NATIONAL MARINE FISHERIES SERVICE
ENDANGERED SPECIES ACT SECTION 7
LETTER OF CONCURRENCE

Title:	Letter of Concurrence issued for NASA's ULDB Program
Consultation Conducted By:	Endangered Species Division *or* Endangered Species Act Interagency Cooperation Division, Office of Protected Resources, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce
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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

MAY 18 2017

Refer to NMFS No: FPR-2016-9158

Mr. Theodore Meyer
Associate Chief, Medical and Environmental Management Division
National Aeronautics and Space Administration
Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, Virginia 23337

Re: Request for Reinitiation of Informal Consultation under Section 7(a)(2) of the Endangered Species Act Regarding Revisions to the National Aeronautics and Space Administration's Ultra Long Duration Balloon Program

Dear Mr. Meyer:

On October 28, 2016, NOAA's National Marine Fisheries Service (NMFS), Endangered Species Act (ESA) Interagency Cooperation Division, received your request for concurrence that changes to the National Aeronautics and Space Administration's (NASA) Ultra Long Duration Balloon (ULDB) Program as a result of minor modifications and a need to expand the action area are not likely to adversely affect species proposed for listing or listed as threatened or endangered under the ESA, nor adversely affect designated critical habitat. On February 7, 2017 NASA submitted a Supplemental Biological Evaluation to be included with the reinitiation of consultation package. This response to your request was prepared by NMFS pursuant to section 7(a)(2) of the ESA, implementing regulations at 50 CFR 402, and agency guidance for preparation of letters of concurrence.

Below, we describe the revised proposed action, expanded action area (EAA), and the ESA-listed species that may be affected by the proposed changes. We then consider the effects of the revised proposed action on ESA-listed species and critical habitats.

Action Agency's Effects Determination
NASA has concluded that the proposed action may affect, but is not likely to adversely affect the following proposed for listing or ESA-listed species:

Table 1. ESA-listed Species that May be Affected by NASA's ULDB Program.				
Species	**ESA-Listing Status**	**ESA Listing (FR Number)**	**Critical Habitat Designation (FR Number)**	**Action Agency Determination**
Marine Mammals				
Blue whale (*Balaenoptera musculus*)	Endangered	December 2, 1970 (35 FR 18319)	Not designated	NLAA
Fin whale (*Balaenoptera physalus*)	Endangered	December 2, 1970 (35 FR 18319)	Not designated	NLAA
Sei whale (*Balaenoptera borealis)*	Endangered	December 2, 1970 (35 FR 18319))	Not designated	NLAA
Southern right whale (*Eubalaena australis*)	Endangered	June 2, 1970 (35 FR 8491)	Not designated	NLAA
Sperm whale (*Physeter macrocephalus*)	Endangered	December 2, 1970 (35 FR 18319))	Not designated	NLAA
Marine Reptiles				
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered	June 2, 1970 (35 FR 8491)	January 26, 2012 (44 FR 17710, 77 FR 4170)	NLAA
Green sea turtle (*Chelonia mydas*) - East-Indian, West-Pacific, Central South Pacific	Endangered	May 6, 2016 (81 FR 20057)	Not designated	NLAA
Green sea turtle (*Chelonia mydas*) - South Atlantic, Southwest Indian, East Pacific	Threatened	May 6, 2016 (81 FR 20057)	Not designated	NLAA
Hawksbill sea turtle (*Eretmochelys imbricate*)	Endangered	June 2, 1970 (35 FR 8491)	September 2, 1998 (63 FR 46693)	NLAA
Loggerhead sea turtle (*Dermochelys coriacea*) - South Pacific	Endangered	September 22, 2011 (76 FR 58868)	August 11, 2014 (79 FR 39855)	NLAA
Loggerhead sea turtle (*Dermochelys coriacea*) - South Atlantic, Southwest Indian, Southeast Indo-Pacific	Threatened	September 22, 2011 (76 FR 58868)	August 11, 2014 (79 FR 39855)	NLAA
Olive ridley sea turtle *(Lepidochelys olivacea)* - breeding populations on Pacific Coast of Mexico	Endangered	July 28, 1978 (43 FR 32800)	Not designated	NLAA
Olive ridley sea turtle (*Lepidochelys olivacea)* – all populations other than breeding populations on Pacific Coast of Mexico	Threatened	July 28, 1978 (43 FR 32800)	Not designated	NLAA
Fishes				

African coelacanth (*Latimeria chalumnae*)	Threatened	April 28, 2016 (81 FR 17398)	Not designated	NLAA
Chondrichthyes				
Scalloped hammerhead shark (*Sphyrna lewini*) - Central and Southwest Atlantic DPS and Indo-West Pacific DPS	Threatened	September 2, 2014 (79 FR 38213)	Not designated	NLAA
Scalloped hammerhead shark (*Sphyrna lewini*) - Eastern Atlantic DPS, Eastern Pacific DPS	Endangered	September 2, 2014, (79 FR 38213)	Not designated	NLAA
Oceanic whitetip shark (*Carcharhinus longimanus*)	Proposed for listing as threatened	December 29, 2016 (81 FR 96304)	Not designated	NLAA
Argentine angelshark (*Squatina argentina*)	Proposed Endangered	December 7, 2015 (80 FR 76067)	Not designated	NLAA
Sawback angelshark (*Squatina aculeate*)	Endangered	August 31, 2016 (81 FR 50394)	Not designated	NLAA
Narrownose smoothound shark (*Mustelus schmitti*)	Proposed for listing as threatened	December 7, 2015 (80 FR 76067)	Not designated	NLAA
Dwarf sawfish (*Pristis clavata*)	Endangered	January 12, 2015 (79 FR 73977)	Not designated	NLAA
Green sawfish (*Pristis zijsron*)	Endangered	January 12, 2015 (79 FR 73977)	Not designated	NLAA
Largetooth sawfish (*Pristis pristis*)	Endangered	July 12, 2011 (76 FR 40822)	Not designated	NLAA
Narrow sawfish (*Anoxypristis cuspidate*)	Endangered	January 12, 2015 (79 FR 73977)	Not designated	NLAA
Giant manta ray (*Manta birostris*)	Proposed for listing as threatened	January 12, 2017 (82 FR 3694)	Not designated	NLAA
Corals				
Acropora jacquelineae, Acropora globiceps, Acropora lokani, Acropora pharaonis, Euphyllia paradivisa, Isopora crateriformis, Montipora ustraliensis, Porites napopora, Seriatopora aculeata, Acropora retusa, Acropora rudis, Acropora speciose, Acropora tenella	Threatened	September 2, 2014 (79 FR 53852)	Not designated	NLAA
Cantharellus noumeae	Endangered	October 7, 2015 (80 FR 60560)	Not designated	NLAA

No designated critical habitat exists in the action area; therefore, critical habitat will not be affected by the proposed ULDB Program.

Consultation History

- On June 16, 2014, NASA submitted a Biological Evaluation to the NMFS Office of Protected Resources Interagency Cooperation Division requesting concurrence with NASA's not likely to adversely affect determinations regarding the proposed action's effects on ESA-listed species.
- On July 3, 2014, NMFS published a final rule (79 FR 38213) listing four DPSs of scalloped hammerhead shark under the ESA. NASA submitted a revised Biological Evaluation on July 10, 2014, adding not likely to adversely affect determinations for the ESA-listed scalloped hammerhead shark DPSs, and again requesting NMFS' concurrence with NASA's not likely to adversely affect determinations regarding the proposed action's effects on ESA-listed species in the action area.
- On August 11, 2014, NMFS concurred with NASA's July 10, 2014 not likely to adversely affect determination.
- On February 22, 2016, NMFS received a letter from NASA requesting concurrence that changes to the proposed action may affect, but are not likely to adversely affect, ESA-listed species or adversely modify designated critical habitat within the action area, as described below. In a letter dated April 1, 2016 (NMFS No. FPR-2016-9158), NMFS determined that no additional adverse effects would be expected from those changes to the ULDB Program.

Description of the Revised Proposed Action and Expanded Action Area

NMFS' letter of concurrence dated August 11, 2014, for NASA's ULDB Program describes the proposed action and subsequent changes based on NASA's Biological Evaluation, dated July 2014. In its Biological Evaluation (BE), NASA proposed to launch up to three Super Pressure Balloons (SPBs) annually through 2024 as part of the ULDB Program, in support of the agency's research in the earth and space sciences. These balloon flights have the potential to drift beyond the continental limits and may terminate in the ocean, in which case their recovery is unlikely. Balloon systems that are terminated in the ocean would have the potential to interact with ESA-listed species under NMFS' jurisdiction.

NMFS' letter of concurrence dated August 11, 2014, contains a detailed description of the proposed action, which includes features of the balloon components, oceanic termination scenarios for balloon flights, measures to reduce potential adverse effects to ESA-listed species, and reporting of the outcomes of balloon flights. Subsequent proposed changes to the action were detailed in NASA's letter to modify the BE, dated February 22, 2016 and in NMFS' response letter of April 1, 2016. Further changes to the proposed action and EAA were provided by NMFS in the February 2017 Supplemental Biological Evaluation (SBE), and are described below. NASA assumes that the revised proposed action would involve annual operations at two launch sites over a ten-year period beginning in 2017/18 and would not exceed the expected operational timeline described in the 2017 SBE. All other operations will continue to be conducted as described in the July 2014 BE, and in NMFS' August 11, 2014, and April 1, 2016, letters of concurrence.

1. Expanded Action Area

Under the ESA, the "action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02).

NASA's Balloon Program Office conducted successful flights of ULDB missions from Wanaka, New Zealand in 2015 and 2016 (one per year). However, trajectories of the ULDB flights did not conform to predicted paths due to anomalous wind patterns. Because of these anomalies, the 2015 New Zealand ULDB mission (Flight 662NT) was stalled by eddies in the Tasman Sea. This resulted in the balloon and payload being terminated over land near latitude 28.9° S, outside of the Action Area specified in the 2014 BE of areas between 29° S and 65° S. In 2016, the New Zealand ULDB mission (Flight 669NT) experienced erratic wind patterns over the southern Pacific which resulted in overflight of the ocean as far north as 5.7° S resulting in termination over, and landing in Peru at about 16.2° S. As a result of these changes in flight paths to areas north of the Action Area described in the 2014 BE, NASA proposes to increase the Action Area to accommodate the possibility of erratic wind currents in future missions. Therefore, NASA proposes for the EAA to include all land and water between the South Pole and 10° S in the Eastern Hemisphere and between the South Pole and 5° S in the Western Hemisphere (Figure 1). This EAA encompasses an increase from 131.8 to approximately 221.9 million-square kilometer (km^2) area comprised of approximately 182.7 million km^2 water, and 39.2 million km^2 terrestrial areas (an increase of 69.4 and 20.7 million km^2, respectively).

The EAA possesses habitat areas used by listed species for foraging (i.e., chondrichthyes species, neritic sea turtles, whales, and African coelacanths); coastal areas utilized for breeding and rearing by most chondrichthyes species (excluding oceanic whitetip sharks) and African coelacanths, including mating and calving grounds for whales, and nesting sites for sea turtles. Nearly all ESA-listed coral habitat is within the EAA, including the Great Barrier Reef. Additionally, there are important marine features such as the continental shelf, seamounts, and areas possessing high primary productivity (NASA 2017).

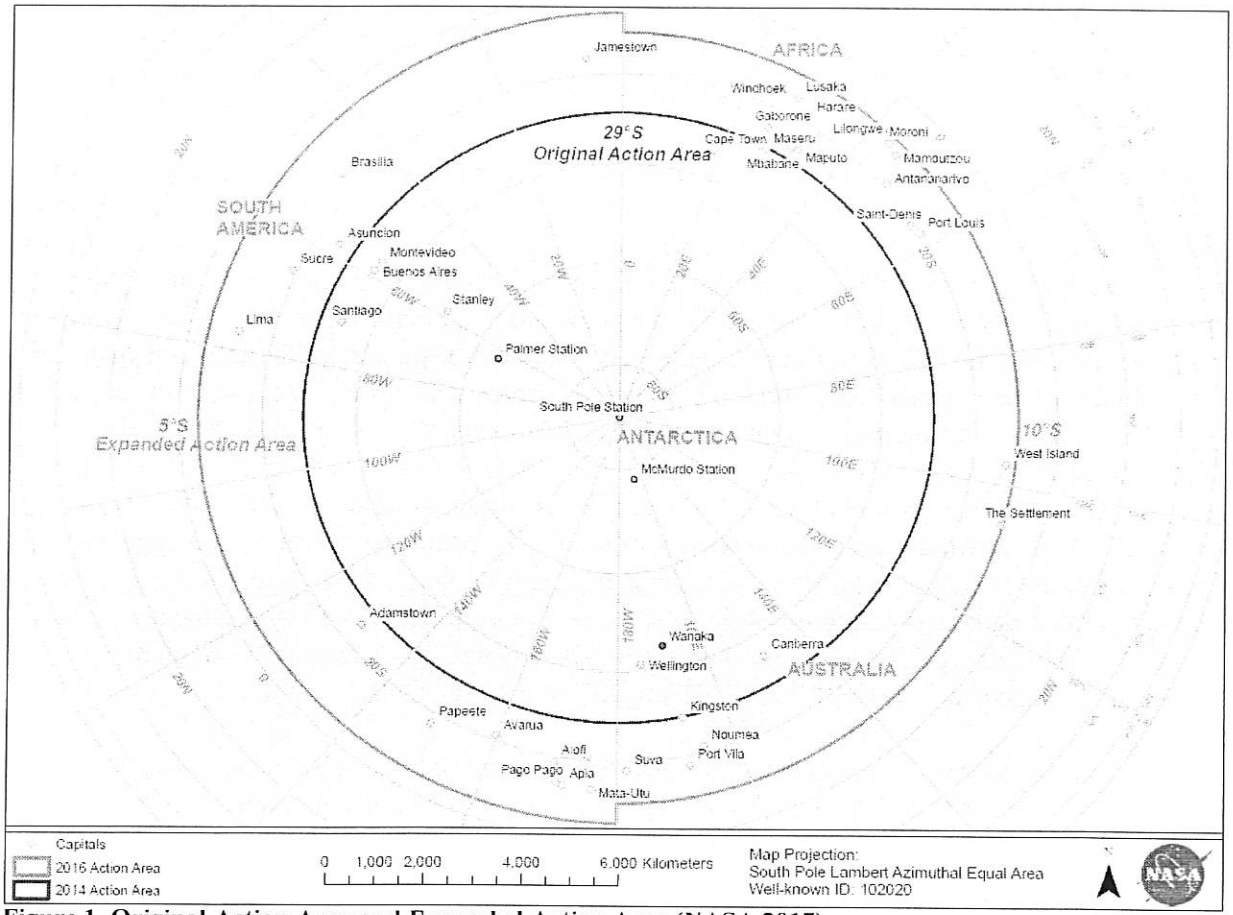

Figure 1. Original Action Area and Expanded Action Area (NASA 2017)

2. Radioactive Sources

The use of radioactive sources (i.e., radionuclides) are often used in NASA missions, including those of the NASA Balloon Program Office. These radionuclides are used for on-the-ground and in-flight calibration of instruments, and are secured within mission payloads (NASA 2017). For this program, NASA is proposing to include the use of radioactive sources (in addition to those payload components identified in the 2014 BE) for the launch of only one mission, as part of the expanded Southern hemisphere ULDB Program in New Zealand. Radioactive sources used for the New Zealand Missions are not likely to enter the region south of 60° S which is regulated by the Antarctic Treaty (NASA 2017), thus radioactive sources if used, will enter a smaller region of the action area. Furthermore, NASA's 2017 SBE describes the criteria used to assess to type of radioactive source and explains the type of radioactive source used for the launch is "considered a minor one" and not prohibited or strictly regulated because of the low environmental concerns.

Minimization Measures

NMFS' letters of concurrence from August 11, 2014, and April 1, 2016, for NASA's ULDB Program contains a complete description of the measures to reduce potential adverse effects to ESA-listed species, and reporting of the outcomes of balloon flights. All minimization and avoidance measures remain the same for the ULDB Program.

Affected Species and Critical Habitat

The proposed action has the potential to affect the ESA-listed species listed in Table 1 above. NASA's analysis shows that the proposed changes to the project and EAA may result in effects

to species and habitats not previously considered due to the expanded action area. Because of the larger area, there is the potential for 34 threatened or endangered species or DPSs to be present during the program's activities. Of these, seven were already included in NMFS' 2014 analyses and concurrence letter. These species are the blue whale (*Balaenoptera musculus*), fin whale (*Balaenoptera physalus*), sei whale (*Balaenoptera borealis*), southern right whale (*Eubalaena australis*), sperm whale (*Physester macrocephalus*), leatherback sea turtle (*Caretta caretta*), and scalloped hammerhead shark (*Sphyrna lewini*). These species will not be discussed further in this analysis since the effects on them remain the same as what was previously considered. In addition, since 2014, the status of the humpback whale (*Megaptera novaeangliae*) was revised, resulting in 14 humpback whale DPSs (81 FR 62259). Of these, none of the DPSs within the EAA are listed as threatened or endangered under the ESA. Additionally, four other species, the narrownose smoothhound shark (*Mustelus schmitti*), argentine angelshark (*Squatina argentina*), oceanic whitetip shark (*Carcharhinus longimanus*), and giant manta ray (*Manta birostris*) were proposed for listing as threatened under the ESA in December 2015, December 2016 and January 2017, respectively (80 FR 76067, 81 FR 96304, 82 FR 3694).

For all 34 species, there is no designated nor proposed critical habitat in the action area; therefore, critical habitat will not be affected by the action. Effects of the action on proposed for listing and ESA-listed species not previously considered are discussed below.

Effects of the Action

Under the ESA, "effects of the action" means the direct and indirect effects of an action on the listed species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action (50 CFR 402.02). The applicable standard to find that a proposed action is not likely to adversely affect listed species or critical habitat is that all of the effects of the action are expected to be discountable, insignificant, or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse effects to the species or critical habitat. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur.

Effects of the Action on Species

NMFS' letter of concurrence from August 11, 2014, for NASA's ULDB Program contains a complete description of the potential stressors and the likelihood of stressors impacting ESA-listed species. The stressors created by the proposed action are entanglement, ingestion, or direct strike of an ESA-listed species by the ULDB. Entanglement, ingestion, or direct strike could lead to injury, reduced fitness, and mortality. The likelihood that ESA-listed species would be impacted by these stressors was determined by considering factors that include: the scale and scope of the action; NMFS' expectations of how components of the ULDB Program are likely to behave following oceanic flight termination; the density and distribution of ESA-listed species; the biology and life histories of ESA-listed species; and the physical characteristics of the action area.

1. Marine Reptiles – Green, Hawksbill, Leatherback, Loggerhead and Olive Ridley Sea Turtles

The EAA contains habitats used by five species of ESA-listed sea turtles. These are the green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricate*), leatherback (*Dermochelys coriacea*),

loggerhead (*Caretta caretta*), and olive ridley (*Lepidochelys olivacea*) sea turtles. The leatherback sea turtle was previously considered in NMFS' 2014 and 2016 analyses and will not be discussed further in this analysis. For the remaining four sea turtle species potentially present in the action area, a general overview of their life history strategies and distribution within the action area is provided below.

a. Green Sea Turtle (*Chelonia mydas*)
Within the action area, the endangered East-Indian, West-Pacific, and Central South Pacific DPSs, and threatened South Atlantic, Southwest Indian, and East Pacific DPSs have the potential to be present during implementation of the ULDB Program. The green sea turtle species is global in distribution between 40° N and 40° S (Hirth 1997). This species prefers waters warmer than 20° C and adults of the species can generally be found in waters less than 200 meters (m) deep (neritic zone). Their diet consists of algae and seagrasses (Plotkin 2003). Adults of the species are known to dive to depths of 20 to 25 m or as deep as 25 m (Hochscheid et al. 1999; Hays et al. 2000). Juveniles are thought to be carnivorous or omnivorous while inhabiting pelagic waters, usually within the first year of hatching, returning to neritic zones as subadults and adults (Hirth 1997; Bjorndal and Jackson 2003). The green sea turtle primarily remains within the neritic zone except when migrating long distances (thousands of kilometers) between nesting and foraging sites (Plotkin 2003).

b. Hawskbill Sea Turtle (*Eretmochelys imbricate*)
Hawksbill sea turtles inhabit tropical marine waters and are closely associated with coral reefs and other communities featuring hard substrates (Plotkin 2003). Their diet is comprised of benthic invertebrates, especially sponges. They are known to dive to depths greater than 70 m while foraging (van Dam and Diez 1996). Similar to green sea turtles, hatchlings spend time in the pelagic environment before returning to the neritic zone as large juveniles (Bjorndal and Jackson 2003). Nesting females migrate hundreds to thousands of kilometers to natal beaches (Miller et al. 1998; Plotkin 2003).

c. Loggerhead Sea Turtle (*Caretta caretta*)
Of the nine federally-listed loggerhead sea turtle DPSs, the endangered South Pacific DPS, and threatened South Atlantic, Southwest Indian, and Southeast Indo-Pacific DPSs, may be located within the EAA. This species inhabits subtropical and temperate waters. Adults are distributed within the neritic zone while juveniles spend a majority of their time in pelagic waters about 5 m below the sea surface (Bjorndal and Jackson 2003; Plotkin 2003; Spotila 2004; Mansfield and Putman 2013). These turtles forage on crustaceans, mollusks, and cnidarians (Spotila 2004). Larger juveniles have been known to forage as deep as 650 m, sometimes around seamounts (Spotila 2004). As with other sea turtle species, females and most males migrate hundreds to thousands of kilometers to breeding areas.

d.Olive Ridley Sea Turtle (*Lepidochelys olivacea*)
The population of Olive ridley sea turtles consists of one population listed as endangered under the ESA (Pacific Coast of Mexico breeding populations) and all other populations are listed as threatened (43 FR 32800). These sea turtles are globally distributed in the tropical regions of the South Atlantic, Pacific, and Indian Oceans. In the South Atlantic Ocean, they are found along the Atlantic coasts of West Africa and South America. This species spends most of its time in

pelagic waters (Bjorndal and Jackson 2003; Plotkin 2003), but has been found to sometimes inhabit coastal areas, including bays and estuaries. Their diet consists of algae, invertebrates (primarily benthic crustaceans, mollusks and tunicates) and fish. Olive ridley sea turtles are known to undertake extraordinary migrations and have been found as far as 2,400 miles from shore. They are known to spend a large amount of time diving, and are capable of diving to depths of 150 m.

Due to the size of the EAA, it is possible that individuals of all sea turtle species discussed above could be present in the action area. During the most likely timeframe of a New Zealand-launched SPB flight termination, most of the green, hawksbill, and loggerhead sea turtle adults would have returned to the neritic zone; olive ridley and leatherback sea turtle adults, as well as small juveniles of all five species, could be found in the open ocean during the most likely timeframe of a flight termination. However, due to the descent time and size of an intact SPB system, it is unlikely that these turtles would become entangled or confuse the balloon components as prey and attempt to ingest them. The likelihood of the balloon degrading into smaller and more buoyant pieces poses a greater ingestion risk to sea turtles, but this occurrence is considered very unlikely due to the rate of degradation (centennial scale) and deep ocean depths along the seafloor where they would begin to break apart. As a result of these factors, NMFS has determined the likelihood of a sea turtle being exposed to the potential stressors associated with the action to be so low as to be discountable.

2. Fishes – Sarcopterygii and Chondricthyes

a. African Coelacanth (*Latimeria chalumnae*)
The African coelacanth is a threatened ESA-listed fish species. The coelacanth is known to inhabit waters between 50 and 230 m deep along the western coast of Africa between South Africa and Kenya. They inhabit deep submarine caves and canyons (Fricke et al. 2011), and some individuals are known to occupy deeper waters (between 200 and 300m) at night to forage (Fricke et al., 1994; Hissmann et al., 2000), while others forage in shallower waters. This may be driven by prey availability, which includes fish and cephalopods, including some species which dwell at depths of over 600 m. African coelacanths exhibit very high site fidelity, though ranges are broad (Whittaker 2014) and ten or more individuals may congregate in caves or other shelters to rest during the day located along the coasts of eastern Africa nations, Madagascar, and the Comoros year-round (Whittaker 2014).

Within the EAA, African coelacanths are likely to remain in pelagic submarine caves and canyons or other geologic formations along the coasts of eastern Africa, Madagascar, and the Comoros year-round (NASA 2017).

b. Oceanic Whitetip Shark (*Carcharhinus longimanus*)
The oceanic whitetip shark was proposed for listing as threatened under the ESA on December 29, 2016 (81 FR 96304). This species is an epipelagic species and inhabits waters offshore on the outer continental shelf and around islands in deep water usually in the upper 80 m, but down to at least 152 m (but can inhabit 180 m or greater) in tropical and warm temperate regions, mostly between 10° N and 10° S but also within 30 ° N and 35 ° S (Backus et al. 1956; Strasburg 1958; Compagno 1984; Bonfil et al. 2008). The diet of oceanic whitetip sharks includes a variety of

fish, cephalopods, and may include seabirds, rays, turtles, and refuse (Compagno 1984), and is capable of foraging at depths greater than 200 m into the mesopelagic zone (Howey-Jordan et al. 2013; Howey et al. 2016).

c. Angelsharks

Within the EAA, there are two species of angelsharks listed as endangered under the ESA, the sawback (*Squatina aculeata*) and smoothback (*S. oculata*), and one species proposed for listing as endangered, the Argentine angelshark (*S. argentina*) (80 FR 76067), that may be present. Angelsharks are batoid, and reside just below the seafloor substrate during the day and exhibit nocturnal foraging behaviors which include ambushing prey. Their diet includes fishes, small sharks and benthic invertebrates. The sawback and smoothback angelsharks occupy very similar ranges and habitats, and can both be found occupying the continental shelf and upper slope benthic habitats from the Mediterranean to Angola. Sawback angelsharks are found in waters between 30 and 500 m deep while smoothbacks occupy a wider vertical range, from 20 to 560 m deep, though they are most commonly found between 50 and 100 m of depth (Compagno 1984; Serena 2005).

The Argentine angelsharks inhabit a very limited range offshore of Brazil, Uruguay, and Argentina in waters between 100 and 400 m deep (Van der Molen et al. 1998, Casselberry and Carson 2015a). They forage on benthic prey species, comprised primarily of fishes, with some crustaceans and mollusks (Casselberry and Carson 2015a).

d. Narrownose Smoothound shark (*Mustelus schmitti*)

The narrownose smoothhound shark is proposed for listing as threatened under the ESA (80 FR 76067). This species inhabits benthopelagic areas along the coasts of Brazil and Argentina between 22 and 47 °S (Compagno 1984; Oddone et al. 2007). These sharks may be found in Brazilian waters as deep as 195 m (Casselberry and Carson 2015b) and are known to use several shallow bays as nurseries (Casselberry and Carson 2015a; Oddone et al. 2007; Van der Molen et al. 1998) where all life stages are found in austral spring, with only pups and juveniles remaining by autumn (Casselberry and Carson 2015b). Their diet consists of fishes, crustaceans, and polychaetes. The species exhibits seasonal shifts in location, as well as sexual segregation in adult populations (Oddone et al. 2007).

e. Sawfish

Four species of sawfish listed as endangered under the ESA may be present within the EAA, including the dwarf (*Pristis clavata*), green (*P. zijsron*), largetooth (*P. pristis*), and narrow sawfish (*Anoxypristis cuspidata*). Their diet is comprised of slow shoaling fishes, benthic crustaceans and mollusks (Sutarno and Suyatna 2012). These species generally occupies nearshore freshwater, estuarine, and marine habitats to depths of about 120 m (Sutarno and Suyatna 2012).

The dwarf and green sawfish historical ranges overlap closely and include northern and northwestern coasts of Australia, coastlines of Thailand, Malaysia, Indonesia, Papau New Guinea, and surrounding islands, as well as Mauritius (Sutarno and Suyatna 2012; IUCN 2016). Geospatial data available from the 2016 International Union for Conservation of Nature (IUCN)

indicates that green sawfish may also occur along the east coasts of South Africa, Kenya, and Australia, in portions of the Red Sea and Persian Gulf, and around the remainder of the Mascarene Islands (NASA 2017). Recent research suggests that dwarf and green sawfish may now be restricted to Australian waters (Sutarno and Suyatna 2012). The narrow sawfish may occupy some of the same historical range as the dwarf and green, but in a much narrower band that stretches from the Horn of Africa to southern Japan and from Malaysia to Papau New Guinea and northern Australia (Sutarno and Suyatna 2012; IUCN 2016).

Dwarf sawfish utilize nearshore marine, estuarine, and freshwater habitats and have been captured in waters between 0.7 and 7 m deep (Thorburn et al. 2008; Wueringer et al. 2009). Green sawfish are typically found in coastal marine and freshwater environments up to 40 m deep, and may prefer waters between 1 to 5 m depth (Wueringer et al. 2009; Sutarno and Suyatna 2012). Narrow sawfish inhabit inshore marine, estuarine, and riverine habitats up to 40 m in depth (Wueringer et al. 2009). Dwarf and green sawfish migrate between the nearshore environment during low tide and inundated mangrove forests during high tide, and appear to prefer water depths of less than 2 m unless resting or traversing deeper water between sites (Stevens et al. 2008). Juvenile dwarf, green, and narrow sawfish in northern Australia are found inhabiting inshore habitats, and appear to prefer foraging in the surf zone (Peverell 2005; Tobin et al. 2014).

The largetooth sawfish (*Pristis pristis*) encompasses disparate populations of a single species or a group of closely related subspecies with wide distribution, formerly described as *Pristis perotteti*, *P. pristis*, *P. microdon*, and others (NOAA 2010). Historical distribution of this species consisted of nearshore environments ranging from the southern United States of America to Brazil in the western Atlantic, from Mauritania to Angola in the western Atlantic (Fernandez-Carvalho et al. 2013), Mexico to Peru in the eastern Pacific (NOAA 2010), and along eastern Africa and from India, through southeast Asia, to Papau New Guinea and northern Australia (Thorburn et al. 2007). Despite a global distribution, Australia may host the only healthy populations in the Indo-Pacific region (Stevens et al. 2005). Largetooth sawfish inhabit coastal marine, estuarine, and riverine habitats less than 10 m deep (though, some individuals in Lake Nicaragua have been observed at depths exceeding 120 m) primarily in brackish waters and mangrove forests (NOAA 2010).

f. Giant Manta Ray.

The giant manta ray (*Manta birostris*) was proposed for listing as threatened under the ESA on January 12, 2017 (82 FR 3694). This species may exist in small, fragmented populations in temperate to tropical marine waters throughout the world to 36° S. Giant manta rays filter-feed on plankton and small fishes epipelagic zones (Michael 1993; Homma et al. 1999; Duffy and Abbott 2003; Luiz et al. 2009; Graham et al. 2012). They inhabit shallow coastal waters for foraging, cleaning, and reproduction (Michael 1993). Bite marks from cookiecutter sharks (*Isistius brasiliensis*) indicate that they may dive to depths below 100 m (Homma et al. 1999).

For the fish species potentially present in the EAA during the most likely timeframe of a New Zealand-launched SPB flight termination (late austral fall-early austral winter), African coelacanths are likely to remain in pelagic submarine caves and canyons or other geologic formations along the coasts of eastern Africa, Madagascar, and the Comoros year-round (NASA

2017). Adults of most subject elasmobranch species (scalloped hammerhead sharks, narrownose smoothhound sharks, oceanic whitetip sharks, giant manta rays, and angelsharks) would likely occupy relatively deeper waters (as compared to inshore, estuarine waters) over the continental and insular shelves. Sawfish would likely be present in nearshore, estuarine, and riverine waters. Therefore, the probability of these fish species interacting with an SPB is very low, making the likelihood of species co-occurrence with an SPB so low as to be discountable.

3. Corals

There are fourteen coral species which may occur in the EAA. Thirteen of these are listed as threatened, and one as endangered, under the ESA (79 FR 53851, 79 FR 74953). These species lack common names and are listed in Table 1 and below by scientific name.

a. Genus Acropora

Of the fourteen coral species listed as threatened under the ESA and potentially present within the EAA, eight are classified under the genus *Acropora (Acropora globiceps, Acropora jacquelineae, Acropora lokani, Acropora pharaonis, Acropora retusa, Acropora rudis, Acropora speciose, Acropora tenella).* This genus of corals is abundant in tropical and sub-tropical waters and is mainly comprised of shallow-water (<10 m depth) species, cohabiting the same reefs although different species can be found within water depth ranges from five to 70 m deep. These species are known to be prolific reef builders and are early colonizers, but they are also very sensitive to disturbance (Wallace 1999). This genus is considered highly susceptible to mortality from storm events and is affected most severely among by coral bleaching (Wallace 1999).

b. Non-Acropora Species

Cantharellus noumeae is listed as endangered under the ESA. This species subsists on zooplankton and through symbiotic relationships with zooxanthellae. *C. noumeae* may exist alone or in colonies in waters 10 to 35 m deep, near soft sediments in sheltered waters. There are a very limited number of populations remaining near Papau New Guinea and New Caledonia (Meadows 2014).

Ephyllia paradivisa is listed as threatened under the ESA. This species is known to benefit from a symbiotic relationship with zooxanthellae and may be found in the Malay Archipelago in waters between 5 and 20 m deep (Brainard et al. 2011).

Isopora crateriformisin is a ESA-listed as threatened species and inhabits waters around Madagascar, Sri Lanka, the Malay Archipelago, north and east Papau New Guinea, the Solomon Islands, Queensland (Australia) islands, New Caledonia, and islands between Fiji and American Samoa. It is typically found in waters 12 m deep, but has been found as deep as 50 m (Brainard et al. 2011).

Montipora australiensis is listed as threatened under the ESA and can be found around Madagascar, the Malay Archipelago (except Papau New Guinea), west, north, and northeast Australia, the Great Barrier Reef, and many south Pacific islands. It is known to occupy water depths of two to 30 m deep, and is thought to a hermaphroditic broadcast spawner that maintains a symbiotic relationship with zooxanthellae (Brainard et al. 2011).

Porites napopora is listed as threatened under the ESA and inhabits waters between three and 15 m deep around the Malay Archipelago, South China Sea, East China Sea, Palau, Micronesian islands, Guam, and Northern Mariana Islands (Brainard et al. 2011). The reproductive strategy for this species is unknown and it is assumed that it maintains a symbiotic relationship with zooxanthellae like others in the genus (Brainard et al. 2011).

Seriatopora aculeata is listed as threatened under the ESA and is found on the north and south ends of Madagascar, the eastern Malay Archipelago, northern Papau New Guinea, Australia's northeast coast, the Great Barrier Reef, and western Pacific islands between the Northern Mariana Islands and American Samoa, and inhabits waters between three and 40 m deep (Brainard et al. 2011).

Because ESA-listed corals are sessile organisms once established along a reef, and with limited dispersion potential, they would remain in the coastal environment of the EAA year-round. Thus they would not be able to move away and avoid any SPB components landing in the water in the rare event of an ocean termination. However, an ocean termination would be considered a worst-case and unlikely scenario. Should the descending SPB land in shallow water atop a coral reef and the balloon carcass unfurl to its full size, some corals could be smothered. However, such an occurrence is considered extremely unlikely, given the minimization measures NASA will implement to avoid impacts to areas with coral species. As a result of these factors, NMFS has determined the likelihood of a coral being exposed to the potential stressors associated with the action is so low as to be discountable.

Summary of Effects on Species

Although there are minor changes to the project description, an expansion of the action area, and the potential for additional species to be present during the program's activities, the animal stressors analyzed in NMFS' 2014 and 2016 letters remain the same. Because of the expansion of the action area, the Large Marine Ecosystems, World Database on Protected Areas marine areas, and seamounts within the action area increased compared to what was described in the 2014 BE and February 2016 amendment (see Table 3-1 in the 2017 SBE for specific increases); therefore the proposed action could affect a greater portion of these sensitive areas. However, since these areas are important to the ESA-listed species, NASA will continue to use the modified marine sensitive areas geospatial data layer (as described in the BE) to identify the boundaries of these areas on an SPB real-time flight tracking and computer system and will avoid flight terminations in those areas at or above 3,000 m depth which are identified as habitat for ESA-listed species, and where concentrations of animals could be the highest. This would result in an overall reduction of sensitive areas within the EAA from 37.865 million km^2 to 26.925 million km^2 (NASA 2017).

In the event of an oceanic flight termination, the likelihood of an ESA-listed species becoming entangled with or being directly struck by any ULDB components is extremely remote. Should an oceanic landing occur, there would be only a remote, extremely low likelihood of the SPB striking or landing near a listed species for several reasons. First, the New Zealand-launched balloon flights would be infrequent (approximately two per year) and would have a low probability (ranging from approximately 0.02 to 0.25) of a water impact (NASA 2017). Second,

if an oceanic flight termination were necessary, NASA would avoid specific habitat areas, including the most sensitive areas (e.g., seamounts, coral reefs) and other areas located along coastal regions and areas of important foraging, mating, or nesting. Finally, because many species considered in this analysis swim below the ocean surface, the descent velocities of the sinking SPB are such that an animal could swim either vertically or laterally out of the way, thereby reducing the effect on the animal to a brief behavioral disruption such as a startle and/or avoidance response. As a result of these factors, NMFS has determined the likelihood of an ESA-listed species becoming entangled with or being directly struck by any ULDB components is so low as to be discountable.

The risk of ingestion by an animal is also considered to be very low, due to the low number of New Zealand-launched flights occurring annually and low probability of an oceanic termination. These factors decrease the chances of a flight landing in the nearshore habitats. Coupled with the rapid (less than two hours) sink rates of the SPB system to well below the depths where individual animals have been recorded as foraging, there is a very small likelihood of an ESA-listed animal ingesting the balloon or equipment. NMFS also expects that SPB components will remain intact and on the seafloor at a depth greater than 3,000 m, which minimizes potential interactions with ESA-listed species since this is deeper than any of the species could inhabit. Degradation of the material into smaller, buoyant pieces is expected to be very slow, occurring over a centennial or greater scale (NASA 2017). Moreover, should the material fragment and release ingestible sized particles, the distribution of the particles would occur over a wide temporal period, across the entire pelagic portion of the EAA, making the probability of ingestion by individuals in the future very low. If an animal were to swallow a piece of the material, no obstruction of the digestive system is expected since the material is weak enough to degrade and likely too weak to obstruct the gut of any ESA-listed species. In summary, as a result of these factors, NMFS has determined that the risk of ingestion of an SPB component by an ESA-listed species is so low as to be discountable. Further, if an animal were to ingest an SPB component, the effects would be insignificant.

In the event that a SPB system carrying a radiation source results in oceanic termination, the payload and all other associated components (e.g., gondola, flight train, parachute, balloon carcass) are expected to sink to the bottom of the ocean quickly. In addition, since the radiation source and calibration equipment are enclosed within plastic, radioactive material is not expected to leak from the payload during its descent to the ocean floor. Once on the ocean floor, slow degradation of the components would occur (as described in the 2014 BE) allowing sea water to enter the payload. Due to the deep depth it would begin to leak ($\geq$ 3,000 m), it would be improbable for ESA-listed species to be present (it is well beyond the dive depths of listed species), plus the amount of radiation that could leak at this point is expected to be minor, so that its effects on any species present in the action area would be negligible. Therefore, based on this information, NMFS has determined that the risk that an ESA-listed species would be affected by the radiation in an SPB system is low as to be discountable.

Effects of the Action on Designated Critical Habitat

The revised proposed action does not occur within designated critical habitat for any of the ESA-listed species, nor candidate species. Therefore, none exists within the EAA. Because there is no designated critical habitat in the action area, critical habitat will not be affected by the action.

Conclusion

The revised proposed action is unchanged except for the minor revisions to the project description, expansion of the action area and potential presence of additional ESA-listed or candidate species not previously considered. After review of the revised proposed action, including minimization and avoidance measures described in NMFS' August 11, 2014 and April 1, 2016 letters, supplemental information provided in the 2017 SBE, and based on the best scientific and commercially available data, NMFS determined the likelihood that an ESA-listed species would be affected by the ULDB Program is discountable. The project's activities would not modify the frequency of balloon flights or their intended flight path, and NASA would also continue to implement measures intended to reduce the likelihood of oceanic terminations. Plus, the size of the ULDB components that may enter the ocean is very small in comparison to the huge expanse of the ocean within the EAA, making the probability of any animal encountering them very low. Therefore, because the type of activity for the ULDB Program remains essentially the same for each mission occurring within the EAA that was previously analyzed in 2014 and in 2016, and the analyses summarized above, NMFS concurs with NASA's determination that the revised proposed ULDB Program is not likely to adversely affect ESA-listed species. There will be no effect to designated critical habitats.

Reinitiation of Consultation

As provided in 50 CFR 402.16, NASA must reinitiate ESA consultation if:

(1) new information reveals effects of the action that may affect ESA-listed species or critical habitat in a manner or to an extent not previously considered,
(2) the action is modified in a manner causing effects to ESA-listed species or critical habitat not previously considered,
(3) or a new species is listed or critical habitat designated that may be affected by the action.

The incidental take of ESA-listed species associated with this action, including behavioral harassment, injury, or mortality, is not anticipated nor exempted; thus, if take occurs as a result of the action, NASA must immediately contact the NMFS Office of Protected Resources ESA, Interagency Cooperation Division to develop and implement mitigation to avoid additional take or initiate formal consultation in accordance with ESA section 7(a)(2).

Please direct questions regarding this letter to the NMFS Office of Protected Resources, Ms. Jacqueline Meyer (301) 427-8492 or jacqueline.pearson-meyer@noaa.gov.

Sincerely,

Donna S. Wieting
Director, Office of Protected Resources

Literature Cited

Backus, R.H., Springer, S. and Arnold Jr., E.L. (1956) A contribution to the natural history of the white-tip shark, *Pterolamiops longimanus* (Poey). Deep-sea Research, 3, 178-188

Bjorndal, K. A., and Jackson, J. B. (2003). Roles of Sea Turtles in Marine Ecosystems: Reconstructing the Past. In Lutz, P. L., Musick, J. A., and Wyneken, J. (Eds). *The biology of sea turtles, volume II.* pp. 259-273. CRC Press, Boca Raton, Florida.

Bonfil, R., Clarke, S., Nakano, H., Camhi, M. D., Pikitch, E. K., and Babcock, E. A. (2008). Chapter 11: The biology and ecology of the oceanic whitetip shark, *Carcharhinus longimanus*. *Sharks of the Open Ocean: Biology, Fisheries, and Conservation*. pp. 128-139. Blackwell Publishing, Ltd. Published Online: January 28, 2009.

Brainard, R. E., Birkeland, C., Eakin, C. M., McElhany, P., Miller, M. W., Patterson, M., and Piniak, G. A. (2011). Status review report of 82 candidate coral species petitioned under the U.S. Endangered Species Act. U.S. Dep. Commerce. *NOAA Tech. Memo*. NOAA-TM-NMFS- PIFSC-27. 530 p. +1 Appendix.

Casselberry, G.A. and Carlson, J. K. (2015a). Endangered Species Act Status Review of the Argentine angel shark (*Squatina argentina*). Report to the National Marine Fisheries Service, Office of Protected Resources. SFD Contribution PCB-15-09.

Casselberry, G. A. and Carlson, J. K. (2015b). Endangered Species Act Status Review of the Narrownose Smoothhound (*Mustelus schmitti*). Report to the National Marine Fisheries Service, Office of Protected Resources. SFD Contribution PCB-15-07.

Compagno, L. J. V. (1984). Sharks of the World. An annotated and illustrated catalogue of shark species to date. 4. *FAO Fisheries Synopsis*, FAO, Rome.

Fernandez-Carvalho, J., Imhoff, J. L., Faria, V. V., Carlson, J. K., and Burgess, G. H. (2014). Status and the potential for extinction of the largetooth sawfish Pristis pristis in the Atlantic Ocean. *Aquatic Conservation: Marine and Freshwater Ecosystems*. 24(4). pp. 478-497.

Fricke, H., and Hissmann, K. (1994). Home range and migrations of the living coelacanth Latimeria chalumnae. Marine Biology. 120(2). pp. 171-180.

Hays, G.C., Adams, C. R., Broderick, A. C., Godley, B. J., Lucas, D. J., Metcalfe, J. D., and Prior, A. A. (2000). The diving behaviour of green turtles at Ascension Island. Animal Behaviour. 59(3). pp. 577-586.

Hirth, H. F. (1997). Synopsis of the biological data on the green turtle *Chelonia mydas* (Linnaeus 1758). United States Fish and Wildlife Service. Biological Report. 97(1). 120 pp.

Hissmann, K., Fricke, H., and Schauer, J. (1998). Population monitoring of the coelacanth (*Latimeria chalumnae*). *Conservation biology*. 12(4). pp. 759-765.

Hochscheid, S., Godley, B. J., Broderick, A. C., and Wilson, R. P. (1999). Reptilian diving: highly variable dive patterns in the green turtle *Chelonia mydas*. *Marine Ecology Progress Series*. 185. pp. 101-112.

Homma, K., Maruyama, T., Ito T., Ishihara, H., and Uchida, S. (1999). Biology of the manta ray Manta birostris Walbaum, in the Indo-Pacific. Proc. 5th Indo-Pac. Fish Conj, Nouméa, 1997. pp. 209-216.

Howey-Jordan, L.A., Brooks, E.J., Abercrombie, D.L., Jordan, L.K.B., Brooks, A., Williams, S., Gospodarczyk, E. and Chapman, D.D. (2013) Complex Movements, philopatry and expanded depth range of a severely threatened pelagic shark, the oceanic whitetip (Carcharhinus longimanus) in the western North Atlantic. PloS one, 8, 1-12.

Howey, L.A., Tolentino, E.R., Papastamatiou, Y.P., Brooks, E.J., Abercrombie, D.L., Watanabe, Y.Y., Williams, S., Brooks, A., Chapman, D.D. and Jordan, L.K.B. (2016) Into the deep: the functionality of mesopelagic excursions by an oceanic apex predator. Ecol. Evol.

IUCN (2016) International Union for Conservation of Nature and United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC). (2016). The World Database on Protected Areas (WDPA) [On-line]. October 2016. Cambridge, UK: UNEP-WCMC. Available at: www.protectedplanet.net.

Mansfield, K. L. and Putman, N. F. (2013). Oceanic Habits and Habitats: *Caretta caretta*. In Wyneken, J., Lohmann, K. J., and Musick, J. A. (Eds.). *The biology of sea turtles, volume* III. pp. 189-210. CRC Press, Boca Raton, Florida.

Meadows, D. (2014). Endangered Species Act draft status review report of three foreign corals. Report to the National Marine Fisheries Service, Office of Protected Resources. August 2014. 35 pp.

Michael, S. W. (1993). *Reef sharks and rays of the world: a guides to their identification, ecology, and behaviour*. Monterey. *Sea Challengers*. VI+. 99 pp.

Miller, J. D., Dobbs, K. A., Limpus, C. J., Mattocks, N., and Landry Jr, A. M. (1998). Long-distance migrations by the hawksbill turtle, *Eretmochelys imbricata*, from north-eastern Australia. *Wildlife Research*. 25(1). pp. 89-95.

NASA (2014). Biological Evaluation of Southern Hemisphere Ultra Long Duration Ballooning. National Aeronautics and Space Administration, Goddard Space Flight Center, Wallops Flight Facility, Wallops Island, VA 23337.

NASA (2017). Biological Evaluation of Southern Hemisphere Ultra Long Duration Ballooning Supplemental Analysis. National Aeronautics and Space Administration, Goddard Space Flight Center, Wallops Flight Facility, Wallops Island, VA 23337.

NOAA (2010). National Oceanic and Atmospheric Administration. *Status Review of the Largetooth Sawfish (Pristis perotteti)*. NOAA-NMFS. March.

Oddone, M. C., Paesch, L., Norbis, W., and Velasco, G. (2007). Population structure, distribution and abundance patterns of the patagonian smoothhound Mustelus schmitti Springer, 1939 (Chondrichthyes, Elasmobranchii, Triakidae) in the Rio de La Plata and inner continental shelf, SW Atlantic ocean (34°30'-39°30'S). Brazilian Journal of Oceanography. 55(3). pp. 167-177

Peverell, S. C. (2005). Distribution of sawfishes (Pristidae) in the Queensland Gulf of Carpentaria, Australia, with notes on sawfish ecology. Environmental Biology of Fishes. 73(4). pp. 391- 402.

Plotkin, P. (2003). Adult migrations and habitat use. In Lutz, P. L., Musick, J. A., and Wyneken, J. (Eds). *The biology of sea turtles, volume II.* pp. 225-241. CRC Press, Boca Raton, Florida.

Serena, F. 2005. Field identification guide to the sharks and rays of the Mediterranean and Black Sea. FAO Species Identification Guide for Fishery Purposes. FAO, Rome.

Spotila, J. R. (2004). Sea turtles: A complete guide to their biology, behavior, and conservation. JHU Press. 227 pp.

Stevens, J. D., Pillans, R. D., and Salini, J. (2005). Conservation assessment of *Glyphis sp. A* (speartooth shark), *Glyphis sp. C* (northern river shark), *Pristis microdon* (freshwater sawfish) and *Pristis zijsron* (green sawfish). Final Report to Department of the Environment and Heritage. 84 pp.

Stevens, J. D., McAuley, R. B., Simpfendorfer, C. A., and Pillans, R. D. (2008). Spatial distribution and habitat utilisation of sawfish (*Pristis* spp) in relation to fishing in northern Australia. A report to Department of the Environment, Water, Heritage and the Arts, 31. 26 pp.

Strasburg, D. (1958) Distribution, abundance, and habits of pelagic sharks in the Central Pacific ocean. . Fishery Bulletin 138 Washington, U.S. Govt. Print. Off., 58, 335-361.

Sutarno, S. A. D., and Suyatna, I. (2012). Species diversity of critically endangered pristid sawfishes (Elasmobranchii: Pristidae) of Nusantara waters (Malay Archipelago). *Biodiversitas*. 13(4). pp. 161-171.

Thorburn, D. C., Morgan, D. L., Rowland, A. J., Gill, H. S., and Paling, E. (2008). Life history notes of the critically endangered dwarf sawfish, *Pristis clavata*, Garman 1906 from the Kimberley region of Western Australia. *Environmental Biology of Fishes*, 83(2). pp. 139-145.

Tobin, A. J., Mapleston, A., Harry, A. V., and Espinoza, M. (2014). Big fish in shallow water; use of an intertidal surf-zone habitat by large-bodied teleosts and elasmobranchs in tropical northern Australia. Environmental Biology of Fishes. 97(7). pp. 821-838.Wallace, C. (1999). Staghorn corals of the world: a revision of the genus *Acropora*. *CSIRO Publishing*. 419 pp.

van Der Molen, S., Caille, G., and González, R. (1999). By-catch of sharks in Patagonian coastal trawl fisheries. *Marine and Freshwater Research*. 49(7). pp. 641-644.

Whittaker, K. (2014). Endangered Species Act Draft Status Review Report for the Coelacanth, *Latimeria chalumnae*. National Oceanic and Atmostpheric Administration. October. 47 pp.

Wueringer, B. E., Squire, L., and Collin, S. P. (2009). The biology of extinct and extant sawfish (Batoidea: *Sclerorhynchidae* and *Pristidae*). *Reviews in Fish Biology and Fisheries*. 19(4). pp. 445-464.