Petition to List the Bigeye Thresher Shark (*Alopias superciliosus*) as an Endangered, or Alternatively as a Threatened, Species Pursuant to the Endangered Species Act and for the Concurrent Designation of Critical Habitat for the Species

Submitted to the U.S. Secretary of Commerce acting through the National Oceanic and Atmospheric Administration and the National Marine Fisheries Service

April 21, 2015

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[1] Defenders of Wildlife would like to thank Graham Senator, a law student at the University of Denver, Sturm college of Law, for his research and work preparing this Petition.

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I. Petitioner

Petitioner, Defenders of Wildlife ("Defenders"), is a nonprofit conservation organization dedicated to the protection of all native animals and plants in their natural communities. Defenders' conservation efforts focus on vulnerable North American and transboundary terrestrial and marine species. Defenders' 2013-2023 Strategic Plan specifically identifies sharks as one of several categories of key species whose conservation is a priority for our organization's work.[2] With more 1.2 million members and supporters, Defenders is a leading advocate for the protection of threatened and endangered species.

II. Introduction

Through this Petition, Defenders hereby requests that the Secretary of Commerce, acting through the National Marine Fisheries Service ("NMFS") – an agency housed within the National Oceanic and Atmospheric Administration ("NOAA") – list the bigeye thresher shark (*Alopias superciliosus*) as a "threatened" or "endangered" species under the U.S. Endangered Species Act of 1973 ("ESA"). 16 U.S.C. §§ 1531–44. Defenders requests that NMFS list the species throughout its entire range, or, in the alternative, if NMFS finds that there are distinct population segments ("DPSs") of bigeye thresher sharks, to list those DPSs under the ESA. Defenders also requests that, in reviewing this Petition, NMFS analyze whether the bigeye thresher is threatened or endangered in a significant portion of its range. *See* 16 U.S.C. §§ 1532(6), (20). Furthermore, Defenders requests that NMFS designate critical habitat for the bigeye thresher shark.

[2] More information on Defenders' work is available on our website, https://www.defenders.org, and Defenders' 2013-2023 Strategic Plan is available at https://www.defenders.org/publications/defenders-strategic-plan-2013-2023.pdf.

Defenders anticipates that, in keeping with 50 C.F.R. § 424.14(a), NMFS will acknowledge the receipt of this Petition in writing within 30 days. All cited documents are listed in the bibliography and electronic copies of these documents accompany this Petition.

III. The Endangered Species Act

The ESA defines a "species" as "any subspecies of fish, wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature." 16 U.S.C. § 1532(16). Additionally, the ESA defines an "endangered species" as a species which is "in danger of extinction throughout all or a significant portion of its range," 16 U.S.C. § 1532(6), and a "threatened species" as one which "is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." 16 U.S.C. § 1532(20).

NMFS must determine whether a species is endangered or threatened, due to any one of the following five factors set forth in 16 U.S.C. § 1533(a)(1):

A. The present or threatened destruction, modification, or curtailment of its habitat or range;
B. Overutilization for commercial, recreational, scientific, or educational purposes;
C. Disease or predation;
D. The inadequacy of existing regulatory mechanisms; or
E. Other natural or manmade factors affecting its continued existence.

With regard to these criteria and factors, the bigeye thresher shark qualifies as "threatened" or "endangered" due to listing factors: (B) overutilization for commercial and recreational purposes; (D) the inadequacy of existing regulatory mechanisms; and (E) other factors—specifically its low reproductive rates, late sexual maturity, lengthy migration, and large size. This threat analysis is continued further in Section XI.

A. 90-Day Finding Standard

After receiving a petition to list a species, NMFS is required to determine "whether the petition presents substantial scientific or commercial information indicating that the petitioned action may be warranted" within 90 days. 16 U.S.C. § 1533(b)(3)(A). This is called a "90-day finding." A "positive" 90-day finding leads to a status review to determine whether listing the species is warranted, not warranted, or warranted but precluded. If listing the species is warranted, NMFS issues a proposed rule in the Federal Register. 16 U.S.C. § 1533(b)(3)(B). A "negative" 90-day finding ends the listing process, and the ESA authorizes judicial review of such a finding. 16 U.S.C. § 1533(b)(3)(C)(ii).

The applicable regulations define "substantial information," for purposes of consideration of petitions, as "that amount of information that would lead a reasonable person to believe that the measure proposed in the petition may be warranted." 50 C.F.R. § 424.14(b)(1). In making a finding as to whether a petition presents "substantial information" warranting a positive 90-day finding, NMFS considers whether the petition:

i. Clearly indicates the administrative measure recommended and gives the scientific and any common name of the species involved;
ii. Contains detailed narrative justification for the recommended measure; describing, based on available information, past and present numbers and distribution of the species involved and any threats faced by the species;
iii. Provides information regarding the status of the species over all or significant portion of its range; and
iv. Is accompanied by appropriate supporting documentation in the form of bibliographic references, reprints of pertinent publications, copies of reports or letters from authorities, and maps.

50 C.F.R. §§ 424.14(b)(2)(i)-(iv). NMFS's own guidance on "substantial information" states that the information presented should merely be "adequate and reliable,"[3] not conclusive.

B. Reasonable Person Standard

Both the language of the regulation itself (by setting the "reasonable person" standard for substantial information) and the relevant case law underscore the point that the ESA does *not* require "conclusive evidence of a high probability of species extinction" in order to support a positive 90-day finding.[4] In reviewing negative 90-day findings, the courts have consistently held that the evidentiary threshold under a 90-day review is much lower than the one required under a 12-month review.[5]

Rather, the courts have held that the ESA contemplates a "lesser standard by which a petitioner must simply show that the substantial information in the Petition demonstrates that listing of the species *may* be warranted."[6] Additionally, in a challenge to determination that listing the porbeagle shark was not warranted under the ESA, a court found that NMFS' application of a heightened "evidentiary standard at the 90-day finding stage was arbitrary and capricious." *Humane Society of the U.S. v. Pritzker* 2014. Thus, a petition does not need to establish that there is a high

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[3] U.S. FISH AND WILDLIFE SERVICE & THE NATIONAL MARINE FISHERIES SERVICE, PETITION MANAGEMENT GUIDANCE 13 (1996).

[4] *Ctr. for Biological Diversity v. Morgenweck*, 351 F. Supp. 2d 1137, 1140 (D. Colo. 2004).

[5] *See, e.g.*, *Ctr. for Biological Diversity v. Kempthorne*, No. CV 07-0038-PHX-MHM, 2008 WL 659822, at *8 (D. Ariz. Mar. 6, 2008) ("[T]he 90–day review of a listing petition is a cursory review to determine whether a petition contains information that warrants a more in-depth review."); *see also Moden v. U.S. Fish & Wildlife Serv.*, 281 F. Supp. 2d 1193, 1203 (D. Or. 2003) (holding that the substantial information standard is defined in "non-stringent terms" and that "the standard in reviewing a petition...does not require conclusive evidence.").

[6] *Morgenweck*, 351 F. Supp. 2d at 1141 (quoting 16 U.S.C. § 1533(b)(3)(A) (emphasis added)); *see also Ctr. for Biological Diversity v. Kempthorne*, No. C 06-04186 WHA, 2007 WL 163244, at *3 (N.D. Cal. Jan. 19, 2007) (holding that in issuing negative 90-day findings for two species of salamander, the Fish and Wildlife Service "once again" erroneously applied "a more stringent standard" than that of the reasonable person).

likelihood that the species is either threatened or endangered at the 90-day finding stage. Although a reviewing court is deferential to NMFS's listing determinations:[7]

> The 'may be warranted' standard, however, seems to require that in cases of . . . contradictory evidence, the Service must defer to information that supports petitioner's position. It would be wrong to discount the information submitted in a petition solely because other data might contradict it. At this stage, unless the Service has demonstrated the *unreliability* of information that supports the petition, that information cannot be dismissed out of hand.

Center for Biological Diversity v. Kempthorne, 2007 WL 163244, at *4 (emphasis added).

C. Best Available Scientific and Commercial Data Standard

ESA listing decisions, including 90-day findings, must rely on the "best scientific and commercial data available." 16 U.S.C. § 1533(b)(1)(A). Previously, NMFS has deemed the IUCN Red List as one source of scientific data that fulfills this standard.

Similar to the "substantial information" standard under the 90-day review, case law has established that the scientific evidence presented also need not be conclusive.[8] Additionally, NMFS has recently acknowledged that, in light of past judicial decisions, "a petition need not establish a 'strong likelihood' or a 'high probability' that a species is either threatened or endangered to support a positive 90-day finding." 79 Fed. Reg. 4, 877 (Jan. 30, 2014). The 90-day finding standard can be

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[7] *Colo. River Cutthroat Trout*, 448 F. Supp. 2d at 175 ("Although the Court may not substitute its judgment for that of the agency, the Court's review must nevertheless be 'searching and careful.'") (citing *Marsh v. Or. Natural Res. Council*, 490 U.S. 360, 378 (1989)).

[8] *See City of Las Vegas v. Lujan*, 891 F.2d 927, 933 (D.C. Cir. 1989) ("[Section 4] merely prohibits the Secretary from disregarding available scientific evidence that is in some way better than the evidence he relies on. Even if the available scientific and commercial data were inconclusive, he may – indeed must – still rely on it at this stage…"); *Trout Unlimited v. Lohn*, 645 F. Supp. 2d 929, 950 (D. Or. 2007) ("[T]he agency 'cannot ignore available biological information'") (citing *Kern Co. Farm Bureau v. Allen*, 450 F.3d 1072, 1080-81 (9th Cir.2006)); *In re Polar Bear Endangered Species Act Listing and 4(d) Rule Litigation*, 794 F. Supp. 2d 65, 106 (D.D.C. 2011) ("As this Court has observed, 'some degree of speculation and uncertainty is inherent in agency decisionmaking' and 'though the ESA should not be implemented 'haphazardly'…an agency need not stop in its tracks when it lacks sufficient information.'") (citing *Oceana v. Evans*, 384 F. Supp. 2d 203, 219 (D.D.C. 2005)).

met even based on conflicting evidence. *Humane Society of the U.S. v. Pritzker* 2014. This is particularly important under a 90-day review since, as noted above, the wildlife agency must make a positive finding and commence a status review when a reasonable person would conclude based on the *available* evidence that listing may be warranted.

Although the International Union for the Conservation of Nature ("IUCN") Red List criteria differ from the ESA's statutory requirements for listing a species as endangered or threatened,[9] both NMFS and the U.S. Fish and Wildlife Service ("FWS") have utilized IUCN data and criteria on species in listing decisions. This is because the IUCN is considered a credible source of scientific data that meets the "best available science" requirement of the ESA.[10] In fact, based on the rigorous set of listing criteria that must be evaluated and applied, the IUCN Red List is arguably a more objective and science-based species extinction risk evaluation than the subjective narrative criteria used in the ESA's listing process. With respect to marine fish species, Davies and Baum (2012) found that IUCN Red Listings were not biased towards exaggerating threat status, and that IUCN threat listings can serve as an accurate flag for relatively data-poor fisheries.[11]

The Red List provides "taxonomic, conservation status and distribution information on plants and animals" around the world.[12] Using the best available science,[13] the Red List categorizes species into nine different categories: Extinct, Extinct in the Wild, Critically Endangered, Endangered, Vulnerable, Near Threatened, Least Concern, Data Deficient, and Not Evaluated.[14]

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[9] 16 U.S.C. § 1533.
[10] 16 U.S.C. § 1533(b)(3)(A).
[11] Davies, T. D., and J. K. Baum, *Extinction Risk and Overfishing: Reconciling Conservation and Fisheries Perspectives on the Status of Marine Fishes*, SCIENTIFIC REPORTS, August 7, 2012, 561.
[12] IUCN Red List About/Introduction, http://www.iucnredlist.org/about/introduction (last visited April 17, 2015).
[13] *Id.*
[14] IUCN, IUCN RED LIST CATEGORIES AND CRITERIA (International Union for Conservation of Nature and Natural Resources 2nd Ed. 2001) (2012).

The IUCN Red List categories are recognized internationally, are relied on in a variety of scientific publications, and are used by numerous governmental and non-governmental organizations. The IUCN Red List has also been used to inform multi-lateral agreements, such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora, the Convention on Migratory Species, and the Convention on Biological Diversity.[15]

NMFS has previously relied on IUCN data and species categorizations a number of times in both proposed and final listing decisions. For example, in its decision to list the Guadalupe fur seal as threatened, NMFS specifically noted:

> The Guadalupe fur seal is listed by IUCN as "vulnerable." Included in this category are species "believed likely to move into the 'Endangered' category in the near future . . ." and species whose populations "have been seriously depleted and whose ultimate security has not yet been assured." This classification corresponds more closely with the ESA definition of "threatened" than "endangered" and therefore, it appears that the "threatened" status is consistent with the IUCN category of vulnerable.[16]

Here, NMFS noted the IUCN's categorization of the species as "vulnerable" and applied the corresponding ESA listing status, "threatened." Through such actions, NMFS has repeatedly recognized the IUCN Red List as a legitimate source of information on species endangerment. Similar to the Guadalupe fur seal, the IUCN finds the bigeye thresher shark to be "vulnerable" throughout its range.[17]

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[15] VIE ET AL., THE IUCN RED LIST: A KEY CONSERVATION TOOL (Jean-Christophe Vie ed., IUCN 2008) (2008).
[16] Threatened Fish and Wildlife; Guadalupe Fur Seal, 50 Fed. Reg. 51,252, 51,254 (Dec. 16, 1985).
[17] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).

A number of other listing decisions by NMFS have also cited to IUCN reports and species categorizations.[18] These listings highlight the conservation status of listed species and can inform conservation planning and prioritization."[19] Through such action, NMFS has repeatedly given credence to the IUCN Red List as a valid source of the best available scientific data.

In line with this practice, Defenders encourages NMFS to consider the IUCN findings as a source of "the best scientific and commercial data available" with regard to the bigeye thresher shark. In 2009, the IUCN listed the bigeye thresher shark as globally "Vulnerable" on its Red List.[20] The IUCN noted that the species can be subdivided into five regional or geographically separate

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[18] *See* 90-Day Finding on a Petition To List the Dwarf Seahorse as Threatened or Endangered, 77 Fed. Reg. 26,478, 26,481 (May 4, 2012); 90-Day Finding on a Petition To List Nassau Grouper as Threatened or Endangered, 77 Fed. Reg. 61,556, 61,561 (Oct. 10, 2012); *See also* Proposed Listing Determinations for 82 Reef-Building Coral Species, 77 Fed. Reg. 73,220, 73,253 (Dec. 7, 2012)("All the proposed corals are listed in the IUCN Red List of Threatened Species as vulnerable, endangered, or critically endangered. Thus, the proposed listing is consistent with these classifications."); Listing Determinations for Six Distinct Population Segments of Scalloped Hammerhead Sharks, 78 Fed. Reg. 20,718, 20,721 (Apr. 5, 2013) ("[T]he IUCN classification for the scalloped hammerhead shark alone does not provide the rationale for a listing recommendation under the ESA, but the sources of information that the classification is based upon are evaluated in light of the standards on extinction risk and impacts or threats to the species."); 12-Month Finding on Petitions To List the Northeastern Pacific Ocean Distinct Population Segment of White Shark as Threatened or Endangered, 78 Fed. Reg. 40,104, 40,123 (July 3, 2013) ("Listing a species on the IUCN Red List does not provide any regulatory protections for the species, but serves as an evaluation of the species' status."); Threatened Status for the Arctic, Okhotsk, and Baltic Subspecies of the Ringed Seal and Endangered Status for the Ladoga Subspecies of the Ringed Seal, 77 Fed. Reg. 76,740, 76,748 (Dec. 28, 2012) (the decision stated that "the bearded seal is currently classified as a species of 'Least Concern' on the IUCN Red List. These listings highlight the conservation status of listed species and can inform conservation planning and prioritization); Proposed Endangered Status for the Hawaiian Insular False Killer Whale Distinct Population Segment, 75 Fed. Reg. 70,169, 70,170 (Nov. 17, 2010) (NMFS has previously relied on and adapted the IUCN's criteria for estimating extinction risk. This can be seen in the proposed endangered listing of a distinct population of Hawaiian insular false killer whale. There, NMFS's biological research team "defined the level of risk based on thresholds that have been used to assess other marine mammal species, and consistent with the criteria used by the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species (IUCN, 2011.)."

[19] Threatened Status for the Arctic, Okhotsk, and Baltic Subspecies of the Ringed Seal and Endangered Status for the Ladoga Subspecies of the Ringed Seal, 77 Fed. Reg. 76,740, 76,748 (Dec. 28, 2012) (emphasis added).

[20] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).

populations, and also made independent classifications for these five populations, several of which differ from the worldwide assessment of the species as a whole. The IUCN categorized the Northwest and Western Central Atlantic population as "Endangered," the Southwest Atlantic population as "Near Threatened," the Mediterranean Sea population as "Data Deficient," the Indo-west Pacific population as "Vulnerable," and the Eastern Central Pacific as "Vulnerable."[21] Therefore, using the IUCN Red List report as the best available scientific data, the bigeye thresher shark meets the standard required for a positive 90-day review, at a minimum, and a 12-month status review is necessary.

D. Significant Portion of Range Standard

The ESA does not define the meaning of "a significant portion of the species' range" ("SPR"). However, the FWS and NOAA issued a final policy on interpretation of SPR on July 1, 2014. 79 Fed. Reg. 37577 (July 1, 2014). According to this new policy, a range constitutes a "significant portion" if "the portion's contribution to the viability of the species is so important such that without the members in that portion the species would be in danger of extinction, or likely to become so in the foreseeable future, throughout all of its range" 79 Fed. Reg. 37580 (July 1, 2014).

Under this new definition of SPR, the agency must 1) determine that the species is neither endangered nor threatened throughout all of its range; 2) determine the biological importance of the portion of range to the conservation of the species; and 3) if so, whether that impairment would increase the vulnerability of the species to threats to the point that the overall species would be in danger of extinction, or likely to be comes so in the foreseeable future. 79 Fed. Reg. 37583 (July 1, 2014). Under this policy, NMFS must specifically considered abundance, spatial distribution, productivity, and devisers of the species under the second factor – biological importance. 79 Fed.

[21] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).

Reg. 37581 (July 1, 2104). NMFS must determine whether such characteristics would be impaired such that the species would have an increased vulnerability to threats. 79 Fed. Reg. 37583 (July 1, 2014).

As an initial matter, Defenders notes that this definition of SPR violates the ESA and relevant judicial precedent. The Courts previously rejected a definition of SPR that required risk of extinction to the species as whole as early as 2001. The Ninth Circuit Court of Appeals explained:

> If, however, the effect of extinction throughout 'a significant portion of its range' is the threat of extinction everywhere, then the threat of extinction throughout 'a significant portion of its range' is equivalent to the threat of extinction throughout all its range. Because the statute already defines 'endangered species' as those that are 'in danger of extinction throughout all …of [their] range,' the Secretary's interpretation of 'a significant portion of its range' has the effect of rendering the phrase superfluous. Such a redundant reading of a significant statutory phrase is unacceptable.

Defenders of Wildlife et al. v. Norton, 258 F.3d 1136, 1145 (9th Cir. 2011). NMFS' new policy, requiring a finding that an area is only a significant portion of a species' range if the loss of the species in that area would result in the loss of the species throughout its range, clearly runs afoul of the Ninth Circuit's prior holding rejecting this interpretation of the SPR language in the statute.

However, even under NMFS's new overly restrictive, and likely illegal, policy, as discuss further below, the bigeye thresher is endangered or threatened in a significant portion of its range and should be listed. See sections IV. G., and V. infra.

IV. Species Description

A. Common Name

The Petition will refer to *Alopias superciliosus* by the common name "bigeye thresher shark" throughout.

B. Taxonomy

The taxonomy of *Alopias superciliosus* is as follows:

Kingdom	*Animalia*
Phylum	*Chordata*
Subphylum	*Vertebrata*
Class	*Chondrichthyes*
Order	*Lamniformes*
Family	*Alopiidae*
Genus	*Alopias*
Species	*Alopias superciliosus*

Figure 1: Bigeye thresher shark taxonomy, Integrated Taxonomic Information System 2015.

The Integrated Taxonomic Information System indicates that the taxonomic status of *Alopias superciliosus* is both "verified" and "valid" as of 2015.

C. Physical Characteristics

The bigeye thresher shark, like all thresher shark species, has a long dorsal caudal lobe—nearly as long as the shark itself.[22] Its living color is a deep violet-grey, which tends to fade to complete grey after the animal dies.[23] The sides of the bigeye thresher shark are a lighter violet-grey and its underbody is a cream color.[24] Bigeye thresher sharks are distinguished from the other two species of thresher shark—common thresher shark (*Alopias vulpinus*) and pelagic thresher shark

[22] Richard Herst, *An Illustrated Compendium of Sharks, Skates, Rays and Chimaera. Chapter 1: The British Isles and Northeast Atlantic. Part 2: Sharks (Shark Trust 2010)* http://www.sharktrust.org/shared/downloads/factsheets/bigeye_thresher_shark_st_factsheet.pdf (last visited April 17, 2015).

[23] Aidan, Martin R. *Biology of the Bigeye Thresher,* ReefQuest Centre for Shark Research (Undated) http://www.elasmo-research.org/education/shark_profiles/a_superciliosus.htm (last visited April 17, 2015).

[24] Herst, *An Illustrated Compendium of Sharks, Skates, Rays and Chimaera (Shark Trust 2010).*

(*Alopias pelagicus*)—by their extremely large eyes, which extend onto the upper surface of the head.[25] Another distinguishing factor is the strong notches that run laterally from behind the eyes to behind the gills.[26] (*See* Figs. 2 & 3). Its maximum total length is approximately 460 centimeters (approximately 15 feet).[27] Males are smaller than females and mature at a variable length of 270 centimeters (approximately 9 feet).[28] Females mature at about 340 centimeters (approximately 11 feet).[29] Pups are approximately 60-140 centimeters at birth (approximately 2-4.5 feet).[30]

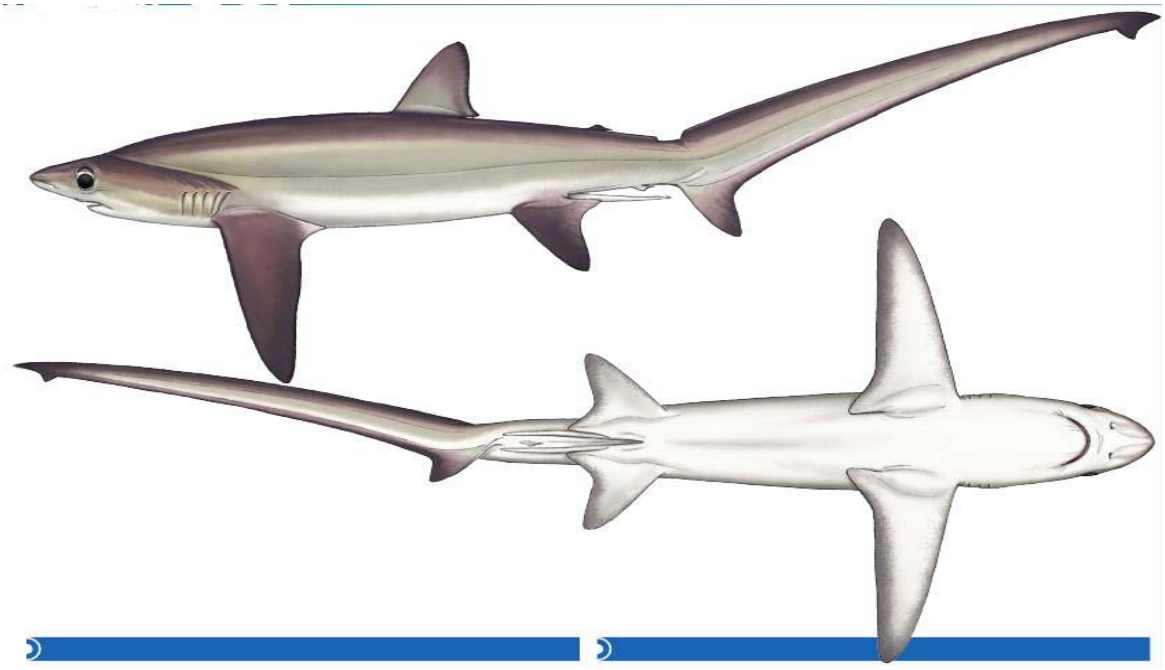

Figure 2: Sketch of bigeye thresher shark, SharkTrust ID Guide.

[25] Herst, *An Illustrated Compendium of Sharks, Skates, Rays and Chimaera (Shark Trust 2010)*.
[26] *Id.*
[27] National Marine Fisheries Service, Final Consolidated Atlantic Highly Migratory Species Fishery Management Plan, Appendix B-54, 2006.
[28] NMFS, FINAL CONSOLIDATED ATLANTIC HMS FMP (2006), at Appendix B-54.
[29] *Id.*
[30] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).

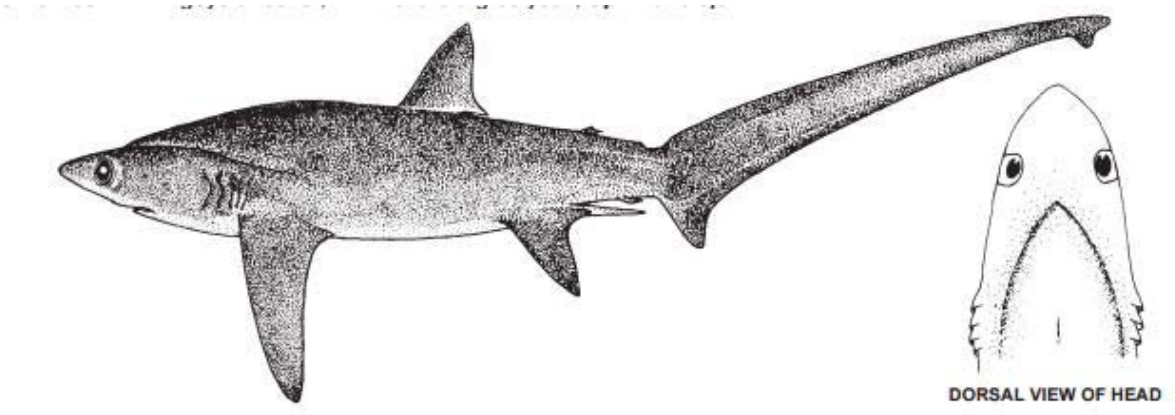

Figure 3: *Alopias superciliosus*, FAO Species Catalogue for Fishery Purposes No. 1.

D. Habitat and Range

The bigeye thresher shark resides at variable depths and can be found anywhere from the surface of the ocean down to at least 500 meters of depth in warmer waters (approximately 1,640 feet).[31] Most bigeye thresher sharks are found at depths below 100 meters (approximately 328 feet).[32] The bigeye thresher shark can be found in an incredibly diverse spectrum of oceanic locations: coastal waters over continental shelves, on the high seas in epipelagic zones far from land, near the deep bottom waters of continental slopes, and also at inshore shallow waters.[33] The bigeye thresher shark seems to prefer warmer sea temperatures and is comfortable around 16-25 degrees centigrade (60-77 Fahrenheit).[34] The bigeye thresher shark is believed to have a "rete mirable" system, which allows it to maintain its body temperature above that of the surrounding water,

[31] COMPAGNO, LEONARD J.V., SHARKS OF THE WORLD: AN ANNOTATED AND ILLUSTRATED CATALOGUE OF SHARK SPECIES KNOWN TO DATE, VOLUME 2, (Food and Agriculture Organization of the United Nations, 2002) (2002).
[32] Fisheries and Aquaculture Department Species Fact Sheet *Alopias Superciliosus*, http://www.fao.org/fishery/species/2795/en (last visited April 17, 2015).
[33] Fisheries and Aquaculture Department Species Fact Sheet *Alopias Superciliosus.*
[34] COMPAGNO, LEONARD J.V., SHARKS OF THE WORLD: AN ANNOTATED AND ILLUSTRATED CATALOGUE OF SHARK SPECIES KNOWN TO DATE, VOLUME 2, (Food and Agriculture Organization of the United Nations, 2002) (2002) at 83.

enabling it to withstand colder waters often found at greater depths.[35] This is a very unique characteristic for a shark and accounts for the species' occurrence at variable depths.[36]

The bigeye thresher shark is a highly migratory species that occurs virtually circumglobally in tropical and temperate seas.[37] One study tracked an individual bigeye thresher shark traveling as far 1,500 miles—from New York to the eastern Gulf of Mexico.[38] The study noted that the recorded distance represents a straight line between tagging and recapture; the actual distance traveled by the shark is thought to have been much greater.[39] Another study of two bigeye thresher sharks using pop-up satellite archival tags in the Gulf of Mexico and the Hawaiian archipelago suggests a pattern of diel vertical migration. This means that the species spends much of its day at greater ocean depths and then ascends to hunt as daylight dims.[40] The species' enormous upwardly cast eyes are said to enable this sort of light-sensitive hunting and migration pattern.[41]

Additional evidence indicates that the bigeye thresher shark is migratory. A recent study of the bigeye thresher shark population in the Atlantic indicates three possible nursery areas: one near the equatorial waters of Africa, one in the Caribbean Sea and Florida region, and one near the Rio Grande Rise.[42] The identification of these three nursery areas indicates that upon sexual maturation, female bigeye thresher sharks in the Atlantic travel to one of these three nursery areas.

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[35] Aidan, *Biology of the Bigeye Thresher*, ReefQuest Centre for Shark Research (Undated).
[36] A.B Block & K.C. Weng, *Diel Vertical Migration of the Bigeye Thresher Shark (Alopias Superciliosus), a Species Possessing Orbital Retia Mirabilia*, FISHERY BULLETIN 102, 221-229 (2004).
[37] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[38] Nancy E. Kohler & Patricia A. Turner, *Shark Tagging: A review of the Conventional Methods and Studies,* 60 ENVTL. BIOL. FISHES, 191-223 (2001); Herst, *An Illustrated Compendium of Sharks, Skates, Rays and Chimaera (Shark Trust 2010*); AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[39] Kohler & Turner, *Shark Tagging,* 191-223 (2001).
[40] Block & Weng, *Diel Vertical Migration of the Bigeye Thresher Shark (Alopias Superciliosus)* at 299.
[41] *Id.*
[42] Project Thresher: Trans-Atlantic Pelagic Sharks Research Initiative (July 2014), http://www.flmnh.ufl.edu/fish/sharks/taps/thresher.html (last visited April 17, 2015).

The bigeye thresher shark is found in five distinct regions of the Earth's oceans and seas: the Northwest and Western Central Atlantic, the Southwest Atlantic, the Mediterranean Sea and Eastern Atlantic, the Indo-West Pacific, and the Eastern Central Pacific. The IUCN's identification of the five distinct regional groupings of bigeye thresher shark[43] is consistent with the five regional distribution groups of bigeye thresher shark found in the FAO Aquatic Species Distribution map, *see* Figs. 4-8 infra.

The Northwest and Western Central Atlantic region includes areas of the Western Atlantic Ocean ranging from the equator to approximately 50 degrees north.[44] In this region the bigeye thresher shark is known to be present in the Gulf of Mexico, including areas off of Mississippi, Texas[45] and Key West, Florida.[46] It is also found along the eastern United States from mid-Florida to New England.[47] Additionally, the bigeye thresher shark is found off the shores of Mexico from Veracruz to the Yucatan Peninsula.[48] Closer to the equator, the bigeye thresher shark is found off the coast of Venezuela and Brazil.[49] Additionally, the bigeye thresher shark is present in areas surrounding Puerto Rico, the U.S. Virgin Islands,[50] the Bahamas and Cuba.[51] (See Fig. 4.)

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[43] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[44] *Id.*
[45] *Id.*
[46] NMFS, FINAL CONSOLIDATED ATLANTIC HMS FMP (2006), at Amendment 1 p.132.
[47] *Id.*
[48] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[49] *Id.*
[50] NMFS, FINAL CONSOLIDATED ATLANTIC HMS FMP (2006), at Amendment 1 p.132.
[51] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).

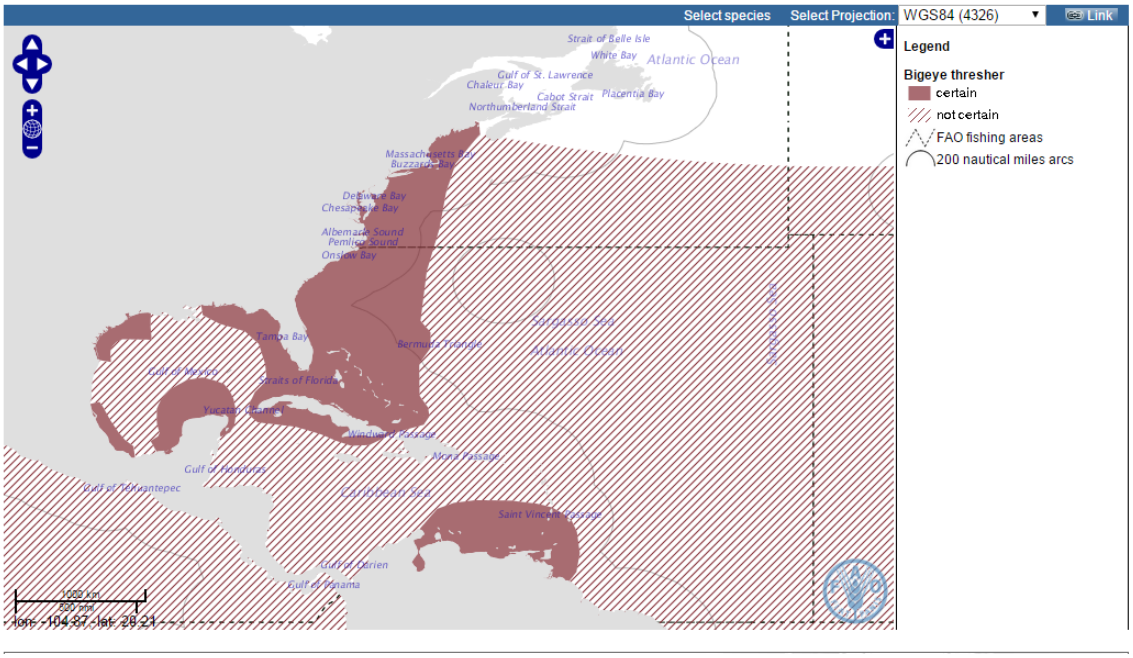

Figure 4: Bigeye Thresher distribution in the Northwest and Western Central Atlantic, FAO Species Distribution Map 2015.

The Southwest Atlantic region includes the Atlantic Ocean south of the equator. In this region, the bigeye thresher shark is present off the coast of southern Brazil, Uruguay, and Argentina.[52] (See Fig. 5.)

[52] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).

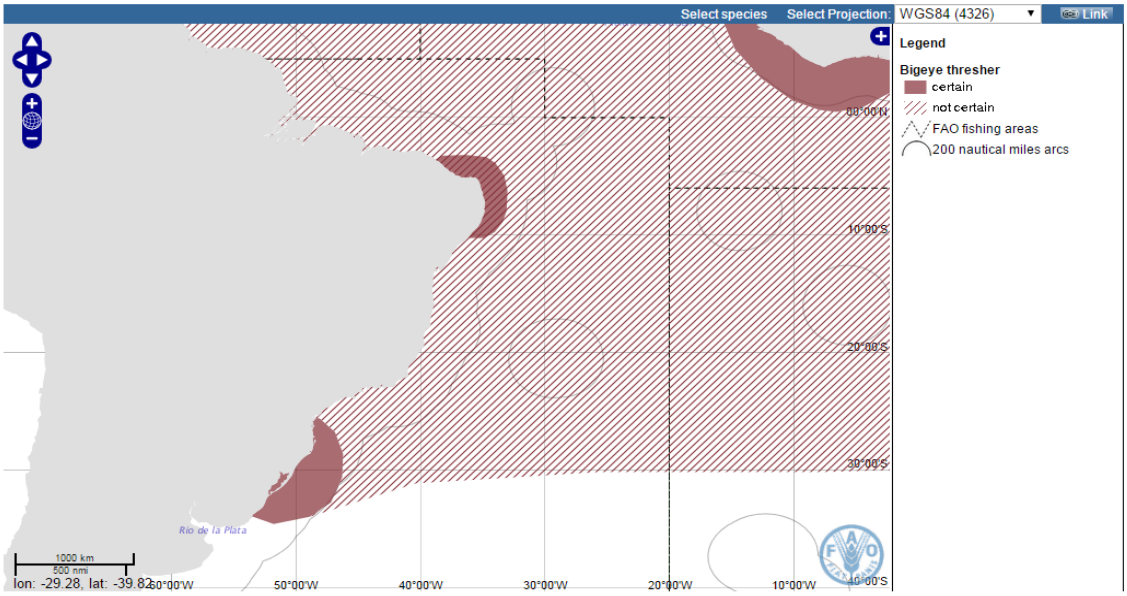

Figure 5: Bigeye Thresher distribution in the Southwest Atlantic, FAO Species Distribution Map 2015.

In the Mediterranean Sea and Eastern Atlantic, the bigeye thresher shark presence is low. However, the bigeye thresher shark has been found in the western Mediterranean Sea[53] and is said to be native to a number of countries in the region, including Greece, Italy, Israel, Morocco, Spain, eastern Portugal, Senegal, the Canary Islands and Turkey.[54] (See Fig. 6).

[53] See Figure 5.
[54] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).

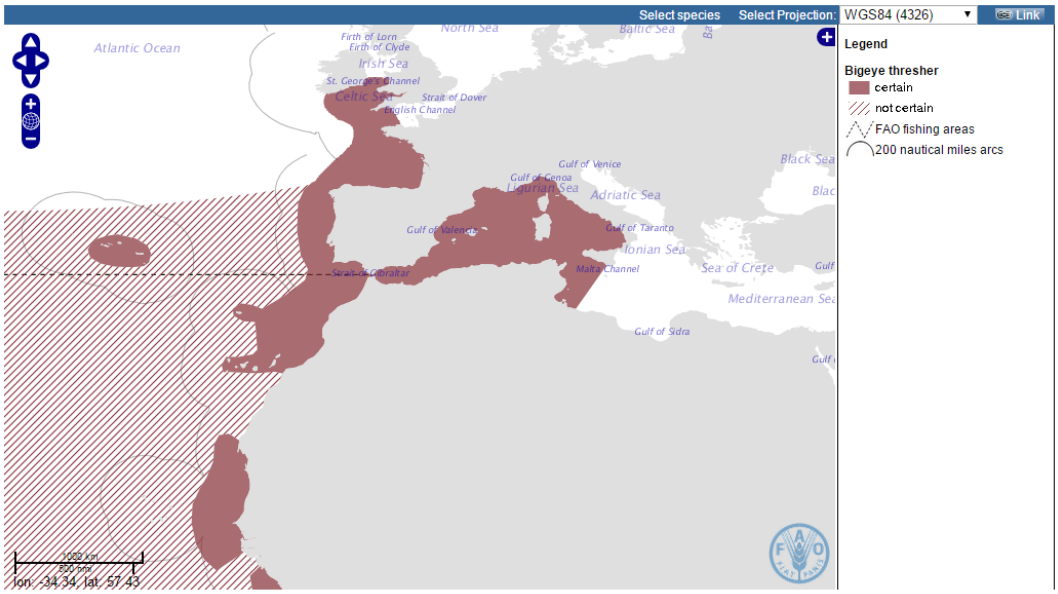

Figure 6: Bigeye Thresher distribution in the Mediterranean Sea and Eastern Atlantic

The Indo-West Pacific region includes the western and central Indian Ocean, specifically the eastern coast of Africa and the coastal waters surrounding Madagascar, the Maldives and Sri Lanka. The region extends north to the Arabian Sea and the Gulf of Oman and west to southern Japan, Taiwan, Viet Nam, the northwestern coast of Australia, and New Zealand.[55] In this region, the bigeye thresher shark is native to Australia, New Caledonia, New Zealand, Taiwan, Province of China, Viet Nam, Madagascar, the Maldives, Somalia, South Africa, and Sri Lanka.[56] (See Fig. 7.)

[55] *Id.*

[56] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).

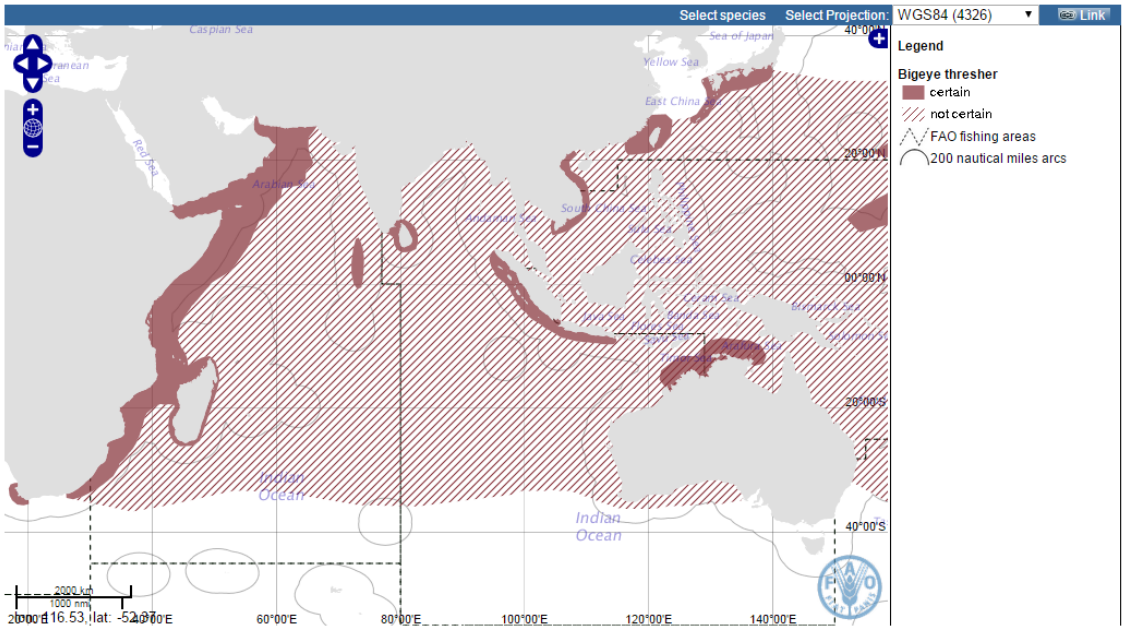

Figure 7: Bigeye Thresher distribution in the Indo-West Pacific, FAO Species Distribution Map 2015.

The Eastern Central Pacific region includes the eastern area of the Pacific Ocean north of the 15 degrees south latitude line.[57] This region includes the western coast of the United States, including the coastal waters off of California.[58] It also includes the coastal waters off of Mexico, specifically the Gulf of California, as well as the Galapagos Islands and northern Peru.[59] In addition, this region includes the Hawaiian Islands, the Line Islands, and the area between the Marquesas and the Galapagos Islands.[60] In this region, the bigeye thresher shark is native to the Galapagos, the United States Minor Outlying Islands, and Hawaii. It is also found in the Gulf of California and off of Ecuador.[61] (See Fig. 8.)

[57] *Id.*
[58] *Id.*
[59] *Id.*
[60] *Id.*
[61] *Id.*

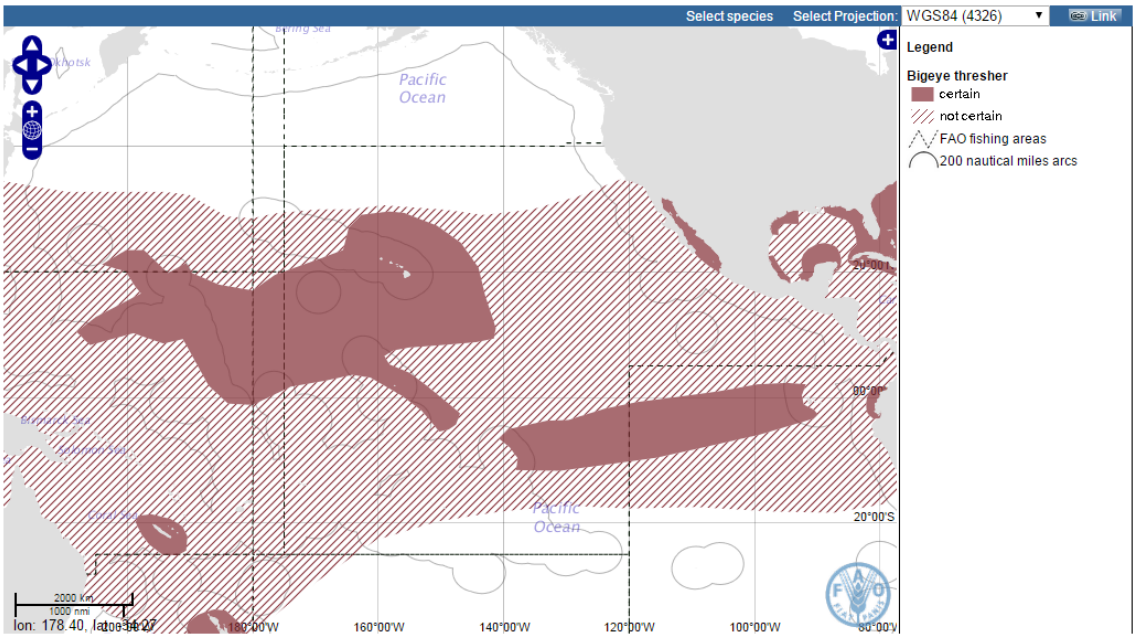

Figure 8: Bigeye Thresher distribution in the Eastern Central Pacific, FAO Species Distribution Map 2015.

E. Diet

The bigeye thresher shark preys on pelagic bony fishes, including mackerels, herrings, small billfish, hake, and cephalopods.[62] The bigeye thresher shark uses its tail to stun its prey.[63] Unfortunately, its large dorsal fin is frequently caught on pelagic long-lines after the shark attempts to stun the bait.[64] The enormous eyes of the bigeye thresher shark allow the shark to hunt for prey silhouetted against the surface in dim light.[65]

F. Reproduction and Lifespan

[62] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[63] *Id.*
[64] COMPAGNO, LEONARD J.V., SHARKS OF THE WORLD: AN ANNOTATED AND ILLUSTRATED CATALOGUE OF SHARK SPECIES KNOWN TO DATE, VOLUME 2, (Food and Agriculture Organization of the United Nations, 2002) (2002) at 83.
[65] *Id.*

Male bigeye thresher sharks reach sexual maturity at a variable length of 270 centimeters (approximately 9 feet)[66] and at the approximate age of 9 years.[67] Females mature at about 340 centimeters (approximately 11 feet)[68] and at the approximate age of 13 years.[69] The shark's lifespan is approximately 19–20 years.[70] Its method of reproduction is aplacental ovoviviparous, meaning that the embryos are enclosed in a membrane capsule during gestation and the pups are live born after gestating inside eggs retained inside the mother's body.[71] The shark's gestation period is approximately 12 months.[72] Generally, females only give birth to two pups per reproductive cycle,[73] although in unusual circumstances three or four pups are born.[74]

The bigeye thresher shark has an extremely low fecundity rate,[75] especially when compared to other species of shark that can produce over one hundred pups per reproductive cycle.[76] In fact, a recent study confirmed that the bigeye thresher shark is one of the least fecund of all shark species.[77] In its lifespan the shark is estimated to produce less than twenty pups, resulting in an exceptionally

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[66] NMFS, Final Consolidated Atlantic HMS FMP, Appendix B-54, 2006.
[67] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009) (females mature at 12-13 years, males mature at 9-10 years).
[68] NMFS, Final Consolidated Atlantic HMS FMP, Appendix B-54, 2006.
[69] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009) (females mature at 12-13 years, males mature at 9-10 years).
[70] *Id.* (female longevity is estimated at 20 years, male longevity is estimated at 19 years).
[71] *Id.*
[72] Fisheries and Aquaculture Department Species Fact Sheet *Alopias Superciliosus.*
[73] NMFS, Final Consolidated Atlantic HMS FMP, Appendix B-54, 2006.
[74] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[75] *Id.*
[76] Joung, *The whale shark, Rhincondon typus, is a livebearer: 300 embryos found in one 'megamamma' supreme*, 46 ENVIRONMENTAL BIOLOGY OF FISHES 219-223 (1996) (one report found a female whale shark carrying 300 embryos in varying states of maturity); Shark and Ray Reproduction, http://www.sharksavers.org/en/education/biology/shark-and-ray-reproduction/ (last visited April 17, 2015) (notes that it is possible for whale sharks to produce 300 pups); Aidan, *Biology of the Bigeye Thresher,* ReefQuest Centre for Shark Research (Undated) (notes that Blue Sharks can have up to 135 pups).
[77] Project Thresher: Trans-Atlantic Pelagic Sharks Research Initiative (July 2014).

low (0.002%) annual rate of population increase.[78] The species is considered highly susceptible to overexploitation due to its low fecundity rates.[79] Recent data indicates that because of the extremely low intrinsic growth rate of the bigeye thresher shark, conservation efforts should be focused mainly on juveniles as their survival can contribute most to the increase in population size.[80] Notably, the same study indicated that the north Atlantic region houses a higher proportion of juveniles than other areas of the Atlantic[81] – making protection in the waters off the coast of the United States invaluable to the species' survival.

G. Population Trends[82]

The bigeye thresher shark's population is declining worldwide as a result of a variety of threats, the most serious of which is commercial fishing pressure from both directed shark fisheries and bycatch. In early 2014, the IUCN—working with a team of 302 experts from 64 countries—released a scientific report positing that a quarter of all shark and ray species face a real threat of extinction.[83] In that report, the IUCN included a chart concerning the seven most threatened families of chondrichthyan species. Out of the 1,041 species assessed, the *Alopiidae* family—the taxonomic family containing the three species of thresher sharks—was listed as the seventh most

[78] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009) (Female bigeye thresher sharks mature at 12–13 years of age and die at about 20 years of age. This provides 7–8 years of reproduction. With a gestation period of around one year, at an average of 2 pups per year, each female bigeye thresher shark produces approximately 16 pups in her lifetime.).
[79] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009); David A. Ebert, Sharks, Rays and Chimaeras of California 103-104 (2003).
[80] Project Thresher: Trans-Atlantic Pelagic Sharks Research Initiative (July 2014).
[81] *Id.*
[82] Should NMFS decide to consider the smooth hammerhead in DPSs under the ESA, then Defenders requests that it consider using the regions/populations as outlined and delimited in this section in that analysis.
[83] Dulvy et al., *Extinction risk and conservation of the world's sharks and rays*, 3 ELIFE SCIENCES 590, Jan. 21, 2014.

threatened family.[84]

Population data for thresher sharks have historically been gathered from fishery logbooks; although these logbooks are used to create approximate population calculations, logbook data are often admittedly incomplete.[85] Regardless of the lack of comprehensive data, the IUCN has listed all species of the genus *Alopiidae* as "Vulnerable" because of their declining populations.[86] The IUCN recognizes that each distinctive regional subpopulation of the bigeye thresher shark is imperiled and has classified each to a varying degree, from "Near Threatened" to "Endangered."[87]

1. Northwest and Western Central Atlantic

As stated above, the Northwest and Western Central Atlantic region includes areas of the Western Atlantic Ocean ranging from the equator to approximately 50 degrees north.[88] The IUCN categorizes the Northwest Western Central Atlantic population of bigeye thresher sharks as "Endangered."[89] This classification indicates that the species is facing a very high risk of extinction in the wild, in the near future, due to a reduction of at least 50% of its population. This percentage of decrease is projected or suspected to occur within the next 10 years, or three generations, whichever is the longer, based on an index of abundance appropriate for the taxon or actual or potential levels of exploitation.[90]

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[84] Dulvy et al., *Extinction risk and conservation of the world's sharks and rays*, 3 ELIFE SCIENCES 590, Jan. 21, 2014.
[85] Julia K. Baum et al., *Collapse and Conservation of Shark Populations in the Northwest Atlantic*, 299 SCIENCE 389-392, Jan. 17, 2003; Enric Cortes et al., *Relative Abundance of Pelagic Sharks in the Western North Atlantic Ocean, Including the Gulf of Mexico and Caribbean Sea*, 19(2) GULF AND CARIBBEAN RESEARCH 37-52 (2007), Abstract.
[86] Dulvy et al., *Extinction risk and conservation of the world's sharks and rays*, ELIFE SCIENCES (2014).
[87] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[88] *Id.*
[89] *Id.*
[90] IUCN, IUCN RED LIST CATEGORIES AND CRITERIA (International Union for Conservation of Nature and Natural Resources 2nd Ed. 2001) (2012) 18-19.

Having undergone over six decades of incidental and targeted fishing,[91] the Northwest and Western Atlantic bigeye thresher shark is the most endangered of all the regional subpopulations. Data, primarily gained from fishery logbooks, is limited on the bigeye thresher shark in the Northwest Atlantic.[92] However, despite the lack of comprehensive data, the Northwestern and Western Central Atlantic subpopulation has been assessed based on trends in abundance from standardized catch rates of the U.S. pelagic long-line fisheries, most of which target swordfish or tuna.[93] The studies use standardized catch per unit effort ("CPUE") calculations to obtain indices of abundance.[94]

Population studies on all species of thresher shark in the Northwest Atlantic began in the mid-1980s and continue to this day. One report found that since the early 2000s, all species of thresher sharks in the Northwest Atlantic have undergone an estimated 80% decline.[95] Another study specifically reported that the bigeye thresher shark population in the Northwest Atlantic has decreased 80% since the late 1980s.[96] A third study reported that the bigeye thresher shark population off the southeastern coast of the United States has declined 70% from historic levels.[97] Other logbook studies have confirmed similar results—that two species of thresher shark, the common thresher shark and the bigeye thresher shark, have suffered an estimated average of 63% overall decline in the Western Central Atlantic since the beginning date of data collection in 1986.[98]

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[91] Enric Cortes et al., *Relative Abundance of Pelagic Sharks in the Western North Atlantic Ocean, Including the Gulf of Mexico and Caribbean Sea*, 19(2) GULF AND CARIBBEAN RESEARCH 37-52 (2007), at43.
[92] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[93] Julia K. Baum et al., *Collapse and Conservation of Shark Populations in the Northwest Atlantic*, 299 SCIENCE 389-392, Jan. 17, 2003.
[94] *Id.*
[95] *Id.*, at 390.
[96] Convention on Migratory Species, 11th Conference of the Parties, *Proposal for the Inclusion of All Species of Thresher Shark, Genus Alopias, On CMS Appendix II*, Doc.24.1.7, (August 11, 2014), at 7.
[97] *Id.*
[98] Enric Cortes et al., *Relative Abundance of Pelagic Sharks in the Western North Atlantic Ocean, Including the Gulf of Mexico and Caribbean Sea*, 19(2) GULF AND CARIBBEAN RESEARCH 37-52 (2007), at 43.

(*See* Fig. 8). However, as intensive fishing in this area began sixty years ago and population studies of sharks began only 30-35 years ago, by the time scientists began collecting population data in the 1980s, the shark populations had already suffered thirty years of decline from their historic levels. Furthermore, this particular study ended in 2005, meaning that an additional 10-years' worth of decline must be accounted for given continued fishing pressure. This indicates that thresher shark populations have likely suffered much more than a 63% population decline.[99]

There is no doubt that all Northwest and Western Central Atlantic Ocean pelagic shark species, including the bigeye thresher shark, have decreased in numbers when compared to unexploited levels.[100] Although some logbook datasets are only specific down to the family of threshers, the bigeye thresher shark is considered more vulnerable than the common thresher due to its rarity and intrinsically low fecundity rate.[101]

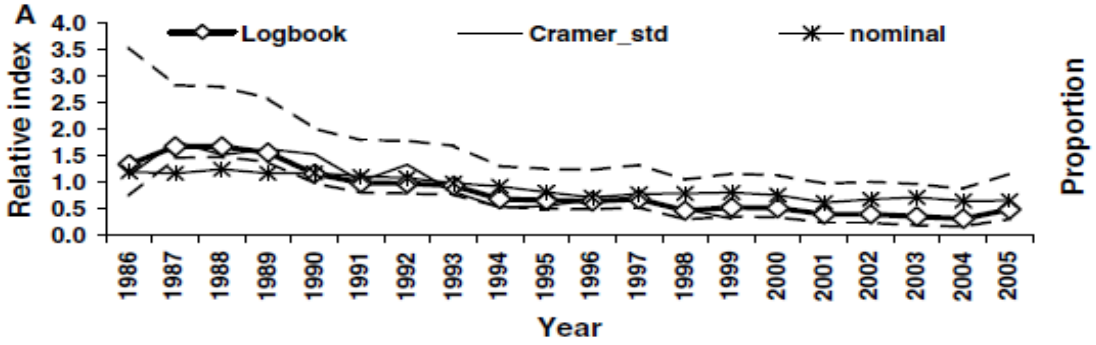

Figure 9: The decline of Western Central Atlantic thresher shark populations based on fishery logbook CPUE reportings, NMFS Gulf and Caribbean Research Vol. 19(2), 2007.

While there is not much data regarding bigeye thresher landing, the available data collected by ICCAT indicates that between 2007-2009 Spain recorded landing approximately 300 bigeye

[99] Enric Cortes et al., *Relative Abundance of Pelagic Sharks in the Western North Atlantic Ocean, Including the Gulf of Mexico and Caribbean Sea*, 19(2) GULF AND CARIBBEAN RESEARCH 37-52 (2007), at 37.
[100] *Id.*
[101] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).

thresher sharks, or 48 tons, Portugal reported landing approximately 1,000 bigeye thresher sharks, or 165 tons, and France reported landing approximately 500 bigeye thresher sharks, or 79 tons.[102]

2. Southwest Atlantic

As stated above, the Southwest Atlantic region includes the region of the Atlantic Ocean south of the equator. A population of the bigeye thresher shark also exists in the Southwest Atlantic. The IUCN considers the bigeye thresher shark population "Near Threatened" in the Southwest Atlantic.[103] A "Near Threatened" categorization by the IUCN indicates that while a species does not qualify for one of the three threatened categories ("Critically Endangered," "Endangered," or "Vulnerable") at this time, it is one step away from, or is likely to qualify for, a threatened category in the near future.[104] Bigeye thresher shark has been known to be an incidental bonus catch to fisheries located in Brazil, Uruguay, and Cuba.[105] A bonus catch occurs when the fishery does not target the shark specifically, but keeps the animal when it is incidentally caught. Some vessels now directly target the bigeye thresher shark for its fins.[106] For over thirty years, fisheries have reported consistent gradual decreases in CPUE of this shark.[107] Bigeye thresher sharks seem to be the most common thresher caught in the Brazilian Santos long-line fishery.[108]

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[102] International Council for the Exploration of the Sea, *Report of the Working Group on Elasmobranch Fishes*, ICES CM 2013/ACOM:19 (June 17-21, 2013), at 77; Aidan, *Biology of the Bigeye Thresher*, ReefQuest Centre for Shark Research (Undated) (Approximate number of individual sharks was calculated using the average weight of 350 to represent a single bigeye thresher shark).
[103] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[104] IUCN, IUCN RED LIST CATEGORIES AND CRITERIA (International Union for Conservation of Nature and Natural Resources 2nd Ed. 2001) (2012).
[105] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[106] *Id.*
[107] A.F. Amorim. Et al, *Pelagic Elasmobranchs Caught by Longliners off Southern Brazil During 1974-97: An Overview*, 49 MARINE AND FRESHWATER RESEARCH 621-632 (1998).
[108] Sadowsky & Amorim, *Sobre a composição da fauna dos equalos pelágicos do Brazil, Resumos da 29 Reanuiao SBPC*, 29(7) A.F. 792 (1977).

3. Mediterranean Sea and Eastern Atlantic

As stated above, the bigeye thresher shark is found in the western Mediterranean Sea[109] and Eastern Atlantic. It is native to Greece, Italy, Israel, Morocco, Spain, eastern Portugal, Senegal, and Turkey.[110] The bigeye thresher shark is uncommon, yet extant, across the Mediterranean.[111] Little substantive data are known about the Mediterranean shark subpopulation and very little data are available on catch trends for this region.[112] The bigeye thresher shark is considered scarce or rare in the Mediterranean.[113] In this region, the bigeye thresher shark is known to be caught as bycatch by semi-industrial fisheries.[114] The bigeye thresher shark is one of the ten species of pelagic shark taken incidentally in Mediterranean pelagic fisheries – most commonly by swordfish fisheries.[115]

Unfortunately, bigeye thresher sharks are often discarded without documentation because they are considered undesirable in the local seafood industry.[116] As a result, there is a lack of proper logbook data.[117] Anecdotally, a 2007 Turkish article was written regarding the incidental capture of threshers in Turkish Mediterranean coastal waters; the data reports that the bigeye thresher shark is almost ten times less commonly caught than the common thresher (*Alopias vulpinus).*[118]

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[109] See Figure 5.
[110] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[111] *Id.*
[112] *Id.*
[113] *Id.*
[114] *Id.*
[115] International Commission for the Conservation of Atlantic Tuna, *Report of the 2007 Data Preparatory Meeting of the Shark Species Group*, Collect. Vol. Sci. Pap. ICCAT, 62(5): 1325-1404 (June 25-27, 2007).
[116] ICCAT, *Report of the 2007 Data Preparatory Meeting of the Shark Species Group* 1327-28 (June 25-27, 2007.
[117] ICCAT, *Report of the 2007 Data Preparatory Meeting of the Shark Species Group* 1327-28 (June 25-27, 2007.
[118] Kabasakal, *Incidental Captures of Thresher Sharks (Lamniformes: Alopiidae) From Turkish Coastal Waters*, ANNALES SER. HIST. NAT. 17 23-28 (2007).

Despite the data deficiency in this subpopulation, based on the IUCN's worldwide assessment of "Vulnerable," as well as the existing data for the four other subpopulations of bigeye thresher shark, the Mediterranean and Eastern Atlantic subpopulation is likely doing poorly.

4. Indo-West Pacific

As stated above, the Indo-West Pacific region includes the western and central Indian Ocean. The bigeye thresher shark occurs all over the Indian Ocean and West Pacific. Fisheries that target or incidentally catch the bigeye thresher shark are prevalent throughout the Pacific and Indian Oceans.[119] Complete data are not available for evaluation from this enormous region, although it is noted that the bigeye thresher shark is a common catch for many of the fisheries in this region.[120] Finning is extensive in this region and includes both legal and extensive illegal directed shark catch.[121] In addition, finning and retention of sharks is extremely common in the West Pacific waters that are a part of the Western and Central Pacific Fisheries Commission's ("WCPFC") Convention area, which includes the bigeye thresher shark's range in this region.[122] Finning and discarding of carcasses has also been reported on the high seas by various fisheries.[123] In 2007, approximately 630 bigeye thresher sharks were landed in the Pacific.[124] All sharks in the Indian Ocean are considered fully exploited throughout the entire region.[125]

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[119] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[120] *Id.*
[121] CAMHI ET.AL., THE CONSERVATION STATUS OF PELAGIC SHARKS AND RAYS, REPORT OF THE IUCN SHARK SPECIALIST GROUP: PELAGIC SHARK RED LIST WORKSHOP (Tubney House, University of Oxford, 2007) (2007), at 29; Casper, *et al.*, 2005.
[122] *See* Clarke et al., *Population Trends in Pacific Oceanic Sharks and the Utility of Regulations on Shark Finning*, 27 CONSERVATION BIOLOGY 197-209 (2012), at 205-206.
[123] FOWLER ET AL., SHARKS, RAYS AND CHIMAERAS: THE STATUS OF THE CHONDRICHTHYAN FISHES, STATUS SURVEY (IUCN/SSC Shark Specialist Group) (2005), at 140-49.
[124] CAMHI ET.AL., THE CONSERVATION STATUS OF PELAGIC SHARKS AND RAYS, REPORT OF THE IUCN SHARK SPECIALIST GROUP: PELAGIC SHARK RED LIST WORKSHOP (Tubney House, University of Oxford, 2007) (2007); Aidan, *Biology of the Bigeye Thresher,* ReefQuest Centre for Shark

Certain Japanese data suggest that that West Pacific thresher shark CPUE increased in the 1990s and that the species is actually being harvested at a stable rate, with no management actions required.[126] However, Japanese long-line fisherman report preferential retention of the bigeye thresher shark due to the species' lower urea content. In 2007, fishermen in this region valued a thresher shark carcass at $250.[127]

The IUCN considers the Indo-West Pacific bigeye thresher shark "Vulnerable." This means that this subpopulation is facing a high risk of extinction in the wild in the medium-term future due to a population reduction of at least 20%, projected or suspected to be met within the next ten years or three generations, whichever is longer, based on actual or potential levels of exploitation.[128]

5. Eastern Central Pacific

As stated above, the Eastern Central Pacific region includes the eastern area of the Pacific Ocean north of the 15 degrees south latitude line.[129] Reports show that there has been an 83% reduction in thresher populations of the Eastern Pacific when compared to pelagic long-line

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Research (Undated) (Approximate number of individual sharks was calculated using the average weight of 350 to represent a single bigeye thresher shark).

[125] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).

[126] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).

[127] Gilman et al., *Shark Depredation and Unwanted Bycatch in Pelagic Longline Fisheries: Industry Practices and Attitudes, and Shark Avoidance Strategies*, Western Pacific Regional Fishery Management Council, 2007, at 94.

[128] IUCN, IUCN RED LIST CATEGORIES AND CRITERIA (International Union for Conservation of Nature and Natural Resources 2nd Ed. 2001) (2012).

[129] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).

research surveys in the 1950s.[130] Historically, pelagic fleeting operations were known to take bigeye thresher shark in Eastern Central Pacific waters.[131]

The IUCN considers the bigeye thresher shark population to be "vulnerable" in the Eastern Central Pacific.[132] This means that this subpopulation is facing a high risk of extinction in the wild in the medium-term future due to a population reduction of at least 20%, projected or suspected to be met within the next ten years or three generations, whichever is longer, based on an index of abundance appropriate for the taxon, or actual or potential levels of exploitation.[133]

6. Significant Portion of Range

If NMFS finds any of these populations to be threatened or endangered it must consider whether those areas are a significant portion of the species' range and thus, whether the species should be listed worldwide.

V. Identified Threats to the Petitioned Species: Criteria for Listing

To be eligible for ESA protection, the bigeye thresher shark must meet at least one of the five ESA listing criteria, as set forth under ESA Section 4:

> A. The present or threatened destruction, modification, or curtailment of its habitat or range;
> **B. Overutilization for commercial, recreational, scientific, or education purposes;**
> C. Disease or predation;
> **D. The inadequacy of existing regulatory mechanisms; or**

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[130] Peter Ward & Ransom A. Myers, *Shifts in Open-Ocean Fish Communities Coinciding With the Commencement of Commercial Fishing*, 86(4) ECOLOGY 835-847 (2005).
[131] Marlon Roman-Verdesoto & Mauricio Orozco-Zoller, *Bycatches of Sharks in the Tuna Purse-seine Fishery of the Eastern Pacific Ocean Reported by Observers of the Inter-American Tropical Tuna Commission , 1993-2004*, Inter-American Tropical Tuna Commission (2005), at 2.
[132] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[133] IUCN, IUCN RED LIST CATEGORIES AND CRITERIA (International Union for Conservation of Nature and Natural Resources 2nd Ed. 2001) (2012).

E. Other natural or manmade factors affecting its continued existence.[134]

Bolded are the three most relevant factors demonstrating that the bigeye thresher shark warrants listing. These three threat categories are discussed below in turn and indicate that the bigeye thresher shark is threatened or endangered throughout all or a significant portion of its range. Arguably, a threat to any of the five subpopulations constitutes a threat to a significant portion of the bigeye thresher shark's range. The IUCN has categorized the Northwest Atlantic population as "Endangered" and both the Eastern Central Pacific and the Indo-West Pacific populations as "Vulnerable." Given that three of the five subpopulations of the bigeye thresher shark are considered to be at risk of extinction, and its worldwide population is considered "Vulnerable," a reasonable person would conclude that the bigeye thresher shark is threatened or endangered throughout a significant portion of its range.

A. Overutilization for Commercial and Recreational Purposes (Factor B)

The bigeye thresher shark has shown substantial population declines in every area where sufficient historical and current population data exists. Reports have shown a steady increase in global shark catch[135] and the bigeye thresher shark is often targeted due to the price its valuable fins can fetch in international fin markets.[136] The thresher shark family has been identified as the seventh most threatened family of chondrichthyans by the IUCN.[137] In addition to being directly targeted by commercial fisheries, the bigeye thresher shark is also incidental bycatch in commercial fisheries.

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[134] 16 U.S.C. § 1533(a)(1)
[135] THE END OF THE LINE? GLOBAL THREATS TO SHARKS (WildAid 2007) (2007).
[136] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[137] Dulvy et al., *Extinction risk and conservation of the world's sharks and rays*, 3 ELIFE SCIENCES 590, Jan. 21, 2014.

Finally, recreational catch is also a known problem that pressures this species.[138] The following subsections summarize the various overutilization threats facing the bigeye thresher shark worldwide. If NMFS concludes that overutilization is a threat in one or more of these subpopulations and also concludes that the same subpopulation(s) is a significant portion of the bigeye thresher shark's range, the entire species should be listed based on the threat of overutilization in that subpopulation.

1. Historical

According to the IUCN, the historical overutilization of the bigeye thresher shark in the Northwest and Western Central Atlantic has rendered the species "Endangered" in this subpopulation.[139] As early as 1999, NMFS recognized the need for the bigeye thresher shark to receive protection from overutilization.[140] Pursuant to the Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. § 1801 *et seq.*, NMFS created the Fisheries Management Plan for Atlantic Tunas, Swordfish and Sharks ("Plan") to protect a number of migratory species, including the bigeye thresher shark, in the Northwest and Central Atlantic, citing depletion due to historic overutilization from pelagic long-line fisheries.[141] The 1999 Plan was later consolidated with other regional fishery management plans and became the Final Consolidated Atlantic Highly Migratory Species Fishery Management Plan ("Atlantic HMS FMP") in 2006.[142] Currently, possession of the bigeye thresher shark is completely prohibited under the Consolidated Plan[143] (discussed further under Section XI. B(ii) *infra*). While NMFS's Consolidated Plan is a step in the right direction, it is an

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[138] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[139] *Id.*
[140] NATIONAL MARINE FISHERIES SERVICE, FINAL FISHERY MANAGEMENT PLAN FOR ATLANTIC TUNAS, SWORDFISH AND SHARKS (1999) (includes provisions protecting bigeye thresher sharks).
[141] *Id.*
[142] NMFS, FINAL CONSOLIDATED ATLANTIC HMS FMP (2006).
[143] *Id.*, at Appendix B-54.

inadequate regulatory mechanism to preserve the species because the protection is limited to specific geographic area, as discussed under Factor D *infra*. The bigeye thresher shark can easily migrate to an area outside the scope of protection with a known migration distance of 1,500 miles.[144] This renders the shark vulnerable to commercial or recreational utilization in international waters (discussed further under Section XI. C. *infra*).

Logbook data also shows an historical decline in the bigeye thresher shark population in the Eastern Central Pacific due to pelagic fishing fleet operations that are known to take bigeye thresher sharks.[145] Bycatch of bigeye thresher sharks in this region was still reported as recently in this region 2004.[146] Additionally, there are reports of commercial take of thresher sharks in this region as early as the 1950s.[147]

2. Directed

In the Southwest Atlantic, there are multiple fishing operations from South and Central American countries that take bigeye thresher sharks.[148] Some long-line fisheries in this area, particularly Brazilian and Uruguayan fisheries, now target sharks due to the commercial value of their fins.[149] In fact, the bigeye thresher shark composes the large majority of the catch for the

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[144] Kohler & Turner, *Shark Tagging,* 191-223 (2001); Herst, *An Illustrated Compendium of Sharks, Skates, Rays and Chimaera (Shark Trust 2010)*; AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[145] Roman-Verdesoto & Orozco-Zoller, *Bycatches of Sharks in the Tuna Purse-seine Fishery of the Eastern Pacific Ocean Reported* Inter-American Tropical Tuna Commission, 2005 at 2.
[146] *Id.*
[147] Peter Ward & Ransom A. Myers, *Shifts in Open-Ocean Fish Communities Coinciding With the Commencement of Commercial Fishing*, 86(4) ECOLOGY 835-847 (2005).
[148] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[149] *Id.*

Santos fishery, a Brazilian long-line fishery.[150] Taiwanese tuna long-line fisheries are also known to take bigeye thresher sharks in this area.[151]

In the Mediterranean, one study indicates that the hammerhead shark family, the blue shark, two species of mackerel shark, and the common thresher shark have all declined by more than 97% in abundance and catch weight over the last 150–200 years in the Mediterranean Sea due to overfishing as well as habitat degradation and slow recovery rates.[152] The same study suggested that the catch weight declines indicate that more juvenile sharks are being caught, which negatively affects the reproductive potential of those species.[153] In terms of size, the sharks caught in the Mediterranean Sea are among the smallest in the world.[154] Given the stark decline in abundance of five large predatory sharks quite similar in life history to the bigeye thresher shark, including another thresher family species, the common thresher shark, a reasonable person would conclude that the bigeye thresher shark has suffered a similar decline in this region.

In the Indo-West Pacific, long-lining operations are increasingly targeting sharks – many for shark fin markets.[155] Indian and Japanese long-line operations have existed in this area of the world for well over fifty years[156] and all sharks in this region were considered fully-to-over-exploited as early as 2006.[157] Finning and discarding of carcasses is often reported in the Indo-West Pacific

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[150] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[151] *Id.*
[152] FERRETTI ET AL., SHARK DECLINES IN THE MEDITERRANEAN SEA (Lenfest Ocean Program) (April) (2008), at 1, 4.
[153] *Id.*, at 4.
[154] *Id.*, at 4.
[155] Indian Ocean Tuna Commission Secretariat, *Status of IOTC Databases For Bycatch Species*, IOTC-2006-WPby-03 (2006), at 1-3.
[156] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[157] *Id.*

region, especially in the high seas.[158] Spanish fleets of surface long-lining vessels have been known to take the bigeye thresher shark in this region.[159] Off the western and southwestern cape of South Africa, bigeye thresher sharks are most commonly caught in the winter.[160] Complete data on this region is not known; however, the species is known to be caught throughout the region. A single thresher shark fin can fetch over $250 for fishers at the markets in this area, creating incentive that is sure to drive overexploitation.[161]

3. Incidental

Currently, it is estimated that 100 million sharks are caught and killed as bycatch each year worldwide—a number that is much higher when one considers how many sharks are caught intentionally by legal shark fishing industries as well.[162] The bigeye thresher shark is slaughtered globally by commercial long-line operations.

In the Northwest and Western Central Atlantic region the bigeye thresher shark is often caught as bycatch of swordfish and tuna fisheries[163] but is known to be taken in driftnet and gillnet fisheries as well.[164] The Consolidated Plan, applicable in parts of this region, acknowledges that the

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[158] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[159] Indian Ocean Tuna Commission Secretariat, *Scientific Estimations of Bycatch Landed by the Spanish Surface Longline Fleet Targeting Swordfish (Xiphias gladius) in the Indian Ocean: 2001-2003 Period*, IOTC-2005-WPBy-14 (2005), at 1-4; AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[160] Gilman et al., *Shark Depredation and Unwanted Bycatch in Pelagic Longline Fisheries: Industry Practices and Attitudes, and Shark Avoidance Strategies*, Western Pacific Regional Fishery Management Council, 2007, at 157.
[161] *Id.*, at 94.
[162] A. KELEDJIIAN ET AL., WASTED CATCH: UNSOLVED PROBLEMS IN U.S. FISHERIES (Oceana 2014) (March, 2014), at 19.
[163] NMFS, FINAL CONSOLIDATED ATLANTIC HMS FMP (2006), at Appendix B-54.
[164] International Council for the Exploration of the Sea, *Report of the Working Group on Elasmobranch Fishes*, ICES CM 2013/ACOM:19 (June 17-21, 2013), at 270.

bigeye thresher shark often impales or hooks itself on fishing gear in this area.[165] Despite the fact that more extensive data on commercial discard mortality rate is not available, the best available data shows that recreationally caught common thresher sharks that struggle for more than 85 minutes have a less than 1% chance of discard survival.[166] Accordingly, it is likely that bigeye thresher sharks that undergo a similarly lengthy struggle while being intentionally or unintentionally taken would have a similarly negligible chance of discard survival.

In the Mediterranean region, the bigeye thresher shark is known to be a bycatch of semi-industrial, artisanal, and gillnet fisheries.[167] Specifically, the bigeye thresher shark is known to be bycaught by the Moroccan driftnet fishery and by trawlers targeting smaller pelagic sharks. In this region, bigeye thresher sharks are known bycatch in the southwest Mediterranean, the Gulf of Lions and the Straits of Gibraltar.[168] Even though exact numbers are unavailable in this region due to the scarcity of the species, evidence indicates the presence of the species in routinely discarded bycatch.[169] However, given the low reproductive rates of the bigeye thresher shark, any amount of bycatch is almost certain to have a negative impact on this subpopulation.

In the Eastern Central Pacific region reports show that bigeye thresher sharks are succumbing to gillnet fishing operations with increasing frequency. Sharks caught in the gillnet

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[165] NMFS, FINAL CONSOLIDATED ATLANTIC HMS FMP (2006), at B-54.
[166] C. HEBERER ET AL., POST-RELEASE MORTALITY FOR COMMON THRESHER SHARKS (ALOPIAS VULPINUS) CAPTURED IN THE SOUTHERN CALIFORNIA RECREATIONAL FISHERY (Undated).
[167] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[168] International Council for the Exploration of the Sea, *Report of the Working Group on Elasmobranch Fishes*, ICES CM 2013/ACOM:19 (June 17-21, 2013), at 270.
[169] *Id.*; Gilman et al., *Shark Depredation and Unwanted Bycatch in Pelagic Longline Fisheries: Industry Practices and Attitudes, and Shark Avoidance Strategies*, Western Pacific Regional Fishery Management Council, 2007, at 103.

fishing operations off the American Pacific Coast are discarded "as unwanted bycatch" at a rate of 63%[170] and furthermore much of the discarded bycatch dies shortly thereafter.[171]

4. Recreational

Finally, recreational fishermen have been known to target thresher sharks in unprotected waters because the shark is considered a desirable "trophy catch" due to its unique appearance and enormous size.[172] Further evidence of overutilization near recreational fishing zones is available; recent studies have reported a stark decrease in the size of specimens caught by trophy fishermen—indicating the possibility that commercial or recreational overutilization has resulted in fewer specimens surviving to maturity.[173] Without the possibility of reaching maturity, these animals are unable to reproduce. This creates a risk of catastrophic population decline, especially given that the species already has a very low fecundity rate. With recent data indicating that conservation of juvenile bigeye threshers is most important to the species' survival, it is that much more important that recreational fishing decreases – especially in the Atlantic where juveniles are prevalent. [174]

Recreational shark fishing has been occurring in the United States since the 1970's. Recreational shark fishing occurs on both coasts of the United States and fishermen target mainly makos, blue sharks, and thresher sharks.[175] In 2011, over 2.7 million sharks were caught

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[170] A. KELEDJIIAN ET AL., WASTED CATCH: UNSOLVED PROBLEMS IN U.S. FISHERIES (Oceana 2014) (March, 2014), at 25.
[171] C. HEBERER ET AL., POST-RELEASE MORTALITY FOR COMMON THRESHER SHARKS (ALOPIAS VULPINUS) CAPTURED IN THE SOUTHERN CALIFORNIA RECREATIONAL FISHERY (Undated).
[172] California Department of Fish and Wildlife, *Marine Sportfish Identification: Shark*, *https://www.dfg.ca.gov/marine/mspcont5.asp#thresher* (last visited April 17, 2015).
[173] Loren McClenachan, *Documenting Loss of Large Trophy Fish from the Florida Keys with Historical Photographs*, CONSERVATION BIOLOGY (2008), at1-8.
[174] Project Thresher: Trans-Atlantic Pelagic Sharks Research Initiative (July 2014).
[175] Shark Fishing in U.S. Territorial Waters, http://www.flmnh.ufl.edu/fish/education/sharks/sharkfishing.html (last visited April 17, 2015).

recreationally in United States territorial waters.[176] Specifically, recreational anglers land far more thresher sharks than commercial pelagic longlines in the Atlantic making recreational fishing a serious concern for the thresher family.[177] It is likely that – even with a catch a release program – many of these sharks died, including an untold number of bigeye thresher sharks.

Despite the fact that more extensive data on commercial discard mortality rate is not available, the best available data shows that recreationally caught common thresher sharks that struggle for more than 85 minutes have a less than 1% chance of discard survival.[178] Accordingly, it is likely that bigeye thresher sharks that undergo a similarly lengthy struggle while being intentionally or unintentionally taken would have a similarly negligible chance of discard survival.

B. The Inadequacy of Existing Regulatory Mechanisms (Factor D)

The bigeye thresher shark qualifies for listing under Factor (D), the inadequacy of current regulatory mechanisms, due to virtually non-existent international regulatory protections for this species and insufficient domestic regulatory protections. Current regulatory mechanisms do not protect this species from overexploitation. Almost no international treaty protection exists for this species, with the exception of the Convention on Migratory Species of Wild Animals (CMS), in which the bigeye thresher shark has recently been listed in Appendix II discussed infra. Furthermore, while the United States has attempted to protect the bigeye thresher shark in U.S. waters, piecemeal protections that fail to cover the species throughout its migratory range have

[176] Recreational Shark Fishing – Healthy Catch and Release, http://www.fisheries.noaa.gov/stories/2013/08/best_fishing_practices_sharks.html (last visited April 17, 2015).
[177] CAMHI ET.AL., THE CONSERVATION STATUS OF PELAGIC SHARKS AND RAYS, REPORT OF THE IUCN SHARK SPECIALIST GROUP: PELAGIC SHARK RED LIST WORKSHOP (Tubney House, University of Oxford, 2007) (2007).
[178] C. HEBERER ET AL., POST-RELEASE MORTALITY FOR COMMON THRESHER SHARKS (ALOPIAS VULPINUS) CAPTURED IN THE SOUTHERN CALIFORNIA RECREATIONAL FISHERY (Undated).

proven to be unsuccessful. See Section V.B.2.a infra. In the Atlantic Ocean alone, the range of the bigeye thresher shark extends to waters off the coast of South America, Africa and Europe - well beyond the protection of any U.S. laws. See Fig. 4 & 6 supra. With global consumption of shark products on the rise and the ongoing overutilization of a bigeye thresher shark population that is already in decline, further domestic and international regulation is urgently needed.

1. Shark Finning Bans

At least 21 countries, the European Union and nine regional fisheries management organizations ("RFMOs") have implemented shark finning bans.[179] However, the strict enforcement that is necessary for these measures to be effective is often lacking, thus detracting from the efficacy of these bans.[180] Additionally, with RFMOs, international, and regional agreements, implementation of the finning bans is often not mandatory or enforceable. The lack of enforcement leads to continued finning even where bans are in place. For example, "[a]s of October 2010, of the 32 Western Central Pacific Fishery Commission members only half had confirmed they were fully implementing the finning prohibition. Only 11 provided specific confirmation of [any ban implementation], and few of these reported the degree of compliance." [181]

Additionally, finning bans aim to "prohibit the retention of shark fins on board vessels without the corresponding carcasses" and do not prohibit landing the entire shark or finning it once it is on land. [182] As a result, even where perfectly enforced, finning bans cannot halt overfishing of

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[179] Dulvy et al., *You can swim but you can't hide: the global status and conservation of oceanic pelagic shark and rays,* 18 AQUATIC CONSERVATION: MARINE & FRESHWATER ECOSYSTEMS 459-82 (2008), at 474.
[180] *Id.*
[181] Clarke et al., *Population Trends in Pacific Oceanic Sharks and the Utility of Regulations on Shark Finning*, 27 CONSERVATION BIOLOGY 197-209 (2012), at Implementation.
[182] Dulvy et al., *You can swim but you can't hide: the global status and conservation of oceanic pelagic shark and rays,* 18 AQUATIC CONSERVATION: MARINE & FRESHWATER ECOSYSTEMS 459-82 (2008), at 474-75.

sharks where the carcasses are landed before being finned.[183] Furthermore, most countries and RFMOs use fin-to-carcass weight ratios as a means to ensure compliance with finning bans, which are difficult, costly to enforce, and vary between fleets.[184] In addition to these difficulties, the upper end of the ratio creates loopholes that "potentially enable fishermen to fin sharks without exceeding the ratio limit."[185] The enforcement issues with finning bans are evident in the United States where, "[a]lthough shark finning . . . is illegal in US waters, it is suspected that some fishers may be finning incidentally caught [shark species] and keeping just their fins for their high value, while retaining carcasses from different shark species with higher value flesh but lower value fins. . ."[186] By retaining high value fins from bigeye thresher sharks, fishers are able to continue finning while maximizing profits and avoiding fin bans. Therefore, even where these finning bans exist, there are opportunities to avoid their regulation and/or to harvest bigeye thresher sharks in unsustainable numbers to satisfy market demands.

Lastly, the bigeye thresher shark's large dorsal fin is frequently caught on pelagic long-lines,[187] likely due to attempts to stun prey on baited hooks with its tail. Shark morbidity and

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[183] Dulvy et al., *You can swim but you can't hide: the global status and conservation of oceanic pelagic shark and rays,* 18 AQUATIC CONSERVATION: MARINE & FRESHWATER ECOSYSTEMS 459-82 (2008), at 474.

[184] *Id.*; Convention on the International Trade in Endangered Species of Wild Fauna and Flora, *Consideration of Proposals for Amendment of Appendices I and II*, E-Cop-Prop-43 (March 3-14, 2013), at 20; Clarke et al., *Population Trends in Pacific Oceanic Sharks and the Utility of Regulations on Shark Finning*, 27 CONSERVATION BIOLOGY 197-209 (2012), at 149 (assessing the weaknesses in one such RFMO fin ratio).

[185] Dulvy et al., *You can swim but you can't hide: the global status and conservation of oceanic pelagic shark and rays,* 18 AQUATIC CONSERVATION: MARINE & FRESHWATER ECOSYSTEMS 459-82 (2008), at 474.

[186] Abercrombie, *et al.*, *Global-scale genetic identification of hammerhead sharks: Application to assessment of the international fin trade and law enforcement*, 6 CONSERVATION GENETICS 775-88 (2005), at 786 (citing personal comments from Special Agent Paul Raymond of NOAA's Office of Law enforcement).

[187] COMPAGNO, LEONARD J.V., SHARKS OF THE WORLD: AN ANNOTATED AND ILLUSTRATED CATALOGUE OF SHARK SPECIES KNOWN TO DATE, VOLUME 2, (Food and Agriculture Organization of the United Nations, 2002) (2002) at 83.

mortality caused by fishing gear is another issue not addressed by retention or fishing bans. Thus, retention bans, and even bans on intentional fishing of sharks, do not stop the bycatch problem or address the fact that sharks caught as bycatch generally die.

2. National Measures

National regulations present inconsistent and non-comprehensive protection to the bigeye thresher shark. Many smaller countries[188] and organizations in the Southwest Atlantic and Indo-West Pacific regions have implemented their own regulatory mechanisms to protect bigeye thresher sharks. 78 Fed. Reg. 20718. Some countries that have prohibited shark fisheries within their Exclusive Economic Zones, including: French Polynesia (2006), Palau (2003, 2009), Maldives (2010), Honduras (2011), The Bahamas (2011), Tokelau (2011), and the Marshall Islands (2011). Other countries have protected areas where no shark fishing is allowed, such as Cocos Island (Costa Rica), Malpelo Sanctuary (Colombia), and the marine reserve of Galapagos Islands (Ecuador)."[189] However, these prohibitions only offer protection in limited areas and suffer from enforcement related issues. Additionally, these prohibitions do not protect against incidental capture of bigeye thresher sharks.

a. United States

In the United States, NMFS has already recognized the need to protect the bigeye thresher shark in the Consolidated Plan, but this effort alone fails to offer the species adequate protection. Since 1999, NMFS has tried to protect the bigeye thresher shark from commercial fishing in the

[188] Countries that have implemented domestic regulatory measures in this region include Palau, the Maldives, Honduras, the Bahamas, the Marshall Islands, Tokelau, New Caledonia, the Cook Islands and the British Virgin Islands.

[189] Convention on the International Trade in Endangered Species of Wild Fauna and Flora, *Consideration of Proposals for Amendment of Appendices I and II*, E-Cop-Prop-43 (March 3-14, 2013), at 20.

Northwest Atlantic by listing the species as "prohibited" under the Plan[190] and later, in 2006, the Consolidated Plan.[191] Under the Consolidated Plan, it is impermissible for commercial or recreational fishermen to possess a bigeye thresher shark.[192]

However, the Consolidated Plan only protects against possession of the bigeye thresher shark and does nothing to protect against incidental deaths through bycatch. The Consolidated Plan even admits that the bigeye thresher shark often impales or hooks itself on fishing gear in this region.[193] Furthermore, the Consolidated Plan does nothing to lower discard mortality of bigeye thresher sharks, which are known to have extremely low survival rates. But, at the same time, the Consolidated Plan notes that bigeye thresher sharks are usually discarded dead by fisheries in this area.[194] Without protection against incidental death, or discards that inevitably lead to death, – whether through regulation of long-line fishing techniques, or limiting fishery activity to areas less frequented by bigeye thresher sharks – the Consolidated Plan does little to protect bigeye thresher sharks in this region. For instance, in 2012, 31 bigeye thresher sharks were released dead from vessels operating in NMFS territory.[195] In addition, 34 bigeye thresher sharks were released alive,[196] though with a high probability of dying subsequent to release. [197] Likewise, 276 commercial landings

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[190] NATIONAL MARINE FISHERIES SERVICE, FINAL FISHERY MANAGEMENT PLAN FOR ATLANTIC TUNAS, SWORDFISH AND SHARKS (1999) at xiii-xviii.
[191] NMFS, FINAL CONSOLIDATED ATLANTIC HMS FMP (2006), at Appendix B-54.
[192] NATIONAL MARINE FISHERIES SERVICE, FINAL FISHERY MANAGEMENT PLAN FOR ATLANTIC TUNAS, SWORDFISH AND SHARKS (1999) at xiii-xviii.
[193] NMFS, FINAL CONSOLIDATED ATLANTIC HMS FMP (2006), at Appendix B-54.
[194] *Id.*
[195] NATIONAL OCEANIC AND ATMOSPHERIC ASSOCIATION, 2013 STOCK ASSESSMENT AND FISHERY EVALUATION (SAFE) REPORT FOR ATLANTIC HIGHLY MIGRATORY SPECIES (NOAA Fisheries Atlantic Highly Migratory Species Management Division) (January 2014), at 43.
[196] *Id.*
[197] C. HEBERER ET AL., POST-RELEASE MORTALITY FOR COMMON THRESHER SHARKS (ALOPIAS VULPINUS) CAPTURED IN THE SOUTHERN CALIFORNIA RECREATIONAL FISHERY (Undated).

of bigeye thresher sharks were made in 2012,[198] even though possession of bigeye thresher sharks on board has been prohibited since 1999. These were only the reported numbers – it is likely that the actual number of bigeye thresher shark interactions were higher. The insufficiency of this protection plan is further demonstrated by the fact that the IUCN still considers this shark to be "endangered" over a decade after the NMFS Atlantic protection scheme was implemented and the fact that fisheries in the Atlantic have continued to report landing bigeye thresher sharks as recently as 2009.[199]

The U.S. national protection scheme is also failing because of the unique migration characteristics of the bigeye thresher shark. The shark is a highly migratory species, capable of traveling over 1,500 miles in a straight line.[200] Bigeye thresher sharks have been documented to swim easily out of their relatively protected North Atlantic zone to the South Atlantic or Gulf waters[201] - areas beyond the reach of U.S. national protection. Once the sharks are out of their protected zone, fleets of South American pelagic long-line fisheries can target the species unencumbered by any protective regulation.[202] Due to the lack of enforceable regulation in areas outside the Northwest Atlantic, the very same sharks that NMFS sets out to protect in the Northwest Atlantic are biologically predisposed to endangerment as they inevitably travel outside of the zone of protection established by NMFS. Furthermore, these regulations are imposed only on U.S. vessels and those

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[198] NATIONAL OCEANIC AND ATMOSPHERIC ASSOCIATION, 2013 STOCK ASSESSMENT AND FISHERY EVALUATION (SAFE) REPORT FOR ATLANTIC HIGHLY MIGRATORY SPECIES (NOAA Fisheries Atlantic Highly Migratory Species Management Division) (January 2014), at 93.
[199] International Council for the Exploration of the Sea, *Report of the Working Group on Elasmobranch Fishes*, ICES CM 2013/ACOM:19 (June 17-21, 2013), at 70; *Biology of the Bigeye Thresher*, Undated (Approximate number of individual sharks was calculated using the average weight of 350 to represent a single bigeye thresher shark).
[200] Kohler & Turner, *Shark Tagging,* 191-223 (2001); Herst, *An Illustrated Compendium of Sharks, Skates, Rays and Chimaera (Shark Trust 2010)*; AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[201] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[202] *Id.*

holding U.S. fishing permits. Without a more comprehensive, wide-reaching protection plan, the Fisheries Management protection offered by NMFS will fail to shield this species from extinction.

b. The European Union

The European Union prohibits the removal of shark fins from bigeye thresher sharks and the discarding of the body.[203] This regulation applies to all EU vessels, wherever they are located, and also applies to non-EU vessels in EU waters. Further, in 2012 the EU prohibited the retention, transshipment or landing of any part or whole carcass of the bigeye thresher shark by any fishery.[204] However, as discussed in Sections V.A and B.1 infra, finning bans alone are insufficient to save sharks as they do not address bycatch or incidental catch – which also have high rates of mortality.

c. Brazil

In 1998 Brazil passed a law that banned all shark finning in its waters.[205] However, Brazil seems to have abandoned this prohibition based on enforcement difficulties.[206] In addition, Brazil has limited pelagic gillnets and prohibited trawling at a distance of less than 1.5 to 3 nautical miles from shore.[207] However, bigeye thresher sharks are susceptible to gillnets and trawling at distances beyond the prohibition. Therefore, these prohibitions do not adequately protect the species.

d. Ecuador

"In an effort to help stop the illegal finning occurring in the Galapagos, the Ecuadorian Government issued a decree in 2004 prohibiting fin export from Ecuador. Unfortunately, the

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[203] Council Regulation 1185/2003, On the Removal of Fins of Sharks on Board Vessels, 2003 O.J. (L 167) 1 (EC).
[204] Council Regulation 44/2012, Fixing for 2012 the fishing opportunities available in EU waters, 2012 O.J. (L 25) 55 (EC), at Art. 19.
[205] Convention on the International Trade in Endangered Species of Wild Fauna and Flora, *Consideration of Proposals for Amendment of Appendices I and II*, E-Cop-Prop-43 (March 3-14, 2013), at 19.
[206] *Id.*
[207] *Id.*

Decree resulted in establishing illegal trade routes, with fins now being exported mainly via Peru and Colombia where there is no finning ban in place."[208] Ecuador also released executive decrees and conservation policies in 2007 and 2008 aimed at protecting sharks from overexploitation.[209] However, the efficacy and enforceability of these later localized protections is thus far unclear and, even if effective, would only protect a small portion of the species' range.

e. Colombia

Columbia has a general finning ban and two areas where directed shark fishing is banned.[210] However, neither of these practices addresses the issue of bycatch or of directed shark fishing outside of the two protected areas, and neither offers any species-specific protection that is tailored to protecting the bigeye thresher shark. In addition, any protections in Columbia are likely to be met with enforcement difficulties as the country is already serving as an illegal trade route for illegal Ecuadorian shark fins and is experiencing illegal fishing and shark finning even in its protected areas.[211]

3. Regional Fisheries Management Organizations (RFMOs)

Generally, international fisheries managers view sharks as bycatch rather than a target species that may require management – even though the value of shark fins is a well-known cause of shark mortality in fishery regions.[212] Regional protections, while seemingly numerous, are inadequate to assure the continued existence of the species in these regions. This is largely due to the fact that

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[208] Convention on the International Trade in Endangered Species of Wild Fauna and Flora, *Consideration of Proposals for Amendment of Appendices I and II*, E-Cop-Prop-43 (March 3-14, 2013), at 20-21.
[209] *Id.*, at 21.
[210] *Id.*, at 20.
[211] *Id.*, at 20-21.
[212] Clarke, et al., 2012 at 198.

these regional efforts are poorly funded and implemented. Many scientists consider existing protective regulations inadequate:

> "With a few exceptions (e.g., Australia and USA), many governments still lack the resources, expertise, and political will necessary to effectively conserve the vast majority of shark and rays, and indeed many other exploited organisms. More than 50 sharks are included in Annex I (Highly Migratory Species) of the 1982 Law of the Sea Convention, implemented on the high seas under the 1992 Fish Stocks Agreement, but currently only a handful enjoy species-specific protections under the world's Regional Fisheries Management Organizations."[213]

a. Indian Ocean Tuna Commission (IOTC)

The Indian Ocean Tuna Commission has prohibited the onboard retention, transshipping, landing, storing, selling or offering for sale any part of whole carcass of all species of thresher sharks in the family *Alopiidae* since 2009. However, the IOTC continuously reports uncertainty regarding the stock status of the bigeye thresher shark due to a lack of information. Additionally, an ecological risk assessment conducted by the IOTC in 2012 found the bigeye thresher shark to have the second highest vulnerability ranking in this region due to its low productivity and its high susceptibility to long-line gear – the type of gear frequently used in the Convention area. Furthermore, the IOTC reported that the bigeye thresher shark continues to be commonly taken by multiple fisheries in the Indian Ocean, thus indicating that the regulations in place have almost no effect on the take of bigeye threshers.[214]

The IOTC also prohibits retaining any part of thresher sharks onboard in an effort to promote live release of these sharks. However, the IOTC itself notes that this may be "largely ineffective" due to the high rates of hooking mortality – meaning that even if released after hooking

[213] Dulvy et al., *Extinction risk and conservation of the world's sharks and rays*, 3 eLIFE SCIENCES 590, Jan. 21, 2014, at 12-13.
[214] Indian Ocean Tuna Commission Secretariat, *Report of the Seventeenth Session of the IOTC Scientific Committee*, IOTC-2014-SC17 (December 8-12, 2014), at 285-86.

the sharks likely die.[215] Therefore, the regulations in place in the IOTC area make little-to-no strides in protecting the bigeye thresher shark in the IOTC area.

b. International Commission for the Conservation of Atlantic Tuna (ICCAT)

ICCAT has recommended that fishers operating in the Convention area do not retain, transship, land, store, or sell bigeye thresher sharks since 2009 largely based on the face that the family *Alopiidae* are caught as bycatch in the Convention area.[216] While this recommendation endeavors to bind the parties, there are large gaps in reporting procedures that make it difficult to determine how often these regulations are followed. Additionally, like all RFMOs, the regulations imposed by ICCAT only extend as far as the Convention area.

c. Inter-American Tropical Tuna Commission (IATTC)

In 2000, the IATTC adopted the Consolidated Resolution on Bycatch. This Resolution requires all fishermen of purse-seine vessels to release unharmed non-target species, such as sharks.[217] In 2005, the IATTC adopted a Resolution on the conservation of sharks caught in association with fisheries in the Eastern Pacific Ocean.[218] The IATTC noted that sharks are captured as bycatch in tuna fisheries in the Convention area as well as the presence of unregulated shark fisheries. This Resolution suggested that all parties to the Commission implement national plans of action for the conservation of shark stocks. However, since the Resolution used the word "should" in place of the word "shall," the national regulations are not a requirement. But, the Resolution did

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[215] Indian Ocean Tuna Commission Secretariat, *Report of the Seventeenth Session of the IOTC Scientific Committee*, IOTC-2014-SC17 (December 8-12, 2014), at 285-86.
[216] International Commission for the Conservation of Atlantic Tuna, *Recommendation by ICCAT on the Conservation of Thresher Sharks Caught in Association with Fisheries in the ICCAT Convention Area*, REC. 09-07 (2009).
[217] Inter-American Tropical Tuna Commission, *Consolidated Resolution on Bycatch*, RESOLUTION C-04-05 (REV 2) (June 26-30, 2006).
[218] Inter-American Tropical Tuna Commission, *Resolution on the Conservation of Sharks Caught in Association with Fisheries in the Eastern Pacific Ocean*, RESOLUTION C-05-03 (June 20-24, 2005).

require the adoption of a fin-to-carcass ratio. However, these resolutions appear to do nothing to deter the presence of unregulated shark fisheries in the Convention area and the regulations directed at bycatch face the same monitoring and enforcement issues due to a pattern of underreporting by contracting parties.

4. International Regulation

Current international treaty regulation is almost non-existent for the bigeye thresher shark.[219] Countries around the globe have tried to implement their own regional protection schemes, but the Convention on Migratory Species is the only international body which has attempted to enact global protection for this migratory species. As recently as 2014, the IUCN noted an utter lack of proper regulatory protection for this species, despite the fact that the thresher shark family is one of the IUCN's top seven most threatened families of chondrichthyans.[220] The species cannot survive on unreliable, unenforceable and geographically limited protection schemes.

a. Convention on International Trade in Endangered Species (CITES)

The bigeye thresher shark is not currently listed under CITES. As noted in NMFS' 90-Day Finding on a Petition to List the Common Thresher Shark, 80 Fed. Reg. 11379, even if the bigeye thresher shark were listed under CITES, such as listing would only address threats associated with the international trade of the species, and would not address issues such as bycatch, recreational catch, and shark finning practice. Thus, even if the bigeye thresher shark were to be listed under CITES, such a listing would not necessarily impact the illegal trade in shark fins to which the bigeye thresher shark is quite susceptible.

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[219] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[220] Dulvy et al., *Extinction risk and conservation of the world's sharks and rays*, 3 ELIFE SCIENCES 590, Jan. 21, 2014, at 12.

b. United Nations Convention on the Law of the Sea (UNCLOS)

The bigeye thresher shark's taxonomic family, the *Alopiidae*, is listed under Annex I, High Migratory Species, of the UN Convention on the Law of the Sea (UNCLOS).[221] Yet, listing under UNCLOS is inadequate because it only *suggests* cooperation amongst the States over management of the species.[222] No actual management exists at this time.[223] Furthermore, even if management were in place, the United States has not signed this treaty.[224] Therefore, the species does not receive any tangible protection under these provisions.

c. Convention on the Conservation of Migratory Species (CMS)

As mentioned above, the bigeye thresher shark received Appendix II status under the Convention on Migratory Species in November 2014. Nevertheless, this listing is also inadequate given that the United States is not a Member Party to CMS and is therefore not bound by the requirements imposed by the Appendix II listing. Additionally, even if the United States were a Member Party, it would not be required to take substantive conservation measures. The Convention text states that CMS Member Parties "shall endeavor to conclude Agreements covering the

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[221] Dulvy et al., *Extinction risk and conservation of the world's sharks and rays*, 3 eLIFE SCIENCES 590, Jan. 21, 2014, at 12.

[222] United Nations Convention on the Law of the Sea, December 10, 1982, 1833 UNTS 3, art. 64 ("The coastal state and other states whose nationals fish in the region for the highly migratory species listed in Annex I shall cooperate directly or through appropriate international organizations with a view to ensuring conservation and promoting the objective of optimum utilization of such species throughout the region…"); FOOD AND AGRICULTURE ORGANIZATION, THE CONSERVATION AND MANAGEMENT OF SHARED FISH STOCKS: LEGAL AND ECONOMIC ASPECTS, FAO Fisheries Technical Paper 465 (2004), at 34 ("It is also generally accepted under international law that the duty to cooperate does not involve the duty to reach an agreement, provided that the cooperation has been undertaken in good faith.").

[223] Dulvy et al., *Extinction risk and conservation of the world's sharks and rays*, 3 eLIFE SCIENCES 590, Jan. 21, 2014, at 12.

[224] *Id.*

conservation and management of migratory species included in Appendix II."[225] Therefore, even under CMS Member Parties are only required to "endeavor to conclude" agreements relating to the conservation of Appendix II listed species – such agreements are not self-executing upon the listing of a species. Much like the language in UNCLOS, under international law this duty "does not involve a duty to reach an agreement, provided that the cooperation has been undertaken in good faith."[226]

Furthermore, listing the bigeye thresher shark as protected under CMS does not impose any obligations on range states that are not Member Parties. Without including the geographic areas in the control of these non-member range states– the United States, the Bahamas, Brazil, El Salvador, Guatemala, Japan, Maldives, Mexico, Nicaragua, Sierra Leone, Turkey, Venezuela and Vietnam[227]– CMS listing presents the same problem of piecemeal protection that was meant to be avoided by listing the bigeye thresher shark in an international convention.

C. Other Natural or Manmade Factors Affecting its Continued Existence (Factor E)

The bigeye thresher shark has multiple biological traits which make it extremely susceptible to human exploitation. Low reproductive rates, late sexual maturation, incredibly large migration distances, and size have become the most pressing biological issues that this species faces. An ecological risk assessment conducted by the Standing Committee on Research and Statistics of the International Commission for the Conservation of Atlantic Tuna categorized the bigeye thresher

[225] Convention on the Conservation of Migratory Species of Wild Animals, May 6, 1979, 1651 UNTS 333, art.III(3)(c): Fundamental Principles.
[226] FOOD AND AGRICULTURE ORGANIZATION, THE CONSERVATION AND MANAGEMENT OF SHARED FISH STOCKS: LEGAL AND ECONOMIC ASPECTS, FAO Fisheries Technical Paper 465 (2004), at 34 ("It is also generally accepted under international law that the duty to cooperate does not involve the duty to reach an agreement, provided that the cooperation has been undertaken in good faith.").
[227] This list includes countries where the bigeye thresher shark is considered native by the IUCN but are listed as Range States under the Convention on Migratory Species.

shark as one of three species considered to have the greatest degree of risk among Atlantic pelagic sharks.[228] An ecological risk assessment conducted by the ICCAT Shark Working Group also found that in 2014 the bigeye thresher shark remained one of five stocks with the lowest biological productivity and the highest susceptibility to capture and mortality in pelagic long-line fisheries.[229]

1. Low reproductive rates

The greatest biological threat to this shark is its low fecundity rate.[230] The bigeye thresher shark gestates for approximately 12 months. Females only reach sexual maturity at roughly 12-13 years of age and only live for 20 years.[231] Females generally have two pups per pregnancy[232] and they are expected to produce fewer than 20 pups in their lifetime.[233] The shark fecundity rate produces only 0.002% of a population increase per year.[234] Compared to the common thresher shark, which typically has 2-4 pups a year and reaches maturity at approximately 5 years, 80 Fed. Reg. 11385 (March 3, 2015), the bigeye thresher shark is much more at risk with half the average birth rate and more than twice the time to maturity. Even minimal harvest would have a negative impact on this the bigeye thresher shark population due to its inability to recover from exploitation.

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[228] International Commission for the Conservation of Atlantic Tuna, *An Integrated Approach to Determining the Risk of Over-Exploitation for Data-Poor Pelagic Atlantic Sharks, International Commission for the Conservation of Atlantic Tuna Sharks*, SHARK WORKING GROUP SCRS/2008/140 (June 3-6, 2008).
[229] International Commission for the Conservation of Atlantic Tuna, *Executive Summary of Sharks*, SHARK WORKING GROUP SCRS/2014/ (2014), at 194.
[230] A. KELEDJIIAN ET AL., WASTED CATCH: UNSOLVED PROBLEMS IN U.S. FISHERIES (Oceana 2014) (March, 2014), at 15; AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[231] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[232] *Id.*; NMFS, FINAL CONSOLIDATED ATLANTIC HMS FMP (2006), at Appendix B-54.
[233] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009) (Female bigeye thresher sharks mature at 12–13 years of age and die at about 20 years of age. This provides 7–8 years of reproduction. With a gestation period of around one year, at an average of 2 pups per year, each female bigeye thresher shark produces approximately 16 pups in her lifetime.).
[234] *Id.*

2. Late sexual maturation

Another grave biological concern, correlated to a low reproduction rate, is the extended length of time required for a bigeye thresher shark to reach sexual maturity. When an animal is harvested before reaching sexual maturity, it will have lived for 9–12 years without positively affecting the population. Near-mature sharks are large and will likely be kept by fishermen. Because these sharks reproduce so slowly and sparsely, unregulated fishing practices will inevitably lead to a number of near-mature sharks being captured and eliminated.[235] This drastically hurts the bigeye thresher shark's chance at survival and recovery.

3. Lengthy migration

Moreover, the bigeye thresher shark's tendency towards long-distance migration also increases the threats to the species. As discussed *supra.*, individual sharks have been tracked traveling straight-line distances of more than 1,500 miles.[236] Sharks can easily migrate from a protected zone to waters where protection may be limited or nonexistent.

4. Large size

Finally, the bigeye thresher shark is a very large species of shark (anywhere from 270–340 centimeters,[237] approximately 9–11 feet, at maturity, with recorded sizes of up to 461 centimeters, or approximately 15 feet[238]). Studies have shown that larger species of sharks have a much higher

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[235] Loren McClenachan, *Documenting Loss of Large Trophy Fish from the Florida Keys with Historical Photographs*, CONSERVATION BIOLOGY (2008), at 1-8.
[236] Kohler & Turner, *Shark Tagging,* 191-223 (2001); Herst, *An Illustrated Compendium of Sharks, Skates, Rays and Chimaera (Shark Trust 2010)*; AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[237] NMFS, FINAL CONSOLIDATED ATLANTIC HMS FMP (2006), at Appendix B-54.
[238] AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).

chance to become threatened if they swim at a depth targeted by pelagic fisheries.[239] The bigeye thresher shark is physically one of the largest threatened sharks and its diverse range of depth, between 300–2000 meters (approximately 985–6,561 feet), puts this species at high risk of exploitation by pelagic fishing operations.[240]

Lastly, the large size of the bigeye thresher shark's tail also makes it vulnerable to fishing gear. When using its tail to stun prey, the bigeye thresher shark often impales or hooks itself on fishing gear. [241] This behavior makes the bigeye thresher shark particularly susceptible to bycatch and subsequently bycatch mortality.

VI. Critical Habitat

This petition requests the designation of critical habitat in U.S. waters, which are essential to this species' survival and recovery. The ESA mandates that, when the Service lists a species as endangered or threated, it generally must also concurrently designate critical habitat for that species. Section 4(a)(3)(A)(i) of the ESA states that, "to the maximum extent prudent and determinable," the Service "shall, concurrently with making a determination…that a species is an endangered species of threatened species, designate any habitat of such species which is then considered to be critical habitat…" 16 U.S. C. § 1533(a)(3)(A)(i); *see also* 16 U.S.C. § 1533(b)(6)(C). The ESA defines the term "critical habitat" to mean:

> i. The specific areas within the geographical area occupied by the species, at the time it is listed…, on which are found those physical or biological features (I) essential to

[239] Dulvy et al., *Extinction risk and conservation of the world's sharks and rays*, 3 eLIFE SCIENCES 590, Jan. 21, 2014, at 5-6; AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[240] Dulvy et al., *Extinction risk and conservation of the world's sharks and rays*, 3 eLIFE SCIENCES 590, Jan. 21, 2014., at 12; AMORIM ET AL., *ALOPIAS SUPERCILIOSUS* (IUCN Red List of Threatened Species Version 2014.3) (2009).
[241] NMFS, FINAL CONSOLIDATED ATLANTIC HMS FMP (2006), at Appendix B-54.

the conservation of the species and (II) which may require special management considerations or protection; and

ii. Specific areas outside the geographical area occupied by the species at the time it is listed…, upon a determination by the Secretary that such areas are essential for the conservation of the species.

16 U.S.C. § 1532(5)(A).

Defenders requests that NMFS comply with this unambiguous mandate and designate critical habitat concurrently with the listing of the bigeye thresher shark. The areas to be designated for the bigeye thresher shark should include the species' habitat within the Northwest Atlantic—spanning from New England to Florida and the Gulf of Mexico. This area is of particular importance for critical habitat designation as it is home to a higher proportion of juveniles than other areas of the Atlantic.[242] Additionally, areas off of Florida and the Caribbean are possible nursery grounds for this species and also require critical habitat designation.[243] Both Puerto Rico and the U.S. Virgin Islands are known habitat of the bigeye thresher shark and should be included.[244] Further designations should be made within the waters of the U.S. West Coast's Eastern Pacific region—specifically off the southern California coast.

The Magnuson Stevens Fishery Conservation and Management Act ("Magnuson-Stevens Act") requires NMFS to describe and identify essential fish habitat (EFH).[245]An EFH must be designated for all species in the fishery management unit[246] – such as the bigeye thresher shark, which is managed under the Consolidated Highly Migratory Species Fishery Management Plan of 2006. EFH is defined as "those habitats necessary to the species for spawning, breeding, feeding, or growth to maturity." 16 U.S.C. 1801 et seq. The EFH for the bigeye thresher shark has already been

[242] Project Thresher: Trans-Atlantic Pelagic Sharks Research Initiative (July 2014).
[243] *Id.*
[244] NMFS, FINAL CONSOLIDATED ATLANTIC HMS FMP (2006), at Amendment at 132.
[245] *Id.*, at 10-1.
[246] *Id.*

designated for the eastern coast of the United States by NMFS. (See Fig. 9) Given the similarity in definition for "critical habitat" under the ESA and "essential fish habitat" under the Magnuson-Stevens Act, this petition requests a critical habitat designation for the bigeye thresher shark that is equivalent to that already designated as essential fish habitat.

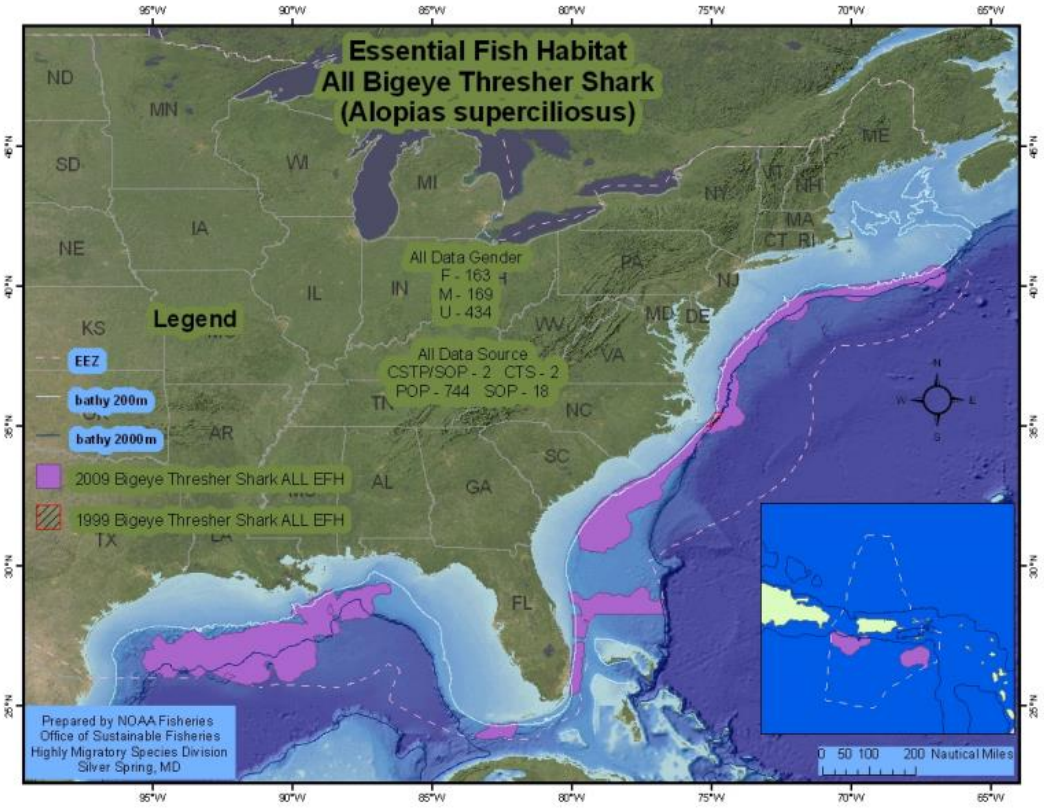

Figure 10: Essential Fish Habitat of all bigeye thresher sharks, Consolidated HMS FMP Amendment 1, 2009.

VII. Conclusion

For the all the reasons explained above, Defenders requests that NMFS list the bigeye thresher shark, *Alopias superciliosus*, as "endangered," or alternatively as "threatened," under the ESA. The species is declining throughout its entire range, or a significant portion of its range, and continues to face overwhelming threats from targeted fishing and bycatch. The bigeye thresher shark currently receives inadequate regulatory protections throughout its range and requires ESA listing to

ensure its survival. Without adequate protection, the species' limiting life history characteristics and predictable aggregations will combine with other threats and likely cause the species' extinction.

If NMFS determines that certain populations of the species qualify as DPSs, but that the species does not qualify as endangered or threatened throughout all or a significant portion of its range, then Defenders requests that NMFS list those DPSs as either endangered or threatened under the ESA.

This Petition contains references to the best scientific and commercial data available for the bigeye thresher shark and meetings the 90-day finding standard by presenting substantial information that would lead a reasonable person to believe that ESA listing may be warranted. Because the bigeye thresher shark faces threats under at least three of the five ESA listing factors, listing is warranted.

Respectfully submitted April 21, 2015,

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