United States Department of the Interior

FISH AND WILDLIFE SERVICE

International Affairs
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MEMORANDUM

To: Chief, Division of Management Authority

From: Chief, Division of Scientific Authority Rosemarie Gnam, Ph.D.

Subject: General advice for the export and introduction from the sea of wild porbeagle shark (*Lamna nasus*) harvested in the commercial fishery by U.S. fisherman in 2017

Advice: *The Division of Scientific Authority (DSA) finds that the export and introduction from the sea of wild porbeagle shark harvested by U.S. fisherman in the 2017 harvest season is not detrimental to the survival of the species, provided that the harvest is in compliance with U.S. management plans in place for the species.*

We will review and re-issue a general advice for porbeagle shark annually, in an effort to be responsive to new data and information that may become available.

Basis for advice:

Species Distribution/Range in the United States

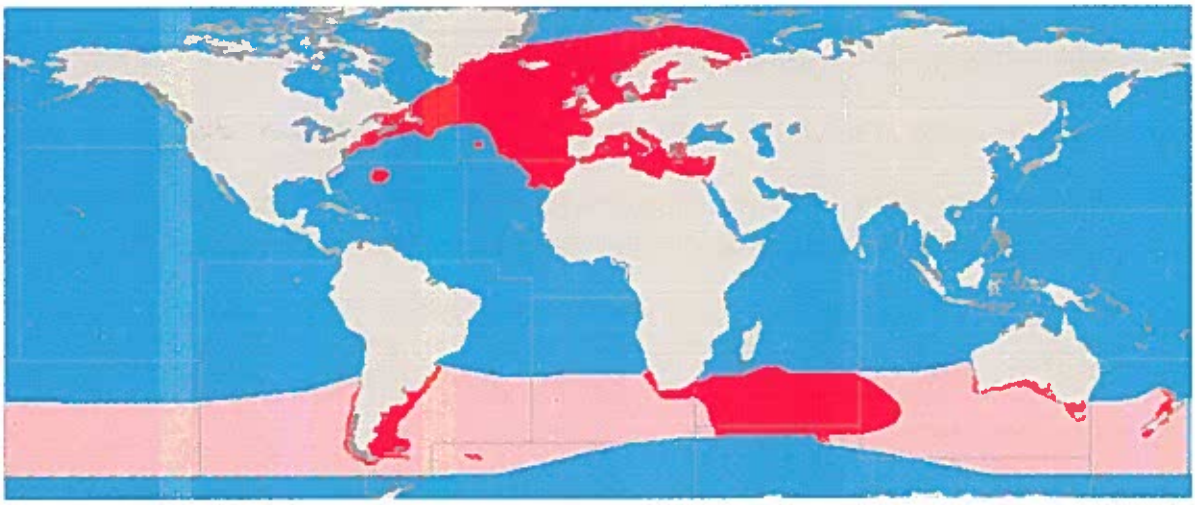
The porbeagle shark is a wide-ranging, primarily coastal species which is also found in the open oceans. It is found in temperate and cold-temperate waters worldwide (1 to 18°C), at depths of approximately 1-700 meters; this species is most commonly associated with continental shelf habitat (Compagno, 2001). The species is centered within the North Atlantic, and within a circumglobal region of temperate water in the Southern Hemisphere including the South Atlantic Ocean, the Indian Ocean, the South Pacific Ocean and the Southern Ocean (Compagno, 2001).

The global population is generally separated into fished stocks located within the Northeast Atlantic, the Mediterranean Sea, the Northwest Atlantic, South Atlantic, Indian Ocean and Southern Ocean. The United States' harvest occurs within the Northwest Atlantic stock.

In the Northwest Atlantic this species' primary population center is located within Canada's territorial waters (Campana and Gibson, 2008). There is seasonal movement within this stock and the species is most commonly associated with continental shelf habitat from close inshore (summer) to far offshore; it is seldom found beyond the Canadian and U.S 200 mile Exclusive Economic Zone (EEZ) (Campana and Gibson, 2008).

In the Northwest Atlantic this species has been found to make annual migrations along the coast between the Gulf of Maine and Newfoundland, and is known occasionally from areas to as far south as New York, New Jersey and possibly South Carolina (Compagno, 2001; Campana *et al.*

1999; Campana and Joyce, 2004). Within U.S. territorial waters, the species is primarily located in 5-10°CC water (Campana and Joyce, 2004). Compagno (2001) noted its distribution included Bermuda. While the Northwest Atlantic stock of porbeagle has been shown to undertake migrations up and down the Atlantic coast of North America, long-term tagging data indicates this stock does not mix with the Northeastern Atlantic porbeagle stock (Compagno, 2001; ICCAT SCRS/ICES, 2009).



Distribution map for Lamna nasus (from FAO Species Identification Sheet 2003). Red/Dark: certain; Pink/Light: uncertain).

Biological Characteristics

This is a relatively slow growing, long-lived species that is late maturing and bears an average of four pups yearly after a gestation period of about eight months (in the North Atlantic) (Aasen, 1963; Gauld, 1989). Metabolically it maintains core body temperature above ambient sea temperature and is therefore often referred to as "warm-blooded". Due to its low reproductive potential, long life and late age of maturity, this species is vulnerable to overharvest.

Overall, when comparing porbeagle sharks from the North and South Atlantic stocks, the North Atlantic stocks are larger, faster growing and have a shorter lifespan than the South Atlantic stock. In the southern hemisphere (southwest Pacific), the species is estimated to live for approximately 65 years (Francis *et al.*, 2007), while some research has estimated the Northwest Atlantic stock to live up to 45 years(Compagno 2001) . The Northeast Atlantic stock is slightly slower growing than the stock in the Northwestern Atlantic (Francis *et al.*, 2008).

Maximum total length for this species is over 300 cm and possibly as long as 370 cm, but most fully grown specimens are much smaller (Compagno 2001). In the western North Atlantic, ages at maturity for males and females are approximately eight and 13 years, respectively, and lengths at maturity are 180-215cm and 230-260cm total length, respectively (Natanson *et al.*, 2002).

Population Status and Trends

The International Union for Conservation of Nature (IUCN) Redlist assessment for the global population of porbeagle indicates the status is Vulnerable (Stevens *et al.*, 2006). The most recent

A 2009 ICCAT/ICES joint assessment estimated the total population size in the Northwest Atlantic, which is defined as north of 35N and west of 42W(approximately from Labrador, Canada south to Rhode Island), to be 22 to 27 percent of its size in 1961 and 95 to 103% of its size in 2001. By 2000, overharvest of this stock had reduced the average size of sharks and catch rates to the lowest levels on record, and catch rates of mature sharks in 2000 were 10% of those in 1992. In 2000, biomass was estimated to be 11–17% of virgin biomass (DFO, 2001). Since harvest quotas were reduced in 2002, population abundance has remained relatively stable with SSB, and number of mature females in the population, estimated at about 95-103% and 83-103% of the 2001 levels, respectively. The Northwest Atlantic porbeagle stock has been determined to be overfished, but due to the management in place it is not currently experiencing overfishing. Currently, this stock is increasing (Campana *et al.*, 2009).

On January 20, 2010 the Wild Earth Guardians requested that the NMFS list the porbeagle shark throughout its entire range as endangered under the Endangered Species Act (ESA). The following day, on January 21, 2010 the Humane Society of the United States (HSUS) requested the NMFS to list the Northwest Atlantic distinct population segment (DPS) as endangered under the ESA. On July 12, 2010 the NMFS published a finding that neither petition presented substantial information indicating that listing porbeagle sharks may be warranted and so a full status review was not initiated. In August 2011 the petitioners filed a court challenge to this finding and on December 12, 2014 the court vacated the 2010 90-day finding. Finally, on March 27, 2015, the NMFS published a *90 Day Petition Finding; Request For Information* and based on the information they received they produced a 90 day finding. The results of the review were to be published on or before December 12, 2015 (FR Notice 2015 07073) and on August 1, 2016 a Federal Register Notice (FR Notice 2016 18101) was published indicating that it had been determined that porbeagle sharks do not warrant listing at this time.

Threats

Globally, overharvest is the primary threat (Stevens *et al.*, 2006). The fishing of juveniles is of particular concern since these fish will never have the opportunity to reproduce and replace themselves in the population. The fisheries produce meat and fins; consumption of meat occurs primarily in Europe, and fins primarily in the Asian market. Porbeagle fins are generally less valued than fins of other shark species, but fins are still exported to Asian markets as by-products of meat processing (Mundy-Taylor and Crook 2013).

Detailed catch records exist for the North Atlantic fisheries, which have been primarily exploited by North American and European fleets, but less data are available for the southern stocks (Semba *et al* 2013). In the early 1960s, before the fishery collapsed, the Northwest Atlantic supported harvests up to 9,000 metric tons (mt). Apparently sustainable harvests of 350 mt occurred here until the 1990s and this allowed some rebuilding of the stock (Campana *et al.*, 2002). With tightened harvest restrictions in place in the Northeast and Northwest Atlantic, additional pressure is a concern for the South Atlantic stocks where cooperative stock management is not well developed. The lack of restrictive management of the southern stocks without adequate monitoring and proper documenting of harvest and trade has the potential to result in regional stock collapses.

Most harvest occurs within the Canadian and U.S. EEZs, where essential habitat for this pelagic species is located (ICCAT SCRS/ICES, 2009) and where harvest is strictly regulated.

Species Management

At the global level, the porbeagle shark is listed among the Highly Migratory Species (Annex 1) in the United Nations (UN) Convention on the Law of the Sea (UNCLOS). A UN Agreement on Straddling and Highly Migratory Fish Stocks, which builds on UNCLOS and has been in force since 2001, calls on States to cooperate on these multijurisdictional stocks on actions and approaches to ensure their long-term conservation and sustainable use.

There is bilateral understanding that the Northwest Atlantic stock of porbeagle shark is a shared stock between the United States and Canada. The U.S. and Canada are utilizing the latest stock assessment information to manage the fishery. Each country independently determines their harvest quota for this species and the combined quotas provide for rebuilding the stock. This type of regional cooperation is what was envisioned in both the UNCLOS and the UN Agreement on Straddling and Highly Migratory Fish Stocks.

Also at the regional level, porbeagle shark have been harvested as bycatch in fisheries targeting other species, including the Northwest Atlantic tuna and swordfish fisheries. The International Commission for the Conservation of Atlantic Tunas (ICCAT), founded in 1969, is the intergovernmental organization responsible for the conservation and management of Atlantic tuna and tuna like species occurring in the Atlantic Ocean and adjacent seas. ICCAT (which is currently composed of 49 Contracting Parties) has adopted numerous recommendations for the management and conservation of both target stocks and bycatch species. ICCAT has also adopted both binding and non-binding measures on porbeagle data collection and management.

In 1995, ICCAT adopted its first (non-binding) measure on sharks, which called on its members to provide relevant information to FAO to support that body as the focal point of an effort to initiate a program to collect biological data on sharks, including stock abundance and the magnitude of bycatch. Additional measures have been adopted since 2003 encouraging and eventually requiring ICCAT members to provide all catch and effort data for porbeagle and other shark species caught in association with fisheries managed by ICCAT, including estimates of dead discards and size frequencies. Regular reporting to ICCAT of harvest and discard data on porbeagle has greatly improved in recent years. Some Contracting Parties do not, however, fully report their data on porbeagle shark to ICCAT.

ICCAT adopted a specific management measure for porbeagle in 2007 that required Contracting Parties to take appropriate measures to reduce fishing mortality of porbeagle shark. In 2007, ICCAT requested that its science body conduct a stock assessment for porbeagle shark no later than 2009. In ICCAT's Standing Committee for Research and Statistics, in cooperation with the International Counsel for the Exploration of the Sea, ICCAT's science body conducted the requested stock assessment for Atlantic stocks. The results of the assessment are the scientific basis for porbeagle species management plans in both Canada and the United States. Additional conservation action has been considered by ICCAT since the 2009 stock assessment, in particular, a prohibition on retention of porbeagle shark. To date, no consensus has been reached on the need for such action. In the United States, porbeagle shark are primarily caught

incidentally to other target species in the longline fishery and represent a relatively small proportion of the global catch.

The European Union (EU), as of January, 2010, prohibited all EU vessels from fishing for, landing, retaining, transshipping or finning porbeagle sharks either within or outside of EU territorial waters (EU, 2010). The EU has been a primary global consumer of porbeagle products (particularly the meat), and prior to the 2010 action, EU member states, especially Spain, were major contributors to worldwide porbeagle harvest.

At the national level in the United States, the National Marine Fisheries Service (NMFS) began managing Atlantic sharks, including porbeagle sharks, in 1993. Currently, the 2006 Consolidated Highly Migratory Species Fishery Management Plan incorporates regulatory measures designed to rebuild the Northwest Atlantic porbeagle stock over a 100 year time frame, with the rebuilding start date of July 24, 2008 (NMFS, 2009 2008). As part of the rebuilding plan, NMFS established a total allowable catch that allows for commercial and recreational harvest. The total allowable catch level is based on average U.S. landings at the time in an effort to maintain the level of fishing mortality recommended in a 2005 Canadian assessment (NMFS, 2008). The 2009 ICCAT stock assessment did not change the conclusions from the 2005 or 2009 Canadian assessments and therefore did not require a change to the rebuilding plan.

In addition to the annual commercial harvest quotas, permit and reporting requirements, size limit and gear restrictions for recreational fishermen are used to regulate the harvest. Commercial fishermen must have at least one of two permits in order to land and sell porbeagle sharks. The directed limited access permit allows commercial fishermen to target porbeagle sharks as long as the fishing season is open. The incidental limited access permit allows commercial fishermen to land up to 16 pelagic sharks, including porbeagle sharks, per trip as long as the fishing season is open. Commercial fishermen who target swordfish and tuna using pelagic longline gear must have one of these shark limited access permits in order to allow them to keep any porbeagle sharks that are caught incidental to their target species. Recreational fishermen must also have a permit and are restricted to one shark per trip with a minimum size of 54 inches fork length; recreationally caught fish cannot be sold. Many recreational fishermen fish in tournaments, many of which target pelagic sharks, including porbeagle sharks. These tournaments are required to be registered and may be selected to report. All fishermen, commercial and recreational, are required to keep shark fins naturally attached to the shark carcass. Dealers, who purchase the porbeagle from commercial fishermen, must have a federal dealers permit and must adhere to strict reporting requirements.

The annual total allowable catch (TAC) for U.S. permitted fishermen, both commercial and recreational, is 11.3 metric tons (mt) dressed weight (dw). The TAC includes allowances for commercial discards and incidental catch of 9.5 mt dw, recreational landings of 0.1 mt dw, and commercial landings of 1.7 mt dw (NMFS, 2008). The commercial harvest of porbeagle sharks is restricted by a commercial quota of 1.7 mt dw and is monitored through reporting by fishermen and dealers. The commercial fishermen must report their directed and incidental catch to NMFS within seven days of landing at the dock and the dealers must report activity within 10 days of purchasing catch. When an estimated 80% of the annual commercial quota has been landed, the fishery is closed to further harvest; this closure notice becomes effective five days

after it is issued. The buffer of the additional 20% of quota is used to account for any late reports and to ensure the quota is not exceeded. If closure the quota is exceeded, any overharvest is deducted from the following year's harvest quota.

In the 2011 and 2012 fishing seasons, the commercial quota was exceeded by 2.1 metric tons and as a result, the commercial quotas for subsequent seasons were reduced. The fishing season was closed in 2013, and in 2014 the quota was reduced by 0.5 mt dw to account for previous overharvest. This resulted in a 2014 quota of 1.2 mt dw. The actual harvest in 2014 amounted to 2.5 mt dw, an overharvest of 1.3 mt dw for the year. Since the management plan calls for the fishery to close after 80% of the quota is harvested, the fishery was closed for the entire 2015 season because of the difficulty of effectively monitoring and managing the 0.5 mt dw of the 1.7 mt dw quota remaining (NMFS, 2014). The quota for the 2016 harvest season, which began on January 1, 2016, reset to the default 1.7 mt dw for this species (FR Notice 2015 19914; NOAA Fisheries 2015). There was no harvest reported throughout the 2016 harvest season. The quota for the 2017 harvest season, which began on January 1, 2017, was again 1.7mt dw (FR Notice 2016 84491; NOAA Fisheries 2016).

Porbeagle regulations are set on both state and Federal levels, and state regulations are consistent with regulations issued by NMFS. The Atlantic state fishery regulations are promulgated jointly among the states within the Atlantic States Marine Fisheries Commission (ASMFC). In certain instances state regulations may be more restrictive than the corresponding Federal regulations but they cannot allow for a harvest in excess of the federally established TAC. State-specific regulations apply to fisheries within three nautical miles from the shoreline, while Federal regulations apply to fisheries from the three mile limit to the 200 mile nautical mile EEZ. These regulations also apply to U.S. fishermen permitted to fish on and in the high seas.

Recreational fishing for porbeagle shark is allowed year-round. Only hand lines, and hook and line gears are allowed in the recreational fishery. There is a one shark per vessel per trip bag limit, and the shark must have a minimum fork length of 54 inches. All porbeagle sharks must be landed with their fins naturally attached.

Summary

The porbeagle fishery in U.S. waters of the Northwestern Atlantic is managed under a rebuilding plan which allows harvest from directed, bycatch and recreational fisheries. Fishers participating in these fisheries are required to be permitted, either by NMFS or in the state where they are fishing. The total allowable catch is based on the ICCAT/ICES joint stock assessment, which is the best available science. The annual harvest is closed to fishermen when NMFS determines, through federal dealer reports, that at least 80% of the annual quota has been harvested. The commercial quota is adjusted annually, based on the previous year's harvest, to ensure the quota is not exceeded, over a multi-year period. If there is overharvest in one year, the commercial quota for the following year is reduced. There is one TAC for this species which is harvested in U.S. waters, and it encompasses all fish harvested whether they are taken from waters governed by state or federal regulations. The species management plan currently being implemented allows the population to rebuild. According to the results of the 2009 assessment, the Northwestern Atlantic population is increasing.

Conclusion

The Division of Scientific Authority (DSA), based on the information and data available, and management measures currently in place, finds that the export and introduction from the sea of wild porbeagle shark harvested by U.S. fisherman in the 2017 harvest season is not detrimental to the survival of the species, provided that the harvest is in compliance with U.S. management plans in place for the species.

Literature cited

Aasen, O. 1963. Length and growth of the porbeagle (*Lamna nasus*, Bonaterre) in the North West Atlantic. *FiskDir. Skr. Serie Havundersokelser* 13(6): 20-37.

Anonymous, 2012. Response to Notification to the Parties No. 2011/049, Concerning Sharks. CITES AC26. Inf. 1. http://www.cites.org/common/com/AC/26/E26-01i.pdf.

ASMFC Coastal Sharks Technical Committee. 2008. Coastal Sharks Technical Committee Consensus Recommendations: Final Draft Interstate Fishery Management Plan for Atlantic Coastal Sharks. April 10, 2008

Campana, Steven E., Warren Joyce, Linda Marks, Lisa J. Natanson, Nancy E. Kohler, Christopher F. Jensen, Joseph J. Mello, and Harold L. Pratt Jr. 2002. Population dynamics of the porbeagle in the Northwest Atlantic Ocean. North American Journal of Fisheries Management 22:106-121.

Campana, S.E. and Joyce, W.N. 2004. Temperature and depth associations of porbeagle shark (*Lamna nasus*) in the northwest Atlantic. *Fish. Oceanogr.* **13**:52–64.

Campana S. and Gibson, J. 2008. Catch and Stock Status of Porbeagle Shark (*Lamna nasus*) in the Northwest Atlantic to 2007, NAFO Doc. 08/36.

Campana, S., Marks, L., Joyce, W., Hurley, P., Showell, M. and Kulka, D. 1999. An analytical assessment of the porbeagle shark (*Lamna nasus*) population in the northwest Atlantic. CSAS. Res Doc.99/158.

Campana, S., Gibson, J., Fowler, M., Dorey, A., and Joyce, W. 2009. Population dynamics of porbeagle in the northwest Atlantic, with an assessment of status to 2009 and projections for recovery. SCRS/2009/095.

Compagno, L.J.V. 2001. Sharks of the world. An annotated and illustrated catalogue of shark species known to date. Volume 2. Bullhead, mackerel and carpet sharks (Heterodontiformes, Lamniformes and Orectolobiformes). FAO Species Catalogue for Fishery Purposes. No. 1, Vol. 2. Rome, FAO. 2001. 269p.

COSEWIC. 2004. Assessment and status report of the porbeagle shark (*Lamna nasus*) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. viii + 43 pp http://www.globalshark.ca/ramweb/papers-total/COSEWIC_2004.pdf

DFO. 2001. Porbeagle shark in NAFO subareas 3–6. *Scientific Stock Status Report*. B3-09. 9 pp.

DFO, 2005. Recovery Potential Assessment of Atlantic Porbeagle Shark: Meeting of the Maritimes Regional Advisory Process; 22 March, 28 June and 14 July, 2005. DFO Can. Sci. Advis. Sec. Proceed. Ser. 2005/019.

European Union (EU). 2010. Council Regulation (EU) No 23/2010 of 14 January 2010 fixing for 2010 the fishing opportunities for certain fish stocks and groups of fish stocks, applicable in EU waters and, for EU vessels in waters where catch limitations are required, and amending Regulations (EC) No 1359/2008, (EC) No 754/2009, (EC) No 1226/2009, and (EC) No 1287/2009. Journal of the European Union. 26.1.2010. L 21/1.

FR Notice 2015 07073. Endangered and Threatened Species; 90–Day Finding on Two Petitions To List Porbeagle Sharks. Federal Register / Vol. 80, No. 59 / Friday, March 27, 2015 / Proposed Rules. pp. 16356-16358. (https://www.federalregister.gov/articles/2015/03/27/2015-07073/endangered-and-threatened-species-90-day-finding-on-two-petitions-to-list-porbeagle-sharks)

FR Notice 2015 19914. Atlantic Highly Migratory Species; Large Coastal and Small Coastal Atlantic Shark Management Measures; Final Rule. Federal Register / Vol. 80, No. 159 / Tuesday, August 18, 2015 / Rules and Regulations. pp. 50074-50102. (https://www.federalregister.gov/articles/2015/08/18/2015-19914/atlantic-highly-migratory-species-large-coastal-and-small-coastal-atlantic-shark-management-measures)

FR Notice 2016 18101. Endangered and Threatened Wildlife and Plants; Notice of 12-Month Finding on Petitions To List Porbeagle Shark as Threatened or Endangered Under the Endangered Species Act (ESA). Notices. Federal Register / Vol. 81, No. 147 / Monday, August 1, 2016 / Notices. pp. 50463-50482. https://www.federalregister.gov/d/2016-18101

FR Notice 2016 84491. Atlantic Highly Migratory Species; 2017 Atlantic Shark Commercial Fishing Season; Final Rule. Federal Register / Vol. 81, No. 226 / Wednesday, November 13, 2016 / Rules and Regulations. pp. 84491-84501. (https://www.gpo.gov/fdsys/pkg/FR-2016-11-23/pdf/2016-28154.pdf)

Francis, M.P., Campana, S. E., and Jones, C. M. 2007. Age under-estimation in New Zealand porbeagle sharks (Lamna nasus): is there an upper limit to ages that can be determined from shark vertebrae? Marine and Freshwater Research 58: 10–23.

Francis, M. P., Natanson, L. J. and Campana, S. E. 2008: The biology and ecology of the Porbeagle shark *Lamna nasus*. In: Pikitch, E. K. and M. Camhi (Eds). *Sharks of the open ocean*. Blackwell Scientific Publications.

Gauld, J.A. 1989. Records of porbeagles landed in Scotland, with observations on the biology, distribution and exploitation of the species. Scottish Fisheries Research Report 45, ISSN 0308 8022.

ICCAT SCRS/ICES. 2009. Report of the 2009 Porbeagle stock assessments meeting. Copenhagen, Denmark, June 22 to 27, 2009. SCRS/2009/014. 57 pp.

Mundy-Taylor V. and Crook V. 2013. Into the deep: Implementing CITES measures for commercially-valuable sharks and manta rays. Report prepared for the European Commission.

Natanson, L.J., Mello, J.J. and Campana, S.E. 2002. Validated age and growth of the porbeagle shark (*Lamna nasus*) in the western North Atlantic Ocean. Fishery Bulletin 100:266-278

NMFS. 2008. Final Amendment 2 to the Consolidated Atlantic Highly Migratory Species

Fishery Management Plan. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Sustainable Fisheries, Highly Migratory Species Management Division, Silver Spring, MD.

NMFS/HMS. 2008. Guide for complying with the Atlantic Shark Fisheries Regulations in Amendment 2 to the consolidated HMS FMP. Department of Commerce. www.nmfs.noaa.gov/sfa/hms/sharks/Compliance_Guide_for_Amendment_2_FINAL.pdf.

NMFS. 2009. Final Amendment 1 to the 2006 Consolidated Atlantic Highly Migratory Species Fishery Management Plan, Essential Fish Habitat. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Sustainable Fisheries, Highly Migratory Species Management Division, Silver Spring, MD. Public Document. pp. 395.

NMFS. 2010. Final Amendment 3 to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Sustainable Fisheries, Highly Migratory Species Management Division, Silver Spring, MD. Public Document. pp. 632.

NMFS. 2014. Closure of Commercial Fishing for Porbeagle Sharks from December 17, 2014 and for the Entire 2015 Fishing Season. (http://www.nmfs.noaa.gov/sfa/hms/news/news_list/2014/12/porbeagle_closure_121214.html)

NOAA Fisheries 2015. NOAA Fisheries a Final Rule Regarding the 2016 Atlantic Shark Commercial Fishing Season. Posted November 30, 2015. (http://www.nmfs.noaa.gov/sfa/hms/news/news_list/2015/11/113015_2016_shk_seasons.htm)

NOAA Fisheries 2016. NOAA Fisheries Announces a Final Rule to Establish the Quotas, Opening Dates, and Retention Limits for the 2017 Atlantic Shark Commercial Fishing Season Posted November 22, 2016. (http://www.nmfs.noaa.gov/sfa/hms/news/news_list/2016/11/2017_shark_season_rule_112216.html)

NOAA/OCRM. 2011. State Jurisdictional and Federal Waters. State Coastal Management Programs, Ocean Management and Coastal and Marine Spatial Planning. Office of Ocean and Coastal Resource Management (OCRM). National Oceanic and Atmospheric Administration, Silver Spring, Maryland (NOAA).). Stevens, J., Fowler, S.L., Soldo, A., McCord, M., Baum, J., Acuña, E., Domingo, A. & Francis, M. 2006. Lamna nasus. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.1. <www.iucnredlist.org>. Downloaded on 30 October 2013.

Semba, Y., Yokawa, K., Matsunaga, H. and Shono, H. 2013. Distribution and trend in abundance of the porbeagle (*Lamna nasus*) in the southern hemisphere. Marine and Freshwater Research, 2013, 64, 518–529.

Stevens, J., Fowler, S.L., Soldo, A., McCord, M., Baum, J., Acuña, E., Domingo, A. and Francis, M. 2006. Lamna nasus. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.1. <www.iucnredlist.org>. Downloaded on 30 October 2013.