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**DEPARTMENT OF COMMERCE**

**National Oceanic and Atmospheric Administration**

**[Docket No. 200226-0065; RTID 0648-XR088]**

**Endangered and Threatened Species; Determination on the Designation of Critical Habitat for Oceanic Whitetip Shark**

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

**ACTION:** Notice.

**SUMMARY:** We, NMFS, have determined that a designation of critical habitat under the Endangered Species Act (ESA) for the oceanic whitetip shark (*Carcharhinus longimanus*) is not prudent at this time. Based on a comprehensive review of the best scientific data available, we find there are no identifiable physical or biological features that are essential to the conservation of the oceanic whitetip shark within areas under U.S. jurisdiction. We also find that there are no areas outside of the geographical area occupied by the species under U.S. jurisdiction that are essential to its conservation. As such, we find there are no areas within the jurisdiction of the United States that meet the definition of critical habitat for the oceanic whitetip shark.

**DATES:** This finding is made on [*insert date of publication in the **FEDERAL REGISTER***].

**ADDRESSES:** Electronic copies of the determination, list of references, and supporting documents prepared for this action are available from the NMFS Office of Protected Resources Web site at <https://www.fisheries.noaa.gov/species/oceanic-whitewtip-shark>.

**FOR FURTHER INFORMATION CONTACT:** Adrienne Lohe, NMFS, Office of Protected Resources, (301) 427-8403.

## **SUPPLEMENTARY INFORMATION:**

### **Background**

On January 30, 2018, we published a final rule to list the oceanic whitetip shark (*Carcharhinus longimanus*) as a threatened species under the ESA (83 FR 4153). Section 4(b)(6)(C) of the ESA requires the Secretary of Commerce (Secretary) to designate critical habitat concurrently with making a determination to list a species as threatened or endangered unless it is not determinable at that time, in which case the Secretary may extend the deadline for this designation by 1 year. In our proposal to list the species as threatened (81 FR 96304, Dec. 29, 2016), we requested relevant information from interested persons to help us identify and describe the physical and biological features essential to the conservation of the oceanic whitetip shark, and assess the economic impacts of designating critical habitat for the species. We solicited input from the public, other governmental agencies, the scientific community, industry, environmental groups, and any other interested parties on features and areas that may meet the definition of critical habitat for the oceanic whitetip shark within U.S. waters. However, at the time of listing, and based on comments provided and the best available scientific information, we concluded that critical habitat was not determinable because: (1) sufficient information was not available to assess the impacts of designation; and (2) sufficient information was not available regarding the physical and biological features essential to conservation. We again requested interested persons to submit relevant information related to the identification of critical habitat and essential physical or biological features for this species, as well as economic or other relevant impacts of designation of critical habitat for the oceanic whitetip shark. Though we did not receive any information relevant to the designation of critical habitat in response to this request, we used the best available scientific data to evaluate whether critical habitat could be

identified for the oceanic whitetip shark. As discussed below, we still find that there are no identifiable physical or biological features that are essential to the conservation of the oceanic whitetip shark within areas under U.S. jurisdiction, or unoccupied areas under U.S. jurisdiction that are essential to the conservation of the species. Therefore, at this time we find no areas within U.S. jurisdiction that meet the definition of critical habitat for the oceanic whitetip shark.

This finding describes information on the biology, distribution, and habitat use of the oceanic whitetip shark and the methods used to identify areas that may meet the definition of critical habitat. In this determination, we focus on information directly relevant to the designation of critical habitat for oceanic whitetip sharks.

### **Oceanic Whitetip Shark Biology and Status**

The following discussion of the life history and status of the oceanic whitetip shark is based on the best scientific data available, including the “Endangered Species Act Status Review Report: Oceanic Whitetip Shark (*Carcharhinus longimanus*)” (Young *et al.* 2017).

The oceanic whitetip shark is a large, pelagic species of shark, described historically as one of the most abundant shark species in tropical waters worldwide (Mather and Day 1954; Backus *et al.* 1956; Compagno 1984). The oceanic whitetip shark belongs to the family Carcharhinidae and is a member of the genus *Carcharhinus*, which includes other pelagic species of sharks, such as the silky shark (*C. falciformis*) and dusky shark (*C. obscurus*).

The oceanic whitetip shark is globally distributed and can be found in all ocean basins in epipelagic tropical and subtropical waters. The species can be found offshore, along the edges of continental shelves, or around oceanic islands in deep water (Backus *et al.* 1956; Strasburg 1958; Compagno 1984; Bonfil *et al.* 2008) and appears to be thermally sensitive, exhibiting a strong preference for the surface mixed layer in warm waters above 20°C (Bass *et al.* 1973; Bonfil *et al.*

2008). Several archival satellite tagging studies from various regions of the species' range indicate that oceanic whitetip sharks spend most of their time at depths of less than 200 m (above the thermocline) (Musyl *et al.* 2011; Carlson and Gulak 2012; Howey-Jordan *et al.* 2013; Tolotti *et al.* 2017). The oceanic whitetip is generally thought to be a long-lived species, ranging from 12 to 18 years in the North Pacific and Western and Central Pacific, respectively (Joung *et al.* 2016; D'Alberto *et al.* 2017), and 13 to 19 years in the South Atlantic (Seki *et al.* 1998; Lessa *et al.* 1999; Rodrigues *et al.* 2015), with relatively low reproductive output.

Similar to other carcharhinid species, the oceanic whitetip shark is viviparous (*i.e.*, gives birth to live young) with placental embryonic development. Reproductive periodicity is thought to be biennial, with individuals giving birth on alternate years after a 10-12 month gestation period (Backus *et al.* 1956; Seki *et al.* 1998; Tambourgi *et al.* 2013). However, recent unpublished data obtained via ultrasonography of pregnant females over multiple years suggests that at least for a proportion of the population, reproduction could be annual (James Gelsleichter, University of North Florida, unpublished data). Litter sizes range from 1 to 14 (average of 6), and there is a positive correlation between female size and number of pups per litter, with larger sharks producing more offspring (Backus *et al.* 1956; Strasburg 1958; Bass *et al.* 1973).

In terms of movement, the oceanic whitetip shark is considered to be a highly migratory species, with several satellite tracking studies measuring long distance movements of up to 4,285 km (Musyl *et al.* 2011) and over 6,000 km in the open ocean (Filmalter *et al.* 2012). Although the species is considered highly migratory and capable of making long distance movements, data from pop-off satellite archival tags provides evidence that this species also exhibits a high degree of philopatry in some locations (*e.g.*, Cat Island, Bahamas and Northeast Brazil) (Howey-Jordan *et al.* 2013; Tolotti *et al.* 2015). Overall, oceanic whitetip sharks are highly mobile and can travel

great distances in the open ocean (Filmalter *et al.* 2012), with excursion estimates of several thousand kilometers demonstrated in multiple studies. However, information on potential migratory corridors and seasonality is lacking.

As discussed in the proposed rule (81 FR 96304, December 29, 2016) and final rule (83 FR 4153, January 30, 2018) to list the oceanic whitetip shark, the most significant threat to the species is overutilization for commercial purposes. Although oceanic whitetip sharks are not necessarily a targeted species, they are caught as bycatch in a number of fisheries throughout their range, and are most susceptible to industrial longline fisheries. Oceanic whitetip shark fins are also prevalent in the international fin trade, which has likely contributed to the significant declines of the species throughout its range. Given the relatively low reproductive output and overall productivity of the oceanic whitetip shark, it is inherently vulnerable to threats that would deplete its abundance, with a low likelihood of recovery. Therefore, while there is considerable uncertainty regarding the current abundance of oceanic whitetip sharks throughout its entire range, the best available information indicates that the species is likely to become an endangered species within the foreseeable future due to overutilization.

### **Critical Habitat Identification and Designation**

Critical habitat is defined by section 3 of the ESA as (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 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. This definition provides a step-wise approach to identifying areas that may qualify as critical habitat for the

oceanic whitetip shark: (1) determine the geographical area occupied by the species at the time of listing; (2) identify physical or biological habitat features essential to the conservation of the species; (3) delineate specific areas within the geographical area occupied by the species on which are found the physical or biological features; (4) determine whether the features in a specific area may require special management considerations or protection; and (5) determine whether any unoccupied areas are essential for conservation. Our evaluation and conclusions as we worked through this step-wise process are described in detail in the following sections.

### **Geographical Area Occupied by the Species**

The “geographical area occupied by the species” is defined in our regulations as an area that may generally be delineated around species’ occurrences, as determined by the Secretary (*i.e.*, range). Such areas may include those areas used throughout all or part of the species’ life cycle, even if not used on a regular basis (*e.g.*, migratory corridors, seasonal habitats, and habitats used periodically, but not solely by vagrant individuals). (50 CFR 424.02). Further, our regulations at 50 CFR 424.12(g) state that the Secretary will not designate critical habitat within foreign countries or in other areas outside of the jurisdiction of the United States. As such, we cannot designate critical habitat for the oceanic whitetip outside of U.S. waters and will focus the following discussion on the U.S. jurisdictions where the oceanic whitetip shark is known to occur.

#### *Northwest Atlantic and Caribbean*

The geographic range of the oceanic whitetip shark in the Northwest Atlantic and Caribbean is reportedly very broad, occurring from Maine to Florida on the East Coast, in the Gulf of Mexico and in U.S. Territorial waters within the Caribbean (U.S. Virgin Islands and Puerto Rico) (Compagno 1984). However, the NMFS Northeast Fisheries Science Center

(NEFSC) describes this species as “uncommon” in the U.S. Atlantic EEZ (NMFS 2017). Essential fish habitat (EFH; defined under the MSA as those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity (16 U.S.C. 1802(10))), has been designated for the oceanic whitetip shark in waters greater than 200 m in depth from offshore of the North Carolina/Virginia border to the Blake Plateau, which is a broad, relatively flat portion of the upper continental slope that extends from the coast of North Carolina to central Florida. Essential fish habitat was not designated north of Virginia (NMFS 2017). Designated EFH in the Gulf of Mexico includes offshore habitats of the northern Gulf of Mexico at the Alabama/Florida border (*e.g.*, the Mississippi plume shows high occurrence of juveniles and adults) to offshore habitats of the western Gulf of Mexico south of eastern Texas. Additionally, the entire U.S. Caribbean (waters of Puerto Rico and the U.S. Virgin Islands) is considered to be EFH for the oceanic whitetip shark (NMFS 2017). These designations were based on high encounters of the species in fisheries observer data from the U.S. pelagic longline fishery as well as recent movement data from archival satellite tags (NMFS 2017), which confirms the historical and current presence of oceanic whitetip sharks in these waters. Areas of high occurrence are also off the east coast of Florida, Charleston Bump off the southeast United States, and between Florida, Cuba and the Yucatan Peninsula (J. Carlson, unpublished analysis, 2019). However, while we can confirm that the geographical areas occupied by the oceanic whitetip include U.S. waters, there is no information regarding the specific habitat use of oceanic whitetip sharks in any of these areas (J. Carlson, NMFS Southeast Fisheries Science Center pers. comm. to C. Young, NMFS OPR, 2017), and nurseries and pupping grounds have not been identified in U.S. waters (NMFS 2017; CITES 2013).

*Eastern Pacific*

In the eastern Pacific, the oceanic whitetip shark reportedly occurs from southern California to Peru, including the Gulf of California and Clipperton Island (Compagno 1984). While its eastern Pacific range reportedly extends as far north as southern California, this is likely due to warm water incursions that allow the species to venture into waters far beyond its normal range (Compagno 1984). Ebert *et al.* (2017) notes that oceanic whitetip sharks are “rare” in southern California waters, usually observed around the Channel Islands during warm water years. Observer data of the West Coast-based U.S. fisheries further confirm this finding, with oceanic whitetip sharks not observed in the catches. For example, in the California/Oregon drift gillnet fishery, which operates off the U.S. Pacific coast from the U.S./Mexican border to waters off of Oregon, observers recorded zero oceanic whitetip sharks in 8,698 sets conducted over the past 25 years (from 1990-2015; Young *et al.* 2017). We have no other information to suggest that oceanic whitetip sharks regularly occupy the waters of southern California or elsewhere along the U.S. West Coast. Based on the best available data, the distribution of the species appears to be concentrated in areas farther south in foreign waters or the high seas. For example, fisheries data from the eastern Pacific tuna purse seine fishery shows catches of oceanic whitetip are concentrated in the area between 10° North and 10° South, despite sets in more northerly waters (Hall and Roman 2013). Other fisheries data confirm the presence of oceanic whitetip sharks in waters off of Costa Rica, Ecuador and Peru (Arauz 2017; Martinez-Ortiz *et al.* 2015; Gonzalez-Pestana *et al.* 2014). Although areas of southern California seem to be outside of the core tropical distribution of oceanic whitetip sharks and are used only during rare weather events that cause warm water incursions, we still consider this area to be part of the species’ range. However, given the extremely limited data and seemingly limited use of this part of their range,

we are unable to identify any features of the area that are essential to the conservation of the oceanic whitetip shark.

#### *Western and Central Pacific*

The range of oceanic whitetip sharks in the Western and Central Pacific is broad, occurring throughout the region between 30°N to 35°S, with catches of the species most frequently occurring in the central North Pacific south of 20°N latitude and some individuals occurring in more northerly locations (Clarke 2011; Clarke *et al.* 2011a). This range encompasses U.S. waters of Hawaii, Guam, American Samoa, Commonwealth of the Northern Mariana Islands (CNMI), and the Pacific Remote Island Areas. Fisheries data from a number of sources confirm the occurrence of the oceanic whitetip shark in all of these waters under U.S. jurisdiction (Brodziak *et al.* 2013; Clarke *et al.* 2011a; Clarke *et al.* 2011b; Lawson 2011; Walsh and Clarke 2011). As such, we conclude that waters under the aforementioned U.S. jurisdictions throughout the Western and Central Pacific are geographical areas occupied by the species, though we are unable to identify any features of the area that are essential to the conservation of the oceanic whitetip shark.

In summary, based on the information above, we consider the geographical areas occupied by the oceanic whitetip shark in the Atlantic at the time of listing to include waters under U.S. jurisdiction off the U.S. East Coast, Gulf of Mexico, U.S. Virgin Islands, and Puerto Rico. We consider the geographical areas occupied by the oceanic whitetip shark in the Pacific to include waters under U.S. jurisdiction off southern California, Hawaii, American Samoa, Guam, CNMI, and the Pacific Remote Island Areas.

#### **Physical or Biological Features Essential for Conservation**

Within the geographical area occupied by an endangered or threatened species at the time

of listing, critical habitat consists of specific areas upon which are found those physical or biological features essential to the conservation of the species and that may require special management considerations or protection. The ESA does not specifically define physical or biological features; however, court decisions and joint NMFS-USFWS regulations at 50 CFR 424.02 provide guidance on how physical or biological features are expressed. Specifically, these regulations state that the physical and biological features are those that are essential to support the life-history needs of the species, including but not limited to, water characteristics, soil type, geological features, sites, prey, vegetation, symbiotic species, or other features. A feature may be a single habitat characteristic, or a more complex combination of habitat characteristics. Features may include habitat characteristics that support ephemeral or dynamic habitat conditions. Features may also be expressed in terms relating to principles of conservation biology, such as patch size, distribution distances, and connectivity. (50 CFR 424.02).

Section 3 of the ESA (16 U.S.C. 1532(3)) defines the terms “conserve,” “conserving,” and “conservation” to mean: to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this chapter are no longer necessary. For oceanic whitetip sharks, we consider conservation to include the use of all methods and procedures necessary to bring oceanic whitetip sharks to the point at which factors related to population ecology and vital rates indicate that the species is recovered in accordance with the definition of recovery in 50 CFR 402.02. Important factors related to population ecology and vital rates include population size and trends, range, distribution, age structure, gender ratios, age-specific survival, age-specific reproduction, and lifetime reproductive success. Based on the available knowledge of oceanic whitetip shark population ecology and life history, we have identified four biological behaviors

that are critical to the goal of increasing survival and population growth: (1) foraging, (2) pupping, (3) breeding, and (4) migration. In the following section, we evaluate whether there are physical and biological features of the habitat areas known or thought to be used for these behaviors that are essential to the species' conservation because they facilitate or are intimately tied to these behaviors and, hence, support the life-history needs of the species. Because these behaviors are essential to the species' conservation, facilitating or protecting each one is considered a key conservation objective for any critical habitat designation for this species.

*Physical and Biological Features of Foraging Habitat That Are Essential to the Conservation of the Species*

Oceanic whitetip sharks are top-level predators in pelagic ecosystems and feed primarily on pelagic teleosts (bony fish) and cephalopods (mostly squids), but are also known to consume sea birds, marine mammals, other sharks and rays, molluscs, crustaceans, large sportfish, and even garbage (Madigan *et al.* 2015; Bonfil *et al.* 2008; Cortés 1999; Backus *et al.* 1956). Based on the species' diet, the oceanic whitetip shark has a high trophic level, scoring 4.2 out of a maximum 5.0 (Cortés 1999). Although typically solitary, oceanic whitetip sharks have been observed aggregating around food sources (Bonfil *et al.* 2008). Historically, oceanic whitetip sharks were described as pests to pelagic longline fisheries for tuna, as the sharks would persistently follow boats and cause significant damage to the catches (Compagno 1984). Oceanic whitetips have also been observed scavenging off dead marine mammal carcasses off South Africa (Bass *et al.* 1973) and feeding opportunistically on recreationally caught sportfish in the Bahamas (Madigan *et al.* 2015). In fact, Madigan *et al.* (2015) suggested that abundance and availability of large pelagic teleosts in waters off Cat Island, Bahamas might be a possible mechanism driving site-fidelity and aggregation of oceanic whitetip sharks in the region.

Additionally, results showed spatiotemporal variation in feeding habits of the species, with short-term (*i.e.*, near Cat Island) diets comprised mostly of larger pelagic teleosts, and long-term diets (> 1 year) comprised mostly of squid, teleosts, and small foraging fish (Madigan *et al.* 2015). However, although site fidelity to Cat Island has been demonstrated via satellite tracking data (Howey-Jordan *et al.* 2013) the reasons driving this site fidelity (*e.g.* foraging, navigation, pupping, mating, etc.) are unknown at this time. See *The Physical and Biological Features of Migratory Habitat That Are Essential to the Conservation of the Species* section below for more information. Based on the foregoing information, the oceanic whitetip shark appears to be an opportunistic predator that is not limited in its foraging habitats and feeds on whatever prey is available.

Aside from the observations described above, there is no information regarding established foraging grounds for the oceanic whitetip shark. Recent tracking studies from the Bahamas, Brazil, and the Indian Ocean have revealed complex vertical movements in the species and diel behavior changes (Papastamatiou *et al.* 2018; Tolotti *et al.* 2017; Howey *et al.* 2016). Based on tracking data from the Bahamas, oceanic whitetip sharks regularly exhibit mesopelagic excursions (defined as  $\geq 5$  consecutive depth records below the 200 m isobaths), particularly during dusk periods that may be related to foraging (Howey *et al.* 2016). Tolotti *et al.* (2017) noted that deep dives below 150 m were rare, but the variation seen in the shark's vertical movement patterns could be linked to prey distribution as well. Papastamatiou *et al.* (2018) further reaffirms this possibility with evidence from oceanic whitetip sharks outfitted with cameras. Potential prey (mackerel, scad and squid) were observed during dives (as opposed to when individuals were in shallow water) and at the apex of the dive when bursts of speed were common (Papastamatiou *et al.* 2018). Squid and other cephalopods are likely an important prey

species for the oceanic whitetip shark; Cortes (1999) and Madigan *et al.* (2015) both reported that cephalopods comprise approximately 44 percent of the oceanic whitetip shark's regular diet. Additionally, oceanic whitetip sharks have been associated with short-finned pilot whales (*Globicephala macrorhynchus*) of which squid is a main prey source (Bester, n.d.). Although the reason for this behavior is unknown, it is thought to be prey-related, as pilot whales are extremely efficient at locating food sources (Migura and Meadows 2002). The diel vertical migrations of oceanic whitetip sharks are similar to and may overlap with the diel vertical migrations and/or distribution of many species of mesopelagic and bathypelagic squids (see original reference in Howey *et al.* 2016). As such, it is possible these mesopelagic excursions represent a foraging strategy for seeking out prey, such as squid. Although the species of squid consumed by oceanic whitetips are unknown, many species have a wide geographic distribution, moving throughout the deep waters of the ocean, and, therefore, it is difficult to link these prey species to any "specific" areas within the oceanic geographic areas occupied. Additionally, there was no site-specific correlation with the mesopelagic dives undertaken by oceanic whitetips tagged in the Bahamas. Individuals not only made consistent dives year-round near the aggregation site in the Bahamas, but also during migrations (Howey *et al.* 2016). Clear temporal or spatial patterns of vertical movements could also not be identified in individuals tagged in Brazil or the Indian Ocean, as behaviors alternated regularly and there was no evident pattern across the time series of the study (Tolotti *et al.* 2017). Overall, although it is hypothesized that these mesopelagic excursions are for purposes of foraging, this theory has not been confirmed.

Overall, the best available information indicates that oceanic whitetip sharks are opportunistic feeders and may exhibit behavioral plasticity when encountering different prey types (Papastamatiou *et al.* 2018). The species does not appear to be associated with any specific

foraging grounds, adapting to its present habitat by feeding on whatever prey are available and even scavenging on whale carcasses when available. There does not appear to be a specific prey species that is required to be present in a habitat for successful foraging to occur, nor are there any specific habitat characteristics that appear to be intimately tied with feeding behavior. As such, we are unable to identify any particular physical or biological features of areas that facilitate successful foraging. Further, no oceanic whitetip sharks have been observed foraging in the geographic areas under U.S. jurisdiction, aside from opportunistic depredation on the catch of pelagic longline fisheries. For the foregoing reasons, it is not possible to identify any specific areas within waters under U.S. jurisdiction with physical or biological features related to foraging that are essential to the conservation of the species.

*Physical and Biological Features of Pupping Habitat That are Essential to the Conservation of the Species*

Because the oceanic whitetip shark is a pelagic species that spends most of its time offshore in the open ocean (Compagno 1984) and is one of the few species that may complete its entire life cycle in open water, there is limited information regarding the species' life history and biology. Studies from the Northwest Atlantic and Indian Ocean estimate that oceanic whitetip sharks give birth from late spring to summer (Backus *et al.* 1956; Bass *et al.* 1973, Compagno 1984; Bonfil *et al.* 2008). Based on ultrasonography, Gelsleichter (unpublished) suggests pupping occurs in the Bahamas in May and June. In contrast, Seki *et al.* (1998) found no apparent parturition period in the North Pacific, as embryos were observed in almost every month in which data was collected. In the Southwest Atlantic, oceanic whitetips likely give birth in the latter half of the year, potentially from September to November (Tambourgi *et al.* 2013) although Amorim (1998) found full-term embryos from July to November, which may indicate a

relatively extended pupping period for this species, as was observed in the North Pacific by Seki *et al.* (1998) (Tambourgi *et al.* 2013). Additionally, recent conflicting results regarding the species' reproductive periodicity (*i.e.*, whether oceanic whitetip sharks give birth annually or biannually), may indicate the possibility of non-specific pupping seasons for this species (Clarke *et al.* 2015). Clarke *et al.* (2015) notes that pregnant females are often found close to shore, particularly around oceanic Caribbean Islands, which suggests that females may come close to shore to pup. However, the specific locations of pupping grounds and nurseries have not been identified for the oceanic whitetip shark, and habitat requisites of these areas, such as temperature, depth, and substrate, are unknown.

To date, neither pupping grounds nor nursery areas have been identified definitively in the Atlantic for the oceanic whitetip shark. Only generalized descriptions of “potential” pupping and nursery areas are available, based largely on observations of young of the year (YOY) and juvenile sharks in fisheries catch data. For example, observations of YOY oceanic whitetips in fisheries catches off Northwest Cuba (Valdés *et al.* 2016) and observations of very small juveniles in the waters off Haiti (Jamie Aquino, Haiti Ocean Project, pers. comm. to C. Young, NMFS OPR, 2019) may indicate potential pupping/nursery areas in these regions. However, these areas are outside U.S. jurisdiction and cannot be designated as critical habitat for the species. In addition, while the available information suggests that there are several regions outside U.S. jurisdiction with potential pupping grounds, there is insufficient information to identify the essential physical or biological features for pupping grounds. Within U.S. waters, an area of pelagic waters over the continental shelf running along the southeastern coast of the United States has been described as a potential nursery area based solely on observations of young oceanic whitetip sharks offshore in this general area (NMFS 2017). In determining the

revised EFH designation for the oceanic whitetip shark, which was based on fisheries observer and archival satellite tagging data (NMFS 2017), high encounters of YOY seem to occur over the continental shelf from North Carolina to Florida, and in other pockets in the central Gulf of Mexico and north of the U.S. Virgin Islands (J. Carlson, NMFS SEFSC, pers. comm. to C. Young, NMFS OPR, 2019). High juvenile encounters seem to occur in similar areas along the U.S. East Coast, with another area of occurrence to the north of Puerto Rico and moderate usage of waters north and south of the U.S. Virgin Islands (J. Carlson, NMFS SEFSC, pers. comm. to C. Young, NMFS OPR, 2019). Although these areas could represent nursery grounds for the oceanic whitetip shark, oceanic whitetip sharks have not been observed pupping in these areas and more importantly, we are unable to determine the physical or biological features that are essential for pupping. Using the nursery area identification criteria proposed by Heupel *et al.* (2007) and validated by Froeschke *et al.* (2010), areas described above meet the first criteria (newborn or YOY sharks are more commonly encountered in the area than in other areas), though data regarding the second two criteria (newborn or YOY sharks have a tendency to remain or return for extended periods; the area or habitat is repeatedly used across years, whereas others are not) are insufficient for a complete analysis. Further, in the EFH designation for oceanic whitetip sharks in the Atlantic, insufficient information prevented any differentiation between EFH areas for neonate/juvenile and adult size classes, resulting in a combined EFH designation for all size classes (NMFS 2017). This emphasizes the lack of information regarding any potential pupping and nursery habitat for the species in U.S. waters of the Atlantic.

As described previously, oceanic whitetip sharks in the Western and Central Pacific are distributed throughout the region from 30°N and 30°S, but are concentrated in warm equatorial waters between 10°N and 10°S. Although limited information suggests there are some areas that

may serve as potential pupping grounds, descriptions are fairly general and whether these areas occur in waters under U.S. jurisdiction is uncertain. Records of pregnant females and newborns are concentrated between the equator and 20°N, and between 170°E to 140°W, with higher concentrations in the central part of this distribution just north of 10°N (Bonfil *et al.* 2008; CITES 2013). This area is a large swath of ocean that partially overlaps the EEZs of Hawaii and several of the U.S. Pacific Remote Island Areas (Johnston Atoll, Palmyra, Jarvis Island, Howland & Baker Islands, and potentially Wake Island). Seki *et al.* (1998) observed small neonates (< 60 cm precaudal length) in a narrow band between 10°N and 20°N, including waters south of Hawaii, and concluded that there is an oceanic whitetip nursery ground in the “oceanic region” of the North Pacific. Bonfil *et al.* (2008) reaffirmed that newborn oceanic whitetips occur mainly in a narrow strip in the central Pacific slightly north of 10°N. This, coupled with higher concentrations of pregnant females, suggest a pupping ground for oceanic whitetip may exist in the central Pacific between 150°W and 180°W and just above 10°N, but a more refined definition of the area is not possible due to incomplete sampling (Bonfil *et al.* 2008). More recent analyses of fisheries catch data determined that juveniles tend to occur in waters near the equator to the west, just north of the northeastern islands of Papua New Guinea and the Solomon Islands (Clarke 2011; Clarke *et al.* 2011a). As in the Atlantic areas, though YOY oceanic whitetip sharks have been more commonly encountered in these areas, there is insufficient data to apply Heupel *et al.*'s (2007) second and third criteria for identifying pupping areas in the Pacific. Other than generalized descriptions of potential nursery area locations, which are based on fisheries encounters of neonates, juveniles, and pregnant females, there is inadequate information to identify any physical or biological features of these areas that would be necessary to facilitate successful pupping behavior for the species.

Overall, while some waters under U.S. jurisdiction may overlap with general areas identified as potential pupping or nursery grounds for the species, the descriptions of these areas are fairly vague (*e.g.*, pelagic waters over continental shelves, oceanic areas, etc.) and are based solely on high encounters with various size classes of the species. We have no other information to specify the locations of these areas within U.S. waters or identify any physical or biological features within these areas that are essential to support the life-history needs of the oceanic whitetip shark. As such, we cannot identify any specific essential features that define pupping habitat for the oceanic whitetip shark in U.S. waters.

*The Physical and Biological Features of Breeding Habitat That Are Essential to the Conservation of the Species*

Little information exists on the reproductive ecology of the oceanic whitetip shark, as mating behavior is rarely observed in the wild and has not been formally documented. Important areas for mating are also unknown for oceanic whitetip sharks and information regarding their reproductive periodicity and specific mating seasons is limited. To identify potential sites as mating grounds, we looked for the presence of both mature females and males. Aside from one established aggregation location in foreign waters (Cat Island, Bahamas), which may be due to availability of food as opposed to reproductive purposes (Madigan *et al.* 2015), there are no known aggregation sites of mature oceanic whitetip sharks. In examining fisheries observer data and tagging data for revising the EFH designation for the oceanic whitetip shark (NMFS 2017), high encounters of oceanic whitetip adults have been observed in pockets along the U.S. East Coast from South Carolina to Florida in waters greater than 200 m, with potential hotspots off the eastern central coast of Florida and in the Gulf of Mexico south of Louisiana and Texas (J. Carlson, NMFS SEFSC, pers. comm. to C. Young, NMFS OPR, 2019). Based on this limited

information, we can cautiously confirm that male and female adult oceanic whitetip sharks co-occupy waters under U.S. jurisdiction in the Atlantic and Gulf of Mexico. Nonetheless, we have no evidence to confirm that these individuals are mating in these waters, nor can we identify any physical or biological features that would facilitate successful breeding in these geographical areas and thus be essential to the conservation of the species.

In the U.S. western Pacific, including Hawaii, American Samoa, Guam, and CNMI, EFH for adult and juvenile oceanic whitetip sharks is broadly defined as the water column down to a depth of 1,000 m from the shoreline to the outer limit of the EEZ (WPFMC 2009). Thus, similar to EFH in the Atlantic, EFH in the Pacific is designated the same for all size classes in this region. It should also be noted that this is a generic EFH designation for all pelagic species, and not specific to the oceanic whitetip shark.

A tagging study in Hawaiian waters, conducted from March 2001 through November 2006, involved the capture and tagging of both mature males and females in the general vicinity that has been identified as a potential pupping ground (*i.e.*, the area between 150°W and 180°W and just above 10°N; Bonfil *et al.* 2008). However, only 11 of the 16 tagged sharks were measured and only four were likely mature (3 males and 1 female), with the remaining likely immature juveniles. Adults of both sexes have also been caught in the pelagic longline fishery operating in the Hawaiian EEZ and in the Papahānaumokuākea Marine National Monument. Based on an assessment of interactions with the Hawaii pelagic longline fishery from 2004-2018, adults of both sexes occur in Hawaiian waters, and the majority of interactions occur on the north side of the Hawaiian Islands in a linear band stretching southeast to northwest within the limits of the EEZ, both inside and outside of the Papahānaumokuākea Marine National Monument (NMFS 2019). One area of high occurrence of interactions is on the south-westernmost portion

of the EEZ, within the limits of the Monument (NMFS 2019). Adults of both sexes have also been caught off Kona, Hawaii (M. Hutchinson, NMFS Pacific Islands Fisheries Science Center, pers. comm. to Chelsey Young, NMFS OPR, 2017). Other analyses of fisheries catch data from across the Western and Central Pacific indicate that adults appear to predominate more to the southwest near the identified center of abundance (10°S, 190°E; refer to Figure 3 in Clarke 2011) and may overlap with waters of American Samoa. However, while adults of both sexes likely co-occur in waters under U.S. jurisdiction in both Hawaii and American Samoa, we have no additional information to confirm that these areas represent mating grounds for the species, or identify the physical and biological features that would be necessary for mating to occur in these areas.

Overall, the areas where oceanic whitetip shark mating occurs remain unknown. Additionally, there has not been any systematic evaluation of the particular physical or biological features that facilitate successful mating behavior. As such, we cannot identify physical or biological features of breeding habitat that are essential to the conservation of the species.

*The Physical and Biological Features of Migratory Habitat That Are Essential to the Conservation of the Species*

Although small and large-scale migratory movements have been observed for the oceanic whitetip shark, information regarding movement patterns or possible migration paths is fairly limited (Bonfil *et al.* 2008). During longline fishing surveys in the Central Pacific Ocean, Strasburg (1958) noted that oceanic whitetip sharks did not exhibit any specific migratory pattern. Since then, several tagging studies have been conducted on oceanic whitetip sharks to determine horizontal and vertical movement patterns of the species, confirming the species' strong thermal preference for temperatures above 20°C, highly migratory nature, and site fidelity

to certain locations (Tolotti *et al.* 2017; Howey *et al.* 2016; Tolotti *et al.* 2015; Howey-Jordan *et al.* 2013; Carlson and Gulak 2012; Musyl *et al.* 2011).

In the Atlantic, limited tagging data from the NMFS Cooperative Tagging Program (Kohler *et al.* 1998; NMFS unpublished data) from eight oceanic whitetip sharks do not elucidate any migratory paths or corridors for the oceanic whitetip shark. The tagging data largely reveal the movements of some juveniles from the northeastern Gulf of Mexico to the East Coast of Florida, from the Mid-Atlantic Bight to southern Cuba, from the Lesser Antilles west into the central Caribbean Sea, from east to west along the equatorial Atlantic, and from southern Brazil to farther offshore in a northeasterly direction (Bonfil *et al.* 2008). Only one adult of unknown sex was both tagged and recaptured near Cat Island, Bahamas (NMFS unpublished data). In another tagging study at Cat Island, 11 mature oceanic whitetip sharks (10 females, 1 male) were tagged in May of 2011. After remaining within 500 km of the tagging site for approximately 30 days, individuals dispersed across a vast area of the western North Atlantic and to several different locations, with many of the sharks returning to the Bahamas approximately 150 days later (Howey-Jordan *et al.* 2013). However, unlike other pelagic animals in the North Atlantic that exhibit more uniform movement patterns within a single demographic group, mature oceanic whitetip females tagged were not uniform in their movement patterns in the months after they were tagged (Howey-Jordan *et al.* 2013). Some individuals remained within the Bahamas' EEZ for their entire track while others made long-distance movements outside of the EEZ (Howey-Jordan *et al.* 2013). This may be attributed to the oceanic whitetip's presumed biennial reproduction cycle (Backus *et al.* 1956; Seki *et al.* 1998), resulting in differences between individuals in particular stages of the reproductive cycle; thus, variation in individual movements may correspond to migrations by gravid and non-gravid females to disjunct pupping and mating

areas (Howey-Jordan *et al.* 2013). However, this has yet to be confirmed, and more information is needed to determine why these sharks are moving to particular locations (*e.g.*, northern Lesser Antilles, northern Bahamas, and north of the Windward Passage). Moreover, none of these locations are within U.S. waters.

In Hawaiian waters, tagging data from 13 oceanic whitetip sharks revealed a complex pattern, where nine individuals showed a meandering swimming behavior and three individuals made more straight-line movements (Musyl *et al.* 2011). The three individuals that made more straight-line movements were all males, whereas the sharks that followed the meandering swimming pattern and remained relatively close to the tagging area were a mix of both males and females (Musyl *et al.* 2011). Aside from confirming the epipelagic niche these sharks occupy and their strong thermal preference of temperatures above 20°C, there were no obvious reasons underpinning the movements undertaken by the tagged individuals.

Although the available information suggests that these sharks do undergo short and long-distance migrations, the space or migratory corridor used by oceanic whitetip sharks during these migrations remains unknown. In addition, the migratory tracking studies that have been conducted in waters under U.S. jurisdiction have not elucidated any information on any potential migratory corridors or habitats that may exist within waters under U.S. jurisdiction for the oceanic whitetip shark. Until such time that the movements and migrations of the species throughout its life cycle are better understood, the importance of physical features (*e.g.*, salinity and temperature) to the oceanic whitetip shark's distribution cannot be clearly established (Bass *et al.* 1973). As such, we cannot identify any specific essential features that define migratory habitat for oceanic whitetip sharks.

## **Unoccupied Areas**

Section 3(5)(A)(ii) of the ESA defines critical habitat to include specific areas outside the geographical area occupied by a threatened or endangered species at the time it is listed if the areas are determined by the Secretary to be essential for the conservation of the species. Regulations at 50 CFR 424.12(b)(2) address designation of unoccupied area as critical habitat and the regulations at 50 CFR 424.12(g) state that critical habitat shall not be designated within foreign countries or in other areas outside of United States jurisdiction.

Because we are unable to identify any physical or biological features of oceanic whitetip shark habitat that are essential to the conservation of the species, we cannot identify any unoccupied habitat that contains such features. Furthermore, due to the limited understanding of habitat use by the oceanic whitetip shark, we cannot identify any unoccupied areas that have a reasonable certainty of contributing to the conservation of the species or are essential to the conservation of the species.

### **Critical Habitat Determination**

Given the best available information and the above analysis of this information, we find that there are no identifiable occupied areas under the jurisdiction of the United States that contain physical or biological features that are essential to the conservation of the species or unoccupied areas that are essential to the conservation of the species. Thus, we conclude there are no specific areas within the oceanic whitetip shark's respective range and under U.S. jurisdiction that meet the definition of critical habitat; and therefore, we have determined that a critical habitat designation for oceanic whitetip sharks is not prudent.

Although we have made this "not prudent" determination, the areas occupied by oceanic whitetip sharks under U.S. jurisdiction will continue to be subject to conservation actions implemented under section 7(a)(1) of the ESA, as well as consultations pursuant to section

7(a)(2) of the ESA for Federal activities that may affect the oceanic whitetip shark, as determined on the basis of the best available information at the time of the action. Through the consultation process, we will continue to assess effects of Federal actions on the species and its habitat.

Additionally, we remain committed to promoting the recovery of the oceanic whitetip shark through both domestic and international efforts. As noted in the proposed and final rules (81 FR 96304, December 29, 2016; 83 FR 4153, January 30, 2018, respectively), the most significant threat to the oceanic whitetip shark is overutilization by commercial fisheries, primarily in areas outside of U.S. jurisdiction. Oceanic whitetip sharks are caught as bycatch in a number of fisheries throughout their range, and they are still a prevalent species in the international fin trade despite retention prohibitions in tuna Regional Fisheries Management Organizations and a Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Appendix II listing. Therefore, efforts to address overutilization of the species through regulatory measures appear inadequate (Young *et al.* 2017). Thus, recovery of the oceanic whitetip shark is highly dependent upon international conservation efforts. To address this, we have developed a recovery plan outline that provides our preliminary strategy for the conservation of the oceanic whitetip shark. This outline can be found on our website at: <https://www.fisheries.noaa.gov/species/oceanic-whitetip-shark#resources> and provides an interim recovery action plan as well as preliminary steps we will take towards the development of a full recovery plan. We also conducted two recovery planning workshops: one in Honolulu, Hawaii (April 23-24, 2019) that focused on the Indo-Pacific portion of the species' range, and one in Miami, Florida (November 13-14, 2019) that focused on the Atlantic/Caribbean portion of the species' range. These workshops brought together numerous experts and various stakeholders

to collect information, facts, and perspectives on how to recover the oceanic whitetip shark. Input received from these workshops, including ideas and recommendations regarding recovery criteria and actions, will help inform the development of the forthcoming recovery plan for the species.

We will continue to work towards the conservation and recovery of oceanic whitetip sharks, both on a domestic and global level, including with our international partners and within regional fisheries management organizations and other international bodies to promote the adoption of conservation and management measures for the threatened oceanic whitetip shark.

### **References**

A complete list of all references cited herein is available upon request (see **FOR FURTHER INFORMATION CONTACT**).

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

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