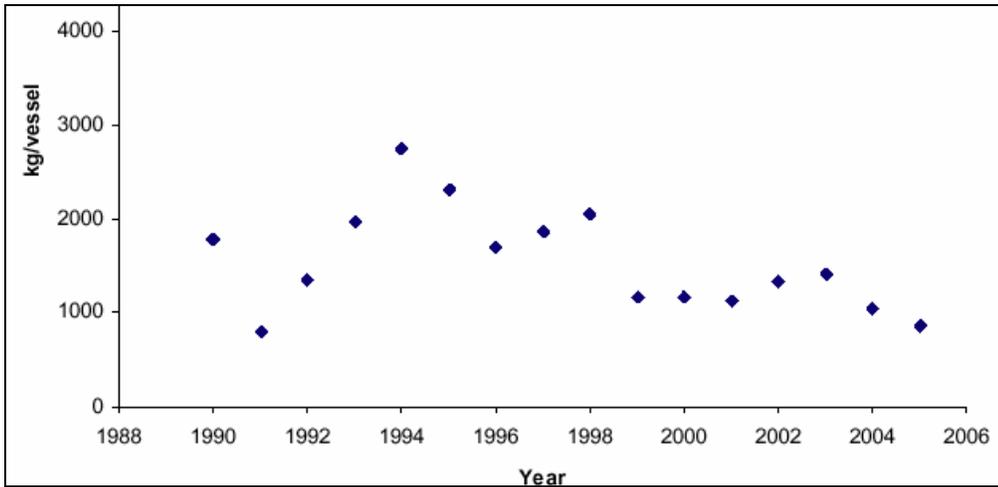
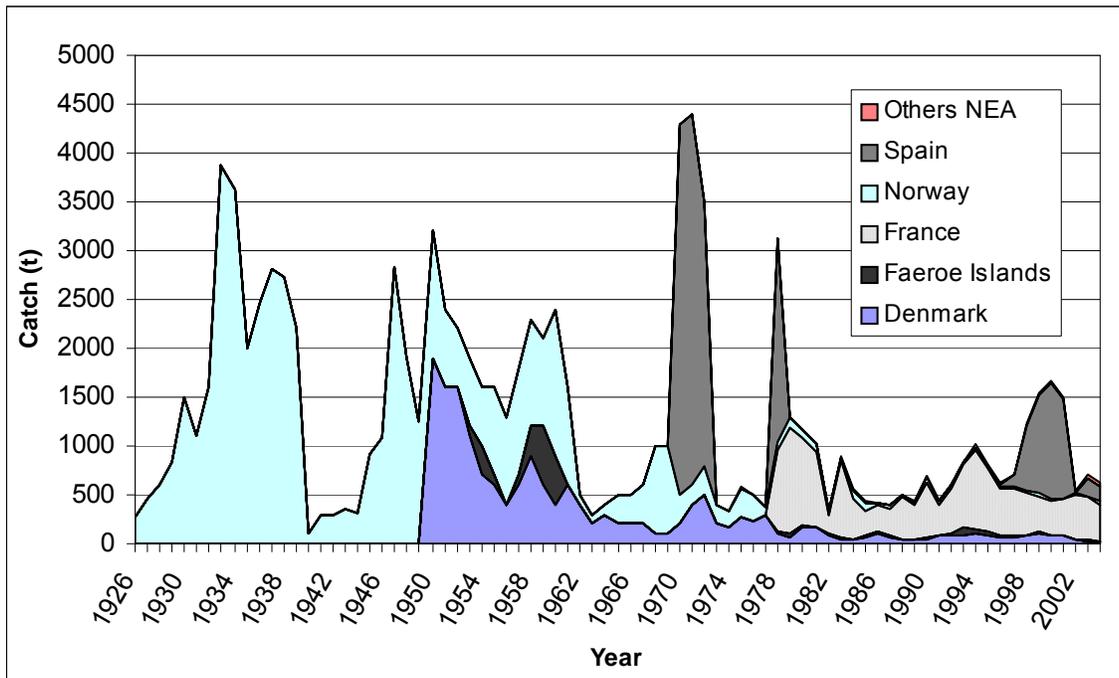


Figure 3: Landings (tonnes) of *Lamna nasus* from the Northeast Atlantic by major fishing States, 1926–2004. (Source: ICES WGEF 2006)



(Note: The three peaks in Spanish landings after 1970 may be represent misidentifications of other species.)

The species is also a valuable utilized bycatch in demersal trawl and longline fisheries, although these catches are not always recorded at species level. Effort has increased in recent years in pelagic longline fisheries for bluefin tuna and swordfish. Reports of landings by Spanish longliners are sporadic but sometimes high, but these peaks may be the result of misidentification. The fleets of Japan, Republic of Korea and Taiwan Province of China also fish in OSPAR Region V and take porbeagle as a bycatch. The catch per unit effort of bycatch in the well-recorded Japanese fishery has declined steeply over the past decade (see above).

Porbeagles are also taken as bycatch in a variety of other fishing gears, including pelagic and demersal trawl fisheries, which take them as they follow schools of their prey species (herring, sardines and clupeid fishes).

ICES WGFE (2006) states that the maximum age and size of *Lamna nasus* have decreased dramatically, as a result of fishing pressure. These were 46 years and 3.5 m in length 25 years ago, but maximum length today is now only 1.8 m. This species matures at 14 years old and a length of 1.2 m.

While porbeagle continues to be such a high value species in European and international markets and fisheries remain unregulated, seasonal target fisheries and utilised bycatch fisheries are both likely to continue. Unfortunately, these catches are often only recorded as sharks, without further detail of the species. If fishing is permitted to continue in the OSPAR Area, a minimum requirement must be to record catches by species and to collect biological data on catches. It would, however, be preferable to adopt ICES and STECF advice. This is to close all directed fisheries for porbeagles and take additional measures to prevent bycatch of porbeagles in fisheries targeting other species (ICES ACFM 2006; STECF 2006).

Relevant additional considerations

Sufficiency of data

ICES WGEF (in prep.) states: "Though there are insufficient data to assess the North-East Atlantic stock of porbeagle shark, this species has likely declined, is not expected to recover in the short-term and is considered very sensitive to over-exploitation.

Changes in relation to natural variability

There is minimal genetic population differentiation across the North Atlantic, possibly as a result of

occasional genetic exchange by sharks that undertake trans-Atlantic migrations. There is not considered to be any exchange with porbeagle populations in the southern hemisphere, which are genetically-distinct (Pade *et al.* 2006).

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 a recognition that the threats to the porbeagle are known, that such threats occur in the OSPAR Maritime Area and that they have led to significant declines in porbeagle stocks. Expert judgement has also played a part in the recognition of the threatened and declining status of this species by ICES, STECF, and IUCN.

ICES Evaluation

In 2005, ICES advised that, given the apparent depleted state of this stock, no fishery should be permitted on this stock. This advice was further considered by STECF in 2006 (see Section 3 of STECF, 2006), and STECF reiterated that no directed fishing for porbeagle in the NE Atlantic be permitted and that additional measures be taken to prevent by catch of porbeagles in fisheries targeting other species.

In 2006, ICES advised that no targeted fishing for porbeagle should be permitted on the basis of its life history and vulnerability to fishing. In addition, measures should be taken to prevent by catch of porbeagle in fisheries targeting other species, particularly in the depleted northern areas.

The ICES Working Group on Elasmobranch Fishes (in prep.) supported an earlier draft of this nomination. ICES has also recommended the closure of directed fisheries and minimisation of bycatch of this species, particularly in the northern part of the OSPAR/ICES Area.

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.

The decline in catches and catch per unit effort in many porbeagle fisheries, in the Northeast Atlantic and elsewhere, is interpreted by fisheries experts as an indication of a decline in the population caused

by fisheries. This threat is therefore linked to human activity.

Management considerations

Detailed management advice was provided by ICES in 2006 and is reproduced here:

“No targeted fishing for porbeagle should be permitted on the basis of their life history and vulnerability to fishing. In addition, measures should be taken to prevent bycatch of porbeagle in fisheries targeting other species, particularly in the depleted northern areas.

“Porbeagles are long-lived, slow-growing, have a high age-at-maturity, and are particularly vulnerable to fishing mortality. Population productivity is low, with low fecundity and a protracted gestation period. In the light of this, risk of depletion of reproduction potential is high. It is recommended that exploitation of this species should only be allowed when indicators and reference points for stock status and future harvest have been identified and a management strategy, including appropriate monitoring requirements has been decided upon and is implemented.

“A long-term management strategy for fisheries on this species would consist of an initial low scientific fishery. This initial low fishery level should aim at identifying harvest rates that are sustainable in the long term. A gradual expansion of the fishery from the initial low level should only be allowed if harvest rates that are sustainable in the long term are clearly identified and a management strategy has been identified and decided upon. Such gradual expansion should be accompanied by close monitoring, enabling adjustment of the management plan according to the outcome of the fisheries.

“Information from surface longline fishing shows that porbeagles are usually captured alive. Therefore, a mitigation policy might be implemented by releasing porbeagle.

“Porbeagle is a highly migratory and schooling species. Sporadic targeted fisheries develop on these schools and such fisheries are highly profitable.

“Porbeagle is highly vulnerable to longline fisheries.

“Countries fishing for porbeagle need to provide better data. All fisheries-dependent data should be provided by EU member states that have fisheries for this stock as well as other countries longlining in the ICES area. Landings data for porbeagle may be

reported as porbeagle, as various sharks, rays, skates, etc. in the official statistics. This means that the reported landings of porbeagle are likely an underestimation of the total landing of the species from the NE Atlantic.”

ICES Advice for 2007 was not available at the time of writing.

Management actions essential for the conservation of this species are control and monitoring of fisheries for porbeagles. It is important that fisheries is not allowed in the OSPAR Maritime Area, and that fishing techniques should be designed to reduce porbeagle bycatch. Porbeagles incidentally caught as by-catch should be immediately returned alive to the sea.

This species is classified as Critically Endangered in the IUCN Red List (Stevens *et al.*, 2006) and in Turkey (Fricke *et al.* in press). It is Critically Endangered in the Baltic Sea (where it is at the edge of its range), and listed on the HELCOM 2006 Red List as a priority species (Fricke 2007). Fishing for this species has been prohibited in Sweden and Norway.

EC Regulation 1185/2003 prohibits the removal of shark fins of this species, and subsequent discarding of the body. This regulation is binding on EC vessels in all waters and non-EC vessels in Community waters (ICES, 2005).

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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