UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
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St. Petersburg, Florida 33701-5505
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SER-2016-18163

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Sindulfo Castillo
Chief, Antilles Regulatory Section
Jacksonville District Corps of Engineers
Department of the Army
Annex Building, Fundación Angél Ramos
383 F.D. Roosevelt Avenue, Suite 202
San Juan, Puerto Rico 00918

Dear Mr. Castillo:

The enclosed Biological Opinion ("Opinion") responds to the request for consultation with the National Marine Fisheries Service (NMFS), pursuant to Section 7 of the Endangered Species Act (ESA) by the U.S. Army Corps of Engineers (USACE) for the following action.

Permit Number	Applicant	SER Number	Project Type
SAJ-2016-1803 (SP-CGR)	Mr. Guillermo Canate c/o Telefonica International Wholesale Services, Puerto Rico Inc., and Alcatel-Lucent Submarine Networks	SER-2016-18163	Installation of fiber optic submarine cable, the Brazil-USA (BRUSA) cable

The Opinion considers the effects of the installation of BRUSA, a fiberoptic submarine cable, on elkhorn and staghorn critical habitat. NMFS concludes that the proposed action is not likely to adversely affect green (*Chelonia mydas*, North and South Atlantic Distinct Population Segment [DPS]), leatherback (*Dermochelys coriacea*), loggerhead (*Caretta caretta*, Northwest Atlantic Ocean [NWA] DPS), and hawksbill (*Eretmochelys imbricata*) sea turtles; elkhorn (*Acropora palmata*), staghorn (*Acropora cervicornis*), lobed star (*Orbicella annularis*), boulder star (*Orbicella franksi*), mountainous star (*Orbicella faveolata*), rough cactus (*Mycetophyllia ferox*), and pillar (*Dendrogyra cylindrus*) corals; blue (*Balaenoptera musculus*), fin (*Balaenoptera physalus*), sei (*Balaenoptera borealis*), and sperm (*Physeter microcephalus*) whales; Nassau grouper (*Epinephelus striatus*) and scalloped hammerhead shark (Central and Southwest Atlantic DPS, *Sphyrna lewini*). NMFS also concludes that the proposed action is not likely to result in the destruction or adverse modification (DAM) of designated critical habitat for elkhorn and staghorn corals.

We look forward to further cooperation with you on other projects to ensure the conservation of our threatened and endangered marine species and designated critical habitat. If you have any

questions on this consultation, please contact Jennifer Moore, Consultation Biologist, by phone at 727-824-5312, or by email at jennifer.moore@noaa.gov.

Sincerely,

Roy E. Crabtree, Ph.D.
Regional Administrator

Enclosure

cc: USACE – Román
F/SER4 – Rivera, Wilber

File: 1514-22.F.9

Endangered Species Act – Section 7 Consultation
Biological Opinion

Action Agency:	U.S. Army Corps of Engineers
Applicant:	Mr. Guillermo Canate c/o Telefonica International Wholesale Services, Puerto Rico Inc. and Alcatel-Lucent Submarine Networks
Activity:	The installation of the BRUSA (Brazil-USA) submarine fiber optic cable (SFOC) system to develop communication services between Virginia, USA, to Brazil, with a link in San Juan, Puerto Rico.
Consulting Agency:	Protected Resources Division Southeast Regional Office National Marine Fisheries Service
	Consultation Number: SER-2016-18163
Approved by:	Roy E. Crabtree, Ph.D., Regional Administrator NMFS, Southeast Regional Office St. Petersburg, Florida
Date Issued:	Nov 21, 2017

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Acronyms and Abbreviations

ASN – Alcatel-Lucent Submarine Networks
BRUSA - Telefonica International Wholesale Services Inc., Brazil – USA
CFMC – Caribbean Fishery Management Council
CFR – Code of Federal Regulations
DAM – Destruction or adverse modification
DNER – Department of Natural and Environmental Resources
DPS – Distinct Population Segment
EPA – U.S. Environmental Protection Agency
EEZ – U.S. Exclusive Economic Zone
ERM – Environmental Resources Management
ESA – Endangered Species Act
LAA – Likely to adversely affect
NE – No effect
NLAA – Not likely to adversely affect
NMFS – National Marine Fisheries Service

NOAA – National Oceanic and Atmospheric Administration
NOS – National Ocean Service
NP – Not present
NPS – National Park Service
NWA – Northwest Atlantic
PVC – polyvinyl chloride
SER – Southeast Regional Office
SFOC – Submarine fiber optic cable
SWIV – Shallow water installation vessel
TIWS PR – TI Wholesale Services Puerto Rico, Inc.
USACE – U. S. Army Corps of Engineers
USFWS – U.S. Fish and Wildlife Service

Units of Measurement

Length and Area

ac	acre(s)
ft	foot/feet
ft^2	square feet
in	inches
km	kilometer(s)
m	meter(s)
mi	miles
mi^2	square miles

1 INTRODUCTION

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1531 et seq.), requires each federal agency to "insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species." Section 7(a)(2) requires federal agencies to consult with the appropriate Secretary on any such action. National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) share responsibilities for administering the Endangered Species Act (ESA).

Consultation is required when a federal action agency determines that a proposed action "may affect" listed species or designated critical habitat. Consultation is concluded after NMFS determines that the action is not likely to adversely affect listed species or critical habitat or issues a Biological Opinion ("Opinion") that identifies whether a proposed action is likely to jeopardize the continued existence of a listed species, or destroy or adversely modify critical habitat. The Opinion states the amount or extent of incidental take of the listed species that may occur, develops measures (i.e., reasonable and prudent measures - RPMs) to reduce the effect of take, and recommends conservation measures to further the recovery of the species. Notably, no incidental destruction or adverse modification of designated critical habitat can be authorized, and thus there are no RPMs—only reasonable and prudent alternatives (RPAs) that must avoid destruction or adverse modification. RPAs are also developed if the Opinion finds that the action is likely to jeopardize the continued existence of a listed species.

This document represents NMFS's Opinion based on our review of impacts associated with the proposed installation of the BRUSA, a submarine fiber optic cable (SFOC) system that is approximately 7,022 miles (11,300 kilometer [km]), proposed by Alcatel-Lucent Submarine Networks (ASN) and Telefonica International Wholesale Services Puerto Rico, Inc. (TIWS PR), as permitted by the U.S. Army Corps of Engineers (USACE). The proposed cable will develop communication services between Brazil and the United States, connecting Virginia, USA, to Brazil, with a link in San Juan, Puerto Rico. This Opinion analyzes the project's effects on threatened and endangered species and designated critical habitat, in accordance with Section 7 of the ESA. We based our Opinion on project information provided by USACE, the applicants and their consultants, and other sources of information, including the published literature cited herein.

2 CONSULTATION HISTORY

The consultation history for this project is as follows:

- NMFS participated in a pre-application meeting in February 2016.
- Pelagian Ltd, consultant to the applicants, submitted the BRUSA route survey report on March 30, 2016.
- On August 24, 2016, the USACE submitted their request for consultation via email and included the full Joint Permit Application package for the Puerto Rico landing site.
- ERM, consultant to the applicants, submitted supplemental figures of the cable route landing in Puerto Rico on November 29, 2016. The consultation was initiated on that day.

- During the drafting of the consultation, NMFS requested additional information via email dated February 28, 2017, about the entire BRUSA route, from the Virginia landing to the Puerto Rico landing and from the Puerto Rico landing to the Brazil landing.
- Separate consultation was concluded between the USACE and the NMFS Greater Atlantic Regional Fisheries Office (GARFO) for permit for the landing site off Virginia out to the outer boundary of the US Economic Exclusive Zone (EEZ) on January 13, 2017 (NER-2017-13929).

3 DESCRIPTION OF THE PROPOSED ACTION AND ACTION AREA

3.1 Proposed Action

ASN and TIWS PR propose the BRUSA project, which involves installing a submarine fiber optic cable (SFOC) system approximately 7,022 miles (11,300 kilometer [km]) in length that will connect Virginia, US, to Brazil, with a link in San Juan, Puerto Rico and be used to develop communications between the US and Brazil (Figure 1). The applicants applied for two separate USACE permits associated with the two United States landing sites. The USACE sought consultation with the NMFS Southeast Regional Office for the permit associated with the Puerto Rico landing, and with the GARFO for the permit associated with the Virginia landing site. The activities underlying these permitting decisions are interrelated and interdependent.

The proposed BRUSA project will begin with cable installation at the seaward terminus at Virginia Beach, VA, spanning the entirety of Virginia's Territorial Sea (3 nautical miles [nmi]), extending through the U.S. Territorial Sea (12 nmi) and Contiguous Zone (24 nmi), with the majority of the cable system passing through a combination of the U.S. EEZ, and the High Seas, to the U.S. EEZ, Contiguous Zone, Territorial Sea, and Puerto Rico Territorial Waters (9 nmi) to the nearshore landings in Carolina, Puerto Rico. From the landing in Puerto Rico, the cable will continue through a combination of the U.S. EEZ, foreign territorial waters and EEZs, and the High Seas, to the nearshore landings Rio de Janero, Brazil, and Fortaleza, Brazil.

We rely on and incorporate GARFO's consultation on installing and operating the cable from Virginia Beach, Virginia and to the outer boundary of the U.S. EEZ off Virginia (NER-2017-13929), as explained further below, and do not repeat detailed information on that portion of the project below.

A 121,129-foot-long segment of the cable will begin within 12 nautical miles of Puerto Rico and land at an existing cable landing at the end of Tartak Street (Figure 2). The applicant proposes the installation of a "long branch" (a second cable) from the main segment of the cable for future cable connections that will measure 94,718-foot-long on its approach to Puerto Rico. The "long branch" will extend from the main cable approximately 8 nautical miles from shore. Two types of cables will be used for the project: 1) single armor cable measuring 1.0 inch (in) in diameter in water depths between 656 feet (ft) and 3,938 ft, and 2) double armor cable measuring 1.4-in in diameter in water depths of 0 - 656 ft. In order to improve cable stability and provide additional protection, articulated pipe segments or cable clamps will be fitted over the cable from its burial point on the beach to within the nearshore surf zone and also in 2 coral reef/hard bottom areas (see Figure 3). These measures will prevent the cable from moving on the sea floor in areas

where it cannot be buried. The maximum outer diameter of the articulated pipe and cable clamps is between 5.1 - 5.8 in.

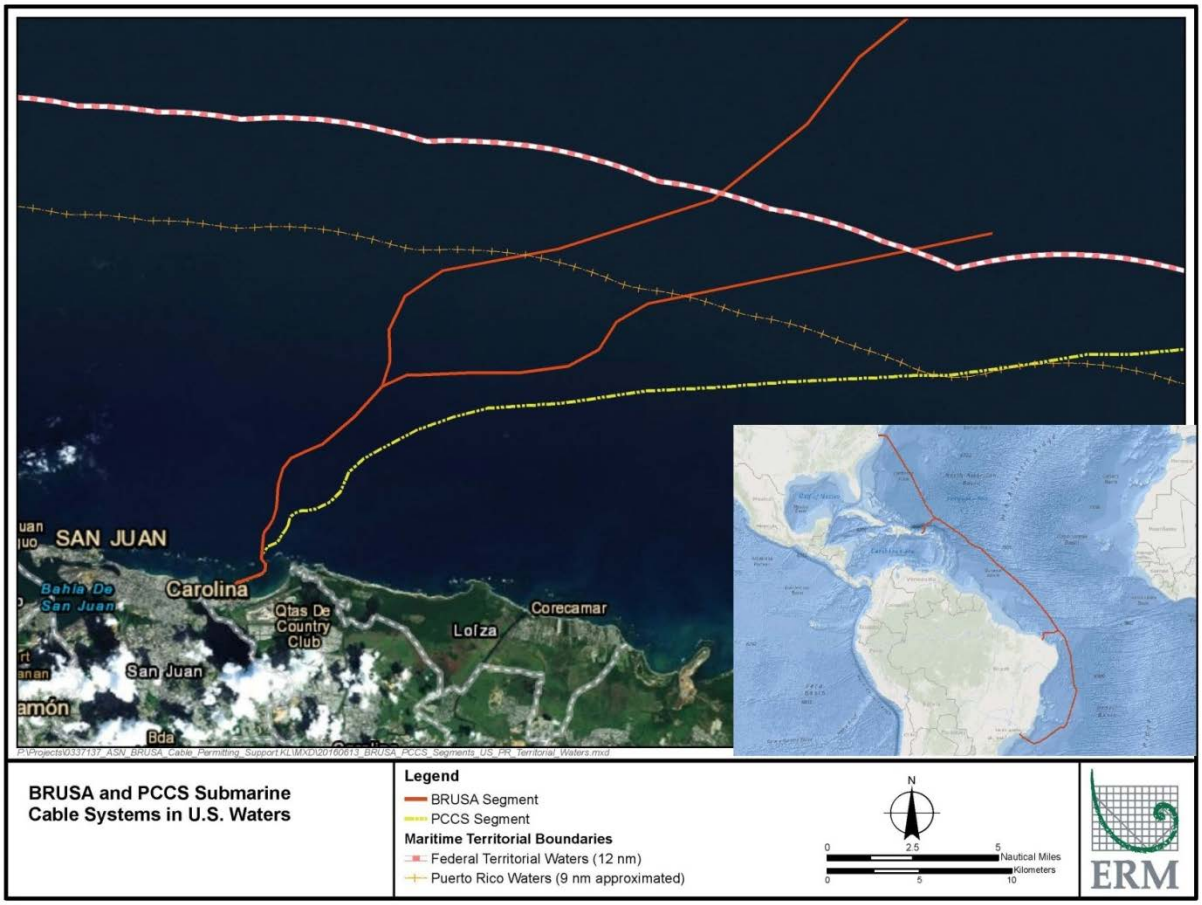

Figure 1. Image of the proposed BRUSA cable segments (solid red lines) with inset showing complete cable route (from Environmental Resources Management [ERM] 2016)

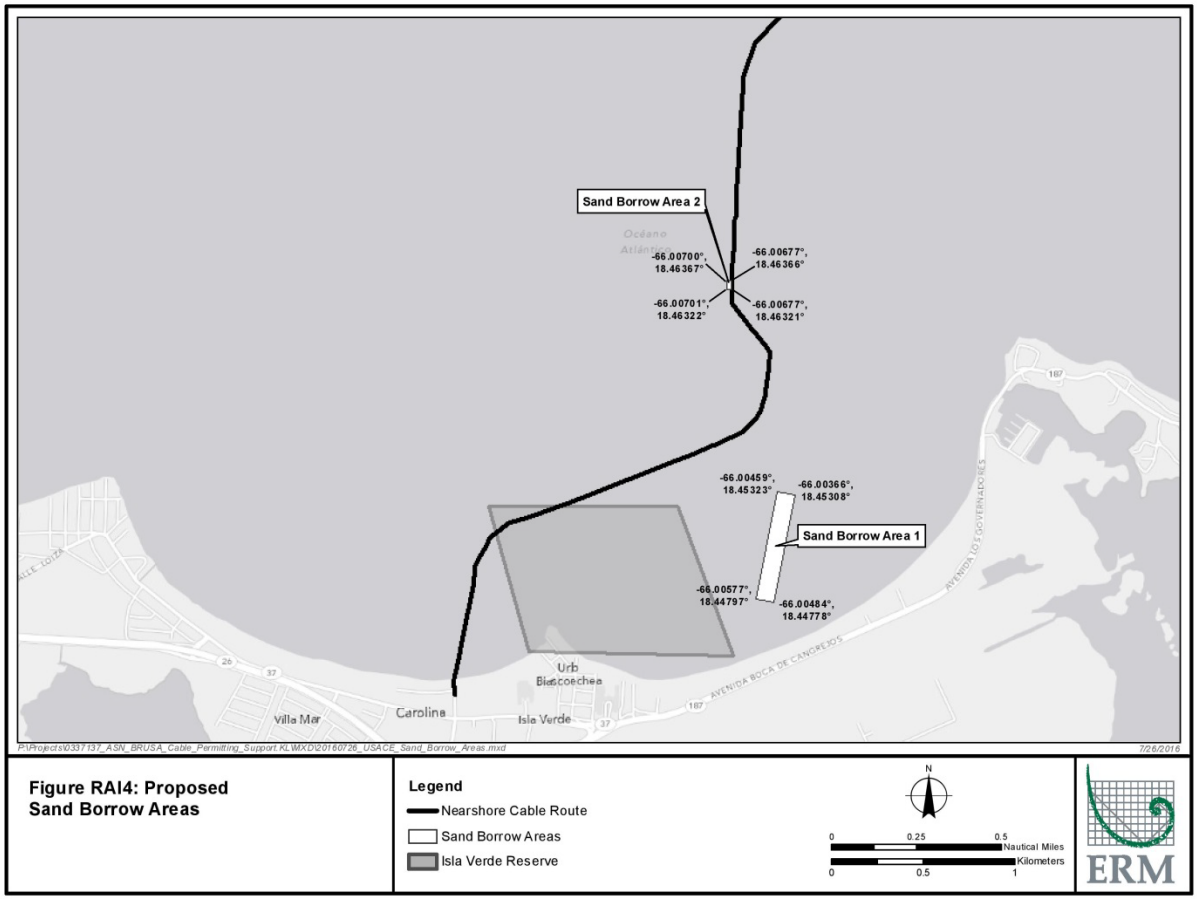

Figure 2. Image showing the Isla Verde Reserve boundaries and proposed sand borrow areas (from ERM 2016)

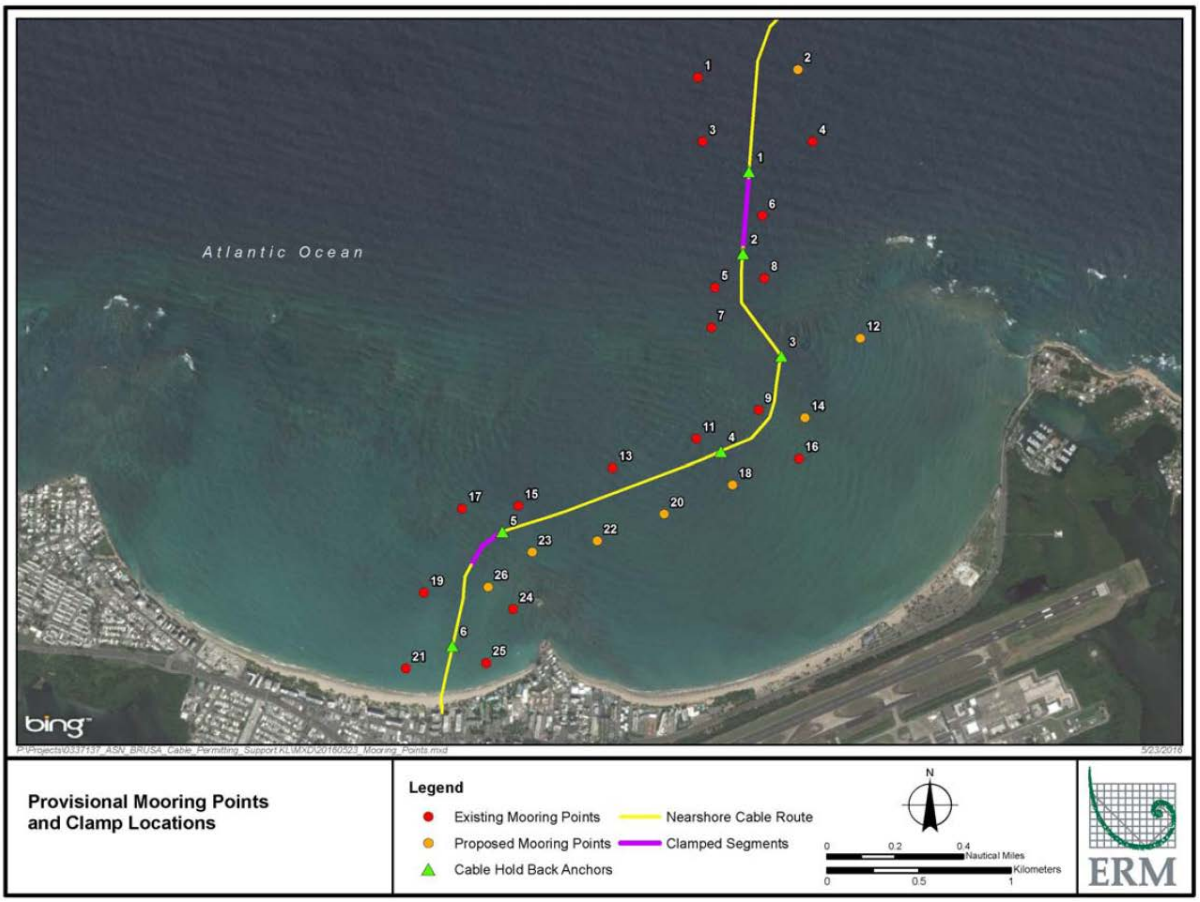

Figure 3. Locations of mooring points for the SWIV, temporary anchors to secure the cable during lay, and permanent clamps (or articulated pipe) to secure the cable to the seafloor (from ERM 2016)

The cable route off of Puerto Rico was selected to avoid impacts to ESA-listed corals and minimize potential impacts to elkhorn and staghorn coral critical habitat by passing through areas of sand instead of colonized hard bottom and coral reef where possible. The cable route will be marked in the field by divers prior to commencement of near-shore cable laying operations as well.

The cable installation comprises 2 phases: the installation of a shore-end section, approximately 3 miles (5 km) in length in water depths up to 115 ft (35 meter [m]), and the main lay of the remainder of the route. The cable laying ship will install the main cable and "long branch" to a point approximately 2.73 miles (4.4 kilometers) north of Boca de Cangrejos, in waters deeper than 115 ft (35m). The "main lay" will involve laying the cable along a pre-determined route using a special purpose cable ship, also referred to as the "main lay" vessel to distinguish it from support boats. The ship will be approximately 420 ft long, and will have a dynamic positioning (DP) system that enables it to maneuver in the nearshore area without anchoring. The main lay ship will operate 24 hrs per day until it reaches the shore end section in 115 ft of water.

The first portion of the shore-end section includes the construction of a trench at the shoreline landward with a total length of 187 ft. Sixty two ft of the trench excavation requires in-water work. The trench width will be 16-ft-wide on top and 3.28-ft-wide on the bottom to bury the

submarine cable once it reaches the shoreline. Excavated material will be sidecast and used to bury the cable and cover the trench once cable installation is complete. Shoreline work to bury the cable and attach to the terrestrial landing point is expected to take 2 days. To install the shore-end cable segment, the applicant will use a shallow water installation vessel (SWIV) that will tow the shallow water segment shoreward from the deep water location of the cable laying ship. In the shallow water segments, divers will assist with cable installation in order to minimize impacts to benthic communities and avoid contact with all corals. The applicant also proposes the installation of 25 temporary mooring points in advance of the cable laying operation to provide secure points on the seabed to hold the SWIV in place during nearshore cable installation. Of these 25 temporary mooring points, 18 would use 1.5 ton sandbag anchors, Bruce®-type anchors would be used in 6 locations within the shallow sandy area, and 1 permanent anchor plate would be used at mooring point 7 in hard bottom. The cable will be temporarily secured to the seafloor during the cable installation using 6 sandbags as hold back anchors at or close to alter course positions of the cable (Figure 3). The temporary anchors used to secure the SWIV and cable would be removed as soon as cable installation is complete. Some of the temporary anchor locations to secure the cable are also where the articulated pipe or cable clamps will be installed to permanently anchor the cable in place. All temporary mooring points will avoid benthic resources, including ESA-listed corals.

The total volume of sand required to fill the 24 sandbags that will serve as temporary anchors for the SWIV and cable is 47 cubic yards (approximately 2 cubic yards per sandbag). Two areas with a total acreage of 15.1 acres have been designated as borrow pits to obtain sand for the anchors. Of this acreage, only 0.018 acre of bottom will be impacted due to the small volume of sand needed to fill the anchors. Once cable installation operations are complete, the sand will be returned to the borrow sites. Divers will place each sandbag on the seafloor, make an incision in the bottom of the bag, and use lift bags to gradually move the bag off the seafloor while pushing the bag for even distribution of sand along the bottom. The filling of sandbags, their transportation and positioning during cable installation operations, and sandbag removal and return of sand once installation operations are complete will be diver-assisted under supervision of the environmental monitor. The designated environmental monitor is a marine biologist with experience in cable installation operations. All cable installation and removal of temporary anchors is expected to be completed within 20 - 24 days.

Construction Conditions
The U.S. Army Corps of Engineers (USACE) will include the following as special permit conditions in order to avoid and minimize impacts to ESA resources as a result of the BRUSA submarine cable installation project:

1. Compliance with NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions* (revised March 23, 2006, copy enclosed) will be required.

2. Compliance with NMFS's *Vessel Strike Avoidance Measures and Reporting for Mariners* (revised February 7, 2008, copy enclosed) is required.

3. A 3-year monitoring program shall be implemented to assess the impacts of the cable on benthic organisms once the cable is installed. As part of this program, 4 monitoring

surveys shall be conducted as follows: immediately after the cable installation and yearly thereafter. Monitoring reports shall be submitted to the USACE and NMFS within 30 days from the completion date of each monitoring event.

4. The cable route shall be marked on the seafloor by divers prior to the commencement of any cable laying operations. Divers shall assist during cable laying operations. Divers will ensure that cables do not contact any corals, including ESA-listed corals, and other benthic organisms and ensure that the cable route avoids and minimizes impacts to corals and other benthic organisms to the maximum extent practicable.

5. To the maximum extent practicable, the cable route shall not contain segments of suspended cable in order to minimize the potential for cutting, breakage, and abrasion of corals, sponges, and other benthic organisms due to swinging of the cable during storm and heavy wave and current conditions.

6. The cable deployment and sand harvesting and sand redistribution shall not take place during high swells or unfavorable weather conditions or during severe currents. Avoiding working in these conditions will prevent damage to corals due to unsafe working conditions for divers and vessel navigation and cable placement. Further, these conditions are unsuitable for sand harvest and sand redistribution because high wave energy can disburse sand during harvest and redistribution. The installation activities shall immediately cease should adverse weather conditions, including heavy swells, strong winds, heavy rains, storm conditions, or unexpected severe currents arise during deployment or sand harvesting and redistribution.

7. Articulated pipes or cable clamps shall be installed in areas where hard bottom habitats are present to avoid movement of cables, which could damage ESA-listed corals.

8. The permittee shall maintain the cable laying vessel at least 2,000 m offshore and use small vessels for nearshore maneuvers during cable deployment to minimize the potential for accidental groundings that could affect ESA resources.

9. Effects, both direct and indirect, to ESA-listed corals are prohibited.

In addition, the applicant has developed the following best management practices to avoid and minimize effects to ESA-listed coral species and elkhorn and staghorn coral designated critical habitat:

1. Anchor locations for the shallow water vessel will be predetermined from benthic surveys and located in areas without ESA-listed coral species to avoid inadvertent contact with the coral species.

2. The environmental monitor shall confirm that the cable route, including a 1-meter (m)-wide buffer area on either side of the cable route, is devoid of ESA-listed corals.

3. Diver installation will be guided by a qualified environmental monitor.

4. Sessile organisms, other than ESA-listed corals, that cannot be avoided by the cable alignment shall be relocated to areas adjoining the project corridor to the extent possible. These organisms will be photographed prior to and after relocation and transplant success will be reported in accordance with the Mitigation and Monitoring Plan developed for the project. This does not include ESA-listed corals as these will be avoided during cable installation activities and by the proposed cable route.

3.2 Action Area

The action area is defined by regulation as "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). ASN and TIWS PR proposes the installation of the BRUSA, a submarine fiber optic cable (SFOC) system approximately 7,022 miles (11,300 kilometer [km]) in length that will connect Virginia, US, to Brazil, with a link in San Juan, Puerto Rico and be used to develop communications between the US and Brazil.

The USACE requested consultation for issuing a permit for cable installation from the San Juan landing site (18.4456ºN, 66.02139ºW) to the U.S. Territorial Sea boundary, and sought consultation on the effects to ESA-listed resources in that area. However, consultations must consider the effects of all activities that are interrelated and interdependent to the federal action under consultation. As defined in 50 CFR § 402.02, action means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas. Effects of the action refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action. *Id.* In addition, 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.

Thus, for the purposes of this consultation, the action area is the entire length of the cable installation, from the landing site in Virginia, through the U.S. EEZ offshore Virginia and the high seas to the U.S. EEZ off of Puerto Rico, through the territorial waters of Puerto Rico, to the landing site in Puerto Rico, through the high seas, and the Brazilian EEZ to the boundary of the Brazilian territorial sea—not just the area identified in the initiation letter (i.e., Puerto Rico landing to the U.S. EEZ boundary).

The USACE requested a separate consultation and received concurrence from the NMFS Greater Atlantic Region Fisheries Office (NER-2017-13929) for the separately permitted portion of the cable installation from Virginia Beach, Virginia, to the outer boundary of U.S. EEZ. That consultation considered the effects of installing and operating the pipeline within that area on the following listed species and critical habitat: Atlantic sturgeon, Northwest Atlantic Ocean DPS of loggerhead sea turtle, Kemp's Ridley sea turtle, green sea turtle, leatherback sea turtle, hawksbill sea turtle, North Atlantic right whale, fin whale, sei whale, blue whale, and sperm whale. GARFO concurred with the USACE that the action may affect, but is not likely to adversely affect those listed species. We incorporate that consultation and its analysis by reference, as described in more detail in Section 4 (Status of Listed Species and Critical Habitat).

Due to the length of cable and the varying conditions along the cable route, we have divided the project into the following segments:

- Segment 0: Landing site in Virginia beach to the outer boundary of the U.S. EEZ off of Virginia. As described in more detail in Section 4, below, effects to species and critical habitat in this area were considered in NER-2017-13929.
- Segment 1: Outer boundary of the U.S. EEZ off of Virginia (approximately 285 nmi from Virginia coastline) to position approximately 3 nmi offshore Carolina, Puerto Rico (115 ft [35 meters (m)] depth). Although not labeled, Segment 1 is the northern portion of the BRUSA cable shown on the inset map of Figure 1.
- Segment 2a: Position approximately 3 nmi offshore Carolina, Puerto Rico to the shore landing point at Tartak Street, Carolina, Puerto Rico (a.k.a., main cable). Although not labeled, Segment 2 is shown on Figures 2 and 3.
- Segment 2b: Position of approximately 3 nmi offshore Carolina, Puerto Rico to point of intersection with segment 2a (a.k.a, "long branch"). Although not labeled, Segment 2b is shown on the map of Figure 1.
- Segment 3: Position approximately 3 nmi offshore Carolina, Puerto Rico to the Territorial Sea of Brazil (12 nmi offshore). Although not labeled, Segment 3 is the southern portion of the BRUSA cable shown on the inset map of Figure 1.
- The action area also includes "Sand Borrow Areas 1 and 2" adjacent to the nearshore cable corridors approximately one quarter mile, and 1 mile, respectively, offshore.

Existing Site Conditions

The proposed project is located in the Atlantic Ocean (see Figure 1). Segments 1 and 3 are in deep water habitats in water depths greater than 115 ft (35 m). Segments 2a and 2b are in shallow-water habitats less than 115 ft deep. The applicant provided a benthic survey conducted for the shallow water portion of the project near the landing site in the Municipality of Carolina. The survey identified 4 distinct zones in the vicinity of the cable route: (1) backreef (water depths of 9 – 25 ft), (2) reef with manmade navigation channel, (3) forereef (water depths of 41 – 63 ft), and (4) deep reef (water depths of 70 – 98 ft).

(1) Backreef: Benthic habitat in the backreef was dominated by sand, with a small portion characterized as hard bottom with sand pockets, rhodoliths with algal cover, and sand/silt stabilized by seagrass. The backreef area also includes a portion of the the northwest section of the Isla Verde Reef Marine Reserve. No ESA-listed corals were observed in this zone.
(2) Reef with manmade navigation channel: A shallow colonized hard bottom area borders the channel and is colonized by hard and soft corals, including 6 colonies of ESA-listed mountainous star coral, and sponges. The portion of the manmade navigation channel surveyed is 59 - 67 ft deep and 131 - 262 ft wide. The channel has steep slopes and the bottom substrate is a combination of sand, rubble and rock with little colonization by benthic organisms.
(3) Forereef: Soft and hard corals species, including 2 colonies of ESA-listed mountainous star coral were observed in the forereef. This area also supports alga and sponges.

(4) Deep reef: Sponges, turf alga, and soft corals were observed in the deep reef. Small colonies of hard corals, including 2 colonies of ESA-listed mountainous star coral were also observed.

Based on the benthic survey, the proposed cable route will cross 1,207 ft (368 m) of consolidated substrate (i.e., elkhorn and staghorn coral essential feature).

Benthic surveys conducted in the mesophotic reef section off the shelf edge for a previous cable project led by the same applicant found some colonies of boulder star corals, none of which are along the proposed BRUSA cable route. Seagrass beds and other areas containing colonized hard bottom and coral reefs are present in the project area based on information in our project files for other submarine cable projects that have used the same landing site. The benthic habitat information provided by the applicant and in our files identifies ESA-listed corals in the vicinity of the cable route (including the 2 colonies of mountainous star coral noted above). However, no ESA-listed corals occur within the cable route, and we do not expect the corals will be affected by the cable installation activities or by cable movement post-installation. The remainder of the action area is in water depths between 100 and 13,000 ft through the U.S. EEZ, high seas, and foreign EEZs to the boundary of the Brazilian territorial waters (12 nautical miles offshore).

4 STATUS OF LISTED SPECIES AND CRITICAL HABITAT

Listed species occurring within the action area that may be affected by the proposed action are listed in Table 1 with their respective scientific name and status. Designated critical habitat in the action area that may be affected by the proposed action is listed in Table 2.

We incorporate by reference the consultation between GARFO and the USACE on effects to species associated with installation and operation of Segment 0, namely, the effects to Atlantic sturgeon; green, leatherback, loggerhead (Northwest Atlantic Ocean DPS), Kemp's ridley, and hawksbill sea turtles; and the North Atlantic right, fin, sperm, sei, and blue whales. We will not consider effects to those species not occurring in Segments 1-3 again in this Opinion (e.g., Atlantic sturgeon, North Atlantic right whale, and Kemp's ridley sea turtles). The analysis below discusses the cumulative effect of installing and operating the cable throughout all segments (Segments 0-3) on species occurring throughout the action area (green, leatherback, loggerhead, and hawksbill sea turtles, and blue, fin, sei, and sperm whales).

Table 1. Effects Determinations for Species the Action Agency or NMFS Believes May Be Affected by the Proposed Action

Species	ESA Listing Status	Action Agency Effect Determination	NMFS Effect Determination
Sea Turtles			
Green (North and South Atlantic Distinct Population Segments [DPS], *Chelonia mydas)*	T	NLAA	NLAA
Leatherback (*Dermochelys coriacea*)	E	NLAA	NLAA
Loggerhead (Northwest Atlantic Ocean	T	NLAA	NLAA

Species	ESA Listing Status	Action Agency Effect Determination	NMFS Effect Determination
DPS, *Caretta caretta*)			
Hawksbill (*Eretmochelys imbricata*)	E	NLAA	NLAA
Fish			
Nassau grouper, *Epinephelus striatus*	T	NE	NLAA
Scalloped hammerhead shark (Central and Southwest Atlantic DPS, *Sphyrna lewini*)	T	NLAA	NLAA
Invertebrates and Marine Plants			
Elkhorn coral (*Acropora palmata)*	T	NE	NE
Staghorn coral (*Acropora cervicornis)*	T	NE	NE
Lobed star coral (*Orbicella annularis)*	T	NE	NE
Mountainous star coral (*Orbicella faveolata)*	T	NLAA	NE
Boulder star coral (*Orbicella franksi)*	T	NE	NE
Pillar coral (*Dendrogyra cylindrus)*	T	NE	NE
Rough cactus coral (*Mycetophyllia ferox)*	T	NE	NE
Marine Mammals			
Blue whale (*Balaenoptera musculus)*	E	NLAA	NLAA
Fin whale *(Balaenoptera physalus)*	E	NLAA	NLAA
Sei whale (*Balaenoptera borealis)*	E	NLAA	NLAA
Sperm whale (*Physeter macrophalus)*	E	NLAA	NLAA
E = endangered; T = threatened; NLAA = may affect, not likely to adversely affect; NE = no effect; NP = not present			

NMFS published a final rule on September 8, 2016 (81 FR 62260) identifying 14 DPSs for humpback whales. The West Indies DPS, which includes Puerto Rico, was found not to merit listing under the ESA. Therefore, no effects determination is needed for humpback whales.

The cable route was designed to avoid all ESA-listed corals, including the 2 colonies of mountainous star coral that occur near the action area. We do not expect the corals will be affected by the cable installation activities or by cable movement post-installation. Therefore, this project will have no effect on ESA-listed corals.

Table 2. Critical Habitat in the Action Area

Species	Critical Habitat Unit	Action Agency Effect Determination	NMFS Effect Determination
Elkhorn and staghorn coral	Puerto Rico Unit	LAA	LAA
NLAA = may affect, not likely to adversely affect; NE = no effect			

4.1 Species Not Likely to be Adversely Affected

Nassau Grouper, Sea turtles, Whales

Listed whales, sea turtles, grouper, and sharks may be affected by cable-laying activities if an animal were to be struck by construction materials or operating vessels, or become entangled in the cables either in the nearshore areas or in the deeper waters in the action area. We believe the risk of any interactions with cable-laying materials or vessels is very low. The whales, sea turtles, and hammerhead sharks are mobile organisms, and we expect them to move away from construction activities and slow moving vessels. All work vessels associated with the project, including the cable laying vessel in deep water and the shallow water installation vessel (SWIV), shall operate at 4 knots or slower. In shallower waters, the cable route has been selected to provide sufficient clearance between the marine bottom and the hull of the SWIV and the SWIV will be anchored in place along the cable route so movement will be minimized during nearshore cable installation activities. Further, the applicant will comply with the best management practices identified above, and NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions*, which require the shutdown of machinery if sea turtles are sighted within the 50-ft (15-m) of construction equipment. Implementation of *NMFS's Vessel Strike Avoidance Measures and Reporting for Mariners* and *NMFS's Sea Turtle and Smalltooth Sawfish Construction Conditions* and the proposed vessels operation at controlled, slow speeds further reduces the likelihood of interactions with listed motile species. Therefore, we believe any potential effects of vessel strikes are discountable. Additionally, we believe any risk of entanglement is very low, as these cables are rigid and not likely to form loops, and they will be installed by divers and anchored to the sea floor in the shallow water portion of the route. Thus, the effect of entanglement also is discountable.

Green, loggerhead, and hawksbill sea turtle foraging habitat could be affected by the installation and operation of the cable, which in turn could affect the species. The cable route, locations of the temporary mooring points, and sand borrow locations were selected to avoid direct impacts to seagrass beds and sessile benthic invertebrates, including hard and soft corals and sponges, to the maximum extent practicable. The preferred cable placement route will be in uncolonized bottom locations.

During construction, sea turtle forage resources may be temporarily affected in shallow waters near the excavation of a 62-ft-long trench in the surf zone at the beach landing off of Puerto Rico and near the sand borrow areas for sandbag anchors. Placement of temporary anchors for the SWIV and to hold the cable in place, shifts in cable placement within the 3-ft-wide buffer along the cable route, and redistribution of sand in the borrow areas during project construction may temporarily affect sea turtle foraging resources. In addition, there is the potential for sediment resuspension and transport associated with the excavation of the trench at the shoreline, excavation of sand at the borrow pits for sandbag anchors, and when sand is returned to the borrow pits. This sediment resuspension and transport may interfere with sea turtle foraging resources; however this is expected to be minimal due to the low volume of sand required for the sand bags, the fact that work will be done manually by divers (instead of using mechanical equipment which has a higher potential for causing greater turbidity), and because suspended sand will quickly resettle. In addition, cable deployment and sand harvesting and redistribution shall not take place during high swells or unfavorable weather conditions, or during severe

currents, when high wave energy can disburse sand during harvest and collection. The trench at the beach for the shoreline connection is expected to be completed in one day and the trench will be back-filled with the sand excavated to complete the trench the following day so any sediment resuspension and transport outside the trench footprint would be very temporary in nature. The temporary anchor locations have been selected to avoid and minimize impacts to hard bottom and seagrass habitat. Additionally, the anchors will remain in place a maximum of 24 days after which they will be removed. The use of divers to install the cables in shallow waters will minimize impacts to forage habitat used by the three sea turtles from shifts in cable placement. In addition, the cable footprint is less than 2 in except in areas where articulated pipe or cable clamps will be installed (with an outer diameter less than 6 in). This cable route will avoid the dense seagrass beds in the project area so impacts green sea turtle foraging habitat will be minimal. Loggerhead and hawksbill sea turtles that may be in the project area will be able to continue using uncolonized bottom as foraging habitat in the project area as there are extensive areas of unconsolidated bottom outside the cable corridor. In addition, there are large areas of similar forage habitat for green, loggerhead, and hawksbill sea turtles outside of the project footprint. Therefore, we believe temporary impacts to foraging habitat associated with cable installation activities will be minimal, and the effect to green, loggerhead, and hawksbill sea turtles will be insignificant.

Green, loggerhead, and hawksbill sea turtle foraging habitat will be affected permanently by the installation of the cable, but we believe the effects to the species will be insignificant. There is a cable corridor buffer of 3ft to allow for slight deviations from the planned route during installation but the cable itself will occupy only 1.4 in along the nearshore portion of the route except in the sections of hard bottom where articulated pipe or cable clamps will be installed. The placement of articulated pipe or cable clamps in certain sections to hold the cable permanently will limit movement of the cable during storms or strong currents to prevent breakage and abrasion of benthic habitat that serves foraging habitat for hawksbill sea turtles. The articulated pipe or cable clamps have a diameter less than 6 in and, based on previous cable projects, these segments often become colonized by sessile benthic organisms, including sponges. Due to the size of the cable and articulated pipe or cable clamps, as well as the requirement that cable placement be done in a way that minimizes suspended cable segments, any effects to forage habitat for loggerhead, green, and hawksbill sea turtles will be minimal. The route for this cable project does not pass through areas containing seagrass beds so no green sea turtle foraging habitat will be permanently affected. The cable route does contain foraging habitat for loggerhead sea turtles where it passes through sandy areas. As in previous cable installations, the cable is expected to self-bury along portions of the route that pass through unconsolidated sediment; thus forage resources are expected to recolonize the area. Therefore, as for the temporary impacts described above, we believe the effects to sea turtles from the permanent impacts to foraging habitat will be insignificant.

GARFO concurred with the USACE's conclusion that the installation and operation of the cable in Segment 0 (the Virginia landing site to the outer boundary of the U.S. EEZ off Virginia) was not likely to adversely affect fin, sei, blue, and sperm whales and loggerhead, leatherback, green, and hawksbill sea turtles from any direct interaction and increased turbidity associated with burial of the cable, habitat modification from any site preparation activities, direct interaction with vessels or cable laying equipment, sound, or fuel spills. Taken together, we believe the installation and operation across the entire route is not likely to adversely affect these species.

4.2 Status of Critical Habitat Likely to be Adversely Affected

The summaries that follow describe the status of the critical habitat that occurs within the action area and are considered in this Opinion. More detailed information on the status and trends of these listed resources and the biology and ecology of these listed species can be found in the listing regulations published in the Federal Register, status reviews, and on these NMFS websites:

- http://sero.nmfs.noaa.gov/protected_resources/index.html
- http://www.nmfs.noaa.gov/pr/species/esa/index.htm.

4.2.1 Elkhorn and Staghorn Coral Critical Habitat

On November 26, 2008, a Final Rule designating *Acropora* critical habitat was published in the Federal Register. Within the geographical area occupied by a listed species, critical habitat consists of specific areas on which are found those physical or biological features essential to the conservation of the species. The feature essential to the conservation of *Acropora* species (also known as the essential feature) is substrate of suitable quality and availability in water depths from the mean high water line to 30 m in order to support successful larval settlement, recruitment, and reattachment of fragments. "Substrate of suitable quality and availability" means consolidated hard bottom or dead coral skeletons free from fleshy macroalgae or turf algae and sediment cover. Areas containing this feature have been identified in 4 locations within the jurisdiction of the United States: the Florida area, which comprises approximately 1,329 mi^2 (3,442 km^2) of marine habitat; the Puerto Rico area, which comprises approximately 1,383 mi^2 (3,582 km^2) of marine habitat; the St. John/St. Thomas area, which comprises approximately 121 mi^2 (313 km^2) of marine habitat; and the St. Croix area, which comprises approximately 126 mi^2 (326 km^2) of marine habitat. The total area covered by the designation is thus approximately 2,959 mi^2 (7,664 km^2).

The essential feature can be found unevenly dispersed throughout the critical habitat units, interspersed with natural areas of loose sediment, fleshy or turf macroalgae covered hard substrate. Existing federally authorized or permitted man-made structures such as artificial reefs, boat ramps, docks, pilings, channels or marinas do not provide the essential feature. The proximity of this habitat to coastal areas subjects this feature to impacts from multiple activities including dredging and disposal activities, stormwater run-off, coastal and maritime construction, land development, wastewater and sewage outflow discharges, point and non-point source pollutant discharges, fishing, placement of large vessel anchorages, and installation of submerged pipelines or cables. The impacts from these activities, combined with those from natural factors (i.e., major storm events), significantly affect the quality and quantity of available substrate for these threatened species to successfully sexually and asexually reproduce.

A shift in benthic community structure from coral-dominated to algae-dominated that has been documented since the 1980s means that the settlement of larvae or attachment of fragments is often unsuccessful (Hughes and Connell) 1999). Sediment accumulation on suitable substrate also impedes sexual and asexual reproductive success by preempting available substrate and smothering coral recruits.

While algae, including crustose coralline algae and fleshy macroalgae, are natural components of healthy reef ecosystems, increases in the dominance of algae since the 1980s impedes coral recruitment. The overexploitation of grazers through fishing has also contributed fleshy macroalgae to persist in reef and hard bottom areas formerly dominated by corals. Impacts to water quality associated with coastal development, in particular nutrient inputs, are also thought to enhance the growth of fleshy macroalgae by providing them with nutrient sources. Fleshy macroalgae are able to colonize dead coral skeleton and other hard substrate and some are able to overgrow living corals and crustose coralline algae. Because crustose coralline algae is thought to provide chemical cues to coral larvae indicating an area is appropriate for settlement, overgrowth by macroalgae may affect coral recruitment (Steneck 1986). Several studies show that coral recruitment tends to be greater when algal biomass is low (Birrell et al. 2005; Connell et al. 1997; Edmunds et al. 2004; Hughes 1985; Rogers et al. 1984; Vermeij 2006). In addition to preempting space for coral larval settlement, many fleshy macroalgae produce secondary metabolites with generalized toxicity, which also may inhibit settlement of coral larvae (Kuffner and Paul 2004). The rate of sediment input from natural and anthropogenic sources can affect reef distribution, structure, growth, and recruitment. Sediments can accumulate on dead and living corals and exposed hard bottom, thus reducing the available substrate for larval settlement and fragment attachment.

In addition to the amount of sedimentation, the source of sediments can affect coral growth. In a study of 3 sites in Puerto Rico, Torres (2001) found that low-density coral skeleton growth was correlated with increased re-suspended sediment rates and greater percentage composition of terrigenous sediment. In sites with higher carbonate percentages and corresponding low percentages of terrigenous sediments, growth rates were higher. This suggests that re-suspension of sediments and sediment production within the reef environment does not necessarily have a negative impact on coral growth while sediments from terrestrial sources increase the probability that coral growth will decrease, possibly because terrigenous sediments do not contain minerals that corals need to grow (Torres 2001).

Long-term monitoring of sites in the U.S. Virgin Islands (USVI) indicate that coral cover has declined dramatically; coral diseases have become more numerous and prevalent; macroalgal cover has increased; fish of some species are smaller, less numerous, or rare; long-spined black sea urchins are not abundant; and sedimentation rates in nearshore waters have increased from one to 2 orders of magnitude over the past 15 to 25 years (Rogers et al. 2008). Thus, changes that have affected elkhorn and staghorn coral and led to significant decreases in the numbers and cover of these species have also affected the suitability and availability of habitat.

Elkhorn and staghorn corals require hard, consolidated substrate, including attached, dead coral skeleton, devoid of turf or fleshy macroalgae for their larvae to settle. Atlantic and Gulf of Mexico Rapid Reef Assessment Program data from 1997-2004 indicate that although the historic range of both species remains intact, the number and size of colonies and percent cover by both species has declined dramatically in comparison to historic levels (Ginsburg and Lang 2003). Monitoring data from the USVI TCRMP indicate that the 2005 coral bleaching event caused the largest documented loss of coral in USVI since coral monitoring data have been available with a decline of at least 50% of coral cover in waters less than 25 m deep (Smith et al. 2011). Many of the shallow water coral monitoring stations showed at most a 12% recovery of coral cover by

2011, 6 years after the loss of coral cover due to the bleaching event (Smith et al. 2011). The lack of coral cover has led to increases in algal cover on area hard bottom, including the critical habitat essential feature.

5 ENVIRONMENTAL BASELINE

This section is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the designated critical habitat for *Acropora* species (elkhorn and staghorn corals) within the action area.

By regulation, environmental baselines for Biological Opinions include the past and present impacts of all state, federal, or private actions and other human activities in the action area. We identify the anticipated impacts of all proposed federal projects in the specific action area of the consultation at issue that have already undergone formal or early Section 7 consultations, as well as the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02). The environmental baseline does not include the effects of the action under review in this consultation.

Focusing on the impacts of the activities in the action area specifically allows us to assess the prior experience and state (or condition) of the designated critical habitat that occurs in an action area, and that will be exposed to effects from the actions under consultation. This is important because, under some ecological conditions, the features essential to the designated critical habitat will commonly exhibit, or be more susceptible to, adverse responses to stressors than they would be in other areas. These localized stress responses or stressed baseline conditions may increase the severity of the adverse effects expected from the proposed action.

5.1 Status of Elkhorn and Staghorn Coral Critical Habitat within the Action Area

In Section 4.2.1, we described the status of elkhorn and staghorn coral critical habitat, including the Puerto Rico elkhorn and staghorn coral critical habitat unit. Within the Puerto Rico elkhorn and staghorn coral critical habitat marine unit, approximately 292 mi^2 (756 km^2) are likely to contain the essential feature of ESA-designated elkhorn and staghorn coral critical habitat, based on the amount of coral, rock reef, colonized hard bottom, and other coralline communities mapped by the National Ocean and Atmospheric Administration (NOAA's) National Ocean Service (NOS) Biogeography Program in 2000 (Kendall et al. 2001b). Within the action area, the essential feature of elkhorn and staghorn coral critical habitat is present within approximately 1 mile the shoreline off Carolina, Puerto Rico. Impacts to critical habitat described in Section 4.2.1 include land-based sources of pollutants, fishing activities, boating, and commercial activities. The action area hosts a submarine cable corridor occupied by several existing submarine cables. The proposed cable will cross 1,207 ft of seafloor that contains the elkhorn and staghorn coral critical habitat essential feature. Given that the action area includes vessel transit routes, commercial operations, and areas with coastal development, we believe the status of critical habitat described in Section 4.2.1 accurately reflects the status of critical habitat within the action area.

5.2 Factors Affecting Elkhorn and Staghorn Coral Critical Habitat within the Action Area

The environmental baseline for this Opinion includes the effects of several activities that affect the condition of elkhorn and staghorn coral critical habitat. We describe these activities' effects in the sections below.

5.2.1 Federal Actions

Numerous activities funded, authorized, or carried out by federal agencies have been identified as threats and may affect elkhorn and staghorn critical habitat in the action area. Although many regulations exist to protect corals, including elkhorn and staghorn corals and their habitat, many of the activities identified as threats still adversely affect the species. Poor boating and anchoring practices and destructive fishing practices cause abrasion and breakage to elkhorn and staghorn critical habitat. Nutrients, contaminants, and sediment from point and non-point sources create substrate unsuitable for larval settlement, recruitment, and reattachment of fragments.

- The Caribbean Fishery Management Council (CFMC) develops fishery management plans (FMP), implemented by NMFS-approved fishery regulations, that govern fishing activities that may affect critical habitat. For all fisheries for which there is a FMP or for which any federal action is taken to manage that fishery, impacts are evaluated under Section 7 of the ESA. NMFS reinitiated Section 7 consultations for the Coral, Queen Conch, Reef Fish, and Spiny Lobster FMPs under the jurisdiction of the CFMC when critical habitat was designated for elkhorn and staghorn corals. NMFS concluded that the implementation of the Coral FMP would have no effect on coral designated critical habitat. NMFS determined that the Queen Conch FMP is not likely to adversely affect coral designated critical habitat. NMFS has also completed Biological Opinions for the Reef Fish and Spiny Lobster FMPs as part of Section 7 consultations to consider the potential impacts of the fisheries coral designated critical habitat.
- The Department of the Interior, including NPS, along with NOAA and the U.S. Environmental Protection Agency (EPA), also conduct research activities using federal research vessels as part of coral reef monitoring activities within the territorials waters of Puerto Rico.
- The USACE and the EPA permit discharges to surface waters through shoreline and riparian disturbances. These disturbances (whether in the riverine, estuarine, marine, or floodplain environment) result in discharges to surface waters that may retard or prevent the reproduction, settlement, reattachment, and development of listed corals (e.g., land development and run-off, and dredging and disposal activities, can result in direct deposition of sediment on corals, shading, and lost substrate for fragment reattachment or larval settlement or recruitment).
    - The USACE authorizes and carries out construction and dredge-and-fill activities that may result in direct mortality or injury of elkhorn or staghorn coral through direct deposition of sediment on corals or shading, or eliminate or impede access to critical habitat for coral larvae or fragments.
    - EPA, through the DNER regulates the discharge of pollutants, such as oil, toxic chemicals, radioactivity, carcinogens, mutagens, teratogens, or organic nutrient-laden water, including sewage water, from point sources into the waters of the United States. Elevated discharge levels may cause habitat destruction/modification.

- The EPA, through the DNER, authorizes the discharge of stormwater to surface waters as part of construction projects. This discharge may result in the release of pollutants carried in runoff that can lead to habitat destruction/modification.

5.2.2 Non-Federal Actions

A number of nonfederal activities that may adversely affect designated critical habitat for elkhorn and staghorn corals include impacts from upland development that do not require federal permits or otherwise have a federal nexus (i.e., residential, agriculture), depending on the size of the development. Development can affect water quality and lead to habitat destruction, in particular through the transport of land-based sources of pollution in sediments and stormwater runoff, but this development often do not require federal authorization. NMFS does not have any knowledge of state or private actions occurring in or near to the action area that may affect these resources that would not also require a federal permit; the likelihood of a shoreline-adjacent project occurring in or near to the action area that does not require a federal permit for in-water construction work, for instance, is very small.

Hurricanes and large coastal storms can also harm coral critical habitat through sediment deposition and substrate damage. Major hurricanes have caused changes in the physical structure of many reefs in Puerto Rico. Based on data from the NOAA Office for Coastal Management, there have been a total of 21 hurricanes and tropical storms that have affected Puerto Rico between 1975 and 2017, including most recently Hurricanes Irma and Maria.

5.2.3 Conservation and Recovery Actions Shaping the Environmental Baseline

The Caribbean Fishery Management Council (CFMC) has established fishery management plans, which NMFS has implemented by regulations, that prohibit the use of bottom-tending fishing gear in seasonally and permanently closed fishing areas containing coral reefs in federal waters of the (EEZ). The Coral Reef Conservation Act and the FMPs established by the CFMC, and implemented by NMFS under the Magnuson-Stevens Fishery Conservation and Management Act (the Reef Fish Fishery of Puerto Rico and the U.S. Virgin Islands and the Corals and Reef Associated Plants and Invertebrates of Puerto Rico and the U.S. Virgin Islands), require the protection of corals and prohibit the collection of hard corals. These plans also provide protection of coral critical habitat.

The Commonwealth Government regulates activities that occur in terrestrial and marine habitats of Puerto Rico. Puerto Rico Regulation 6766 (Law 241 of 1999, the New Wildlife Law) establishes protections for listed species. Permits can be issued by the Secretary of DNER for the collection and transport of species listed by the Commonwealth as vulnerable, threatened, endangered, or critically endangered species for rehabilitation, scientific use, or survival and species' benefit purposes. (Note that federally-listed species are also protected through this Commonwealth regulation, as is ESA-designated critical habitat). In addition, the regulation prohibits the modification of listed species' habitat without a mitigation plan approved by the Secretary of DNER, although the regulation also restricts the type of habitat that can be modified at all. Regulation 6768 under the same law also regulates the collection of all organisms, not just listed species. The DNER Secretary can issue a collection permit for the purposes of scientific investigation, or educational activities or exhibits. Puerto Rico Law 147 of 1999 for the protection, conservation, and management of coral reefs in Puerto Rico, prohibits the removal,

extraction, mutilation, or destruction of coral reefs and associated systems. The Secretary of DNER can issue permits for scientific investigations that require extraction of corals, or those that will otherwise affect corals. Additionally, Puerto Rico has a state regulatory program that regulates most land, including upland and wetland, and surface water alterations, including in partnership with NOAA under the Coastal Zone Management Act, and EPA under the Clean Water Act. EPA has maintained regulatory authority for some activities regulated under the Clean Water Act, such as the non-point source discharge elimination system permits.

Section 6 of the ESA allows NMFS to enter into cooperative agreements with states to assist in recovery actions of ESA-listed species, including scientific research related to documenting species condition and trends in presence and abundance. DNER renewed its Section 6 agreement with NMFS in 2016 and is in the process of renewal for 2017, for the following fiscal year, although the status of any ESA Section 6 funding for the Commonwealth is not known at this time as the proposal competition closed in November 2017. Recovery actions may also include the collection of fragments from coral colonies, their grow-out in nursery areas, and the outplanting of fragments. The DNER has issued memoranda of understanding to several coral nursery operators with coral nurseries in various areas around Puerto Rico. The DNER is also the entity responsible for permitting the use of coral species, including ESA-listed corals, in coral nurseries. NMFS completed ESA Section 7 consultation with the USACE for the issuance of a Regional General Permit, SAJ-112, that would authorize the installation and maintenance of coral nursery operations up to 1 acre (ac) in size that do not require the placement of fill, such as the installation of polyvinyl chloride (PVC) "trees." NOAA's Restoration Center also maintains coral nurseries in various locations around Puerto Rico and uses farmed corals in efforts to repair damage from vessel groundings on reefs.

NMFS convened a recovery team comprised of fishers, scientists, managers, and agency personnel from Florida, Puerto Rico, and USVI, as well as federal representatives to create a recovery plan for elkhorn and staghorn corals and their habitat. NMFS has also created a recovery outline for the development of a recovery plan for the 5 additional coral species that were listed in September 2014 (http://sero.nmfs.noaa.gov/protected_resources/coral/documents/recovery_outline.pdf).

The NOAA Coral Reef Conservation Program, through its internal grants, external grants, and grants to the Territory, Commonwealth, and the CFMC, has provided funding for several activities with an education and outreach component for informing the public about the importance of the coral reef ecosystem of the USVI and Puerto Rico. The NMFS Southeast Regional Office has also developed outreach materials regarding the listing of elkhorn and staghorn corals, the listing of 5 other coral species on September 10, 2014, the ESA Section 4(d) rule for elkhorn and staghorn corals, and the designation of elkhorn and staghorn coral critical habitat. These materials have been circulated to constituents during education and outreach activities and public meetings, and as part of other Section 7 consultations, and are readily available on the web: http://sero.nmfs.noaa.gov/protected_resources/coral/index.html.

6 EFFECTS OF THE ACTION ON CRITICAL HABITAT

Effects of the action include direct and indirect effects of the action under consultation. Indirect effects are those that result from the proposed action, occur later in time (i.e., after the proposed action is complete), but are still reasonably certain to occur.

As described below, NMFS believes that the proposed action will adversely affect elkhorn and staghorn coral critical habitat. As part of this Opinion and because the action will result in adverse effects to elkhorn and staghorn coral critical habitat, NMFS must evaluate whether the action is likely to result in destruction or adverse modification of critical habitat. If so, NMFS must develop RPAs to avoid the destruction or adverse modification.

6.1 Effects of the Action on Elkhorn and Staghorn Coral Critical Habitat

The essential feature of elkhorn and staghorn coral critical habitat will be affected by the installation and operation of the BRUSA cable. The benthic survey completed for the project found that there are 2,851 ft (869 m) of consolidated substrate, including colonized hard bottom and coral reefs that could contain the essential feature of elkhorn and staghorn coral critical habitat. Within Segments 2a and 2b, the installation of articulated pipe is proposed in a shallow hard bottom area for a length of 689 ft (210 m) and 40 cable clamps are proposed in a 1,207 ft (368 m) section further seaward. The estimated total area of elkhorn and staghorn coral critical habitat that will be affected by the installation of articulated pipe and cable clamps to secure the cable is 542.5 sq ft. There is a total of 1,383 square miles of elkhorn and staghorn coral designated critical habitat in Puerto Rico. Of this, approximately 292 square miles are likely to contain the essential feature, based on the amount of coral, rock reef, colonized hard bottom, and other coralline communities mapped by NOAA's National Ocean Service in 2001. Covering approximately 542.5 sq ft of elkhorn and staghorn coral critical habitat under cable clamps or articulated pipe segments represents approximately 0.000007% (292 square miles = 8,140,000,000 sq ft; 542.5 sq ft/8,140,000,000 sq ft * 100 = 0.000007%) of the area likely to contain the essential feature within the Puerto Rico critical habitat unit. The use of articulated pipe and clamps will prevent the pipe from moving on the seafloor and will protect adjacent elkhorn and staghorn coral critical habitat from abrasion. These effects are discussed further in Section 8.

7 CUMULATIVE EFFECTS

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this Biological Opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA (50 CFR 402.14).

Most activities affecting elkhorn and staghorn critical habitat are regulated federally; therefore, any future activities within the action area, which is in waters of the U.S., will likely require ESA Section 7 consultation. However, upland development, whether for housing or agriculture, often has no federal nexus if the project is located on uplands and is small in size. Depending on the number and location of these developments, sediment and nutrient loading to nearshore waters could become a chronic stressor, which would affect elkhorn and staghorn coral critical habitat.

NMFS is not aware of any proposed or anticipated changes in human-related actions (e.g., recreational use, fisheries, habitat degradation including from vessel use) or natural conditions that would substantially change the impacts that each threat has on elkhorn and staghorn coral critical habitat, or any additional future state, tribal, or local private actions that are reasonably certain to occur in the action area in the future beyond the potential development described above. Therefore, NMFS expects that the levels of interactions with elkhorn and staghorn critical habitat described for each of the fisheries and non-fisheries activities in Section 5.2 (Factors Affecting Species and Critical Habitat within the Action Area) will continue at similar levels into the foreseeable future.

8 ANALYSIS OF DESTRUCTION OR ADVERSE MODIFICATION OF DESIGNATED CRITICAL HABITAT FOR ELKHORN AND STGHORN CORALS

NMFS's regulations define *Destruction or adverse modification* to mean "a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features" (50 CFR § 402.02). Other alterations that may destroy or adversely modify critical habitat may include impacts to the area itself, such as those that would impede access to or use of the essential features. We intend the phrase "significantly delay" in development of essential features to encompass a delay that interrupts the likely natural trajectory of the development of physical and biological features in the designated critical habitat to support the species' recovery. NMFS will generally conclude that a Federal action is likely to "destroy or adversely modify" designated critical habitat if the action results in an alteration of the quantity or quality of the essential physical or biological features of designated critical habitat, or that precludes or significantly delays the capacity of that habitat to develop those features over time, and if the effect of the alteration is to appreciably diminish the value of critical habitat for the conservation of the species.

Ultimately, we seek to determine if, with the implementation of the proposed action, critical habitat would remain functional (or retain the current ability for the essential features to be functionally established) to serve the intended conservation role for the species. This analysis takes into account the geographic and temporal scope of the proposed action, recognizing that "functionality" of critical habitat necessarily means that it must now and must continue in the future to support the conservation of the species and progress toward recovery. Thus the analysis must take into account any changes in amount, distribution, or characteristics of the critical habitat that will be required over time to support a successfully recovering species. Destruction or adverse modification does not depend strictly on the size or proportion of the area adversely affected, but rather on the role the action area and the affected critical habitat serves with regard to the function of the overall critical habitat designation, and how that role is affected by the action.

Elkhorn and Staghorn Coral Critical Habitat

Critical habitat was designated for elkhorn and staghorn corals, in part, because further declines in the low population sizes of the species could lead to threshold levels that make the chances for recovery low. More specifically, low population sizes for these species could lead to an Allee

effect[1] and lower effective density (of genetically distinct adults required for sexual reproduction), and a reduced source of fragments for asexual reproduction and recruitment. Therefore, the key conservation objective of designated critical habitat is to facilitate increased incidence of successful sexual and asexual reproduction, which in turn facilitates increases in the species' abundances, distributions, and genetic diversity. To this end, our analysis of whether the proposed action is likely to destroy or adversely modify designated critical habitat seeks to determine if the adverse effects of the proposed action on the essential feature of designated *Acropora* critical habitat will appreciably reduce the capability of the critical habitat to facilitate an increased incidence of successful sexual and asexual reproduction. This analysis takes into account the status of the species during the installation of the BRUSA cable system. The level of increased incidence of successful reproduction needs to be facilitated by availability of the essential feature and may differ depending on the recovery status of elkhorn and staghorn corals in the action area for each cable project. This analysis also takes into account the geographic and temporal scope of the actions.

An area of 542.5 sq ft containing the elkhorn and staghorn critical habitat essential feature will be permanently covered where the cable will lay directly over hard bottom or articulated pipe or clamps will be installed over the cable to prevent it from moving. Benthic surveys and previous monitoring reports from other submarine cable projects indicate that hard and soft corals often colonize the cables and articulated pipe segments over time such that distinguishing the cable corridor becomes difficult. The hard bottom areas that will be affected by the BRUSA installation are within a historic cable landing with several other cable segments already present.

As noted in the critical habitat rule (73 FR 72210, November 26, 2008), the loss of suitable habitat is one of the greatest threats to the recovery of listed coral populations. The loss of suitable habitat affects the reproductive success of listed corals because substrate for sexual recruits to settle is lost. Thus, the value of critical habitat for the conservation of the species is to facilitate an increased incidence of successful sexual and asexual reproduction. Nevertheless, NMFS does not believe the installation of BRUSA cable system will permanently alter the suitability or habitat quality of elkhorn and staghorn coral critical habitat in the action area or throughout the critical habitat units, or prevent the critical habitat from facilitating successful sexual and asexual reproduction. Approximately 292 mi^2 are likely to contain the essential element of ESA-designated elkhorn and staghorn coral critical habitat within the Puerto Rico unit, based on the amount of coral, rock reef, colonized hard bottom, and other coralline communities mapped by NOAA's National Ocean Service (NOS) Biogeography Program in 2000 (Kendall et al. 2001a).

Given the very small size (542.5 sq ft) of the impact corridor for each cable system compared to the area containing elkhorn and staghorn coral critical habitat within the action area for the BRUSA cable project, NMFS does not anticipate that any of the action area containing the essential feature will cease to function as adequate substrate for settlement of listed coral larvae, reattachment of listed coral fragments, and growth of listed coral colonies. Therefore, NMFS does not believe the installation of the BRUSA cable systems will have an appreciable impact on

[1] The Allee effect is the effect of population density on population growth by which reproductive rates fall at very low population densities and reproduction and survival of individuals increase as population density increases.

the ability of elkhorn and staghorn coral critical habitat in the Puerto Rico unit to provide for the conservation of these acroporid corals.

9 CONCLUSION

NMFS has analyzed the best available data, the current status of the species, environmental baseline, effects of the proposed action, and cumulative effects to determine whether the proposed action is likely to result in the destruction or adverse modification of critical habitat for elkhorn and staghorn corals. It is our Opinion that the installation of the BRUSA cable system is not likely to impede the critical habitat's ability to support the conservation of the species. Thus we conclude that the action, as proposed, is likely to adversely affect, but is not likely to destroy or adversely modify, designated critical habitat for elkhorn and staghorn corals.

10 INCIDENTAL TAKE STATEMENT

NMFS does not anticipate that the proposed action will incidentally take any species and no take is authorized. Nonetheless, any takes of listed sea turtles, fishes, or corals shall be immediately reported to takereport.nmfsser@noaa.gov. Refer to the present Biological Opinion by title (BRUSA cable), issuance date, NMFS PCTS identifier number (SER-2016-18163), and USACE permit number (SAJ-2016-1803 (SP-CGR)). At that time, consultation must be reinitiated.

11 CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on ESA-listed species or critical habitat, to help implement recovery plans, or to develop information.

We believe the following conservation recommendations further the conservation of ESA-listed sea turtles, corals, and staghorn and elkhorn coral designated critical habitat. We strongly recommend consideration and adoption of these measures. In order for NMFS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, we request notification of the implementation of any conservation recommendations.

1. We recommend that the USACE include the mesophotic survey protocol used for other fiber optic cable projects, such as the Virgin Islands Next Generation Network cable project (SER-2013-10552; SAJ-2013-00294), as an application requirement for all submarine cable projects with proposed routes within Territorial, Commonwealth, and EEZ waters. This will provide information on corals and their habitat that occur deeper than 100 ft. We also recommend that reporting requirements be established in coordination with NMFS to ensure that data collected by the surveys can be used to assess impacts on ESA-listed corals and their habitat that occur in deep waters (greater than 100 ft) and to ensure that the routes are developed to minimize potential impacts to ESA-listed corals and their habitat.

2. We recommend that the USACE prepare a report of all permitted and proposed submarine cable and utility corridor projects in the range of ESA-corals to assess cumulative impacts of these projects on these coral species and to develop recommended corridors to concentrate impacts in the same areas for similar projects.

3. We recommend that the avoidance and minimization measures developed by Telefonica International Wholesale Services, Puerto Rico Inc., and Alcatel-Lucent Submarine Networks for the BRUSA cable (Section 3.1) cable systems be included as special conditions of any permit to be issued by the USACE.

4. We recommend that NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions* (2006) and NMFS's *Vessel Strike Avoidance Measures and Injured or Dead Protected Species Reporting* (2008) be included in the design of projects requiring the installation of in-water structures or other in-water or shoreline construction activities, as appropriate, in order to minimize the potential impacts to all ESA-listed sea turtle species during construction and operation of project components.

5. Provide NMFS Southeast Region PRD with copies of all monitoring reports completed for the BRUSA submarine cable projects.

12 REINITIATION OF CONSULTATION

This concludes NMFS's formal consultation on the proposed action. As provided in 50 CFR Section 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the Biological Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the identified action.

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