

Porbeagle – *Lamna nasus*

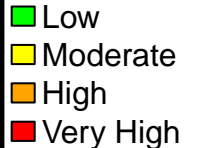
Overall Vulnerability Rank = High ■

Biological Sensitivity = High ■

Climate Exposure = High ■

Data Quality = 83% of scores ≥ 2

<i>Lamna nasus</i>		Expert Scores	Data Quality	Expert Scores Plots (Portion by Category)
Sensitivity attributes	Stock Status	3.8	2.6	
	Other Stressors	1.4	1.8	
	Population Growth Rate	4.0	2.8	
	Spawning Cycle	2.2	2.8	
	Complexity in Reproduction	1.4	1.8	
	Early Life History Requirements	1.0	3.0	
	Sensitivity to Ocean Acidification	1.1	3.0	
	Prey Specialization	1.2	2.6	
	Habitat Specialization	1.3	2.4	
	Sensitivity to Temperature	2.0	2.8	
	Adult Mobility	1.0	3.0	
	Dispersal & Early Life History	1.0	3.0	
	Sensitivity Score	High		
	Exposure variables	Sea Surface Temperature	3.9	3.0
Variability in Sea Surface Temperature		1.0	3.0	
Salinity		2.0	3.0	
Variability Salinity		1.2	3.0	
Air Temperature		1.0	3.0	
Variability Air Temperature		1.0	3.0	
Precipitation		1.0	3.0	
Variability in Precipitation		1.0	3.0	
Ocean Acidification		4.0	2.0	
Variability in Ocean Acidification		1.0	2.2	
Currents		2.1	1.0	
Sea Level Rise		1.1	1.5	
Exposure Score		High		
Overall Vulnerability Rank		High		



Porbeagle (*Lamna nasus*)

Overall Climate Vulnerability Rank: **High** (100% certainty from bootstrap analysis).

Climate Exposure: **High**. Two exposure factors contributed to this score: Ocean Surface Temperature (3.9) and Ocean Acidification (4.0). Porbeagle are pelagic and complete their life cycle in marine habitats.

Biological Sensitivity: **High**. Two attributes scored above 3.0: Population Growth Rate (3.8) and Stock Status (3.1). Porbeagle have low population growth rates (Cortés et al., 2010). Porbeagle is listed as vulnerable by the IUCN owing to low population abundance (<http://www.iucnredlist.org/details/11200/0>). Porbeagle is identified as a Species of Concern in the Western Atlantic by the U.S. (http://www.nmfs.noaa.gov/pr/pdfs/species/porbeagleshark_detailed.pdf).

Distributional Vulnerability Rank: **Very High** (100% certainty from bootstrap analysis). Porbeagle are habitat generalists and highly mobile. In addition, Porbeagle do not have larval early life stages.

Directional Effect in the Northeast U.S. Shelf: The effect of climate change on Porbeagle is very likely to be neutral (>95% certainty in expert scores). Porbeagle is a highly mobile cold-temperate shark. There is very little information available that suggests negative or positive effects of climate change.

Data Quality: 83% of the data quality scores were 2 or greater indicate that data quality is moderate.

Climate Effects on Abundance and Distribution: There is very little information on the effect of climate change on Porbeagle. Drinkwater et al. (2003) noted decreases in the catch of Porbeagle on the Scotian Shelf when colder Labrador Slope Water moved into the region.

Life History Synopsis: The Porbeagle is a migratory-pelagic, cold-temperate elasmobranch species found throughout the north Atlantic, south Atlantic, and south Pacific Oceans, but from Newfoundland to New Jersey and the Sargasso Sea in the western Atlantic (Campana et al., 2010a; Campana et al., 2010b). Maturity is reached at a later age and larger size for females than males: 50% maturity at 174 cm fork length (FL) and 8 years for males, 217 cm FL and 13 years for females (Jensen et al., 2002; Natanson et al., 2002). Research indicates that mating likely occurs off southern Newfoundland and the entrance to the Gulf of St Lawrence and on Georges Bank in fall (Jensen et al. 2002; Campana et al., 2010b). Porbeagles reproduce annually and are ovoviviparous (Jensen et al., 2002). Embryos are oophagous, but are not known to consume siblings (Jensen et al., 2002). After an 8-9 month gestation period, litters of 1-4 large individuals (60-70 cm) are born in late spring (Branstetter, 2002; Jensen et al. 2002). The locations of pupping grounds are unknown, but satellite tagging suggests females travel over 2000 km to the Sargasso Sea during the pupping season (Campana et al., 2010a). Porbeagles migrate seasonally from winter habitats in the southern portion of their range (namely Gulf of Maine, Georges Bank, and the southern Scotian Shelf), along the Scotian Shelf in spring, to their summer and fall habitat along the southern coast of Newfoundland and in the Gulf of St. Lawrence with little mixing with the eastern Atlantic population (Campana et al., 2010b). Porbeagles probably adjust their distribution in the water column to maintain their preferred temperature range, 5-10°C; but are able to maintain muscle and stomach temperatures greater than the ambient water temperature (Branstetter, 2002; Campana et al., 2010b). Adults consume Atlantic mackerel, herrings, other sharks, other small fishes, and squids (Branstetter, 2002). Porbeagle is listed as a NMFS Species of Concern. Population size in the western Atlantic dropped in the 1960s due to fishing pressure, but is on a long road to recovery now that fishing

pressure has been reduced (Campana et al., 2010b). The species is federally managed through the Consolidated Atlantic Highly Migratory Species fishery management plan (NMFS 2006) and is also managed in state waters through the Interstate Fishery Management Plan for Atlantic coastal sharks (ASMFC 2008). Assessments are conducted by the International Commission for the Conservation of Atlantic Tunas (ICCAT) and Porbeagle are considered overfished, but overfishing is not occurring (ICCAT, 2009).

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