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KEY INFORMATION

Areas of Concern

Newfoundland, Canada to Massachusetts, and seasonally to New Jersey.

Year Identified as “Species of Concern”
2006

Factors for Decline

- Fishing

Conservation Designations

IUCN: Critically Endangered- Northeast Atlantic and Mediterranean, Endangered – Northwest Atlantic, Vulnerable globally

Brief Species Description:

The porbeagle reaches a maximum reported size of 11.6 feet (355 cm) TL (Francis et al. 2005 cited by Fowler et al. 2005). Males mature at approximately eight years and 5.5 feet (170 cm) TL while females mature at 13 years and 6.4 feet (195 cm) TL (Fowler et al. 2005). They are ovoviparous (give birth to live young that were nourished in utero with egg yolk) and oophagous (egg eating) with females producing on average four young per year. Gestation is thought to be eight to nine months.

This is a large, cold-temperate coastal and oceanic species with a heavy spindle-shaped body. It is dark bluish grey dorsally and white ventrally. Greatest body depth is found at the dorsal fin. Porbeagle sharks can be distinguished from white sharks by their spikelike smooth-edged teeth and by the position of the second dorsal fin, which is found directly over the anal fin (Collette and Klein-MacPhee 2002). The presence of tooth cusplets and secondary caudal fin keels distinguish this species from shortfin mako sharks (Collette and Klein-MacPhee 2002). Porbeagle sharks are **endothermic**, possessing countercurrent heat exchangers in the circulatory system. This allows porbeagles to maintain body temperatures that are 13 to 18°F (7-10°C) above ambient water temperature (Carey and Teal 1969; Carey et al. 1971 cited in COSEWIC 2004). Porbeagles are distributed across the North Atlantic and in a circumglobal band in the southern Atlantic, southern Indian, southern Pacific, and Antarctic Oceans. The species of concern range is shown in Figure 1. Tagging data provide strong evidence that there are distinct porbeagle populations in the Northeast and Northwest Atlantic (DFO 1999; Kohler et al. 2002 cited by COSEWIC 2004), and that the Northwest Atlantic stock is a separate population that undertakes extensive annual migrations between Canada and the northeastern United States. The northern and Southern hemisphere populations are genetically distinct and isolated (Shivji, unpublished).

Porbeagle sharks in the Gulf of Maine feed predominantly on mackerel and herring and other small fishes, other species of sharks, and squids (Collette and Klein-MacPhee 2002). This species is **pelagic** and rarely enters shallow, coastal waters (Collette and Klein-MacPhee 2002). They are



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found from the surface to depths of up to 1000 feet (300 meters), and apparently, move to the deeper water in the winter to avoid low surface water temperatures (Collette and Klein-MacPhee 2002).

Rationale for “Species of Concern” Listing:

Demographic and Genetic Diversity Concerns:

Despite the lack of data regarding many aspects of this species’ life history, the porbeagle population in the Northwest Atlantic has often been cited as a clear example of [stock](#) collapse in an elasmobranch (Anderson 1990, Walker 1998). The Northwest Atlantic population has declined by approximately 90% over the last four decades since the 1961 start of commercial exploitation (COSEWIC 2004, Campana et al. 2002). This species is slow growing and has a relatively late age at maturity (eight years for males and 13 for females). They mature considerably after the age at which they first appear in the fishery (Campana et al. 2002). Due to the species’ life history characteristics, the intrinsic rate of increase (r) of the porbeagle is low. This rate varies between 0.05 and 0.07 depending on what assumptions are made in the calculation and suggests that the porbeagle is fundamentally unproductive (Campana et al. 2002).

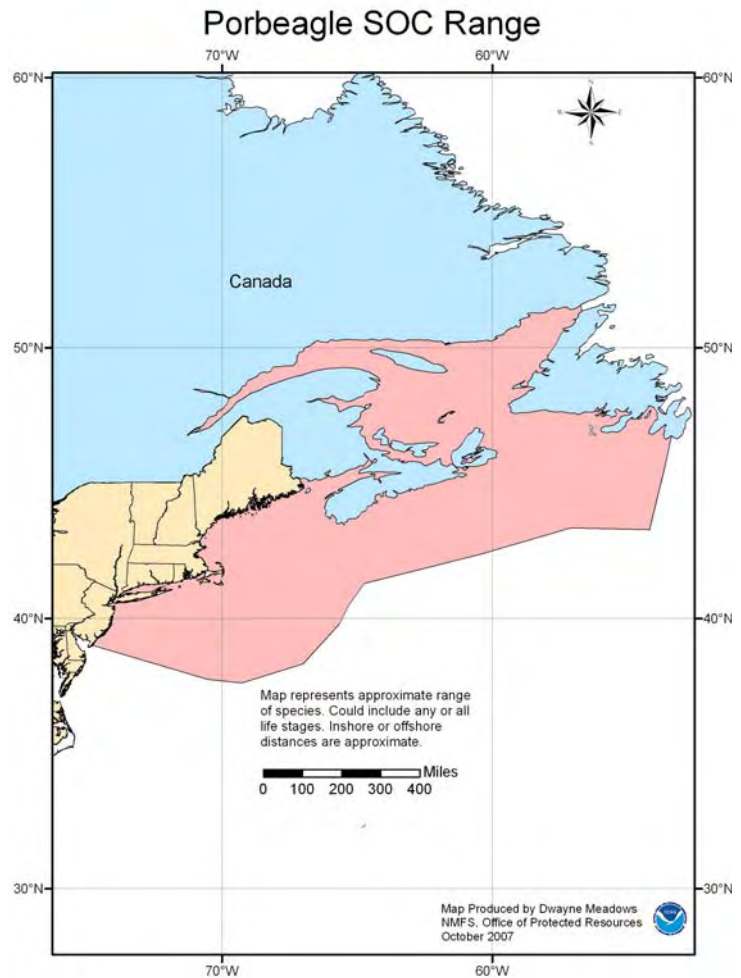


Figure 1. Range of the porbeagle species of concern.

Factors for Decline:

While the porbeagle is a very wide-ranging species, it exhibits little exchange between neighboring populations (COSEWIC 2004). The porbeagle has a low reproductive capacity and high commercial value. This species has been heavily fished and utilized for human consumption in the North Atlantic and the Mediterranean. North Atlantic populations have been seriously over-exploited in longline fisheries. The species is primarily caught with pelagic longlines; also pelagic and bottom trawls, handlines and gillnets (Compagno 1984 cited by COSEWIC 2004). It represents a highly valuable retained component of multispecies fisheries that target other species. There is also some concern that porbeagle abundance could be adversely affected by declining groundfish stocks as they represent a significant forage base for porbeagle (COSEWIC 2004).

There is some evidence that Japanese catches of porbeagle sharks outside of the Canadian Exclusive Economic Zone may be substantial, and may comprise a significant portion of total catches



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from the Northwestern Atlantic population (DFO 2005a). There is insufficient information at this time to ascertain the impact of this catch on the status of the stock but this should be considered (DFO 2005a). The recreational fishery did not land any porbeagle sharks in 2003 and 2004 (Cortes and Neer 2005).

Norwegian long-liners initiated the first commercial fishery for the Northwest Atlantic population of porbeagles in 1961 (Campana et al. 2002). Detailed catch records exist for this early fishery and indicate that the species was heavily fished in the early 1960s. The fishery supported annual catches of up to 9,000 metric tons (mt) until it collapsed in 1967 (Campana et al. 2002). Low and apparently sustainable catch rates of approximately 350 mt in the 1970s and 1980s allowed the population to partially rebuild before the new fishery arose in the 1990s (Campana et al. 2002). Figure 2 represents NMFS data on commercial landings in the U.S. from 1987 through 2004. Based on the most recent stock assessment conducted by Canada, NMFS determined in 2006 that the porbeagle shark stock is **overfished** and that the rebuilding period is 100 years. NMFS also concluded that **overfishing** is currently not occurring for this species. However, exploitation rates for the Shelf region where the fishery currently takes place either exceed or are close to the values that produce **maximum sustainable yield** (personal communication, Southeast Fisheries Science Center 2006). Fishing mortality rates for 2004 for the three models presented in the Canadian stock assessment for the Shelf region are higher than those that produce optimum yield (Southeast Fisheries Science Center 2006, personal communication).

Commercial landings of porbeagle sharks 1987-2004

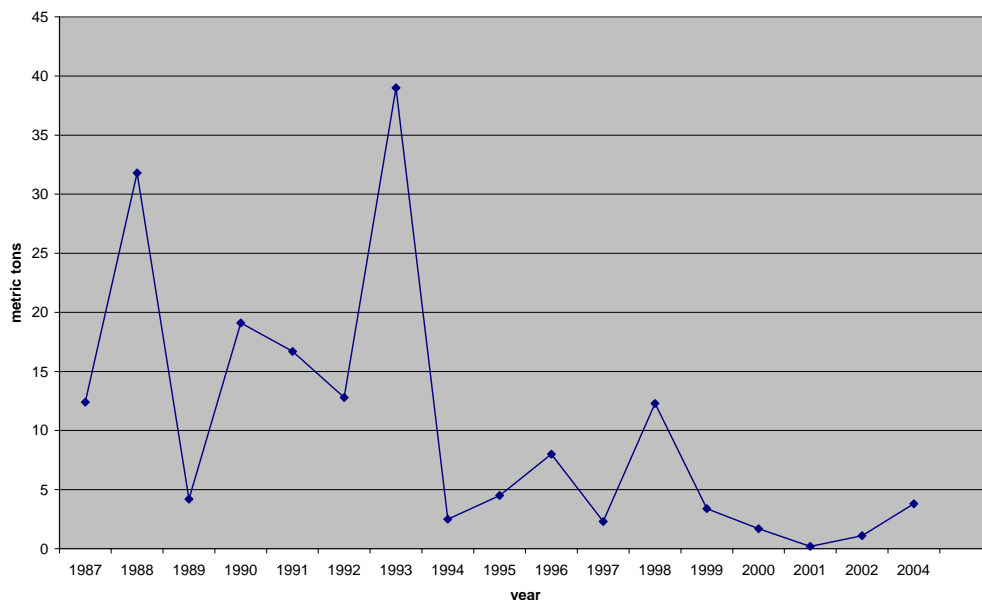


Figure 2. Commercial landings for porbeagle sharks in the United States from 1987-2004. NMFS.

New population dynamics analysis by Campana et al. (2002) suggests that the current population abundance has again declined. Based on more than 140,000 length measurements, an extensive catch rate index, a confirmed growth model, and a catch-at-age matrix, they found that at least 90% of



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the sexually mature population of porbeagles has been lost as the fishing mortality rate has increased (Figure 3, Campana et al. 2002). In 2000, the fishing mortality rate was estimated to be 0.20, and biological reference points based on life table analysis indicate that fishing at $F_{0.1} = 0.18$ will result in population collapse, $F = 0.08$ is equivalent to no population growth, and the fishing mortality rate at maximum sustainable yield is $F = 0.04$ (Campana et al. 2002). Canada's Department of Fisheries and Oceans (DFO 2005b) modeled the potential for porbeagle shark to recover. The model's estimate of the number of female spawners in 2005 ranged from 9,000 to 13,000 fish, representing about 15% of the population. Figure 4 depicts the standardized catch rate (number/hook) of sexually mature (>200 cm or 79 inches fork length, FL) and immature (<200 cm FL) porbeagles (Campana et al. 2002). Based on the low number of mature females in the population, Campana et al. (2002) concluded that it was unlikely that even with the strict quota management in place at that time in both the U.S. and Canada that this population would rebuild quickly.

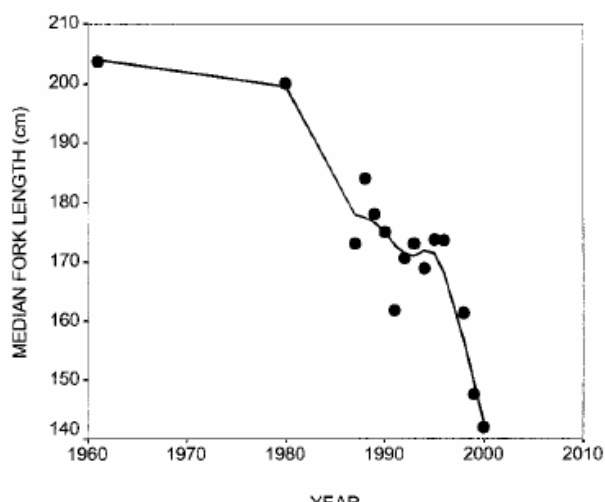


Figure 3. Long term changes in median fork length of porbeagles in the commercial catch by the offshore fleet during September – October on the southern Newfoundland (NF-Gulf) mating grounds. Campana et al. (2002).

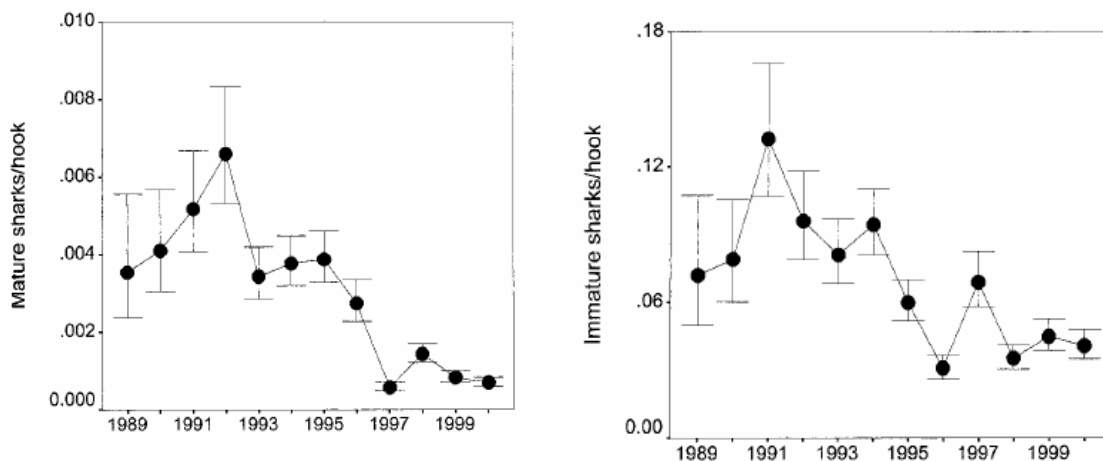
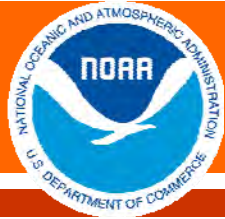


Figure 4. Standardized catch rate (number/hook) of sexually mature (>200 cm fork length, FL) and immature (<200 cm FL) porbeagles. Factors in the analysis included year, month, area, and vessel. Error bars are 95% confidence intervals. Campana et al. (2002).



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Status Reviews/Research Underway:

None.

Data Deficiencies:

Information on mating and nursery grounds for this species is lacking and other general life history information is needed. Also, accurate population estimates are currently not available.

Existing Protections and Conservation Actions:

At a 2004 meeting of the Convention on the International Trade in Endangered Species (CITES) Animals Committee, Germany introduced a draft proposal listing the porbeagle under CITES. The CITES Shark Working Group concluded that North Atlantic populations have been severely depleted, and most members agreed that the species appears to meet the criteria for listing in CITES Appendix II, but it was not listed at that time. The Working Group provided several recommendations including the following: International Commission for the Conservation of Atlantic Tunas members were encouraged to collect and report data on catches and discards of porbeagle; the U.S. and Canada were encouraged to enhance existing management for the shared porbeagle stock by establishing a cooperative, bilateral research and fisheries management program; and the World Customs Organization was encouraged with urgency to establish a harmonized international code for porbeagle sharks. In late 2006, the European Union agreed to support Germany's proposal but CITES listing again narrowly failed in 2007.

In May 2004, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) recommended to the Canadian Minister of Fisheries that this species be listed as endangered under the Species at Risk Act (SARA). In 2006, the Canadian government decided not to list the porbeagle shark under SARA due to the economic impact of a listing, both on the commercial fishing industry and on the government who would have to expend over \$50,000 annually in monitoring funds (Canada Gazette 2006).

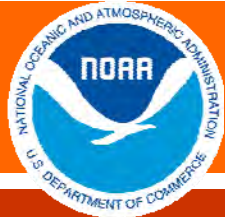
In the U.S., this species is currently included in the Highly Migratory Species Fishery Management Plan (NMFS 2006). The annual quota is 92 mt dressed weight (dw). There are a number of restrictions on the commercial and/or recreational shark fisheries including no shark finning, limited access, trip limits, gear restrictions, and a minimum size. Additionally, there are a number of restrictions on the pelagic longline fishery including hook and bait restrictions and time/area closures. None of these restrictions, except for the annual quota, are specific to porbeagle sharks. The commercial fishery landed 0.8 and 2.6 mt dw in 2003 and 2004, respectively (Cortes and Neer 2005).

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Point(s) of contact for questions or further information:

For further information on this Species of Concern, or on the Species of Concern Program in general, please contact NMFS, Office of Protected Resources, 1315 East West Highway, Silver Spring, MD 20910, (301) 713-1401, soc.list@noaa.gov; <http://www.nmfs.noaa.gov/pr/species/concern/>, or Kimberly Damon-Randall, NMFS, Northeast Region, One Blackburn Drive, Gloucester, MA 01930-2295, (978) 281-9328, x6535, Kimberly.Damon-Randall@noaa.gov.