DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Parts 223 and 224

[Docket No. 150506425-5425-01]

RIN 0648-XD941

Endangered and Threatened Wildlife; 90-Day Finding on a Petition to List the Smooth Hammerhead Shark as Threatened or Endangered under the Endangered Species Act

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Department of Commerce.

ACTION: 90-day petition finding, request for information.

SUMMARY: We, NMFS, announce a 90-day finding on a petition to list the smooth hammerhead shark (*Sphyrna zygaena*) range-wide or, in the alternative, any identified distinct population segments (DPSs), as threatened or endangered under the Endangered Species Act (ESA), and to designate critical habitat concurrently with the listing. We find that the petition and information in our files present substantial scientific or commercial information indicating that the petitioned action may be warranted. We will conduct a status review of the species to determine if the petitioned action is warranted. To ensure that the status review is comprehensive, we are soliciting scientific and commercial information pertaining to this species from any interested party.

DATES: Information and comments on the subject action must be received by **[INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

ADDRESSES: You may submit comments, information, or data on this document, identified by the code NOAA-NMFS-2015-0103, by either any of the following methods:

- *Electronic Submissions*: Submit all electronic public comments via the Federal eRulemaking Portal. Go to *www.regulations.gov/#!docketDetail;D=NOAA-NMFS-2015-0103*. Click the "Comment Now" icon, complete the required fields, and enter or attach your comments.
- *Mail*: Submit written comments to Maggie Miller, NMFS Office of Protected Resources (F/PR3), 1315 East West Highway, Silver Spring, MD 20910, USA.

Instructions: Comments sent by any other method, to any other address or individual, or received after the end of the comment period, may not be considered by NMFS. All comments received are a part of the public record and will generally be posted for public viewing on *www.regulations.gov* without change. All personal identifying information (e.g., name, address, etc.), confidential business information, or otherwise sensitive information submitted voluntarily by the sender will be publicly accessible. NMFS will accept anonymous comments (enter "N/A" in the required fields if you wish to remain anonymous).

Copies of the petition and related materials are available on our website at *http://www.fisheries.noaa.gov/pr/species/fish/smooth-hammerhead-shark.html*.

FOR FURTHER INFORMATION CONTACT: Maggie Miller, Office of Protected Resources, 301-427-8403.

SUPPLEMENTARY INFORMATION:

Background

On April 27, 2015, we received a petition from Defenders of Wildlife to list the smooth hammerhead shark (*Sphyrna zygaena*) as threatened or endangered under the ESA throughout its entire range, or, as an alternative, to list any identified DPSs as threatened or endangered. To this end, the petitioners identified five populations that they indicate qualify for protection as DPSs: Northeast Atlantic and Mediterranean Sea, Northwest Atlantic, Southwest Atlantic, Eastern Pacific, and Indo-West Pacific. The petition also requests that critical habitat be designated for the smooth hammerhead shark under the ESA. In the case that the species does not warrant listing under the ESA, the petition requests that the species be listed based on its similarity of appearance to the listed DPSs of the scalloped hammerhead shark (*Sphyrna lewini*). Copies of the petition are available upon request (see **ADDRESSES**)

ESA Statutory, Regulatory, and Policy Provisions and Evaluation Framework

Section 4(b)(3)(A) of the ESA of 1973, as amended (16 U.S.C. 1531 *et seq*.), requires, to the maximum extent practicable, that within 90 days of receipt of a petition to list a species as threatened or endangered, the Secretary of Commerce make a finding on whether that petition presents substantial scientific or commercial information indicating that the petitioned action may be warranted, and to promptly publish such finding in the Federal Register (16 U.S.C. 1533(b)(3)(A)). When it is found that substantial scientific or commercial information in a petition indicates the petitioned action may be warranted (a ‘‘positive 90-day finding’’), we are required to promptly commence a review of the status of the species concerned during which we will conduct a comprehensive review of the

best available scientific and commercial information. In such cases, we conclude the review with a finding as to whether, in fact, the petitioned action is warranted within 12 months of receipt of the petition. Because the finding at the 12-month stage is based on a more thorough review of the available information, as compared to the narrow scope of review at the 90-day stage, a ''may be warranted'' finding does not prejudge the outcome of the status review.

Under the ESA, a listing determination may address a species, which is defined to also include subspecies and, for any vertebrate species, any DPS that interbreeds when mature (16 U.S.C. 1532(16)). A joint NMFS–U.S. Fish and Wildlife Service (USFWS) (jointly, ''the Services'') policy clarifies the agencies' interpretation of the phrase ''distinct population segment'' for the purposes of listing, delisting, and reclassifying a species under the ESA (61 FR 4722; February 7, 1996). A species, subspecies, or DPS is ''endangered'' if it is in danger of extinction throughout all or a significant portion of its range, and ''threatened'' if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range (ESA sections 3(6) and 3(20), respectively, 16 U.S.C. 1532(6) and (20)). Pursuant to the ESA and our implementing regulations, we determine whether species are threatened or endangered based on any one or a combination of the following five section 4(a)(1) factors: the present or threatened destruction, modification, or curtailment of habitat or range; overutilization for commercial, recreational, scientific, or educational purposes; disease or predation; inadequacy of existing regulatory mechanisms; and any other natural or manmade factors affecting the species' existence (16 U.S.C. 1533(a)(1), 50 CFR 424.11(c)).

ESA-implementing regulations issued jointly by NMFS and USFWS (50 CFR 424.14(b)) define ‘‘substantial information’’ in the context of reviewing a petition to list, delist, or reclassify a species as the amount of information that would lead a reasonable person to believe that the measure proposed in the petition may be warranted. In evaluating whether substantial information is contained in a petition, the Secretary must consider whether the petition: (1) Clearly indicates the administrative measure recommended and gives the scientific and any common name of the species involved; (2) 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; (3) provides information regarding the status of the species over all or a significant portion of its range; and (4) is accompanied by the appropriate supporting documentation in the form of bibliographic references, reprints of pertinent publications, copies of reports or letters from authorities, and maps (50 CFR 424.14(b)(2)).

At the 90-day finding stage, we evaluate the petitioners’ request based upon the information in the petition including its references and the information readily available in our files. We do not conduct additional research, and we do not solicit information from parties outside the agency to help us in evaluating the petition. We will accept the petitioners’ sources and characterizations of the information presented if they appear to be based on accepted scientific principles, unless we have specific information in our files that indicates the petition’s information is incorrect, unreliable, obsolete, or otherwise irrelevant to the requested action. Information that is susceptible to more than one interpretation or that is contradicted by other available information will not be

dismissed at the 90-day finding stage, so long as it is reliable and a reasonable person would conclude it supports the petitioners' assertions. In other words, conclusive information indicating the species may meet the ESA's requirements for listing is not required to make a positive 90- day finding. We will not conclude that a lack of specific information alone negates a positive 90-day finding if a reasonable person would conclude that the unknown information itself suggests an extinction risk of concern for the species at issue.

To make a 90-day finding on a petition to list a species, we evaluate whether the petition presents substantial scientific or commercial information indicating the subject species may be either threatened or endangered, as defined by the ESA. First, we evaluate whether the information presented in the petition, along with the information readily available in our files, indicates that the petitioned entity constitutes a ''species'' eligible for listing under the ESA. Next, we evaluate whether the information indicates that the species faces an extinction risk that is cause for concern; this may be indicated in information expressly discussing the species' status and trends, or in information describing impacts and threats to the species. We evaluate any information on specific demographic factors pertinent to evaluating extinction risk for the species (e.g., population abundance and trends, productivity, spatial structure, age structure, sex ratio, diversity, current and historical range, habitat integrity or fragmentation), and the potential contribution of identified demographic risks to extinction risk for the species. We then evaluate the potential links between these demographic risks and the causative impacts and threats identified in section 4(a)(1).

Information presented on impacts or threats should be specific to the species and should reasonably suggest that one or more of these factors may be operative threats that act or have acted on the species to the point that it may warrant protection under the ESA. Broad statements about generalized threats to the species, or identification of factors that could negatively impact a species, do not constitute substantial information indicating that listing may be warranted. We look for information indicating that not only is the particular species exposed to a factor, but that the species may be responding in a negative fashion; then we assess the potential significance of that negative response.

Many petitions identify risk classifications made by nongovernmental organizations, such as the International Union on the Conservation of Nature (IUCN), the American Fisheries Society, or NatureServe, as evidence of extinction risk for a species. Risk classifications by other organizations or made under other Federal or state statutes may be informative, but such classification alone may not provide the rationale for a positive 90-day finding under the ESA. For example, as explained by NatureServe, their assessments of a species' conservation status do ''not constitute a recommendation by NatureServe for listing under the U.S. Endangered Species Act'' because NatureServe assessments ''have different criteria, evidence requirements, purposes and taxonomic coverage than government lists of endangered and threatened species, and therefore these two types of lists should not be expected to coincide'' http://www.natureserve.org/prodServices/pdf/NatureServeStatusAssessmentsListing-Dec%202008.pdf. Additionally, species classifications under IUCN and the ESA are not equivalent; data standards, criteria used to evaluate species, and treatment of uncertainty are also not necessarily the same. Thus, when a petition cites such classifications, we will

evaluate the source of information that the classification is based upon in light of the standards on extinction risk and impacts or threats discussed above.

Distribution and Life History of the Smooth Hammerhead Shark

The smooth hammerhead shark is a circumglobal species found in temperate to warm waters (Compagno, 1984). It occurs close inshore and in shallow waters, over continental shelves, in estuaries and bays, and around coral reefs, but it has also been observed offshore at depths as great as 65-650 feet (20-200 meters (m)) deep (Compagno, 1984; Bester, n.d.). Smooth hammerheads are highly mobile and, within the Sphyrnidae family, are the most tolerant of temperate waters (Compagno, 1984). In the western Atlantic Ocean, the range of the smooth hammerhead shark extends from Nova Scotia to Florida and into the Caribbean Sea, and in the south from southern Brazil to southern Argentina (Compagno, 1984; Bester, n.d). In the eastern Atlantic Ocean, smooth hammerhead sharks can be found from the British Isles to Guinea and farther south through parts of equatorial West Africa. They are also found throughout the Mediterranean Sea (Compagno, 1984; Bester, n.d). In the Indian Ocean, the shark occurs from South Africa, along the southern coast of India and Sri Lanka, to the coasts of Australia. Distribution in the Pacific extends from Vietnam to Japan and includes Australia and New Zealand in the west, the Hawaiian Islands in the central Pacific, and extends from Northern California to the Nayarit state of Mexico, and from Panama to southern Chile in the eastern Pacific (Compagno, 1984; Bester, n.d).

The smooth hammerhead shark gets its common name from its large, laterally expanded head that resembles a hammer (Bester, n.d.). The unique head shape allows for easy distinction of hammerheads of the Sphyrnidae family from other types of sharks.

The smooth hammerhead is characterized by a ventrally located and strongly arched mouth with smooth or slightly serrated teeth (Compagno, 1984). The body of the shark is fusiform with a moderately hooked first dorsal fin and a lower second dorsal fin, and its color ranges from a dark olive to greyish-brown that fades into a white underside (Bester, n.d.).

The general life history characteristics of the smooth hammerhead shark are that of a long-lived, slow-growing, and late maturing species (Compagno, 1984; Casper *et al.*, 2005). The smooth hammerhead can reach a maximum length of 16 feet (5 m) and a maximum weight of 880 pounds (400 kilograms (kg)) (Bester, n.d.). Females are considered sexually mature at the age of 9, which correlates to size at sexual maturity of 8.7 feet (2.65 m) (Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 2013). Males are considered sexually mature slightly earlier in life than females, and at sizes from 8.2-8.7 feet (2.10-2.65 m.) (CITES, 2013). The smooth hammerhead shark is viviparous (i.e., give birth to live young), with a gestation period of 10-11 months, and likely breeds every other year (ICCAT, 2012; Bester, n.d.). Litter sizes range from 20 to 40 live pups with a mean litter size of 33.5 pups. Average length at birth is estimated to be 50 cm (Bester, n.d.).

The smooth hammerhead shark is a high trophic level predator (Cortés, 1999) and opportunistic feeder that consumes a variety of teleosts, small sharks, skates and stingrays, crustaceans, and cephalopods (Compagno, 1984). The species has also been observed scavenging from nets and hooks.

Analysis of Petition and Information Readily Available in NMFS Files

The petition contains information on the species, including the taxonomy, species description, geographic distribution, habitat, population status and trends, and factors contributing to the species' decline. According to the petition, all five causal factors in section 4(a)(1) of the ESA are adversely affecting the continued existence of the smooth hammerhead shark: (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) inadequacy of existing regulatory mechanisms; and (E) other natural or manmade factors affecting its continued existence.

In the following sections, we evaluate the information provided in the petition and readily available in our files to determine if the petition presents substantial scientific or commercial information indicating that an endangered or threatened listing may be warranted as a result of any of these ESA factors. Because we were requested to list a global population and, alternatively, DPSs, we will first determine if the petition presents substantial information that the petitioned action is warranted for the global population. If it does, then we will make a positive finding on the petition and conduct a review of the species range-wide. If after this review we find that the species does not warrant listing range-wide, then we will consider whether the populations requested by the petitioners qualify as DPSs and warrant listing. If the petition does not present substantial information that the global population may warrant listing, and it has requested that we list any populations of the species as threatened or endangered, then we will consider whether the petition provides substantial information that the requested population(s) may qualify as DPSs under the discreteness and significance criteria of our joint DPS

Policy, and if listing any of those DPSs may be warranted. Below, we summarize the information presented in the petition and in our files on the status of the species and the ESA section 4(a)(1) factors that may be affecting the species' risk of global extinction and determine whether a reasonable person would conclude that an endangered or threatened listing may be warranted as a result of any of these factors.

Smooth Hammerhead Shark Status and Trends

The petition does not provide an estimate of global population abundance or trends for the smooth hammerhead shark. The petition refers to the IUCN Redlist status assessment (Casper *et al.,* 2005) and its classification of the smooth hammerhead as globally "vulnerable." The IUCN assessment cites overutilization by global fisheries as the main threat to the species, with smooth hammerheads both targeted and caught as bycatch and kept for their fins.

The petition provides evidence of population declines in a number of regions throughout the smooth hammerhead's range that would indicate that smooth hammerhead sharks may be experiencing declines on a global scale. For example, a stock assessment of smooth hammerhead sharks in the Northwest Atlantic region, conducted by Hayes (2007), estimated a 91 percent decline of the population between 1981 and 2005. Similarly, another study (Myers *et al.,* 2007) used standardized catch per unit effort (CPUE) data from shark-targeted, fishery-independent surveys off the east coast of the United States and found a 99 percent decline of smooth hammerhead sharks from 1972-2003. Myers *et al.* (2007) remarks that the trends in abundance may be indicative of coast-wide population declines because the survey was situated ''where it intercepts sharks on their seasonal migrations.'' In the southwest Atlantic, Brazilian commercial

fisheries report an 80 percent decline in CPUE of the hammerhead complex (including smooth hammerhead sharks) from 2000 to 2008, suggesting a significant decline in abundance of hammerhead sharks from this area (FAO, 2010). The State of Rio Grande do Sul, Brazil, experienced a 65 percent decrease in CPUE from 2000-2002, specifically of smooth hammerhead sharks (CITES, 2013). In the Mediterranean Sea, estimated declines of the *Sphyrna* complex (with *S. zygaena* comprising the main species) exceeded 99 percent over the last century, with hammerhead sharks considered to be functionally extinct in the region (Feretti *et al.*, 2008). In the Indian Ocean, tagging surveys conducted off the eastern coast of South Africa over the course of 25 years suggest smooth hammerhead abundance has declined, after reaching a peak in 1987 (n=468, 34.9 percent of the total smooth hammerheads tagged over the course of the study; Diemer *et al.*, 2007). However, catches of smooth hammerhead sharks in beach protective nets set off the KwaZulu-Natal beaches in South Africa were highly variable from 1978-2003, with no clear trend that could indicate the status of the population (Dudley and Simpfendorfer, 2006). In the Eastern Pacific, incidental catches of smooth hammerhead sharks by tuna purse-seine vessels have exhibited a declining trend, from a peak of 1,205 sharks caught in 2004 to 436 individuals in 2011 (a decrease of around 64 percent) (CITES, 2013). Based on the available information from these regions, we find evidence suggesting that the population abundance of smooth hammerhead sharks has declined significantly and may still be in decline. While data are limited with respect to population size and trends, we find the information presented in the petition and readily available in our files to be substantial information on smooth hammerhead shark abundance, trends, and status.

Analysis of ESA Section 4(a)(1) Factors

The present or threatened destruction, modification, or curtailment of its habitat or range

The petition contends that smooth hammerhead sharks are at risk of extinction throughout their range due to pollutants, especially those that are able to bioaccumulate and biomagnify to high concentrations at high trophic levels. Of particular concern to the petitioners are high mercury and polychlorinated biphenyl (PCB) concentrations in smooth hammerhead shark tissues. International agencies, such as the Food and Drug Administration and the World Health Organization, have set a recommended maximum of 1 µg/g concentration of mercury in seafood tissues (García-Hernández *et al.*, 2007) for human consumption. Storelli *et al.* (2003) tested tissue samples from four smooth hammerhead sharks from the Mediterranean Sea and found that, on average, tissue samples from the liver and muscle had concentrations of mercury that greatly exceeded recommended limits (mean mercury concentration in muscle samples: 12.15 ± 4.60 µg/g, mean mercury concentration in liver samples: 35.89 ± 3.58 µg/g). Additionally, these specimens showed high concentrations of more chlorinated (hexa- and hepta-chlorinated) PCBs. Similarly, García-Hernández *et al.* (2007) found high concentrations of mercury in tissues of four smooth hammerhead sharks from the Gulf of California, Mexico (mean mercury concentration in muscle tissue: 8.25 ± 9.05 µg/g). Escobar-Sánchez (2010) also studied mercury concentrations in the muscle tissues of smooth hammerhead sharks from the Mexican Pacific, but out of 37 studied sharks, only one shark had a mercury concentration that exceeded the recommended limits. As stated previously, we look for information in the petition and in our files to indicate that not only is the particular species exposed to a factor, but that the species may be responding in a negative fashion. Despite providing evidence that smooth hammerhead sharks accumulate pollutants in

their tissues, the petitioners fail to provide evidence that these concentrations of mercury and PCBs are causing detrimental physiological effects to the species or may be contributing significantly to population declines in smooth hammerhead sharks to the point where the species may be at risk of extinction. As such, we conclude that the information presented in the petition on threats to the habitat of the smooth hammerhead shark does not provide substantial information indicating that listing may be warranted for the species.

Overutilization for commercial, recreational, scientific, or educational purposes

Information from the petition and in our files suggests that the primary threat to the smooth hammerhead shark is from overutilization by fisheries. Smooth hammerhead sharks are both targeted and taken as bycatch in many global fisheries. Smooth hammerhead sharks face fishing pressure from commercial, artisanal, and recreational fisheries that use a variety of gear types to harvest these sharks: pelagic and bottom longlines, handlines, gillnets, purse seines, and pelagic and bottom trawls (Camhi *et al.*, 2007). Smooth hammerhead sharks are mostly targeted for their large, high-quality fins for use in shark fin soup, which are then transported to Asian markets where they fetch a high market price ($88/kg in 2003) (Abercrombie *et al.*, 2005). In the Hong Kong fin market, which is the largest fin market in the world, *S. zygaena* and *S. lewini* are mainly traded under a combined market category called *Chun chi* (Abercrombie *et al.*, 2005; NMFS, 2014a). Based on data from 2000-2002, *Chun chi* is the second most traded category, comprising around 4-5 percent of the total fins traded in the Hong Kong market annually (Clarke *et al.*, 2006; Camhi *et al.*, 2007). This percentage of fins correlates to an estimated 1.3-2.7 million individuals of scalloped and smooth hammerhead sharks

(equivalent to a biomass of 49,000-90,000 tons) traded in the Hong Kong market annually. Given their relatively high price and popularity in the Hong Kong market, there is concern that many smooth hammerhead sharks caught as incidental catch may be kept for the fin trade as opposed to released alive; however, as noted in the Great Hammerhead 12-month finding (79 FR 33509; June 11, 2014), there has also been a recent global push to decrease the demand of shark fins, especially for shark fin soup.

In the northwestern Atlantic, smooth hammerhead sharks are mainly caught as bycatch in the U.S. commercial longline and net fisheries and by U.S. recreational fishermen using rod and reel, albeit rarely (NMFS, 2014b). This is likely a reflection of the low abundance of the species. Between 1981 and 2005, Hayes (2007) estimated that the Northwest Atlantic population of smooth hammerhead shark suffered a 91 percent decline in size. As of 2005, the population was estimated to be at 19-24 percent of the biomass that would produce maximum sustainable yield (MSY), as defined by the Magnuson-Stevens Fishery Conservation and Management Act, and that the population was being fished at 150 percent of fishing mortality associated with MSY. Under 2005 catch levels, Hayes (2007) estimated that there was a 64 percent likelihood of smooth hammerhead shark recovery within 30 years. It is important to note that the term "recovery" as used by Hayes (2007) is defined under the Magnuson-Stevens Fishery Conservation and Management Act and is based on different criteria than threatened or endangered statuses under the ESA. As such, it does not necessarily indicate that a species may warrant listing under the ESA because it does not necessarily have any relationship to a species' extinction risk. Overutilization under the ESA means that a species has been or is being harvested at levels that pose a risk of extinction, not just at

levels over MSY. However, we agree that the significant decline estimated for the population combined with the species' biological susceptibility to current fisheries and high at-vessel mortality rates (see *Other natural or manmade factors affecting its continued existence* section) may be of concern as it relates to the extinction risk of the species. In addition, we note that, as pointed out in the NMFS Great Hammerhead Shark Status Review (Miller *et al.*, 2014), Hayes (2007) (cited as Hayes 2008 in the status review) identified many uncertainties in the data and catch estimates from his stock assessment model that may have affected population decline estimates and should be taken into consideration. We will evaluate these uncertainties and the adequacy of existing regulatory measures in preventing further declines in the species during the status review phase.

In the southwestern Atlantic, industrial landings of the hammerhead complex (mainly *S. lewini* and *S. zygaena*) off the coast of Santa Catarina, Brazil increased from 6.7 tons in 1989 to a peak of 570 tons in 1994, due to fast development of industrial net fishing during this time (CITES, 2013). However, catches of hammerheads from the industrial net fishery fell to 44 tons in 2008, despite continued fishing effort. Industrial deep fishing with bottom gillnets off the coast of Brazil is a threat to recruiting coastal hammerheads, especially during their mating and birthing seasons (CITES, 2013). Data from a bottom gillnet fishery targeting hammerheads off the coast of Brazil noted an 80 percent decline in CPUE of the hammerhead complex from 2000-2008 (FAO, 2010). The targeted hammerhead fishery was abandoned after 2008 when the species became too rare to make the fishery economically viable. In the Rio Grande do Sul State of Brazil, a 65 percent decrease in CPUE of smooth hammerhead sharks from the industrial fisheries

was noted from 2000-2002, decreasing from 0.37 tons per trip to 0.13 tons per trip (CITES, 2013). The various fishing operations in this region concentrate effort in areas where all life stages of hammerhead sharks occur. For example, the artisanal net and industrial trawl fishing within inshore areas and on the continental shelf place neonates and juveniles at risk of fishery-related mortality, and the industrial gillnet and longline fisheries operating on the outer continental shelf and adjacent ocean waters place adults at risk (CITES, 2013). With this heavy fishing effort affecting all life stages, there may be observed declines in the population.

In the Mediterranean Sea, it is thought that smooth hammerheads may have been fished to functional extinction (Feretti *et al.*, 2008). In the early 20th century, coastal fisheries would target large sharks and also land them as incidental bycatch in gill nets, fish traps, and tuna traps (Feretti *et al.*, 2008). Feretti *et al.* (2008) hypothesized that certain species, including *S. zygaena,* found refuge in offshore pelagic waters from this intense coastal fishing. However, with the expansion of the tuna and swordfish longline and drift net fisheries into pelagic waters in the 1970s, these offshore areas no longer served as protection from fisheries, and sharks again became regular bycatch. Consequently, the hammerhead shark abundance in the Mediterranean Sea (primarily *S. zygaena*) is estimated to have declined by more than 99 percent over the past 107 years, with hammerheads considered to be functionally extinct in the region. Recently, Sperone *et al.* (2012) provided evidence of the contemporary occurrence of the smooth hammerhead shark in Mediterranean waters, recording seven individuals from 2000-2009 near the Calabria region of Italy. Additionally, the aforementioned toxicology study, Storelli *et al.* (2003), used four smooth hammerhead sharks that were caught as bycatch

from the swordfish fishery in the Mediterranean in July of 2001. These two studies suggest that numbers of smooth hammerhead shark in the Mediterranean region may be slowly recovering (Sperone *et al.*, 2012), although further study is needed.

In the waters off of northwestern Africa, hammerhead sharks are retained primarily as bycatch from the industrial fisheries and catch from the artisanal fisheries operating within this region. Historically, Spanish swordfish gillnet and longline fisheries and European industrial trawl fisheries caught significant amounts of hammerheads (Buencuerpo *et al.*, 1998; Zeeberg *et al.*, 2006). For example, from 1991-1992 a total of 675 hammerheads (the authors refer to them as scalloped hammerheads but give the scientific name of *S. zygaena*) were landed as incidental catch in the Spanish swordfish fishery, with juveniles comprising the majority of the catch (94 percent of males and 96 percent of females) (Buencuerpo *et al.*, 1998). In a study of European trawl fisheries off the coast of Mauritania, 42 percent of the megafauna bycatch (the largest category) were hammerhead sharks and 75 percent of the hammerhead sharks were juveniles (Zeeberg *et al.*, 2006). The study estimated that over 1,000 hammerheads are removed annually, a number considered to be unsustainable for the region. Additionally, according to a review of shark fishing in the Sub Regional Fisheries Commission member countries (Cape-Verde, Gambia, Guinea, Guinea-Bissau, Mauritania, Senegal, and Sierra Leone), Diop and Dossa (2011) state that shark fishing is an important component of the artisanal fishery. Before 1989, artisanal catch of sharks was less than 4,000 mt. However, from 1990 to 2005, shark catch increased dramatically from 5,000 mt to over 26,000 mt, as did the level of fishing effort (Diop and Dossa, 2011). However, from 2005 to 2008, shark landings dropped by more than 50 percent, to 12,000 mt (Diop and Dossa, 2011). As

noted in the Scalloped Hammerhead Final Listing Rule (79 FR 38213; July 3, 2014), regulations in Europe appear to be moving towards the sustainable use and conservation of shark species; however, there is still concern regarding the level of exploitation of hammerhead sharks off the west coast of Africa, and the threat warrants further exploration.

In the eastern Pacific Ocean, smooth hammerhead sharks are both targeted and taken as bycatch in industrial and artisanal fisheries (Casper *et al.*, 2005). In Mexico, sharks, in general, are an important component of the artisanal fishery (INP, 2006). They are targeted for both their fins, which are harvested by fishermen for export, and for their shark meat, which is becoming increasingly important for domestic consumption. In the Gulf of Tehuantepec, smooth hammerhead sharks are the seventh most important shark species (out of 21 identified species) caught in the artisanal fishery (INP, 2006). In a survey of the targeted artisanal elasmobranch fishery off the coast of Sinaloa, Mexico, smooth hammerhead sharks accounted for 6.4 percent (n=70) of total landings in the more active winter season and 3 percent (n=120) of the total surveyed catch from 1998-1999 (Bizzarro *et al.*, 2009). Of concern is the fact that all individuals landed during this survey were juveniles. Similarly, a 1995-1996 survey of the artisanal fishery off the Tres Marinas Islands of Mexico demonstrated that smooth hammerhead sharks constituted 35 percent (n=700) of the total catch, and only 20 percent of the females and 1 percent of the males were considered mature (Pérez-Jiménez *et al.*, 2005). Given the species' low productivity, slow growth rate, and late maturity, this targeted removal of recruits from the population may cause or continue to cause declines in the abundance of the species to

the point where it may be contributing to the species' risk of extinction and is cause for concern that warrants further review.

Smooth hammerhead sharks are also taken as bycatch by the tuna purse-seine fisheries operating in the Inter-American Tropical Tuna Commission convention area of the Eastern Pacific region. Based on data from observers, smooth hammerhead sharks constituted around 1.7 percent of the total bycatch from the tuna purse-seine fleet from 2000-2001. Since the mid-1980s, the tuna purse-seine fishery in the Pacific has been rapidly expanding (Williams and Terawasi, 2011), and despite the increase in fishery effort (or perhaps a consequence of this increased fishing pressure), incidental catch of smooth hammerhead sharks has seen a decline, from a peak of 1,205 individuals in 2004 to 436 individuals in 2011 (CITES, 2013).

In the west-coast based U.S. fisheries, hammerheads are primarily caught as bycatch, and, based on observer data, appear to be relatively rare in the fisheries catch. For example, in the California/Oregon drift gillnet fishery, which targets swordfish and common thresher shark and operates off the U.S. Pacific coast, observers recorded only 70 bycaught smooth hammerheads and 2 unidentified hammerheads in 8,698 sets conducted over the past 25 years (from 1990-2015; WCR, 2015).

Throughout the majority of the Indian Ocean and western Pacific, fisheries data in the petition and available in our files are lacking, but shark finning and illegal, unregulated and unreported (IUU) fishing were identified by the petitioners as threats contributing to the overutilization of the species in these areas. The smooth hammerhead shark is caught in both artisanal and commercial fisheries as directed catch and retained incidental bycatch (Casper *et al.*, 2005). Pelagic fisheries from industrialized countries

have been active in the region for over 50 years (Casper *et al.*, 2005). A recent review of fisheries in the Indian Ocean reports that sharks in the area are fully or over-exploited (de Young, 2006), but due to the high levels of IUU fishing and lack of species-specific catch reporting, it is difficult to determine the rate of exploitation of smooth hammerhead sharks. In Western Australia, smooth hammerhead sharks are retained as bycatch in the demersal gillnet fishery, but it appears that the fishing pressure is too low to have impacted populations in this region (Casper *et al.*, 2005). Smooth hammerheads are relatively common around New Zealand's North Island, where they are frequently caught as bycatch in commercial gillnets and trawls; however, these individuals are often discarded dead (Casper *et al.*, 2005).

In the central Pacific, smooth hammerhead sharks are bycaught in the Hawaii-based fisheries, but comprise a very small proportion of the bycatch. In fact, from 1995-2006, only 49 smooth hammerhead sharks and 38 unidentified hammerhead sharks were bycaught in the Hawaiian longline fishery, amounting to less than 0.1 percent of all bycaught shark species in the fishery for that time period (Walsh *et al.*, 2009). According to the U.S. National Bycatch Report (NMFS, 2011; NMFS, 2013), the Hawaii-based deep-set pelagic longline fishery (which targets swordfish) bycaught 3,173.91 pounds (1440 kg) of smooth hammerhead in 2010, an increase of around 29 percent from the amount reported in 2005 (2,453.74 pounds (1,113 kg)). However, for the Hawaii based shallow-set pelagic longline fishery (which also targets swordfish), there were no reports of bycaught smooth hammerhead sharks in 2010, whereas in 2005, 930.35 pounds (422 kg) of smooth hammerheads were recorded as bycatch. Additionally, in 2011, an estimated 12 smooth hammerhead sharks (based on extrapolated observer data) were

taken in the American Samoa longline fishery (PIFSC, unpublished data). Further review is necessary to determine if this level of fishery-related mortality is a threat to the smooth hammerhead shark.

Given the evidence of historical exploitation of the species and subsequent population declines, and the fact that fishing pressure from industrial and artisanal fisheries may still be high based on available fisheries data and the high value and contribution of smooth hammerhead fins to the international fin trade, we conclude that the information in the petition and in our files suggest that global fisheries are impacting smooth hammerhead shark populations to a degree that raises concern that the species may be at risk of extinction.

Disease or Predation

The petition asserts that high concentrations of arsenic in smooth hammerhead shark tissues should be considered a significant threat to smooth hammerhead shark populations as it is a possible carcinogenic. The petition refers to Storelli *et al.* (2003), which found that smooth hammerhead sharks (n=4) had a mean arsenic concentration in muscle samples of 18.00 ± 8.57 µg/g and a mean arsenic concentration in liver samples of 44.22 ± 2.22 µg/g. The study cites that sharks rarely have arsenic concentrations that exceed 10 µg/g, and so the arsenic levels in the sharks tissues should be considered "notably elevated" (Storelli *et al.*, 2003). The petitioners contend that the smooth hammerhead sharks are at a higher risk for developing cancer due to these high levels of arsenic. However, as already stated, we look for information in the petition and in our files to indicate that not only is the particular species exposed to a factor, but that the species may be responding in a negative fashion. Despite providing evidence that some

smooth hammerhead sharks have elevated levels of arsenic in their tissues, the petitioners fail to show that those specific levels are causing detrimental physiological effects or may be contributing significantly to population declines in smooth hammerhead sharks to the point where the species may be at risk of extinction. Additionally, neither the petitioners nor the information in our files indicate that predation is a significant threat to this apex species. As such, we conclude that the information presented in the petition on the threats of disease or predation to the smooth hammerhead shark does not provide substantial information indicating that listing may be warranted for the species.

Inadequacy of Existing Regulatory Mechanisms

The petition asserts that the existing international, regional, and national regulations do not adequately protect the smooth hammerhead shark and have been insufficient in preventing population declines. Additionally, the petition asserts that most existing regulations are inadequate because they limit retention of the smooth hammerhead shark and argues that the focus should be on limiting the catch of smooth hammerhead sharks in order to decrease fishery-related mortality, particularly given the species' high post-catch mortality rates. Among the regulations that the petition cites as inadequate are shark finning bans and shark finning regulations. Shark finning bans are currently one of the most widely used forms of shark utilization regulations, and the petition notes that 21 countries, the European Union, and 9 Regional Fisheries Management Organizations (RFMOs) have implemented shark finning bans (CITES, 2013). However, the petition contends that these shark finning bans are often ineffective as enforcement is difficult or lacking, implementation in RFMOs and international agreements is not always binding, and catches often go unreported (CITES, 2013). The

petition also states that shark finning regulations tend to have loopholes that can be exploited to allow continued finning. Many shark finning regulations require that both the carcass and the fins be landed, but not necessarily naturally attached. Instead, the regulations impose a fin to carcass ratio weight, which is usually 5 percent (Dulvy *et al.*, 2008). This allows fishermen to preferentially retain the carcasses of valuable species and valuable fins from other species in order to maximize profits (Abercrombie *et al.*, 2005). In 2010, the United States passed the Shark Conservation Act, which except for a limited exception regarding smooth dogfish, requires all sharks to be landed with their fins attached, abolishing the fin to carcass ratio. However, in other parts of the species' range, the inadequacy of existing finning bans may be contributing to further declines in the species by allowing the wasteful practice of shark finning at sea to continue.

In the Atlantic United States, smooth hammerhead sharks are managed as part of the Large Coastal Shark (LCS) complex group under the U.S. Highly Migratory Species Fishery Management Plan (HMS FMP). The petition asserts that the inclusion of smooth hammerheads in the LCS complex offers minimal to no protection to the smooth hammerhead shark, and that implementation of Amendment 5 to the HMS FMP does not cover smooth hammerhead sharks. We find that the petitioners are incorrect in their assertion.

Amendments, in general, are rulemakings that amend FMPs, and in 2012, NMFS published a draft of Amendment 5 to the 2006 HMS FMP (77 FR 73029) that proposed measures designed to reduce fishing mortality and effort in order to rebuild various overfished Atlantic shark species while ensuring that a limited sustainable shark fishery for certain species could be maintained. After considering all of the public comments on

Draft Amendment 5, NMFS split Amendment 5 into two rulemakings: Amendment 5a (which addressed scalloped hammerhead, sandbar, blacknose, and Gulf of Mexico blacktip sharks) and Amendment 5b (which addressed dusky sharks).

Amendment 5a was implemented in 2013 (78 FR 40318) and was a rulemaking designed to maintain the rebuilding of sandbar sharks, end overfishing and rebuild scalloped hammerhead and Atlantic blacknose sharks, establish total allowable catches (TAC) and commercial quotas for Gulf of Mexico blacknose and blacktip sharks, and establish new recreational shark fishing management measures. Although Amendment 5a focuses specifically on the rebuilding of scalloped hammerhead sharks, the regulatory measures affect and likely benefit the entire hammerhead complex. For example, with the implementation of Amendment 5a, commercial hammerhead shark quotas (which include smooth, scalloped and great hammerheads) have been separated from the aggregated LCS management group quotas, with links between the Atlantic hammerhead shark quota and the Atlantic aggregated LCS quotas, and links between the Gulf of Mexico hammerhead shark quota and Gulf of Mexico aggregated LCS quotas. In other words, if either the aggregated LCS or hammerhead shark quota is reached, then both the aggregated LCS and hammerhead shark management groups will close. These quota linkages were implemented as an additional conservation benefit for the hammerhead shark complex due to the concern of hammerhead shark bycatch and additional mortality from fishermen targeting other sharks within the LCS complex. The separation of the hammerhead species for quota monitoring purposes from other sharks within the LCS management unit allows for better management of the specific utilization of the hammerhead shark complex, which includes smooth hammerhead sharks.

Additionally, although the petition asserts that Amendment 5 did not cover the smooth hammerhead shark, it acknowledges that an applicable protection for smooth hammerhead sharks from Amendment 5a is the minimum size catch requirement for recreational fishermen, which has been set at 6.5 feet (198 cm). However, the petition notes that this minimum size is below the size at maturity for smooth hammerhead sharks (estimated at 210-250 cm for males and 270 cm for females), and, as such, allows for the continued catch of immature smooth hammerhead sharks.

Finally, although not part of Amendment 5a but still applicable to the smooth hammerhead shark, we note that starting in 2011, U.S. fishermen using pelagic longline (PLL) gear and operating in the Atlantic Ocean, including the Caribbean Sea, and dealers buying from vessels that have PLL gear onboard, have been prohibited from retaining onboard, transshipping, landing, storing, selling, or offering for sale any part or whole carcass of hammerhead sharks of the family Sphyrnidae (except for *S. tiburo*) (76 FR 53652; August 29, 2011). This prohibition provides an additional benefit to the species by reducing the fishery-related mortality of this species within the Atlantic.

While we find that the petitioners are incorrect in their assertion that the inclusion of smooth hammerheads in the LCS complex offers minimal to no protection to the smooth hammerhead shark and the implementation of Amendment 5 (presumably Amendment 5a) does not cover smooth hammerhead sharks, we will evaluate the adequacy of these and the other existing regulations in relation to the threat of overutilization of the species during the status review.

In terms of other national measures, the petition provides a list of countries that have prohibited shark fishing in their respective waters, but notes that many suffer from

enforcement related issues, citing cases of illegal fishing and shark finning. The petition also highlights enforceability issues associated with international agreements regarding smooth hammerhead shark utilization and trade. Based on the information presented in the petition as well as information in our files, we find that further evaluation of the adequacy of existing regulatory measures is needed to determine whether this may be a threat contributing to the extinction risk of the species.

Other natural or manmade factors affecting its continued existence

The petition contends that ‘‘biological vulnerability’’ in the form of long gestation periods, late maturity, large size, relatively infrequent reproduction, and high post-catch mortality rates exacerbate the threat of overutilization and increase the species’ susceptibility to extinction. The petition cites Cortés *et al.* (2010), which estimated a post-release mortality of 85 percent for smooth hammerheads caught on pelagic longline. In New South Wales, Australia, Reid and Krogh (1992) examined shark mortality rates in protective beach nets set off the coast between 1950 and 1990, and found that only 1.7 percent of the total number of hammerheads caught in the net (total =2,031 sharks) were still alive when the nets were cleared. These high post-release mortality rates increases the sharks’ vulnerability to fishing pressure, with any capture of this species, regardless of whether the fishing is targeted or incidental, contributing to its fishing mortality. However, in an ecological risk assessment of 20 shark stocks, Cortés *et al.* (2010) found that the smooth hammerhead ranked among the least vulnerable sharks to pelagic longline fisheries in the Atlantic Ocean, although the authors note that the amount and quality of data regarding the species was considerably lower than for the other species. Overall, this information suggests that the species’ biological vulnerability

(low productivity and high post-release mortality) may be a threat in certain fisheries, possibly contributing to an increased risk of extinction, but may not be a cause for concern in other fisheries.

The petition also contends that the species' tendency to form juvenile aggregations increases the species' susceptibility to extinction. Juveniles of the species have been known to aggregate in shallow, coastal waters (Zeeberg *et al.*, 2006; Diemer *et al.*, 2011; CITES, 2013), which increases the species' susceptibility to being caught in large numbers. These shallow areas are close to coastlines and, as such, generally face heavier fishing pressure from commercial, artisanal, and recreational fisheries. Many studies of targeted and retained bycatch shark fisheries have demonstrated that a large amount of the catch of smooth hammerhead sharks are juveniles (Bizzarro *et al.*, 1998; Buencuerpo *et al.*, 1998; Zeeberg *et al.*, 2006; Diemer *et al.*, 2007). The removal of substantial numbers of juveniles from a population can have significant effects on recruitment to the population and could lead to population declines and potentially extinction of a species. Given the observed declines in the species, this juvenile aggregating behavior and, consequently, increased susceptibility to being caught in large numbers, may be a threat that is contributing to the extinction risk of the species.

Thus, the available information in the petition and in our files suggests that the species' natural biological vulnerability (including high post-catch mortality rates and aggregating behavior) may present a threat that warrants further exploration to see if it is exacerbating the threat of overutilization and contributing to the species' risk of extinction that is cause for concern.

Summary of ESA Section 4(a)(1) Factors

We conclude that the petition presents substantial scientific or commercial information indicating that a combination of three of the section 4(a)(1) factors (overutilization for commercial, recreational, scientific, or educational purposes; inadequate existing regulatory mechanisms; and other natural factors) may be causing or contributing to an increased risk of extinction for the smooth hammerhead shark.

Petition Finding

After reviewing the information contained in the petition, as well as information readily available in our files, and based on the above analysis, we conclude the petition presents substantial scientific information indicating the petitioned action of listing the smooth hammerhead shark as threatened or endangered may be warranted. Therefore, in accordance with section 4(b)(3)(B) of the ESA and NMFS' implementing regulations (50 CFR 424.14(b)(2)), we will commence a status review of the species. During our status review, we will first determine whether the species is in danger of extinction (endangered) or likely to become so (threatened) throughout all or a significant portion of its range. If it is not, then we will consider whether the populations identified by the petitioners meet the DPS policy criteria, and if so, whether any of these are threatened or endangered. If no populations meet the DPS policy criteria, then we will consider whether a similarity of appearance listing is warranted. We now initiate this review, and thus, the smooth hammerhead shark is considered to be a candidate species (69 FR 19975; April 15, 2004). Within 12 months of the receipt of the petition (April 27, 2016), we will make a finding as to whether listing the species (or any petitioned DPSs) as endangered or threatened is warranted as required by section 4(b)(3)(B) of the ESA. If listing the species (or any petitioned DPSs) or a similarity of appearance listing is found

to be warranted, we will publish a proposed rule and solicit public comments before developing and publishing a final rule.

Information Solicited

To ensure that the status review is based on the best available scientific and commercial data, we are soliciting information on whether the smooth hammerhead shark is endangered or threatened. Specifically, we are soliciting information in the following areas: (1) Historical and current distribution and abundance of this species throughout its range; (2) historical and current population trends; (3) life history in marine environments, including identified nursery grounds; (4) historical and current data on smooth hammerhead shark bycatch and retention in industrial, commercial, artisanal, and recreational fisheries worldwide; (5) historical and current data on smooth hammerhead shark discards in global fisheries; (6) data on the trade of smooth hammerhead shark products, including fins, jaws, meat, and teeth; (7) any current or planned activities that may adversely impact the species; (8) ongoing or planned efforts to protect and restore the species and its habitats; (9) population structure information, such as genetics data; and (10) management, regulatory, and enforcement information. We request that all information be accompanied by: (1) Supporting documentation such as maps, bibliographic references, or reprints of pertinent publications; and (2) the submitter's name, address, and any association, institution, or business that the person represents.

References Cited

A complete list of references is available upon request to the Office of Protected Resources (see **ADDRESSES**).

Authority

The authority for this action is the Endangered Species Act of 1973, as amended **(**16 U.S.C. 1531 *et seq*.).

Dated: August 5, 2015.

Samuel D. Rauch III,

Deputy Assistant Administrator for Regulatory Programs,

National Marine Fisheries Service.

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