**DEPARTMENT OF COMMERCE**

**National Oceanic and Atmospheric Administration**

**50 CFR Parts 223 and 226**

**[Docket No. 200918–0250]**

**RIN 0648–BG26**

# Endangered and Threatened Species; Critical Habitat for the Threatened Caribbean Corals

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

**ACTION:** Proposed rule; request for comments.

**SUMMARY:** We, NMFS, propose to designate critical habitat for the threatened Caribbean corals: *Orbicella annularis, O. faveolata, O. franksi, Dendrogyra cylindrus,* and *Mycetophyllia ferox* pursuant to section 4 of the Endangered Species Act (ESA). Twenty-eight mostly overlapping specific occupied areas containing physical features essential to the conservation of all these coral species are being proposed for designation as critical habitat; these areas contain approximately 15,000 square kilometers (km²; 5,900 square miles (mi²)) of marine habitat. We have considered positive and negative economic, national security, and other relevant impacts of the proposed designations, and we propose to exclude one area from the critical habitat designations due to anticipated impacts on national security. We are soliciting comments from the public on all aspects of the proposal, including our identification of the geographical area and depths occupied by the species, the physical and biological feature essential to the coral species' conservation and identification, areas not included and excluded, and consideration of impacts of the proposed action.

**DATES:** Comments on this proposal must be received by January 26, 2021.

*Public hearings:* If requested, we will hold at least one public hearing on this proposed rule.

**ADDRESSES:** You may submit comments, identified by the docket number NOAA–NMFS–2020–0131, by any of the following methods:

- *Electronic Submissions:* Submit all electronic public comments via the Federal eRulemaking Portal. Go to *www.regulations.gov/#!docketDetail;D=NOAA-NMFS-2020-0131* click the ''Comment Now'' icon, complete the required fields, and enter or attach your comments.

*Instructions:* You must submit comments by the above to ensure that we receive, document, and consider them. Comments sent by any other method or received after the end of the comment period, may not be considered. All comments received are a part of the public record and will generally be posted to *http://www.regulations.gov* without change. All Personal Identifying Information (for example, name, address, etc.) voluntarily submitted by the commenter may be publicly accessible. Do not submit Confidential Business Information or otherwise sensitive or protected information.

NMFS will accept anonymous comments (enter ''N/A'' in the required fields if you wish to remain anonymous).

**FOR FURTHER INFORMATION CONTACT:** Jennifer Moore, NMFS, SERO, 727–824–5312, *Jennifer.Moore@noaa.gov;* Celeste Stout, NMFS, Office of Protected Resources, 301–427–8436, *Celeste.Stout@noaa.gov.*

**SUPPLEMENTARY INFORMATION:** In accordance with section 4(b) of the ESA and our implementing regulations (50 CFR 424.12), this proposed rule is based on the best scientific information available concerning the range, biology, habitat, threats to the habitat, and conservation objectives for the threatened Caribbean boulder star coral (*Orbicella franksi*), lobed star coral (*O. annularis*), mountainous star coral (*O. faveolata*), pillar coral (*Dendrogyra cylindrus*), and rough cactus coral (*Mycetophyllia ferox*). We have reviewed the available information and have used it to identify a composite physical feature essential to the conservation of each coral, the specific areas within the occupied geographical areas that contain the physical essential feature that may require special management considerations or protections, the Federal activities that may impact the proposed critical habitat, and the potential impacts of designating critical habitat for the corals. The economic, national security, and other relevant impacts of the proposed critical habitat designations are described in the draft document titled, Draft Information Basis and Impact Considerations of Critical Habitat Designations for Threatened Caribbean Corals (Draft Information Report). This supporting document is available at *www.regulations.gov* or upon request (see **ADDRESSES**).

## Background

We listed twenty coral species as threatened under the ESA effective October 10, 2014 (79 FR 53851, September 10, 2014). Five of the corals occur in the Caribbean: *Orbicella annularis, O. faveolata, O. franksi, Dendrogyra cylindrus,* and *Mycetophyllia ferox.* The final listing determinations were all based on the best scientific and commercial information available on a suite of demographic, spatial, and susceptibility components that influence the species' vulnerability to extinction in the face of continuing threats over the foreseeable future. All of the species had undergone population declines and are susceptible to multiple threats, including: Ocean warming, diseases, ocean acidification, ecological effects of fishing, and land-based sources of pollution. However, aspects of the species' demography and distribution buffer the effects of the threats. We determined that all the Caribbean coral species are likely to become endangered throughout all of their ranges within a foreseeable future of the next several decades as a result of a combination of threats, of which the most severe are related to climate change, and we listed them as threatened.

This proposed rule is based on our Draft Information Report and peer review comments on the report. All of the information that we used to make our determinations in this proposed rule is contained in that report. The Draft Information Report is available on NMFS's Southeast Regional Office website at [*https://www.fisheries.noaa.gov/resource/document/5-caribbean-coral-proposed-CH-Information-Report* and at *www.regulations.gov,* see **ADDRESSES**].

### *Natural History*

This section summarizes life history and biological characteristics of the five corals to provide context for the identification of the physical and biological feature essential for the conservation of these species. In this section, we cover several topic areas, including an introduction to reef-building corals, reproduction, settlement and growth, coral habitat types, and coral reef ecosystems. The amount of information available on the life history, reproductive biology, and ecology varies for each of the five corals that occur in U.S. waters of the Caribbean. We provide specific information for each species where possible. In addition, we provide information on the biology and ecology of Caribbean corals in general, highlighting traits that these five corals share. The information below is largely summarized from the final listing rule (79 FR 53852, September 10, 2014), and updated with the best scientific information available to date.

Reef-building corals, in the phylum Cnidaria, are marine invertebrates that occur as polyps. The Cnidaria include true stony corals (class Anthozoa, order Scleractinia), the blue coral (class Anthozoa, order Helioporacea), and fire corals (class Hydrozoa, order Milleporina). These species secrete massive calcium carbonate skeletons that form the physical structure of coral reefs. Reef-building coral species collectively produce coral reefs over time when growth outpaces erosion. Corals may also occur on hard substrate that is interspersed among other benthic features (*e.g.,* seagrass beds in the back reef lagoon) in the coral reef ecosystem, but not on the physical structure of coral reefs. Corals also contain symbiotic algae within their cells. As described below, corals produce clones of themselves by several different means, and most corals occur as colonies of polyps.

Reef-building corals are able to grow and thrive in the characteristically nutrient-poor environments of tropical and subtropical regions due to their ability to form mutually beneficial symbioses with unicellular photosynthetic algae (zooxanthellae) belonging to the dinoflagellate genus *Symbiodinium* living within the host coral's tissues. Zooxanthellae provide a food source for their host by translocating fixed organic carbon and other nutrients. In return, the algae receive shelter and nutrients in the form of inorganic waste metabolites from host respiration. This exchange of energy, nutrients, and inorganic metabolites allows the symbiosis to flourish and helps the coral secrete the calcium carbonate that forms the skeletal structure of the coral colony, which in turn contributes to the formation of the reef. Thus, reef-building corals are also known as zooxanthellate corals. Some corals, which do not contain zooxanthellae, form skeletons much more slowly, and therefore are not considered reef-building. The five corals discussed in this proposed rule are zooxanthellate species, and thus are reef-building species that can grow large skeletons that contribute to the physical structure of coral reefs.

Only about 10 percent of the world's approximately 800 reef-building coral species occur in the Caribbean. The acroporids were once the most abundant and most important species on Caribbean coral reefs in terms of accretion of reef structure, characterizing the ''palmata'' and ''cervicornis'' zones in the classical descriptions of Caribbean reefs (Goreau, 1959). The three species (*O. annularis, O. faveolata,* and *O. franski*) in the *Orbicella* star coral species complex have also been dominant components on Caribbean coral reefs, characterizing the ''buttress zone'' and ''annularis zone.'' After the die-off of *Acropora* spp., the star coral species complex became the major reef-builder in the greater Caribbean due to their large size.

Most reef-building coral species are colonial, producing colonies made up of polyps that are connected through tissue and skeleton. In a colonial species, a single larva will develop into a discrete unit (the primary polyp) that then produces modular units of itself (*i.e.,* genetically-identical copies, or clones, of the primary polyp). Each polyp consists of a column with mouth and tentacles on the upper side growing on top of a calcium carbonate skeleton that the polyps produced through the process of calcification. Colony growth is achieved mainly through the addition of more cloned polyps. The colony can continue to exist even if numerous polyps die or if the colony is broken apart or otherwise damaged. The five corals are all colonial species, although polyp size, colony size, and colony morphology vary considerably by species, and can also vary based on environmental variables in different habitats. Colonies can produce clones, most commonly through fragmentation or budding (described in more detail below). The five corals are all clonal species with the ability to produce colonies of cloned polyps as well as clones of entire colonies. The way they produce colony-level clones varies by species. For example, branching species are much more likely than encrusting species to produce clones via fragmentation.

Corals use a number of reproductive strategies that have been researched extensively; however, many individual species' reproductive modes remain poorly described. Most coral species use both sexual and asexual propagation. Sexual reproduction in corals is primarily through gametogenesis (*i.e.,* development of eggs and sperm within the polyps near the base). Some coral species have separate sexes (gonochoric), while others are hermaphroditic (individuals simultaneously containing both sexes), and others are a combination of both (Richmond, 1997). Strategies for fertilization are either by brooding (internal fertilization) or broadcast spawning (external fertilization). Asexual reproduction in coral species usually occurs by fragmentation, when colony pieces or fragments are dislodged from larger colonies to establish new colonies, or by the budding of new polyps within a colony.

Depending on the mode of fertilization, coral larvae (called planulae) undergo development either mostly within the mother colony (brooders) or outside of the mother colony, adrift in the ocean (broadcast spawners). In either mode of larval development, larvae presumably experience considerable mortality (up to 90 percent or more) from predation or other factors prior to settlement and metamorphosis (Goreau *et al.,* 1981). Such mortality cannot be directly observed, but is inferred from the large number of eggs and sperm spawned versus the much smaller number of recruits observed later. Coral larvae are relatively poor swimmers; therefore, their dispersal distances largely depend on the duration of the pelagic phase and the speed and direction of water currents transporting the larvae.

All three species of the *Orbicella* star coral species complex are hermaphroditic broadcast spawners, spawning over a 3-night period, 6 to 8 nights following the full moon in late August, September, or early October (Levitan *et al.,* 2004). Fertilization success measured in the field was generally below 15 percent for all three species and correlated to the number of colonies concurrently spawning (Levitan *et al.,* 2004). The minimum colony size at first reproduction for the *Orbicella* species complex is 83 $cm^2$ (Szmant-Froelich, 1985). Successful recruitment by the *Orbicella* species has seemingly always been rare with many studies throughout the Caribbean reporting negligible to no recruitment (Bak and Engel, 1979; Hughes and Tanner, 2000; Rogers *et al.,* 1984; Smith and Aronson, 2006).

*Dendrogyra cylindrus* is a gonochoric (having separate sexes) broadcast spawning species with relatively low annual egg production for its size. The combination of gonochoric spawning with persistently low population densities is expected to yield low rates of successful fertilization and low larval supply. Spawning has been observed several nights after the full moon of August in the Florida Keys (Neely *et al.,* 2013; Waddell and Clarke, 2008). In Curaçao, *D. cylindrus* was observed to spawn over a 3-night period, 2–5 nights after the full moons in August and September (Marhaver *et al.,* 2015). Lab-reared embryos developed into swimming planulae larvae within 16 hours after spawning and were competent to settle relatively soon afterward (Marhaver *et al.,* 2015). Despite short duration from spawn to settlement competency in the lab, sexual recruitment of this species is low, and there are no reported juvenile colonies in the Caribbean (Bak and Engel, 1979; Chiappone, 2010; Rogers *et al.,* 1984). *Dendrogyra cylindrus* can propagate by fragmentation following storms or other physical disturbance (Hudson and Goodwin, 1997). Recent investigations determined that there is no genetic differentiation along the Florida Reef Tract, meaning that all colonies belong to a single mixed population (Baums *et al.,* 2016). The same study found that all sampled colonies from Curaçao belonged to a single population that was distinct from the Florida population. Similar studies have not been conducted elsewhere in the species' range.

*Mycetophyllia ferox* is a hermaphroditic brooding species producing larvae during the winter months (Szmant, 1986). Brooded larvae are typically larger than broadcast spawned larvae and are expected to have higher rates of survival once settled. However, recruitment of *M. ferox* appears to be very low, even in studies from the 1970s (Dustan, 1977; Rogers and Garrison, 2001).

Spatial and temporal patterns of coral recruitment are affected by substrate availability and community structure, grazing pressure, fecundity, mode and timing of reproduction, behavior of larvae, hurricane disturbance, physical oceanography, the structure of established coral assemblages, and chemical cues. Additionally, several other factors may influence reproductive success and reproductive isolation, including external cues, genetic precision, and conspecific signaling.

Like most corals, the threatened Caribbean corals require hard, consolidated substrate, including attached, dead coral skeleton, for their larvae to settle. The settlement location on the substrate must be free of macroalgae, turf algae, or sediment for larvae to attach and begin growing a colony. Further, the substrate must provide a habitat where burial by sediment or overgrowth by competing organisms (*i.e.,* algae) will not occur. In general, on proper stimulation, coral larvae settle and metamorphose on appropriate hard substrates. Some evidence indicates that chemical cues from crustose coralline algae (CCA), microbial films, and/or other reef organisms or acoustic cues from reef environments stimulate planulae's settlement behaviors. Calcification of the newly-settled larva begins with the forming of the basal plate. Buds formed on the initial corallite develop into daughter corallites. Once larvae have metamorphosed onto appropriate hard substrate, metabolic energy is diverted to colony growth and maintenance. Because newly settled corals barely protrude above the substrate, juveniles need to reach a certain size to limit damage or mortality from threats such as grazing, sediment burial, and algal overgrowth. In some species, it appears there is virtually no limit to colony size beyond structural integrity of the colony skeleton, as polyps apparently can bud indefinitely.

Polyps are the building blocks of colonies, and colony growth occurs both by increasing the number of polyps, as well as extending the supporting skeleton under each polyp. Reef-building corals combine calcium and carbonate ions derived from seawater into crystals that form their skeletons. Skeletal expansion rates vary greatly by taxa, morphology, location, habitat and other factors. For example, in general, branching species (*e.g.,* most *Acropora* species) have much higher skeletal extension rates than massive species (*e.g., Orbicella* species). The energy required to produce new polyps and build calcium carbonate skeleton is provided by the symbiotic relationship corals have with photosynthetic zooxanthellae. Therefore, corals need light for their zooxanthellae to photosynthesize and provide the coral with food, and thus also require low turbidity for energy, growth, and survival. Lower water clarity sharply reduces photosynthesis in zooxanthellae and results in reductions in adult colony calcification and survival (79 FR 53852, September 10, 2014). Some additional information on the biological requirements for reproduction, settlement, and growth is provided below in the *Physical or Biological Features Essential to Conservation* section.

Coral reefs are fragile ecosystems that exist in a narrow band of environmental conditions that allow the skeletons of reef-building coral species to grow quickly enough for reef accretion to outpace reef erosion. High-growth conditions for reef-building corals include clear, warm waters with abundant light, and low levels of nutrients, sediments, and freshwater.

There are several categories of coral reefs: Fringing reefs, barrier reefs, patch reefs, platform reefs, and atolls. Despite the differences between the reef categories, most fringing reefs, barrier reefs, atolls, and platform reefs consist of a reef slope, a reef crest, and a back-reef, which in turn are typically characterized by distinctive habitats. The characteristics of these habitat types vary greatly by reef categories, locations, latitudes, frequency of disturbance, etc., and there is also much habitat variability within each habitat type. Temporal variability in coral habitat conditions is also very high, both cyclically (*e.g.,* from tidal, seasonal, annual, and decadal cycles) and episodically (*e.g.,* storms, temperature anomalies, etc.). Together, all these factors contribute to the habitat heterogeneity of coral reefs.

The five corals vary in their recorded depth ranges and habitat types (Table 1). All five corals generally have overlapping ranges and occur throughout the wider-Caribbean. The major variance in their distributions occurs at the northern-most extent of their ranges in Florida or the Flower Garden Banks (FGB) in the northwest Gulf of Mexico. As described below, critical habitat can be designated only in areas under U.S. jurisdiction, thus we provide the species' distribution in U.S. waters (Table 1).

TABLE 1—DISTRIBUTIONS OF THREATENED CARIBBEAN CORALS IN THE UNITED STATES

| Species | Depth distribution | U.S. geographic distribution |
|---|---|---|
| *Dendrogyra cylindrus* | 1 to 25 m | Southeast Florida from Lake Worth Inlet in Palm Beach County to the Dry Tortugas; Puerto Rico; USVI; Navassa Island. |
| *Mycetophyllia ferox* | 5 to 90 m | Southeast Florida from Broward County to the Dry Tortugas; Puerto Rico; USVI; Navassa Island. |
| *Orbicella annularis* | 0.5 to 20 m | Southeast Florida from Lake Worth Inlet in Palm Beach County to the Dry Tortugas; FGB; Puerto Rico; USVI; Navassa Island. |
| *Orbicella faveolata* | 0.5 to 90 m | Southeast Florida from St. Lucie Inlet in Martin County to the Dry Tortugas; FGB; Puerto Rico; USVI; Navassa Island. |

TABLE 1—DISTRIBUTIONS OF THREATENED CARIBBEAN CORALS IN THE UNITED STATES—Continued

| Species | Depth distribution | U.S. geographic distribution |
|---|---|---|
| *Orbicella franksi* | 0.5 to 90 m | Southeast Florida from Lake Worth Inlet in Palm Beach County to the Dry Tortugas; FGB; Puerto Rico; USVI; Navassa Island. |

The depth ranges in Table 1 are the typical ranges and do not apply to the depths in which the species occur at FGB, which are much deeper due to the unique setting and conditions at that site.

## Critical Habitat Identification and Designations

The purpose of designating critical habitat is to identify the areas that are essential to the species' recovery. Once critical habitat is designated, it can contribute to the conservation of listed species in several ways, including by identifying areas where Federal agencies can focus their section 7(a)(1) conservation programs, and helping focus the efforts of other conservation partners, such as States and local governments, nongovernmental organizations, and individuals (81 FR 7414, February 11, 2016). Designating critical habitat also provides a significant regulatory protection by ensuring that the Federal government considers the effects of its actions in accordance with section 7(a)(2) of the ESA and avoids or modifies those actions that are likely to destroy or adversely modify critical habitat. This requirement is in addition to the section 7 requirement that Federal agencies ensure that their actions are not likely to jeopardize the continued existence of ESA-listed species. Critical habitat requirements do not apply to citizens engaged in activities on private land that do not involve a Federal agency.

Section 3(5)(A) of the ESA defines critical habitat as (i) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of the ESA, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protections; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of the ESA, upon a determination by the Secretary that such areas are essential for the conservation of the species (16 U.S.C. 1532(5)(A)). Conservation is defined in section 3 of the ESA as the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this chapter are no longer necessary (16 U.S.C. 1532(3)). Therefore, critical habitat is the habitat essential for the species' recovery. However, section 3(5)(C) of the ESA clarifies that, except in those circumstances determined by the Secretary, critical habitat shall not include the entire geographical area which can be occupied by the threatened or endangered species.

To identify and designate critical habitat, we considered information on the distribution of the five threatened Caribbean corals, their major life stages, habitat requirements of those life stages, threats to the species, and conservation objectives that can be supported by identifiable essential physical or biological features (hereafter also referred to as ''PBFs'' or ''essential features''). In the final listing rule, ocean warming, diseases, ocean acidification, trophic effects of reef fishing, nutrient enrichment, sedimentation, and inadequacy of regulatory mechanisms were found to be the main threats contributing to the threatened status of all five corals. Several other threats also contributed to the species' statuses, but were considered to be relatively lower in importance as compared to the main threats. Therefore, we evaluated physical and biological features of their habitats to determine what features are essential to the conservation of each coral.

Accordingly, our step-wise approach for identifying potential critical habitat areas for the threatened corals was to determine: (1) The geographical area occupied by each coral at the time of listing; (2) the physical or biological features essential to the conservation of the corals; (3) whether those features may require special management considerations or protection; (4) the specific areas of the occupied geographical area where these features occur; and, (5) whether any unoccupied areas are essential to the conservation of any of the corals.

### *Geographical Area Occupied by the Species*

''Geographical area occupied'' in the definition of critical habitat is interpreted to mean the entire range of the species at the time it was listed, inclusive of all areas they use and move through seasonally (50 CFR 424.02; 81 FR 7413, February 11, 2016). The ranges of the five threatened corals span the wider-Caribbean, and specifically Florida, Puerto Rico, and USVI in the United States (79 FR 53851, September 10, 2014). We did not consider geographical areas outside of the United States, because we cannot designate critical habitat areas outside of U.S. jurisdiction (50 CFR 424.12(g)).

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

Within the geographical area occupied, critical habitat consists of specific areas on which are found those PBFs essential to the conservation of the species and that may require special management considerations or protection. PBFs essential to the conservation of the species are defined as the features that occur in specific areas and that are essential to support the life-history needs of the species, including water characteristics, soil type, geological features, sites, prey, vegetation, symbiotic species, or other features. A feature may be a single habitat characteristic, or a more complex combination of habitat characteristics. Features may include habitat characteristics that support ephemeral or dynamic habitat conditions. Features may also be expressed in terms relating to principles of conservation biology, such as patch size, distribution distances, and connectivity (50 CFR 424.02).

In the final listing rule, we determined that the five corals were threatened under the ESA. This means that while the species are not in danger of extinction currently, they are likely to become so within the next several decades based on their current abundances and trends in abundance, distributions, and threats they experience now and in the future. Further, the reproductive strategies of the three Caribbean *Orbicella* spp. and *Dendrogyra cylindrus* present a challenge to repopulation after mortality events they have experienced and will likely experience in the future. The goal of an ESA listing is to first prevent extinction, and then to recover the species so they no longer meet the definition of a threatened species and no longer need the protections of the

ESA. One of the first steps in recovery planning we completed after listing these coral species was to develop a Recovery Outline that contains a Recovery Vision, which describes what the state of full recovery looks like for the species. We identified the following Recovery Vision for the five corals listed in 2014: Populations of the five threatened Caribbean corals should be present across their historical ranges, with populations large enough and genetically diverse enough to support successful reproduction and recovery from mortality events and dense enough to maintain ecosystem function (*https://www.fisheries.noaa.gov/resource/document/5-caribbean-coral-species-recovery-outline*). Recovery of these species will require conservation of the coral reef ecosystem through threats abatement to ensure a high probability of survival into the future (NMFS, 2015). The key conservation objective that facilitates this Recovery Vision, and that can be assisted through these critical habitat designations, is supporting successful reproduction and recruitment, and survival and growth of all life stages, by abating threats to the corals' habitats. In the final listing rule, we identified the major threats contributing to the five corals' extinction risk: Ocean warming, disease, ocean acidification, trophic effects of reef fishing, nutrient enrichment, and sedimentation. Five of the six major threats (*i.e.,* all but disease) impact corals in part by changing the corals' habitat, making it unsuitable for them to carry out the essential functions at all life stages. Although it was not considered to be posing a major threat at the time of listing, we also identified contaminants as a potential threat to each of these corals (79 FR 53852, September 10, 2014). Thus, we identify ocean warming, ocean acidification, trophic effects of reef fishing, nutrient enrichment, sedimentation, and contaminants as the threats to the five corals' habitat that are impeding their recovery. Protecting essential features of the corals' habitat from these threats will facilitate the recovery of these threatened species.

We then turned to determining the physical or biological features essential to this conservation objective of supporting successful reproduction and recruitment, and survival and growth of all life stages. There are many physical and biological features that are important in supporting the corals' habitat; therefore, we focused on a composite habitat feature that supports the conservation objective through its relevance to the major threats and threats impeding recovery. The essential feature we ultimately identified is sites with a complex combination of substrate and water column characteristics that support normal functions of all life stages of the corals. Due to corals being sessile for almost their entire life cycle, they carry out most of their demographic functions in one location. Thus, we have identified sites with a combination of certain substrate and water column characteristics as the essential feature. A detailed discussion of how this feature was determined will follow. Specifically, these sites have attributes that determine the quality of the appropriate attachment substrate, in association with warm, aragonite-supersaturated, oligotrophic, clear marine water, which are essential to reproduction and recruitment, survival, and growth of all life stages of all five species of coral. These sites can be impacted by ocean acidification and ocean warming, trophic effects of reef fishing, nutrient enrichment, sedimentation, and contamination.

Based on the best scientific information available we propose the following essential physical feature for the five corals:

*Reproductive, recruitment, growth, and maturation habitat.* Sites that support the normal function of all life stages of the corals are natural, consolidated hard substrate or dead coral skeleton free of algae and sediment at the appropriate scale at the point of larval settlement or fragment reattachment, and the associated water column. Several attributes of these sites determine the quality of the area and influence the value of the associated feature to the conservation of the species:

(1) Substrate with presence of crevices and holes that provide cryptic habitat, the presence of microbial biofilms, or presence of crustose coralline algae;

(2) Reefscape (all the visible features of an area of reef) with no more than a thin veneer of sediment and low occupancy by fleshy and turf macroalgae;

(3) Marine water with levels of temperature, aragonite saturation, nutrients, and water clarity that have been observed to support any demographic function; and

(4) Marine water with levels of anthropogenically-introduced (from humans) chemical contaminants that do not preclude or inhibit any demographic function.

As described in detail in the Draft Information Report, all corals require exposed natural consolidated hard substrate for the settlement and recruitment of larvae or asexual fragments. Recruitment substrate provides the physical surface and space necessary for settlement of coral larvae, and a stable environment for metamorphosis of the larvae into the primary polyp, growth of juvenile and adult colonies, and re-attachment of fragments. The substrate must be available at appropriate physical and temporal scales for attachment to occur. In other words, the attachment location must be available at the physical scale of the larva or fragment, and at the temporal scale of when the larva or fragment is ''seeking'' recruitment. Larvae can also settle and attach to dead coral skeleton (Grober-Dunsmore *et al.,* 2006; Jordán-Dahlgren, 1992).

A number of features have been shown to influence coral larval settlement. Positive cues include the presence of particular species of crustose coralline algae (Morse and Morse, 1996; Ritson-Williams *et al.,* 2010), microbial biofilms (Sneed *et al.,* 2014; Webster *et al.,* 2004), and cryptic habitat such as crevices and holes (Edmunds *et al.,* 2004; Edwards *et al.,* 2014; Nozawa, 2012). Features that negatively affect settlement include presence of sediment, turf algae, sediment bound in turf algae, and macroalgae (Birrell *et al.,* 2005; Kuffner *et al.,* 2006; Richmond *et al.,* 2018; Speare *et al.,* 2019; Vermeij *et al.,* 2009). While sediment, turf algae, and macroalgae are all natural features of the coral reef ecosystem, it is the relative proportion of free space versus occupied space that influences recruitment; recruitment rate is positively correlated with free space (Connell *et al.,* 1997). The recruitment substrate feature is adversely affected by four of the major threats to the five corals: Ocean acidification, trophic effects of reef fishing, nutrient enrichment, and sedimentation.

The dominance of fleshy macroalgae as major space-occupiers on many Caribbean coral reefs impedes the recruitment of new corals. A shift in benthic community structure over recent decades from the dominance of stony corals to fleshy algae on Caribbean coral reefs is generally attributed to the greater persistence of fleshy macroalgae under reduced grazing regimes due to human overexploitation of herbivorous fishes (Edwards *et al.,* 2014; Hughes, 1994; Jackson *et al.,* 2014) and the regional mass mortality of the herbivorous long-spined sea urchin in 1983–84 (Hughes *et al.,* 1987). As overall coral cover has declined, the absolute area occupied by macroalgae has increased and herbivore grazing capacity is spread more thinly across a larger relative amount of space (Williams *et al.,* 2001). Further, impacts to water quality (principally nutrient input) coupled with low herbivore grazing are also believed to enhance fleshy macroalgal productivity. Fleshy macroalgae are able to colonize dead coral skeleton and other available substrate, preempting space available for coral recruitment (McCook *et al.,* 2001; Pastorok and Bilyard, 1985). The increasing frequency of coral mortality events, such as the 2014–2016 global bleaching event, continues to increase the amount of dead skeleton available to be colonized by algae.

The persistence of fleshy macroalgae under reduced grazing regimes also negatively impacts CCA growth, potentially reducing settlement cues which may reduce settlement of coral larvae (Sharp *et al.,* 2010). Most CCA are susceptible to fouling by fleshy algae, particularly when herbivores are absent (Steneck, 1986). Patterns observed in St. Croix, USVI, also indicate a strong positive correlation between CCA abundance and herbivory (Steneck and Testa, 1997). Both turf and macroalgal cover increases and CCA cover decreases with reductions in herbivory, which may last for a period of time even when herbivores are reintroduced (de Ruyter van Steveninck and Bak, 1986; Liddell and Ohlhorst, 1986; Miller *et al.,* 1999). The ability of fleshy macroalgae to affect growth and survival of CCA has indirect, yet important, impacts on the ability of coral larvae to successfully settle and recruit.

In addition to the direct impacts of ocean acidification on the corals from reduced aragonite saturation state (discussed later in this section), significant impacts to recruitment habitat are also expected. Kuffner *et al.* (2007) and Jokiel *et al.* (2008) showed dramatic declines in the growth rate of CCA and other reef organisms, and an increase in the growth of fleshy algae at atmospheric $CO_2$ levels expected later this century. The decrease in CCA growth, coupled with rapid growth of fleshy algae, will result in less available habitat and more competition for settlement and recruitment of new coral colonies.

Several studies show that coral recruitment tends to be greater when macroalgal biomass is low (Birrell *et al.,* 2008a; Birrell *et al.,* 2005; Birrell *et al.,* 2008b; Connell *et al.,* 1997; Edmunds *et al.,* 2004; Hughes, 1985; Kuffner *et al.,* 2006; Rogers *et al.,* 1984; Vermeij, 2006). In addition to preempting space for coral larvae settlement, many fleshy macroalgae produce secondary metabolites with generalized toxicity that also may inhibit larval settlement, recruitment, and survival (Kuffner and Paul, 2004; Kuffner *et al.,* 2006; Paul *et al.,* 2011). Furthermore, algal turfs can trap sediments (Kendrick, 1991; Nugues and Roberts, 2003a; Purcell and Bellwood, 2001; Purcell, 2000; Steneck and Testa, 1997; Wilson and Harrison, 2003), which then creates the potential for algal turfs and sediments to act in combination to hinder coral settlement (Birrell *et al.,* 2005; Nugues and Roberts, 2003a). These turf algae-sediment mats also can suppress coral growth under high sediment conditions (Nugues and Roberts, 2003b) and may gradually kill the marginal tissues of stony corals with which they come into contact (Dustan, 1977).

Coral recruitment habitat is also adversely impacted by sediment cover. Sediments enter the reef environment through many processes that are natural or anthropogenic in origin, including coastal erosion, coastal development, resuspension of bottom sediments, terrestrial erosion and run-off, in-water construction, dredging for coastal construction projects and navigation purposes, and in-water and beach placement of dredge spoils. The rate of sedimentation affects reef distribution, community structure, growth rates, and coral recruitment (Dutra *et al.,* 2006). Accumulation of sediment can smother living corals, cover dead coral skeleton, and exposed hard substrate (Erftemeijer *et al.,* 2012; Fabricius, 2005). Sediment accumulation on dead coral skeletons and exposed hard substrate reduces the amount of available substrate for coral larvae settlement and fragment reattachment (Rogers, 1990). The location of larval settlement must be free of sediment for attachment to occur (Harrington *et al.,* 2004; Mundy and Babcock, 1998).

The depth of sediments over hard substrate affects the duration that the substrate may be unavailable for settlement. The deeper the sediment, the longer it may take for natural waves and currents to remove the sediment from the settlement substrate. Lirman *et al.* (2003) found sediment depth next to live coral colonies was approximately 1 cm deep and significantly lower than mean sediment depth collected haphazardly on the reef. Sediment deposition threshold criteria have recently been proposed for classifying sediment impacts to reef habitats based on threshold values in peer-reviewed studies and new modeling approaches (Nelson *et al.,* 2016). Nelson *et al.* (2016) suggest that sediment depth greater than 1 cm represents a significant impact to corals, while sediment between 0.5 and 1 cm depth represents a moderate impact, with the ability to recover. Nelson *et al.* (2016) identify sediment depth less than 0.5 cm as posing minimal stress to corals and settlement habitat.

Sediment texture also affects the severity of impacts to corals and recruitment substrate. Fine grain sediments have greater negative effects to live coral tissue and to recruitment substrate (Erftemeijer *et al.,* 2012). Accumulation of sediments is also a major cause of mortality in coral recruits (Fabricius *et al.,* 2003). In some instances, if mortality of coral recruits does not occur under heavy sediment conditions, then settled coral planulae may undergo reverse metamorphosis and die in the water column (Te, 1992). Sedimentation, therefore, impacts the health and survivorship of all life stages (*i.e.,* adults, fragments, larvae, and recruits) of corals, in addition to adversely affecting recruitment habitat.

The literature provides several recommendations on maximum sedimentation rates for coral reefs (*i.e.,* levels that managers should strive to stay under). De'ath and Fabricius (2008) and The Great Barrier Reef Marine Park Authority (2010) recommend that sediment levels on the Great Barrier Reef (GBR) be less than a mean annual sedimentation rate of 3 $mg/cm^2/day$, and less than a daily maximum of 15 $mg/cm^2/day$. Rogers (1990) recommends that sediment levels on coral reefs globally be less than a mean maximum of 10 $mg/cm^2/day$ to maintain healthy corals, and also notes that moderate to severe effects on corals are generally expected at mean maximum sedimentation rates of 10 to 50 $mg/cm^2/day$, and severe to catastrophic effects at >50 $mg/cm^2/day$. Similarly, Erftemeijer *et al.* (2012) suggest that moderate to severe effects to corals are expected at mean maximum sediment levels of >10 $mg/cm^2/day$, and catastrophic effects at >50 $mg/cm^2/day$. Nelson *et al.* (2016) suggest that sediment depths of >0.5 cm result in substantial stress to most coral species, and that sediment depths of >1.0 cm are lethal to most coral species. The above generalizations are for coral reef communities and ecosystems, rather than individual species.

Sublethal effects of sediment to corals potentially occur at much lower levels than mortality. Sublethal effects include reduced growth, lower calcification rates and reduced productivity, bleaching, increased susceptibility to diseases, physical damage to coral tissue and reef structures (breaking, abrasion), and reduced regeneration from tissue damage (see reviews by Fabricius *et al.,* 2005; Erftemeijer *et al.,* 2012; Browne *et al.,* 2015; and Rogers, 1990). Erftemeijer *et al.* (2012) states that sublethal effects for coral species that are sensitive, intermediate, or tolerant to sediment (*i.e.,* most reef-building coral species) occur at mean maximum sedimentation rates of between <10 and 200 mg/cm²/day, depending on species, exposure duration, and other factors.

Artificial substrates and frequently disturbed ''managed areas'' are not essential to coral conservation. Only natural substrates provide the quality and quantity of recruitment habitat necessary for the conservation of threatened corals. Artificial substrates are generally less functional than natural substrates in terms of supporting healthy and diverse coral reef ecosystems (Edwards and Gomez, 2007; USFWS, 2004). Artificial substrates are man-made or introduced substrates that are not naturally occurring to the area. Examples include, but are not necessarily limited to, fixed and floating structures, such as aids-to-navigation (AToNs), jetties, groins, breakwaters, seawalls, wharves, boat ramps, fishpond walls, pipes, wrecks, mooring balls, docks, aquaculture cages, and other artificial structures. The proposed essential feature does not include any artificial substrate. In addition, there are some natural substrates that, because of their consistently disturbed nature, also do not provide the quality of substrate necessary for the conservation of threatened corals. While these areas may provide hard substrate for coral settlement and growth over short periods, the periodic nature of direct human disturbance renders them poor environments for coral growth and survival over time (*e.g.,* they can become covered with sediment). Therefore, they are not essential to the conservation of the species. Specific areas that may contain these disturbed natural substrates are described in the *Specific Areas Containing the Essential Features within the Geographical Area Occupied by the Species* section of this proposed rule.

The substrate characterized previously must be associated with water that also supports all life functions of corals that are carried out at the site. Water quality conditions fluctuate greatly over various spatial and temporal scales in natural reef environments (Kleypas *et al.,* 1999). However, certain levels of particular parameters (*e.g.,* water clarity, water temperature, aragonite saturation) must occur on average to provide the conditions conducive to coral growth, reproduction, and recruitment. Corals may tolerate and survive in conditions outside these levels, depending on the local conditions to which they have acclimatized and the intensity and duration of any deviations from conditions conducive to a particular coral's growth, reproduction and recruitment. Deviations from tolerance levels of certain parameters result in direct negative effects on all life stages.

As described in the Draft Information Report, corals thrive in warm, clear, nutrient-poor marine waters with calcium carbonate concentrations that allow for symbiont photosynthesis, coral physiological processes, and skeleton formation. The water must also have low to no levels of contaminants (*e.g.,* heavy metals, chemicals) that would interfere with normal functions of all life stages. Water quality that supports normal functions of corals is adversely affected by ocean warming, ocean acidification, nutrient enrichment, sedimentation, and contamination.

Temperature is a particularly important limiting factor of coral habitat. Corals occur in a fairly-wide temperature range across geographic locations (15.7 °C–35.5 °C weekly average and 21.7–29.6 °C annual average; Guan *et al.,* 2015), but only thrive in areas with mean temperatures in a fairly-narrow range (typically 25 °C–29 °C) as indicated by the formation of coral reefs (Brainard *et al.,* 2011; Kleypas *et al.,* 1999; Stoddart, 1969; Vaughan, 1919). Short-term exposures (days) to temperature increases of a few degrees (*i.e.,* 3 °C–4 °C increase above climatological mean maximum summer temperature) or long-term exposures (several weeks) to minor temperature increases (*i.e.,* 1 °C–2 °C above mean maximum summer temperature) can cause significant thermal stress and mortality to most coral species (Berkelmans and Willis, 1999; Jokiel and Coles, 1990). In addition to coral bleaching, elevated seawater temperatures impair coral fertilization and settlement (Negri and Heyward, 2000; Nozawa and Harrison, 2007) and cause increases in coral disease (Jones *et al.,* 2004b; Miller *et al.,* 2009). Effects of elevated seawater temperatures are well-studied for reef-building corals, and many approaches have been used to estimate temperature thresholds for coral bleaching and mortality (see reviews by (Baker *et al.,* 2008; Berkelmans, 2002; Brown, 1997; Coles and Brown, 2003; Coles and Riegl; Jokiel, 2004; Jones, 2008)). The tolerance of corals to temperature is species-specific (Barker, 2018; Bruno *et al.,* 2007; Eakin *et al.,* 2010; Heron *et al.,* 2010; Ruzicka *et al.,* 2013; Smith and Buddemeier, 1992; van Woesik *et al.,* 2011; Vega-Rodriguez *et al.,* 2015) and depends on suites of other variables that include acclimation temperature, aragonite saturation state, dissolved inorganic nitrogen (Barker, 2018; Cunning and Baker, 2013; Fabricius, 2005; Wooldridge, 2013); suspended sediments and turbidity (Anthony *et al.;* Devlin-Durante *et al.*); trace metals such as copper (Kwok *et al.,* 2016; Negri and Hoogenboom, 2011; Woods *et al.,* 2016); ultraviolet radiation (Anthony *et al.,* 2007); and salinity, nitrates, and phosphates (Negri and Hoogenboom, 2011), among other physical, physiological, and chemical stressors (Barker, 2018).

Ocean warming is one of the most significant threats to the five ESA-listed Caribbean corals (Brainard *et al.,* 2011). Mean seawater temperatures in reef-building coral habitat in both the Caribbean and Indo-Pacific have increased during the past few decades, and are predicted to continue to rise between now and 2100 (IPCC, 2013). The primary observable coral response to ocean warming is bleaching of adult coral colonies, wherein corals expel their symbiotic zooxanthellae in response to stress (Brown, 1997). For many corals, an episodic increase of only 1 °C–2 °C above the normal local seasonal maximum ocean temperature can induce bleaching (Hoegh-Guldberg *et al.,* 2007; Jones, 2008; Whelan *et al.,* 2007). Corals can withstand mild to moderate bleaching; however, severe, repeated, or prolonged bleaching can lead to colony death (Brown, 1997; Whelan *et al.,* 2007). Increased sea surface temperatures are occurring more frequently and leading to multiple mass bleaching events (Hughes *et al.,* 2017), which are reoccurring too rapidly for coral populations to rebound in between (Hughes *et al.,* 2018).

In addition to coral bleaching, other effects of ocean warming detrimentally affect virtually every life-history stage in reef-building corals. Impaired fertilization and developmental abnormalities (Negri and Heyward, 2000), mortality, and impaired settlement success (Nozawa and Harrison, 2007; Putnam *et al.,* 2008; Randall and Szmant, 2009) have all been documented. Increased seawater temperature also may act synergistically with coral diseases to reduce coral health and survivorship (Bruno and Selig, 2007). Coral disease outbreaks often have either accompanied or immediately followed bleaching events (Brandt and McManus, 2009; Jones *et al.,* 2004a; Lafferty *et al.,* 2004; Miller *et al.,* 2009; Muller *et al.,* 2008). Outbreaks also follow seasonal patterns of high seawater temperatures (Sato *et al.,* 2009; Willis *et al.,* 2004).

Coles and Brown (2003) defined a general bleaching threshold for reef-building corals as increases in seawater temperatures of 1–3 °C above maximum annual mean temperatures at a given location. GBRMPA (2010) defined a general ''trigger value'' for bleaching in reef-building corals as increases in seawater temperatures of no more than 1 °C above maximum annual mean temperatures at a given location. Because duration of exposure to elevated temperatures determines the extent of bleaching, several methods have been developed to integrate duration into bleaching thresholds, including the number of days, weeks, or months of the elevated temperatures (Berkelmans, 2002; Eakin *et al.,* 2009; Goreau and Hayes, 1994; Podesta and Glynn, 1997). NOAA's Coral Reef Watch Program utilizes the Degree Heating Week method (Glynn & D'Croz, 1990; Eakin *et al.* 2009), which defines a general bleaching threshold for reef-building corals as seawater temperatures of 1 °C above maximum monthly mean at a given location for 4 consecutive weeks (*https://coralreefwatch.noaa.gov/*).

These general thresholds were developed for coral reef communities and ecosystems, rather than individual species. Many of these studies are community or ecosystem-focused and do not account for species-specific responses to changes in seawater temperatures, and instead are focused on long-term climatic changes and large-scale impacts (*e.g.,* coral reef distribution, persistence).

In summary, temperature deviations from local averages prevent or impede successful completion of all life history stages of the listed coral species. Identifying temperatures at which the conservation value of habitat for listed corals may be affected is inherently complex and influenced by taxa, exposure duration, and other factors.

Carbonate ions ($CO_3{}^{2-}$) are used by many marine organisms, including corals, to build calcium carbonate skeletons. The mineral form of calcium carbonate used by corals to form their skeletons is aragonite. The more carbonate ions dissolved in seawater, the easier it is for corals to build their aragonite skeletons. The metric used to express the relative availability of calcium and carbonate ions is the aragonite saturation state ($\Omega_{arg}$). Thus, the lower the Ωarg of seawater, the lower the abundance of carbonate ions, and the more energy corals have to expend for skeletal calcification, and vice versa (Cohen and Holcomb, 2009). At saturation states between 1 and 20, marine organisms can create calcium carbonate shells or skeletons using a physiological calcifying mechanism and the expenditure of energy. The aragonite saturation state varies greatly within and across coral reefs and through daily cycles with temperature, salinity, pressure, and localized biological processes such as photosynthesis, respiration, and calcification by marine organisms (Gray *et al.,* 2012; McMahon *et al.,* 2013; Shaw *et al.,* 2012b)). Coral reefs form in an annually-averaged saturation state of 4.0 or greater for optimal calcification, and an annually-averaged saturation state below 3.3 will result in reduced calcification at rates insufficient to maintain net positive reef accretion, resulting in loss of reef structure (Guinotte *et al.,* 2003; Hoegh-Guldberg *et al.,* 2007). Guinotte *et al.* (2003) classified the range of aragonite saturation states between 3.5–4.0 as ''adequate'' and < 3 as ''extremely marginal.'' Thus, aragonite saturation state between 3 and 4 is likely necessary for coral calcification. But, generally, seawater Ωarg should be 3.5 or greater to enable maximum calcification of reef-building corals, and average Ωarg in most coral reef areas is currently in that range (Guinotte *et al.,* 2003). Further, (Kleypas *et al.,* 1999) concluded that a general threshold for Ωarg occurs near 3.4, because only a few reefs occur where saturation is below this level. Guan *et al.* (2015) found that the minimum aragonite saturation observed where coral reefs currently occur is 2.82; however, it is not known if those locations hosted live, accreting corals. These general characterizations and thresholds were identified for coral reef communities and ecosystems, rather than individual species.

Ocean acidification is a term referring to changes in ocean carbonate chemistry, including a drop in the pH of ocean waters, that is occurring in response to the rise in the quantity of atmospheric $CO_2$ and the partial pressure of $CO_2$ ($pCO_2$) absorbed in oceanic waters (Caldeira and Wickett, 2003). As $pCO_2$ rises, oceanic pH declines through the formation of carbonic acid and subsequent reaction with water resulting in an increase of free hydrogen ions. The free hydrogen ions react with carbonate ions to produce bicarbonate, reducing the amount of carbonate ions available, and thus reducing the aragonite saturation state. Ocean acidification is one of the most significant threats to reef-building corals (Brainard *et al.,* 2011; Jokiel, 2015).

A variety of laboratory studies conducted on corals and coral reef organisms (Langdon and Atkinson, 2005) consistently show declines in the rate of coral calcification and growth with rising pCO2, declining pH, and declining carbonate saturation state. Laboratory experiments have also shown that skeletal deposition and initiation of calcification in newly settled corals is reduced by declining aragonite saturation state (Albright *et al.,* 2008; Cohen *et al.,* 2009). Field studies from a variety of coral locations in the Caribbean, Indo-Pacific, and Red Sea have shown a decline in linear extension rates of coral skeleton under decreasing aragonite saturation state (Bak *et al.,* 2009; De'ath *et al.,* 2009; Schneider and Erez, 2006; Tanzil *et al.,* 2009). In addition to effects on growth and calcification, recent laboratory experiments have shown that increased $CO_2$ also substantially impairs fertilization and settlement success in *Acropora palmata* (Albright *et al.,* 2010). Reduced calcification and slower growth will mean slower recovery from breakage, whether natural (hurricanes and storms) or human (breakage from vessel groundings, anchors, fishing gear, etc.), or mortality from a variety of disturbances. Slower growth also implies even higher rates of mortality for newly settled corals due to the longer time it will take to reach a colony size that is no longer vulnerable to overgrowth competition, sediment smothering, and incidental predation. Reduced calcification and slower growth means more time to reach reproductive size and reduces sexual and asexual reproductive potential. Increased $pCO_2$ coupled with increased sea surface temperature can lead to even lower rates of calcification, as found in the meta-analysis by Kornder *et al.* (2018).

In summary, aragonite saturation reductions prevent or impede successful completion of all life history stages of the listed coral species. Identifying the declining aragonite saturation state at which the conservation value of habitat for listed corals may be affected is inherently complex and influenced by taxa, exposure duration, acclimatization to localized nutrient regimes, and other factors.

Nitrogen and phosphorous are two of the main nutrients that affect the suitability of the water column in coral reef habitats (Fabricius *et al.,* 2005; Fabricius, 2005). These two nutrients occur as different compounds in coral reef habitats and are necessary in low levels for normal reef function. Dissolved inorganic nitrogen and dissolved inorganic phosphorus in the forms of nitrate ($NO_3{}^-$) and phosphate ($PO_4{}^{3-}$) are particularly important for photosynthesis, with dissolved organic nitrogen also providing an important source of nitrogen, and are the dominant forms of nitrogen and phosphorous in coral reef waters. Nutrients are a major component of land-based sources of pollution (LBSP), which is one of the most significant threats to reef-building corals (Brainard *et al.,* 2011). Excessive nutrients affect corals through two main mechanisms: Direct impacts on coral physiology, such as reduced fertilization and growth (Harrison and Ward, 2001; Ferrier-Pages *et al.,* 2000), and indirect effects through nutrient-stimulation of other community components (*e.g.,* macroalgae seaweeds, turfs/filamentous algae, cyanobacteria, and filter feeders) that compete with corals for space on the reef (79 FR 53851, September 10, 2014). As discussed previously, the latter also affects the quality of recruitment substrate. The physiological response a coral exhibits to an increase in nutrients mainly depends on concentration and duration. A short duration of a high increase in a nutrient may result in a severe adverse response, just as a chronic, lower concentration might. Increased nutrients can result in adverse responses in all life stages and affect most physiological processes, resulting in reduced number and size of gametes (Ward and Harrison, 2000), reduced fertilization (Harrison and Ward, 2001), reduced growth, mortality (Ferrier-Pages *et al.,* 2000; Koop *et al.,* 2001), increased disease progression (Vega Thurber *et al.,* 2013; Voss and Richardson, 2006), tissue loss (Bruno *et al.,* 2003), and bleaching (Kuntz *et al.,* 2005; Wiedenmann *et al.,* 2012).

Most coral reefs occur where annual mean nutrient levels are low. Kleypas *et al.* (1999) analyzed dissolved nutrient data from nearly 1,000 coral reef sites, finding mean values of 0.25 micromoles per liter (µmol/l) for $NO_3$, and 0.13 µmol/l for $PO_4$. Over 90 percent of the sites had mean $NO_3$ values of <0.6 µmol/l, and mean $PO_4$ values of <0.2 µmol/l (Kleypas *et al.,* 1999). Several authors, including Bell and Elmetri (1995) and Lapointe (1997) have proposed threshold values of 1.0 µmol/l for $NO_3$, and 0.1–0.2 µmol/l for $PO_4$, beyond which reefs are assumed to be eutrophic. However, concentrations of dissolved nutrients are poor indicators of coral reef status, and the concept of a simple threshold concentration that indicates eutrophication has little validity (McCook, 1999). One reason for that is because corals are exposed to nutrients in a variety of forms, including dissolved nitrogen (*e.g.,* $NO_3$), dissolved phosphorus (*e.g.,* $PO4_3$), particulate nitrogen (PN), and particulate phosphate (PP). Since the dissolved forms are assimilated rapidly by phytoplankton, and the majority of nitrogen and phosphorus discharged in terrestrial runoff is in the particulate forms, PN and PP are the most common bio-available forms of nutrients for corals on coastal zone reefs (Cooper *et al.,* 2008). De'ath and Fabricius (2008) and GBRMPA (2010) provide general recommendations on maximum annual mean values for PN and PP of 1.5 µmol/l PN and 0.09 µmol/l PP for coastal zone reefs. These generalizations are for coral reef communities and ecosystems, rather than individual species.

As noted above, identifying nutrient concentrations at which the conservation value of habitat for listed corals may be affected is inherently complex and influenced by taxa, exposure duration, and acclimatization to localized nutrient regimes, and other factors.

Water clarity or transparency is a key factor for marine ecosystems and it is the best explanatory variable for a range of bioindicators of reef health (Fabricius *et al.,* 2012). Water clarity affects the light availability for photosynthetic organisms and food availability for filter feeders. Corals depend upon their symbiotic algae for nutrition and thus depend on light availability for algal photosynthesis. Reduced water clarity is determined by the presence of particles of sediment, organic matter, and/or plankton in the water, and so is often associated with elevated sedimentation and/or nutrients. Water clarity can be measured in multiple ways, including percent of solar irradiance at depth, Secchi depth (the depth in the water column at which a black and white disk is no longer visible), and Nephelometric Turbidity Unit (NTU) (measure of light scatter based on particles in the water column). Reef-building corals naturally occur across a broad range of water clarity levels from very turbid waters on enclosed reefs near river mouths (Browne *et al.,* 2012) to very clear waters on offshore barrier reefs, and many intermediate habitats such as open coastal and mid-shelf reefs (GBRMPA, 2010). Coral reefs appear to thrive in extremely clear areas where Secchi depth is ≥ 15 m or light scatter is < 1 NTU (De'ath and Fabricius, 2010). Typical levels of total suspended solids (TSS) in reef environments are less than 10 mg/L (Rogers, 1990). The minimum light level for reef development is about 6–8 percent of surface irradiance (Fabricius *et al.,* 2014).

For a particular coral colony, tolerated water clarity levels likely depend on several factors, including species, life history stage, spatial variability, and temporal variability. For example, colonies of a species occurring on fringing reefs around high volcanic islands with extensive groundwater inputs are likely to be better acclimatized or adapted to higher turbidity than colonies of the same species occurring on offshore barrier reefs or around atolls with very little or no groundwater inputs. In some cases, corals occupy naturally turbid habitats (Anthony and Larcombe, 2000; McClanahan and Obura, 1997; Te, 2001) where they may benefit from the reduced amount of UV radiation to which they are exposed (Zepp *et al.,* 2008). As turbidity and nutrients increase, thus decreasing water clarity, reef community composition shifts from coral-dominated to macroalgae-dominated, and ultimately to heterotrophic animals (Fabricius *et al.,* 2012). Light penetration is diminished by suspended abiotic and biotic particulate matter (esp. clay and silt-sized particles) and some dissolved substances (Fabricius *et al.,* 2014). The availability of light decreases directly as a function of particle concentration and water depth, but also depends on the nature of the suspended particles. Fine clays and organic particles are easily suspended from the sea floor, reducing light for prolonged periods, while undergoing cycles of deposition and resuspension. Suspended fine particles also carry nutrients and other contaminants (Fabricius *et al.,* 2013). Increased nutrient runoff into semi-enclosed seas accelerates phytoplankton production to the point that it also increases turbidity and reduces light penetration, and can also settle on colony surfaces (Fabricius, 2005). In areas of nutrient enrichment, light for benthic organisms can be additionally severely reduced by dense stands of large fleshy macroalgae shading adjacent corals (Fabricius, 2005).

The literature provides several recommendations on maximum turbidity levels for coral reefs (*i.e.,* levels that managers should strive to stay under). GBRMPA (2010) recommends minimum mean annual water clarity, or ''trigger values'', in Secchi distances for the GBR depending on habitat type: For enclosed coastal reefs, 1.0–1.5 m; for open coastal reefs and mid-shelf reefs, 10 m; and for offshore reefs, 17 m. De'ath and Fabricius (2008) recommend a minimum mean annual water clarity trigger value in Secchi distance averaged across all GBR habitats of 10 m. Bell and Elmetri (1995) recommend a maximum value of 3.3 mg/L TSS across all GBR habitats. Thomas *et al.* (2003) recommend a maximum value of 10 mg/L averaged across all Papua New Guinea coral reef habitats. Larcombe *et al.* (2001) recommend a maximum value of 40 mg/L TSS for GBR ''marginal reefs'', *i.e.,* reefs close to shore with high natural turbidity levels. Guan *et al.* (2015) recommend a minimum light intensity (μmol photons second/m²) of 450 μmol photons second/m² globally for coral reefs. The above generalizations are for coral reef communities and ecosystems, rather than individual species.

A coral's response to a reduction in water clarity is dependent on the intensity and duration of the particular conditions. For example, corals exhibited partial mortality when exposed to 476 mg/L TSS (Bengtsson *et al.,* 1996) for 96 hours, but had total mortality when exposed to 1000 mg/L TSS for 65 hours (Thompson and Bright, 1980). Depending on the duration of exposure, most coral species exhibited sublethal effects when exposed to turbidity levels between 7 and 40 NTU (Erftemeijer *et al.,* 2012). The most tolerant coral species exhibited decreased growth rates when exposed to 165 mg/L TSS for 10 days (Rice and Hunter, 1992). By reducing water clarity, turbidity also reduces the maximum depth at which corals can live, making deeper habitat unsuitable (Fabricius, 2005). Existing data suggest that coral reproduction and settlement are more highly sensitive to changes in water clarity than adult survival, and these functions are dependent on clear water. Suspended particulate matter reduces fertilization and sperm function (Ricardo *et al.,* 2015), and strongly inhibits larvae survival, settlement, recruitment, and juvenile survival (Fabricius, 2005).

In summary, water clarity deviations from local averages prevent or impede successful completion of all life history stages of the listed coral species. Identifying turbidity levels at which the conservation value of habitat for listed corals may be affected is inherently complex and influenced by taxa, exposure duration, and acclimatization to localized nutrient regimes, and other factors.

The water column may include levels of anthropogenically-introduced chemical contaminants that prevent or impede successful completion of all life history stages of the listed coral species. For the purposes of this rule, ''contaminants'' is a collective term to describe a suite of anthropogenically-introduced chemical substances in water or sediments that may adversely affect corals. The study of the effects of contaminants on corals is a relatively new field and information on sources and ecotoxicology is incomplete. The major groups of contaminants that have been studied for effects to corals include heavy metals (also called trace metals), pesticides, and hydrocarbons. Other organic contaminants, such as chemicals in personal care products, polychlorinated biphenyl, and surfactants, have also been studied. Contaminants may be delivered to coral reefs via point or non-point sources. Specifically, contaminants enter the marine environment through wastewater discharge, shipping, industrial activities, and agricultural and urban runoff. These contaminants can cause negative effects to coral reproduction, development, growth, photosynthesis, and survival.

Heavy metals (*e.g.,* copper, cadmium, manganese, nickel, cobalt, lead, zinc, and iron) can be toxic at concentrations above naturally-occurring levels. Heavy metals are persistent in the environment and can bioaccumulate. Metals are adsorbed to sediment particles, which can result in their long distance transport away from sources of pollution. Corals incorporate metals in their skeleton and accumulate them in their soft tissue (Al-Rousan *et al.,* 2012; Barakat *et al.,* 2015). Although heavy metals can occur in the marine environment from natural processes, in nearshore waters they are mostly a result of anthropogenic sources (*e.g.,* wastewater, antifouling and anticorrosive paints from marine vessels and structures, land filling and dredging for coastal expansion, maritime activities, inorganic and organic pollutants, crude oil pollution, shipping processes, industrial discharge, agricultural activities), and are found near cities, ports, and industrial developments.

The effects of copper on corals include physiological impairment, impaired photosynthesis, bleaching, reduced growth, and DNA damage (Bielmyer *et al.,* 2010; Schwarz *et al.,* 2013). Adverse effects to fertilization, larval development, larval swimming behavior, metamorphosis, and larval survival have also been documented (Kwok and Ang, 2013; Negri and Hoogenboom, 2011; Puisay *et al.,* 2015; Reichelt-Brushett and Hudspith, 2016; Rumbold and Snedaker, 1997). Toxicity of copper was found to be higher when temperatures are elevated (Negri and Hoogenboom, 2011). Nickel and cobalt can also have negative effects on corals, such as reduced growth and photosynthetic rates (Biscere *et al.,* 2015), and reduced fertilization success (Reichelt-Brushett and Hudspith, 2016). Chronic exposure of corals to higher levels of iron may significantly reduce growth rates (Ferrier-Pages *et al.,* 2001). Further, iron chloride has been found to cause oxidative DNA damage to coral larvae (Vijayavel *et al.,* 2012).

Polycyclic aromatic hydrocarbons (PAHs) are found in fossil fuels such as oil and coal and can be produced by the incomplete combustion of organic matter. PAHs disperse through non-point sources such as road run-off, sewage, and deposition of particulate air pollution. PAHs can also disperse from point sources such as oil spills and industrial sites. Studies have found adverse effects of oil pollution on corals that include growth impairments, mucus production, and decreased reproduction, especially at increased temperature (Kegler *et al.,* 2015). Hydrocarbons have also been found to affect early life stages of corals. Oil-contaminated seawater reduced settlement of *O. faveolata* and of *Agaricia humilis* and was more severe than any direct or latent effects on survival (Hartmann *et al.,* 2015). Natural gas (water accommodated fraction) exposure resulted in abortion of larvae during early embryogenesis and early release of larvae during late embryogenesis, with higher concentrations of natural gas yielding higher adverse effects (Villanueva *et al.,* 2011). Exposure to oil, dispersants, and a combination of oil and dispersant significantly decreased settlement and survival of *Porites astreoides* and *Orbicella faveolata* larvae (Goodbody-Gringley *et al.,* 2013).

Anthracene (a PAH that is used in dyes, wood preservatives, insecticides, and coating materials) exposure to apparently healthy fragments and diseased fragments (Caribbean yellow band disease) of *O. faveolata* reduced activity of enzymes important for protection against environmental stressors in the diseased colonies (Montilla *et al.,* 2016). The results indicated that diseased tissues might be more vulnerable to exposure to PAHs such as anthracene compared to healthy corals. PAH concentrations similar to those present after an oil spill inhibited metamorphosis of *Acropora tenuis* larvae, and sensitivity increased when larvae were co-exposed to PAHs and ''shallow reef'' ultraviolet (UV) light levels (Negri *et al.,* 2016).

Pesticides include herbicides, insecticides, and antifoulants used on vessels and other marine structures. Pesticides can affect non-target marine organisms like corals and their zooxanthellae. Diuron, an herbicide, decreased photosynthesis in zooxanthellae that had been isolated from the coral host and grown in culture (Shaw *et al.,* 2012a). Irgarol, an additive in copper-based antifouling paints, significantly reduced settlement in

*Porites hawaiiensis* (Knutson *et al.,* 2012). *Porites astreoides* larvae exposed to two major mosquito pesticide ingredients, naled and permethrin, for 18–24 hours showed differential responses. Concentrations of 2.96 μg/L or greater of naled significantly reduced larval survivorship, while exposure of up to 6.0 μg/L of permethrin did not result in reduced larval survivorship. Larval settlement, post-settlement survival, and zooxanthellae density were not impacted by any treatment (Ross *et al.,* 2015).

Benzophenone-2 (BP–2) is a chemical additive to personal care products (*e.g.,* sunscreen, shampoo, body lotions, soap, detergents), product coatings (oil-based paints, polyurethanes), acrylic adhesives, and plastics that protects against damage from UV light. It is released into the ocean through municipal and boat/ship wastewater discharges, landfill leachates, residential septic fields, and unmanaged cesspits (Downs *et al.,* 2014). BP–2 is a known endocrine disruptor and a DNA mutagen, and its effects are worse in the light. It caused deformation of scleractinian coral *Stylophora pistillata* larvae, changing them from a motile planktonic state to a deformed sessile condition at low concentrations (Downs *et al.,* 2014). It also caused increasing larval bleaching with increasing concentration (Downs *et al.,* 2014). Benzophenone-3 (BP–3; oxybenzone) is an ingredient in sunscreen and personal care products (*e.g.,* hair cleaning and styling products, cosmetics, insect repellent, soaps) that protects against damage from UV light. It enters the marine environment through swimmers and municipal, residential, and boat/ship wastewater discharges and can cause DNA mutations. Oxybenzone is a skeletal endocrine disruptor, and it caused larvae of *S. pistillata* to encase themselves in their own skeleton (Downs *et al.,* 2016). Exposure to oxybenzone transformed *S. pistillata* larvae from a motile state to a deformed, sessile condition (Downs *et al.,* 2016). Larvae exhibited an increasing rate of coral bleaching in response to increasing concentrations of oxybenzone (Downs *et al.,* 2016).

Polychlorinated biphenyls (PCBs) are environmentally stable, persistent organic contaminants that have been used as heat exchange fluids in electrical transformers and capacitors and as additives in paint, carbonless copy paper, and plastics. They can be transported globally through the atmosphere, water, and food chains. A study of the effects of the PCB, Aroclor 1254, on the *Stylophora pistillata* found no effects on coral survival, photosynthesis, or growth; however, the exposure concentration and duration may alter the expression of certain genes involved in various important cellular functions (Chen *et al.,* 2012).

Surfactants are used as detergents and soaps, wetting agents, emulsifiers, foaming agents, and dispersants. Linear alkylbenzene sulfonate (LAS) is one of the most common surfactants in use. Biodegradation of surfactants can occur within a few hours up to several days, but significant proportions of surfactants attach to suspended solids and remain in the environment. This sorption of surfactants onto suspended solids depends on environmental factors such as temperature, salinity, or pH. Exposure of *Pocillopora verrucosa* to LAS resulted in tissue loss on fragments (Kegler *et al.,* 2015). The combined effects of LAS exposure with increased temperature (+3 °C, from 28 to 31 °C) resulted in greater tissue loss than LAS exposure alone (Kegler *et al.,* 2015).

In summary, there are multiple chemical contaminants that prevent or impede successful completion of all life history stages of the listed coral species. Identifying contaminant levels at which the conservation value of habitat for listed corals may be affected is inherently complex and influenced by taxa, exposure duration, and other factors.

As described above, the best-available information shows coral reefs form on solid substrate but only within a narrow range of water column conditions that on average allow the deposition rates of corals to exceed the rates of physical, chemical, and biological erosion (*i.e.,* conducive conditions, Brainard *et al.,* 2005). However, as with all ecosystems, water column conditions are dynamic and vary over space and time. Therefore, we also describe environmental conditions in which coral reefs currently exist globally, thus indicating the conditions that may be tolerated by corals and allow at least for survival. To the extent tolerance conditions deviate in duration and intensity from conducive conditions, they may not support coral reproduction and recruitment, and reef growth, and thus would impair recovery of the species. Further, annually and spatially averaged-tolerance ranges provide the limits of the environmental conditions in which coral reefs exist globally (Guan *et al.,* 2015), but these conditions do not necessarily represent the conditions that may be tolerated by individual coral species. Individual species may or may not be able to withstand conditions within or exceeding the globally-averaged tolerance ranges for coral reefs, depending on the individual species' biology, local average conditions to which the species are acclimatized, and intensity and duration of exposure to adverse conditions. In other words, changes in the water column parameters discussed above that exceed the tolerance ranges may induce adverse effects in a particular species. Thus, the concept of individual species' tolerance limits is a different aspect of water quality conditions compared to conditions that are conducive for formation and growth of reef structures.

These values presented in the summaries above constitute the best available information at the time of this rulemaking. It is possible that future scientific research will identify species-specific values for some of these parameters that become more applicable to the five listed coral species, though it is also possible that future species-specific research will document that conducive or tolerance ranges for the five Caribbean corals fall within these ranges. Because the ESA requires us to use the best scientific information available in conducting consultations under section 7, we will incorporate any such new scientific information into consultations when evaluating potential impacts to the critical habitat.

*Need for Special Management Considerations or Protection*

Specific areas within the geographical area occupied by a species may be designated as critical habitat only if they contain essential features that may require special management considerations or protection (16 U.S.C. 1532(5)(A)(i)(II). Special management considerations or protection are any methods or procedures useful in protecting physical or biological features for the conservation of listed species (50 CFR 424.02).

The proposed essential feature is particularly susceptible to impacts from human activity because of the relatively shallow water depth range (less than 295 ft (90 m)) the corals inhabit. The proximity of this habitat to coastal areas subjects this feature to impacts from multiple activities, including, but not limited to, coastal and in-water construction, dredging and disposal activities, beach nourishment, stormwater run-off, wastewater and sewage outflow discharges, point and non-point source discharges of contaminants, and fishery management. Further, the global oceans are being impacted by climate change from greenhouse gas emissions, particularly the tropical oceans in which the Caribbean corals occur (van Hooidonk *et al.,* 2014). The impacts from these activities, combined with those from natural factors (*e.g.,* major storm events), significantly affect habitat for all life stages for these threatened corals. We conclude that the essential feature is currently and will likely continue to be negatively impacted by some or all of these factors.

Greenhouse gas emissions (*e.g.,* fossil fuel combustion) lead to global climate change and ocean acidification. These activities adversely affect the essential feature by increasing sea surface temperature and decreasing the aragonite saturation state. Coastal and in-water construction, channel dredging, and beach nourishment activities can directly remove the essential feature by dredging it or by depositing sediments on it, making it unavailable for settlement and recruitment of coral larvae or fragments. These same activities can impact the essential feature by creating turbidity during operations. Stormwater run-off, wastewater and sewage outflow discharges, and point and non-point source contaminant discharges can adversely impact the essential feature by allowing nutrients and sediments, as well as contaminants, from point and non-point sources, including sewage, stormwater and agricultural runoff, river discharge, and groundwater, to alter the natural levels in the water column. The same activities can also adversely affect the essential feature by increasing the growth rates of macroalgae, allowing them to preempt available recruitment habitat. Fishery management can adversely affect the essential feature if it allows for the reduction in the number of herbivorous fishes available to control the growth of macroalgae on the substrate.

Given these ongoing threats throughout the corals' habitat, we find that the essential feature may require special management considerations.

*Specific Areas Containing the Essential Features Within the Geographical Area Occupied by the Species*

The definition of critical habitat requires us to identify specific areas on which are found the physical or biological features essential to the species' conservation that may require special management considerations or protection. Our regulations state that critical habitat will be shown on a map, with more-detailed information discussed in the preamble of the rulemaking documents in the **Federal Register**, which will reference each area by the State, county, or other local governmental unit in which it is located (50 CFR 424.12(c)). Our regulations also state that when several habitats, each satisfying requirements for designation as critical habitat, are located in proximity to one another, an inclusive area may be designated as critical habitat (50 CFR 424.12(d)).

Within the geographical areas occupied by each of the five corals in U.S. waters, at the time of listing, there are five or six broad areas in which the essential feature occurs. For each of the five corals, boundaries of specific areas were determined by each coral's commonly occupied minimum and maximum depth ranges within each coral's specific geographic distribution. Across all five coral species, a total of 28 specific areas were identified as being under consideration for critical habitat designation. There are five or six specific areas per species, depending on whether it occurs in FGB; one each in Florida, Puerto Rico, St. Thomas and St. John, USVI, St. Croix, USVI, FGB, and Navassa Island. Within each of these areas, the individual species' specific areas are largely-overlapping. For example, in Puerto Rico, there are five largely-overlapping specific areas, one for each species, that surround each of the islands. The difference between each of the areas is the particular depth contours that were used to create the boundaries. For example, *Dendrogyra cylindrus'* specific area in Puerto Rico extends from the 1-m contour to the 25-m contour, which mostly overlaps the *Orbicella annularis* specific area that extends from the 0.5-m contour to the 20-m contour. Overlaying all of the specific areas for each species results in the maximum geographic extent of the areas under consideration for designation, which covers 0.5–90 m (1.6 to 295-ft) water depth around all the islands of Puerto Rico, USVI, and Navassa, FGB, and from St. Lucie Inlet, Martin County to Dry Tortugas, Florida.

To these specific areas, we reviewed available species occurrence, bathymetric, substrate, and water quality data. We used the highest resolution bathymetric data available from multiple sources depending on the geographic location. In Florida and the FGB, we used contours created from National Ocean Service Hydrographic Survey Data and NOAA ENCDirect bathymetric point data (NPS) and contours created from NOAA's Coastal Relief Model. In Puerto Rico, contours were derived from the National Geophysical Data Center's (NGDC) 2005 U.S. Coastal Relief Model. In USVI, we used contours derived from NOAA's 2004–2015 Bathymetric Compilation. In Navassa, contours were derived from NOAA's NGDC 2006 bathymetric data. These bathymetric data (*i.e.,* depth contours) were used with other geographic or management boundaries to draw the boundaries of each specific area on the maps in the proposed critical habitat designations.

Within the areas bounded by depth and species occurrence, we evaluated available data on the essential feature. For substrate, we used information from the NCCOS Benthic Habitat Mapping program that provides data and maps at *http://products.coastalscience.noaa.gov/collections/benthic/default.aspx* and the Unified Florida Reef Tract Map found at *https://myfwc.com/research/gis/regional-projects/unified-reef-map/.* Using GIS software, we extracted all habitat classifications that could be considered potential recruitment habitat, including hardbottom and coral reef. The benthic habitat information assisted in identifying any major gaps in the distribution of the substrate essential feature. The data show that hard substrate is unevenly distributed throughout the ranges of the species. However, there are large areas where benthic habitat characterization data are still lacking, particularly deeper than 30 m (99 ft). Therefore, we made assumptions that the substrate feature does exist in those areas, though in unknown quantities, because the species occur there. The available data also represent a snapshot in time, while the exact location of the habitat feature may change over time (*e.g.,* natural sediment movement covering or exposing hard substrate).

There are areas within the geographical and depth ranges of the species that contain natural hard substrates that, due to their consistently disturbed nature, do not provide the quality of substrate essential for the conservation of threatened corals. These disturbances may be naturally occurring or caused by human activities. While these areas may provide hard substrate for coral settlement and growth over short periods, the periodic nature of direct human disturbance renders them poor habitat for coral growth and survival over time. These ''managed areas,'' for the purposes of this proposed rule, are specific areas where the substrate has been persistently disturbed by planned management activities authorized by local, state, or Federal governmental entities at the time of critical habitat designation, and expectations are that the areas will continue to be periodically disturbed by such management activities. Examples include, but are not necessarily limited to, dredged navigation channels, vessel berths, and active anchorages. These managed areas are not under consideration for critical habitat designation.

NMFS is aware that dredging may result in sedimentation impacts beyond the actual dredge channel. To the extent that these impacts are persistent, are expected to recur whenever the channel is dredged and are of such a level that the areas in question have already been made unsuitable for coral, then NMFS expects that the federal action agency can assess and identify such areas during their pre-dredging planning and provide their rationale and information supporting this conclusion. To the extent that the federal action agency does so, NMFS proposes that these persistently impacted areas be considered part of the managed areas and excluded from critical habitat.

GIS data of the locations of some managed areas were available and extracted from the maps of the specific areas being considered for critical habitat designation. These data were not available for every managed area; however, regardless of whether the managed area is extracted from the maps depicting the specific areas being proposed as critical habitat, no managed areas are part of the specific areas that contain the essential feature.

The nearshore surf zones of Martin, Palm Beach, Broward, and Miami-Dade Counties are also consistently disturbed by naturally-high sediment movement, suspension, and deposition levels. Hard substrate areas found within these nearshore surf zones are ephemeral in nature and are frequently covered by sand, and the threatened coral species have never been observed there. Thus, this area (water in depths from 0 ft to 6.5 ft [0 m to 2 m] offshore St. Lucie Inlet to Government Cut) does not contain the essential feature and is not considered part of the specific areas under consideration for critical habitat. The shallow depth limit (*i.e.,* inshore boundary) was identified based on the lack of these or any reef building corals occurring in this zone, indicating conditions are not suitable for their settlement and recruitment into the population. These conditions do not exist in the area south of Government Cut, nor in the nearshore zones around the islands of Puerto Rico and the U.S. Virgin Islands. In these areas the hydrodynamics allow for the growth of some (*e.g., Orbicella* spp.) of the threatened coral in the shallow depths.

Due to the ephemeral nature of conditions within the water column and the various scales at which water quality data are collected, this aspect of the essential feature is difficult to map at fine spatial or temporal scales. However, annually-averaged plots of temperature, aragonite saturation, nitrate, phosphate, and light, at relatively large spatial scale (*e.g.,* 1° X 1° grid) are available from Guan *et al.* (2015), using 2009 data for some parameters, and updated with newer data from the World Ocean Atlas (2013) for temperature and nutrients. Those maps indicate that conditions that support coral reef growth, and thus coral demographic functions, occur throughout the specific areas under consideration.

Based on the available data, we identified 28 mostly-overlapping specific areas that contain the essential feature. The units can generally be grouped as the: (1) Florida units, (2) Puerto Rico units, (3) St. Thomas/St. John units (STT/STJ), (4) St. Croix units, (5) Navassa units, and (6) FGB units. Within each group of units, each species has its own unique unit that is specific to its geographic and depth distributions. Therefore, within a group there are five mostly-overlapping units—one for each species. The exception is that there are only three completely-overlapping units in the FGB group, because only the three species of *Orbicella* occur there. The essential feature is unevenly distributed throughout these 28 specific areas. Within these areas there exists a mosaic of habitats at relatively small spatial scales, some of which naturally contain the essential features (*e.g.,* coral reefs) and some of which do not (*e.g.,* seagrass beds). Further, within these large areas, specific managed areas and naturally disturbed areas, as described above, also exist. Due to the spatial scale at which the essential feature exists interspersed with these other habitats and disturbed areas, we are not able to more discretely delineate the specific areas under consideration for critical habitat designation.

*Unoccupied Critical Habitat Areas*

ESA section 3(5)(A)(ii) defines critical habitat to include specific areas outside the geographical area occupied by the species at the time of listing if the areas are determined by the Secretary to be essential for the conservation of the species. Our regulations at 50 CFR 424.12(b)(2) further explain that unoccupied areas shall only be designated after determining that occupied areas are inadequate to ensure the conservation of the species, and the unoccupied areas are reasonably certain to contribute to the conservation of the species and contain one or more essential feature.

The threats to these five corals are generally the same threats affecting coral reefs throughout the world (climate change, fishing, and land-based sources of pollution) and are fully described in the final listing rule (79 FR 53852, September 10, 2014). Specifically, ocean warming, disease, and ocean acidification are the three most significant threats that will impact the potential for recovery of all the listed coral species. Because the primary threats are global in nature, adapting to changing conditions will be critical to the species' conservation and recovery.

We issued guidance in June 2016 on the treatment of climate change uncertainty in ESA decisions, which addresses critical habitat specifically (*https://www.fisheries.noaa.gov/national/endangered-species-conservation/endangered-species-act-guidance-policies-and-regulations*). The guidance states that, when designating critical habitat, NMFS will consider proactive designation of unoccupied habitat as critical habitat when there are adequate data to support a reasonable inference that the habitat is essential for the conservation of the species because of the function(s) it is likely to serve as climate changes. Further, we will only consider unoccupied areas to be essential where a critical habitat designation limited to geographical areas occupied would be inadequate to ensure the conservation of the species (50 CFR 424.12(b)(2). We specifically address this consideration for threatened Caribbean corals in this section.

All five corals occur in the Caribbean, an area predicted to have more rapid and severe impacts from climate change (van Hooidonk *et al.,* 2014). Shifting into previously unoccupied habitats that become more suitable as other parts of their range become less suitable may be a strategy these corals employ in the future to adapt to changing conditions. However, due to the nature of the Caribbean basin, there is little opportunity for range expansion. The only area of potential expansion is north up the Florida coast. Several of the five coral species have different northern limits to their current range, with *Orbicella faveolata*'s limit at St. Lucie Inlet, Martin County, Florida, being the farthest north and at the limit of coral reef formation in Florida for these species. A northern range expansion along Florida's coast beyond this limit is unlikely due to lack of evidence of historical reef growth under warmer climates. Further, northern expansion is inhibited by hydrographic conditions (Walker and Gilliam, 2013). The other corals could theoretically expand into the area between their current northern extents to the limit of reef formation. However, temperature is not likely the factor limiting occupation of those areas, given the presence of other reef-building corals. Thus, there are likely other non-climate-related factors limiting the northern extent of the corals' ranges.

Because the extent of the proposed critical habitat designations is the entire occupied areas of the species, we believe that the designations are adequate to provide for the conservation of the five corals. Further, no unoccupied areas exist that would add to the conservation of the five corals. Therefore, we are not considering any unoccupied areas for designation of critical habitat for the five corals.

**Application of ESA Section 4(a)(3)(B)(i) (Military Lands)**

Section 4(a)(3)(B)(i) of the ESA prohibits designating as critical habitat any lands or other geographical areas owned or controlled by the Department of Defense (DoD), or designated for its use, that are subject to an Integrated Natural Resources Management Plan (INRMP) prepared under section 101 of the Sikes Act (16 U.S.C. 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation. Our regulations at 50 CFR 424.12(h) provide that, in determining whether an applicable benefit is provided, we will consider:

(1) The extent of the area and features present;

(2) The type and frequency of use of the area by the species;

(3) The relevant elements of the INRMP in terms of management objectives, activities covered, and best management practices, and the certainty that the relevant elements will be implemented; and

(4) The degree to which the relevant elements of the INRMP will protect the habitat from the types of effects that would be addressed through a destruction-or-adverse-modification analysis.

Naval Air Station Key West (NASKW) is the only installation controlled by the DoD, specifically the Department of the Navy (Navy), that coincides with any of the areas under consideration for critical habitat. On September 21, 2015, the Navy requested in writing that the areas covered by the 2014 INRMP for NASKW not be designated as critical habitat, pursuant to ESA section 4(a)(3)(B)(i), and provided the INRMP for our review.

The NASKW INRMP covers the lands and waters—generally out to 50 yards (45.7 m)—adjacent to NASKW, including several designated restricted areas (see INRMP figures C–1 through C–14). The total area of the waters covered by the INRMP that overlaps with areas considered for the proposed critical habitat is approximately 800 acres. Within this area, four of the threatened corals (*D. cylindrus, O. annularis, O. faveolata, and O. franksi*) and the proposed essential feature are present in densities and proportions similar to those throughout the rest of the nearshore habitat in the Florida Keys. The species use this area in the same way that they do all areas proposed for critical habitat—to carry out all life functions. As detailed in Chapter 4 and Appendix C of the INRMP, the plan provides benefits to the threatened corals and existing *Acropora* critical habitat through the following NASKW broad programs and activities: (1) Erosion control—which will prevent sediments from entering into the water; (2) Boca Chica Clean Marina Designation—which eliminates or significantly reduces the release of nutrients and contaminants; (3) stormwater quality improvements—which prevent or reduce the amount of nutrients, sediments, and contaminants; and (4) wastewater treatment—which reduces the release of nutrients and contaminants consistent with Florida Surface Water Quality Standards. Within these categories, there are 15 specific management activities and projects that provide benefit to the corals and their habitat (see Table 4–2 of the INRMP). These types of best management practices have been ongoing at NASKW since 1983; thus, they are likely to continue into the future. Further, the plan specifically provides assurances that all NASKW staff have the authority and funding (subject to appropriations) to implement the plan. The plan also provides assurances that the conservation efforts will be effective through annual reviews conducted by state and Federal natural resource agencies. These activities provide a benefit to the species and the identified essential feature in the proposed critical habitat designations by reducing sediment and nutrient discharges into nearshore waters, which addresses some of the particular conservation and protection needs that critical habitat would afford. These activities are similar to those that we describe below as project modifications for avoiding or reducing adverse effects to the proposed critical habitat. Therefore, were we to consult on the activities in the INRMP that may affect the proposed critical habitat, we would likely not require any project modifications based on best management practices in the INRMP. Further, the INRMP includes provisions for monitoring and evaluating conservation effectiveness, which will ensure continued benefits to the species. Annual reviews of the INRMP for 2011–2015 found that the INRMP executions, including actions that minimize or eliminate land-based sources of pollution, ''satisfied'' or ''more than satisfied'' conservation objectives. We believe the NASKW INRMP provides the types of benefits to the threatened corals described in our regulations (50 CFR 424.12(h)).

Four (*D. cylindrus, O. annularis, O. faveolata, and O. franksi*) of the five corals' specific areas overlap with NASKW, based on the depth in which the species occur and the distance from shore covered by NASKW's INRMP. Therefore, pursuant to section 4(a)(3)(B)(i) of the ESA, we determined that the INRMP provides a benefit to those threatened corals, and we are not designating critical habitat within the boundaries covered by the INRMP.

**Application of ESA Section 4(b)(2)**

Section 4(b)(2) of the ESA requires that we consider the economic impact, impact on national security, and any other relevant impact, of designating any particular area as critical habitat. Additionally, the Secretary has the discretion to consider excluding any area from critical habitat if (s)he determines, based upon the best scientific and commercial data available, the benefits of exclusion (that is, avoiding some or all of the impacts that would result from designation) outweigh the benefits of designation. The Secretary may not exclude an area from designation if exclusion will result in the extinction of the species. Because the authority to exclude is discretionary, exclusion is not required for any particular area under any circumstances.

The ESA provides the U.S. Fish and Wildlife Service (USFWS) and NMFS (the Services) with broad discretion in how to consider impacts. (*See,* H.R. Rep. No. 95–1625, at 17, reprinted in 1978 U.S.C.C.A.N. 9453, 9467 (1978). Economics and any other relevant impact shall be considered by the Secretary in setting the limits of critical habitat for such a species. The Secretary is not required to give economics or any other relevant impact predominant consideration in his specification of critical habitat. The consideration and weight given to any particular impact is completely within the Secretary's discretion.). Courts have noted the ESA does not contain requirements for any particular methods or approaches. (*See, e.g., Bldg. Indus. Ass'n of the Bay Area et al.* v. *U.S. Dept. of Commerce et al.,* No. 13–15132 (9th Cir., July 7, 2015), upholding district court's ruling that the ESA does not require the agency to follow a specific methodology when designating critical habitat under section 4(b)(2)). For this proposed rule, we followed the same basic approach to describing and evaluating impacts as we have for several recent critical habitat rulemakings, as informed by our Policy Regarding Implementation of Section 4(b)(2) of the ESA (81 FR 7226, February 11, 2016).

The following discussion of impacts is summarized from our Draft Information Report, which identifies the economic, national security, and other relevant impacts that we projected would result from including each of the specific areas in the proposed critical habitat designations. We considered these impacts when deciding whether to exercise our discretion to propose excluding particular areas from the designations. Both positive and negative impacts were identified and considered (these terms are used interchangeably with benefits and costs, respectively). Impacts were evaluated in quantitative terms where feasible, but qualitative appraisals were used where that is more appropriate to particular impacts.

The primary impacts of a critical habitat designation result from the ESA section 7(a)(2) requirement that Federal agencies ensure their actions are not likely to result in the destruction or adverse modification of critical habitat, and that they consult with NMFS in fulfilling this requirement. Determining these impacts is complicated by the fact that section 7(a)(2) also requires that Federal agencies ensure their actions are not likely to jeopardize the species' continued existence. One incremental impact of designation is the extent to which Federal agencies modify their proposed actions to ensure they are not likely to destroy or adversely modify the critical habitat beyond any modifications they would make because of listing and the requirement to avoid jeopardy to listed corals. When the same modification would be required due to impacts to both the species and critical habitat, there would be no additional or incremental impact attributable to the critical habitat designation beyond the administrative impact associated with conducting the critical habitat analysis. Relevant, existing regulatory protections are referred to as the ''baseline'' for the analysis and are discussed in the Draft Information Report. In this case, notable baseline protections include the ESA listings of the threatened corals, and the existing critical habitat for elkhorn and staghorn corals (73 FR 72210; November 26, 2008).

The Draft Information Report describes the projected future Federal activities that would trigger section 7 consultation requirements if they are implemented in the future, because they may affect the essential feature and consequently may result in economic costs or negative impacts. The report also identifies the potential national security and other relevant impacts that may arise due to the proposed critical habitat designations, such as positive impacts that may arise from conservation of the species and its habitat, state and local protections that may be triggered as a result of designation, and education of the public to the importance of an area for species conservation.

**Economic Impacts**

Economic impacts of the critical habitat designations result through implementation of section 7 of the ESA in consultations with Federal agencies to ensure their proposed actions are not likely to destroy or adversely modify critical habitat. The economic impacts of consultation may include both administrative and project modification costs; economic impacts that may be associated with the conservation benefits resulting from consultation are described later.

In 2016, we examined the ESA section 7 consultation record for the period 2004–2014, as compiled in our Public Consultation Tracking System (PCTS) database, to identify the types of Federal activities that may affect the five threatened Caribbean corals' proposed critical habitat. We will also review more recent consultation information prior to the publication of any final rule. We requested that Federal action agencies provide us with information on any additional future consultations that may affect the proposed critical habitat, and therefore should be included in our analysis. Of the types of past consultations that may affect the essential feature in any unit of proposed critical habitat, we determined that none of the activities would solely affect the essential feature. That is, all categories of the activities identified have potential routes of effects to both the threatened corals and the critical habitat.

We identified the following 10 categories of activities implemented by six different Federal entities as having the potential to affect the essential feature of the five corals' critical habitat:

• Coastal and in-water construction (*e.g.* docks, seawalls, piers, marinas, port expansions, anchorages, pipelines/cables, bridge repairs, aids to navigation, etc.) conducted or authorized by U.S. Army Corps of Engineers (USACE);
• Channel dredging (maintenance dredging of existing channels and offshore disposal of dredged material) conducted or authorized by USACE;
• Beach nourishment/shoreline protection (placement of sand onto eroding beaches from onshore or offshore borrow sites) conducted or authorized by USACE;
• Water quality management (revision of state water quality standards, issuance of National Pollutant Discharge Elimination System (NPDES) permits and Total Maximum daily load (TMDL) standards under the CWA, and pesticide registrations under the Federal Insecticide, Fungicide and Rodenticide Act) authorized by the Environmental Protection Agency (EPA);
• Protected area management (development of management plans for national parks, marine sanctuaries, wildlife refuges, etc.) conducted by the National Park Service (NPS) and NOAA National Ocean Service (NOS);
• Fishery management (development of fishery management plans under the Magnuson-Stevens Fishery Conservation and Management Act) conducted by NMFS;
• Aquaculture (development of aquaculture facilities) authorized by EPA and USACE, and funded by NMFS; and
• Military activities (*e.g.,* training exercises) conducted by DoD.

By conducting interviews and querying the database for these categories of activities in the maximum geographic extent of the sum of the five corals' proposed critical habitat, we estimate that 5 programmatic, 39 formal, and 272 informal section 7 consultations (for a total of 307) are likely to occur over the next 10 years and will require analysis of impacts to the proposed critical habitat. Because we have data on past consultations for impacts to the acroporid corals as well as their critical habitat, we believe it is a reasonable assumption that the breakout of the type of past consultations (into informal, formal, and programmatic consultations) likely reflects the breakout of future consultations. In addition to the type of consultation, we also present the data across the geopolitical groups of units (*i.e.,* the scale at which economic data is collected) that overlap with the maximum geographic extent *(i.e.,* the area that is determined by the species with the widest geographic and depth ranges) of the proposed critical habitat designations. We are not able to display the data by individual species' specific areas due to the largely overlapping but distinct nature of the specific areas for all the species within a geopolitical area, and the limitations on the way the historical consultation data are recorded (*i.e.,* by county or region, rather than specific location).

As discussed in more detail in our Draft Information Report, all categories of activities identified as having the potential to affect the proposed essential feature also have the potential to affect the threatened Caribbean corals. To estimate the economic impacts of critical habitat designation, our analysis compares the state of the world with and without the designation of critical habitat for the five corals. The ''without critical habitat'' scenario represents the baseline for the analysis, considering protections already afforded the proposed critical habitat as a result of the listing of the five corals as threatened species and as a result of other Federal, state, and local regulations or protections, notably the previous designation of critical habitat for the two Caribbean acroporids. The ''with critical habitat'' scenario describes the state of the world with the critical habitat designations. The incremental impacts that will be associated specifically with these critical habitat designations if finalized as proposed are the difference between the two scenarios. Baseline protections exist in large areas proposed for designation; however, there is uncertainty as to the degree of protection that these protections provide. In particular:

- The five corals are present in each of the areas proposed for them, and are already expected to receive significant protections related to the listing of the species under the ESA that may also protect the critical habitat. However, there is uncertainty on whether a particular species may be present within a particular project site, due to their patchy distribution throughout their habitat.
- The 2008 *Acropora* critical habitat designation overlaps significantly with the specific areas under consideration, and the overlap includes the areas where the vast majority of projects and activities potentially affected are projected to occur. The existing critical habitat designation shares the substrate aspect of the essential feature with this proposed designation for the five corals, but not the water quality components. The activities that may affect the proposed critical habitat water column feature are the same as those that would affect the *Acropora* critical habitat substrate feature, with the exception of activities that would increase water temperature.

Incremental impacts result from changes in the management of projects and activities, above and beyond those changes resulting from existing required or voluntary conservation efforts undertaken due to other Federal, state, and local regulations or guidelines (baseline requirements). The added administrative costs of considering critical habitat in section 7 consultation and the additional impacts of implementing conservation efforts (*i.e.,* reasonable and prudent alternatives in the case of an adverse modification finding) resulting from the designation of critical habitat are the direct, incremental compliance costs of designating critical habitat.

Designation of critical habitat for the five corals is unlikely to result in any new section 7 consultations. Given the listing of the five corals, and the fact that the proposed critical habitat overlaps, in part, with *Acropora* critical habitat, section 7 consultations are already likely to occur for activities with a Federal nexus throughout the proposed critical habitat areas. However, the need to address adverse modification of the proposed critical habitat in future consultations will add an incremental administrative burden, but only for those activities that would not have affected *Acropora* critical habitat (*i.e.,* the Federal action areas are outside the boundaries or the actions involve increases in water temperature that is not considered under existing *Acropora* critical habitat). Thus, some of the categories of activities identified above as having the potential to affect the proposed critical habitat will not result in incremental impacts due to these designations. We estimate that 1 programmatic, 19 formal and 34 informal, for a total of 54 consultations will result in incremental costs over the next 10 years. Table 2 shows the predicted number of consultations, by activity and Federal agency, that are projected to result in incremental costs.

TABLE 2—FORECAST INCREMENTAL SECTION 7 CONSULTATIONS BY ACTIVITY AND ACTION AGENCY (2016–2025)

| Unit | Coastal & in-water construction (USACE) | Channel dredging (USACE) | Beach nourishment (USACE) | Water quality mgmt. (EPA) | Military (NAVY) | Total |
|---|---|---|---|---|---|---|
| Florida | 24 | 5 | 4 | 2 | 2 | 37 |
| Puerto Rico | 4 | 0 | 0 | 7 | 0 | 11 |
| STT/STJ | 1 | 0 | 0 | 2 | 0 | 3 |
| St. Croix | 0 | 0 | 0 | 2 | 0 | 2 |
| Navassa | 0 | 0 | 0 | 0 | 0 | 0 |
| FGB | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 29 | 5 | 4 | 19 | 2 | 54 |
| % of Total | 43% | 9% | 7% | 35% | 4% | 100% |

The administrative effort required to address adverse effects to the proposed critical habitat is assumed to be the same, on average, across activities regardless of the type of activity (*e.g.,* beach nourishment versus channel dredging). Informal consultations are expected to require comparatively low levels of administrative effort, while formal and programmatic consultations are expected to require comparatively higher levels of administrative effort. For all formal and informal consultations, we anticipate that incremental administrative costs will be incurred by NMFS, a Federal action agency, and potentially a third party (*e.g.,* applicant, permittee). For programmatic consultations, we anticipate that costs will be incurred by NMFS and a Federal action agency. Incremental administrative costs per consultation effort are expected on average to be $9,200 for programmatic consultations, $5,100 for formal consultations, and $2,400 for informal consultations. The cost per consultation effort is multiplied by the number of each anticipated type of consultation (*i.e.,* programmatic, formal, and informal) within each unit under consideration. Incremental administrative costs are expected to total approximately $140,000 over the next 10 years for an annualized cost of $20,000 (discounted at 7 percent as required by the Office of Management and Budget (OMB)).

To determine the incremental impact of the designations of critical habitat from project modifications triggered specifically to avoid potential destruction or adverse modification of critical habitat, we evaluated whether and where critical habitat designations may generate project modifications above and beyond those undertaken under the baseline, for example, to avoid jeopardy to the five corals or to avoid destruction or adverse modification of existing *Acropora* critical habitat. Depending on the circumstances, project modifications may be considered baseline (*e.g.,* would be required regardless of critical habitat designation) or incremental (*e.g.,* resulting from critical habitat designation). The types of project modifications that may be recommended to avoid adverse modification of the five corals critical habitat are the same as those that would be recommended to avoid adverse modification of the existing *Acropora* critical habitat (with the exception of modifications to address increases in water temperature), or to avoid jeopardy to the five corals. Whether projects will require modifications solely due to the proposed critical habitat will depend on: (1) Geographic location, (2) activity type, and (3) results of surveys to determine the potential presence of at least one of the five corals. Project modifications would be incremental only in cases where the five listed corals are all absent and thus would not be affected, and the project would also not affect existing *Acropora* critical habitat.

We conducted the following steps to quantify the incremental impacts of potential project modifications to the activities that we ultimately concluded would not affect one of the five corals and *Acropora* critical habitat: (1) Identified the types and occurrence of activities that are likely to be affected by the proposed critical habitat designations, (2) projected the likelihood that forecasted activities will in fact need to be modified, and (3) estimated the average costs of modifications needed to comply with the ESA's critical habitat provisions. Based on this analysis, incremental project modifications and associated costs are projected to result only from coastal and in-water construction, channel dredging, beach nourishment/shoreline protection, water quality management activities, and military activities.

We recognize that uncertainty exists regarding whether, where, and how frequently surveys will identify the presence of the five coral species. Should one of the listed corals be present within the area of a future project that may also affect proposed critical habitat, the costs of project modifications would not be incremental to the critical habitat. To reflect the uncertainty with respect to the likelihood that these consultations will require additional project modifications due to impacts to new critical habitat, we estimated a range of costs. The low-end estimate assumes that no incremental project modifications will occur because any project modifications would be required to address impacts to one of the five corals or to existing *Acropora* critical habitat in a project area. The high-end estimate assumes that all the project modifications would be incremental because none of the five corals are present and the action would not affect existing *Acropora* critical habitat. Taking into consideration the types and cost estimates of the project modifications that may be required for predicted consultations identified, we estimate the high-end incremental costs, which total $880,000 over 10 years for an annualized cost of $88,000 (discounted at 7 percent).

Total incremental costs resulting from the five corals critical habitat are estimated to range from $140,000 to $1.02 million over 10 years, an annualized cost of $20,000 to $140,000 (discounted at 7 percent). The low-end costs are a result of the increased administrative effort to analyze impacts to the proposed critical habitat in future consultations on activities that are not projected to affect *Acropora* critical habitat (*i.e.,* in areas outside the boundaries, projects with impacts to water temperature, or pesticide registrations). The high-end costs are a result of the increased administrative effort (*i.e.,* low-end costs) plus the incremental project modification costs that stem solely from the proposed critical habitat. Incremental project modification costs are a result of future consultations that are not projected to have effects on *Acropora* critical habitat. The high-end costs also assume that the project modifications will be solely a result of the proposed critical habitat, and not the presence of the species. However, the high-end estimate is very likely an overestimate on incremental costs because an undetermined number of future consultations will have project modifications that address adverse effects to one or more of the five corals, as well as adverse effects to the new critical habitat. Nearly 86 percent of total high-end incremental costs result from project modifications, primarily for coastal and in-water construction and water quality management consultations. The relative percentage costs by unit and depth is illustrated in Table 3 and Table 4 for the low-end and high-end scenarios, respectively (depth is included to illustrate areas being proposed beyond existing *Acropora* critical habitat, which extends to 30 m). At the high end, approximately 30 percent of these costs is related to activity in Florida and another 50 percent is related to activity occurring in Puerto Rico. This cost distribution is as expected due to the size of the human populations adjacent to the proposed units, and thus human activity, in these jurisdictions, as compared to the other units. In other words, the highest proportion of the incremental costs occurs in those units with the highest number of future consultations, which is proportional to the human population adjacent to those units.

TABLE 3—LOW-END TOTAL INCREMENTAL COSTS (ADMINISTRATIVE) BY UNIT, 2016–2025 ($2015, 7 PERCENT DISCOUNT RATE)

| | Present value impacts | | | | Annualized impacts | | |
|---|---|---|---|---|---|---|---|
| Unit | Shore to 30 m | 30 m to 90 m | All depths | % of Total | Shore to 30 m | 30 m to 90 m | All depths |
| Florida | $15,000 | $25,000 | $40,000 | 30 | $2,000 | $3,600 | $5,700 |
| Puerto Rico | 22,000 | 49,000 | 70,000 | 50 | 3,100 | 7,000 | 10,000 |
| STT/STJ | 4,000 | 10,000 | 14,000 | 10 | 600 | 1,400 | 2000 |
| St. Croix | 4,000 | 10,000 | 14,000 | 0 | 600 | 1,400 | 2000 |
| Navassa | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

TABLE 3—LOW-END TOTAL INCREMENTAL COSTS (ADMINISTRATIVE) BY UNIT, 2016–2025 ($2015, 7 PERCENT DISCOUNT RATE)—Continued

| Unit | Present value impacts | | | | Annualized impacts | | |
|---|---|---|---|---|---|---|---|
| | Shore to 30 m | 30 m to 90 m | All depths | % of Total | Shore to 30 m | 30 m to 90 m | All depths |
| FGB | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 45,000 | 95,000 | 140,000 | 100 | 6,300 | 13,500 | 20,000 |

**Note:** The estimates may not sum to the totals reported due to rounding.

TABLE 4—HIGH-END TOTAL INCREMENTAL COSTS (ADMINISTRATIVE AND PROJECT MODIFICATION) BY UNIT, 2016–2025 ($2015, 7 PERCENT DISCOUNT RATE)

| Unit | Present value impacts | | | | Annualized Impacts | | |
|---|---|---|---|---|---|---|---|
| | Shore to 30 m | 30 m to 90 m | All depths | % of Total | Shore to 30 m | 30 m to 90 m | All depths |
| Florida | $385,000 | $154,000 | $540,000 | 53 | $55,000 | $22,300 | $77,700 |
| Puerto Rico | 22,000 | 408,000 | 429,000 | 42 | 3,100 | 57,700 | 60,700 |
| STT/STJ | 4,000 | 29,000 | 33,000 | 3 | 600 | 3,600 | 4,700 |
| St. Croix | 4,000 | 10,000 | 14,000 | 1 | 600 | 1,400 | 2,000 |
| Navassa | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FGB | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 415,000 | 604,000 | 1,020,000 | 100 | 59,000 | 83,000 | 140,000 |

**Note:** The estimates may not sum to the totals reported due to rounding.

Tables 5 and 6 present total low and high-end incremental costs by activity type. The activity with the highest costs is coastal and in-water construction, ranging from $70,600 to $500,000 over 10 years (discounted at 7 percent). At the high end this represents approximately 50 percent of the total costs. This result is expected because this is the category of activity with the most frequent projects that occur in the marine environment.

TABLE 5—LOW-END TOTAL INCREMENTAL COSTS (ADMINISTRATIVE) BY ACTIVITY, 2016–2025

[$2015, 7 percent discount rate]

| Unit | Coastal and in-water construction (USACE) | Beach nourishment (USACE) | Channel dredging (USACE) | Water quality mgmt. (EPA) | Military activities (Navy) | Total | Coastal and in-water construction (USACE) | Beach nourishment (USACE) | Channel dredging (USACE) | Water quality mgmt. (EPA) | Military activities (Navy) | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Florida | $14,500 | $5,600 | $220 | $9,200 | $11,000 | $32,500 | $2,100 | $800 | $31 | $670 | $1,500 | $4,600 |
| Puerto Rico | 45,400 | 4,100 | 5,000 | 10,500 | 3,000 | 63,000 | 6,500 | 580 | 710 | 1,000 | 600 | 8,900 |
| STT/STJ | 5,800 | 80 | 230 | 7,880 | 0 | 6,200 | 830 | 10 | 30 | 600 | 0 | 880 |
| St. Croix | 4,900 | 0 | 950 | 8,000 | 0 | 6,000 | 700 | 0 | 140 | 600 | 0 | 830 |
| Navassa | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FGB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 70,600 | 9,700 | 6,300 | 36,000 | 14,000 | 140,000 | 10,000 | 1,400 | 910 | 3,000 | 2,100 | 18,000 |

TABLE 6—HIGH-END TOTAL INCREMENTAL COSTS (ADMINISTRATIVE AND PROJECT MODIFICATION) BY ACTIVITY, 2016–2025

[$2015, 7 percent discount rate]

| Unit | Coastal & in-water const. (USACE) | Beach nourishment (USACE) | Channel dredging (USACE) | Water quality mgmt. (EPA) | Military (NAVY) | Total | Coastal & in-water const. (USACE) | Beach nourishment (USACE) | Channel dredging (USACE) | Water quality mgmt. (EPA) | Military (NAVY) | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FL | $364,500 | $80,600 | $75,220 | $9,200 | $11,000 | $532,500 | $53,000 | $11,800 | $11,031 | $170 | $1,500 | $76,600 |
| PR | 101,400 | 4,100 | 5,000 | 310,500 | 3,000 | 422,000 | 14,500 | 580 | 710 | 43,000 | 600 | 59,390 |
| STT/STJ | 24,800 | 80 | 230 | 80 | 0 | 25,200 | 3,530 | 11 | 33 | 11 | 0 | 3,585 |
| STX | 4,900 | 0 | 950 | 8,000 | 0 | 6,000 | 700 | 0 | 140 | 0 | 0 | 840 |
| Nav | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FGB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 500,600 | 84,700 | 81,300 | 336,000 | 14,000 | 1,020,000 | 71,000 | 12,000 | 12,000 | 43,000 | 2,100 | 140,000 |

**National Security Impacts**

Our critical habitat impacts analyses recognize that impacts to national security result only if a designation would trigger future ESA section 7 consultations because a proposed military activity ''may affect'' the physical or biological feature(s) essential to the listed species' conservation. Anticipated interference with mission-essential training or testing or unit readiness, through the additional commitment of resources to an adverse modification analysis and expected requirements to modify the action to prevent adverse modification of critical habitat, has been identified as an impact of critical habitat designations. Our impacts analyses also recognize that whether national security impacts result from the designation depends on whether future consultations would be required under the jeopardy standard, due to the coral being present, regardless of the critical habitat designation, and whether the designation would add new burdens beyond those related to the consultation on effects to the corals.

As described previously, we identified DoD military operations as a category of activity that has the potential to affect the essential feature of the proposed critical habitat for the five corals. However, most of the actions we have consulted on in the past would not result in incremental impacts in the future, because the consultations would be required to address impacts to either the five corals or the substrate feature of *Acropora* critical habitat. Based on our review of historical consultations, only those activities that would be conducted in the South Florida Ocean Measuring Facility operated by the Navy would involve incremental impacts due to the proposed designations, and thus only consultations on naval activities in this particular area could result in national security impacts.

In 2015, we requested the DoD provide us with information on military activities that may affect the proposed critical habitat and whether the proposed critical habitat would have a national security impact due to the requirement to consult on those activities. The Navy responded that activities associated with the designated restricted area managed by the South Florida Ocean Measuring Facility (SFOMF–RA), defined in 33 CFR 334.580, and located offshore of Dania, Florida, may affect the proposed critical habitat. This assertion is supported by two previous consultations on cable-laying activities in the SFOMF–RA over the past 10 years.

The SFOMF–RA contains underwater cables and benthic sensor systems that enable real-time data acquisition from Navy sensor systems used in Navy exercises. The previous consultations, in 2011 and 2013, were for the installation of new cables. These consultations did not affect any coral species, because the cables were routed to avoid the corals. These consultations did not consider effects to *Acropora* critical habitat because the area was excluded from the 2008 *Acropora* critical habitat designation based on national security impacts. However, installation of the cables would have affected the substrate feature. Because the installation of new cables in the future may affect the proposed critical habitat substrate feature, and the area was excluded from *Acropora* critical habitat, we expect that there may be an incremental impact to the Navy due to the proposed critical habitat designations. The impact would result from the added administrative effort to consider impacts to the proposed critical habitat and project modifications to avoid adverse effects to the substrate aspect of the essential feature. These impacts would likely be incremental due to the critical habitat designations.

The Navy has conducted extensive benthic surveys in the SFOMF–RA and has mapped the locations of all listed corals. Thus, they would be able to avoid impacts to the listed corals from the installation of new cables. However, if the cables were laid over the proposed critical habitat's substrate feature, the cable would make the substrate unavailable for settlement and recruitment. Thus, we would require consultation to evaluate impact of this adverse effect to the essential feature. The administrative costs and project modification costs would be incremental impacts of the proposed critical habitat. The Navy concluded that critical habitat designations at the SFOMF–RA would likely impact national security by diminishing military readiness through the requirement to consult on their activities within critical habitat beyond the requirement to consult on the threatened corals and through any additional project modifications.

In 2019, the Navy requested the exclusion of the Federal Danger Zones and Restricted Areas off NAS Key West designated in 33 CFR 334.610 and 33 CFR 334.620 in Navy's Key West Operations Area. However, at this time NMFS is unable to make a determination and has been in discussion with the Navy to identify the potential national security impacts in these areas. NMFS will provide exclusion determinations for this request in the final rule.

**Other Relevant Impacts**

We identified three broad categories of other relevant impacts of this proposed critical habitat: Conservation benefits, both to the species and to society; impacts on governmental or private entities that are implementing existing management plans that provide benefits to the listed species; and educational and awareness benefits. Our Draft Impacts Analysis discusses conservation benefits of designating the 28 specific areas, and the benefits of conserving the five corals to society, in both ecological and economic metrics.

*Conservation Benefits*

The primary benefit of critical habitat designation is the contribution to the conservation and recovery of the five corals. That is, in protecting the features essential to the conservation of the species, critical habitat directly contributes to the conservation and recovery of the species. This analysis contemplates three broad categories of benefits of critical habitat designation:

(1) Increased probability of conservation and recovery of the five corals. The most direct benefits of the critical habitat designations stem from the enhanced probability of conservation and recovery of the five corals. From an economic perspective, the appropriate measure of the value of this benefit is people's ''willingness-to-pay'' for the incremental change. While the existing economics literature is insufficient to provide a quantitative estimate of the extent to which people value incremental changes in recovery potential, the literature does provide evidence that people have a positive preference for listed species conservation, even beyond any direct (*e.g.,* recreation, such as viewing the species while snorkeling or diving) or indirect (*e.g.,* reef fishing that is supported by the presence of healthy reef ecosystems) use for the species.

(2) Ecosystem service benefits. Overall, coral reef ecosystems, including those comprising populations of the five corals, provide important ecosystem services of value to individuals, communities, and economies. These include recreational opportunities (and associated tourism spending in the regional economy), habitat and nursery functions for recreationally and commercially valuable fish species, shoreline protection in the form of wave attenuation and reduced beach erosion, and climate stabilization via carbon sequestration. The total annual

economic value of coral reefs in U.S. jurisdictions in 2012 has been summarized as: (1) Florida—$324M/year, (2) Puerto Rico—$1,161M/year, and (3) USVI—$210M/year (Brander and Van Beukering, 2013). Efforts to conserve the five corals also benefit the broader reef ecosystems, thereby preserving or improving these ecosystem services and values.

Conservation benefits to each coral in all their specific areas are expected to result from the designations. Critical habitat most directly influences the recovery potential of the species and protects coral reef ecosystem services through its implementation under section 7 of the ESA. That is, these benefits stem from the implementation of project modifications undertaken to avoid destruction and adverse modification of critical habitat. Accordingly, critical habitat designation is most likely to generate the benefits discussed in those areas expected to be subject to additional recommendations for project modifications (above and beyond any conservation measures that may be implemented in the baseline due to the listing status of the species or for other reasons). In addition, critical habitat designation may generate ancillary environmental improvements and associated ecosystem service benefits (*i.e.,* to commercial fishing and recreational activities) in areas subject to incremental project modifications. While neither benefit can be directly monetized, existing information on the value of coral reefs provides an indication of the value placed on those ecosystems.

(3) Education and Awareness Benefits. There is the potential for education and awareness benefits arising from the critical habitat designations. This potential stems from two sources: (1) Entities that engage in section 7 consultation and (2) members of the general public interested in coral conservation. The former potential exists from parties who alter their activities to benefit the species or essential feature because they were made aware of the critical habitat designations through the section 7 consultation process. The latter may engage in similar efforts because they learned of the critical habitat designations through outreach materials. For example, we have been contacted by diver groups in the Florida Keys who are specifically seeking the two Caribbean acroporid corals on dives and reporting those locations to NMFS, thus assisting us in planning and implementing coral conservation and management activities. In our experience, designation raises the public's awareness that there are special considerations to be taken within the area.

Similarly, state and local governments may be prompted to enact laws or rules to complement the critical habitat designations and benefit the listed corals. Those laws would likely result in additional impacts of the designations. However, it is impossible to quantify the beneficial effects of the awareness gained through, or the secondary impacts from state and local regulations resulting from, the critical habitat designations.

*Impacts to Governmental and Private Entities With Existing Management Plans Benefitting the Essential Features*

Among other relevant impacts of the critical habitat designations we considered under section 4(b)(2) of the ESA are impacts on relationships with, or the efforts of, private and public entities involved in management or conservation efforts benefiting listed species. In some cases, the additional regulatory layer of a designation could negatively impact the conservation benefits provided to the listed species by existing or proposed management or conservation plans.

Impacts on entities responsible for natural resource management, conservation plans, or the functioning of those plans depend on the type and number of section 7 consultations that may result from the designations in the areas covered by those plans, as well as any potential project modifications recommended by these consultations. As described in section 10.1.3.5 of the Draft Information Report, there were six past consultations on Federal protected area management plans (three formal, three informal) in the units being proposed as critical habitat. The three formal consultations were related to the NPS management plans at the following Federal protected areas:

- Buck Island Reef National Monument in St. Croix, U.S. VI;
- Everglades National Park in Monroe County, FL; and
- Biscayne National Park in Miami-Dade County, FL.

Negative impacts to the NPS could result if the critical habitat designations interfere with these agencies' ability to provide for the conservation of the species, or otherwise hampers management of these areas. Existing management plans in these three protected areas and their associated regulations protect existing coral reef resources, but they do not specifically protect the substrate and water quality feature for purposes of increasing listed coral abundance and eventual recovery. Thus, the five corals' critical habitat designations would provide unique benefits for the corals, beyond the benefits provided by these existing management plans. However, the identified areas not only contain the essential feature, but they also contain one or more of the five corals, and they overlap with previously designated *Acropora* critical habitat. Hence, any section 7 impacts will likely be limited to administrative costs. Because we identified resource management as a category of activities that may affect both the five corals and the critical habitat, these impacts would not be incremental. In addition, we found no evidence that relationships with the Federal protected area managers would be negatively affected, or that negative impacts to other agencies' ability to provide for the conservation of the listed coral species would result from designation. Therefore, we do not expect the critical habitat designations to impact natural resource agencies implementing management plans.

**Discretionary Exclusions Under Section 4(b)(2)**

We are not exercising our discretion to consider exclusions based on economic impacts. Our conservative identification of the highest potential incremental economic impacts indicates that any such impacts will be relatively small—$20,000 to $140,000 annually. The incremental costs are split between the incremental administrative effort and incremental project modification costs for the relatively few (about 54) consultations over the next 10 years. Further, the analysis indicates that there is no particular area within the units that meet the definition of critical habitat where economic impacts would be particularly high or concentrated as compared to the human population and level of activities in each unit.

We are proposing to exclude one particular area on the basis of national security impacts. National security impacts would occur in the designated restricted area managed by the SFOMF–RA offshore Dania Beach, Florida, which coincides with all five threatened corals' proposed critical habitats. The area does support the essential feature and contains the five threatened Caribbean corals. The Navy concluded that critical habitat designations at the SFOMF–RA would likely impact national security by diminishing military readiness through the requirement to consult on their activities within critical habitat beyond the requirement to consult on the threatened corals and potentially result in additional project modifications. This is likely because the Navy, which has comprehensive maps of all threatened coral locations within the SFOMF–RA, would need to avoid impacts to the substrate aspect of the essential feature in addition to avoiding impacts to the listed corals themselves, should any new cables or sensors be installed. The Navy stated that impediments to SFOMF operations would adversely impact the Navy's ability to maintain an underwater stealth advantage of future classes of ships and submarines and impede our nation's ability to address emergent foreign threats. The Navy stated that the critical habitat designations would hinder its ability to continue carrying out the unique submarine training provided by this facility, as no other U.S. facility has the capability to make the cable-to-shore measurements enabled at the SFOMF that satisfy its requirement to assure the newest submarines are not vulnerable to electromagnetic detection. The Navy advised the loss of this capability would directly impact new construction of submarines and submarines already in the fleet that are being readied for deployment. Therefore, SFOMF's activities are necessary to maintain proficiency in mission-essential tactics for winning wars, deterring aggression, and maintaining freedom of the seas. The excluded area comprises a very small portion of the areas that meet the definition of critical habitat. Navy regulations prohibit anchoring, trawling, dredging, or attaching any object within the area; thus, the corals and their habitat will be protected from these threats. Further, the corals and their habitat will still be protected through ESA section 7 consultations that prohibit jeopardizing the species' continued existence and require modifications to minimize the impacts of incidental take. Further, we do not foresee other Federal activities that might adversely impact critical habitat that would be exempted from future consultation requirements due to this exclusion, since this area is under exclusive military control. Therefore, in our judgment, the benefit of including the particular area of the SFOMF–RA is outweighed by the benefit of avoiding the impacts to national security the Navy would experience if it were required to consult based on critical habitat. Given the small area (5.5 $mi^2$ (14.2 $km^2$)) that meets the definition of critical habitat encompassed by this area, we conclude that exclusion of this area will not result in extinction of any of the five threatened Caribbean corals.

We are not able to make a determination on the exclusion of the Key West Operations Area at this time due to a lack of information to conduct the proper analysis and our deadline for the proposed designations. NMFS, in close coordination with the Navy, will reconsider this matter consistent with the weighing factors, and will provide exclusion determinations for this request in the final rule.

We are not proposing to exclude any particular area based on other relevant impacts. Other relevant impacts include conservation benefits of the designations, both to the species and to society. Because the feature that forms the basis of the critical habitat designations is essential to the conservation of the five threatened Caribbean corals, the protection of critical habitat from destruction or adverse modification may at minimum prevent loss of the benefits currently provided by the species and their habitat and may contribute to an increase in the benefits of these species to society in the future. While we cannot quantify or monetize the benefits, we believe they are not negligible and would be an incremental benefit of these designations.

## Proposed Critical Habitat Designations

Our critical habitat regulations state that we will show critical habitat on a map instead of using lengthy textual descriptions to describe critical habitat boundaries, with additional information discussed in the preamble of the rulemaking and in agency records (50 CFR 424.12(c)). When several habitats, each satisfying the requirements for designation as critical habitat, are located in proximity to one another, an inclusive area may be designated as critical habitat (50 CFR 424.12(d)).

The habitat containing the essential feature and that may require special management considerations or protection is marine habitat of particular depths for each species in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea. The boundaries of each specific area for each coral species are determined by the species' commonly occupied minimum and maximum depth ranges (*i.e.,* depth contour) within their specific geographic distributions, as described in the literature and observed in monitoring data. All depths are relative to mean low water (MLW). Because the quality of the available GIS data varies based on collection method, resolution, and processing, the proposed critical habitat boundaries are defined by the maps in combination with the textual information included in the proposed regulation. This textual information clarifies and refines the location and boundaries of each area. In particular, the textual information clarifies the proposed boundaries of the critical habitat for each coral species based on a specific water-depth range. The textual information also lists certain particular areas that are not included in the proposed critical habitat.

### *Occupied Critical Habitat Unit Descriptions*

Table 7 describes each unit of critical habitat for each species. It contains the geographic extent and water depths, which generally form the boundaries of each unit.

TABLE 7—DESCRIPTION AND EXTENT OF EACH CRITICAL HABITAT UNIT BY SPECIES

| Species | Critical habitat unit name | Location | Geographic extent | Water depth range | Area (approx. rounded) |
|---|---|---|---|---|---|
| *Orbicella annularis* | OANN–1 | Florida | Lake Worth Inlet, Palm Beach County to Government Cut, Miami-Dade County. | 2–20 m (6.5–65.6 ft). | 3,800 $km^2$ (1,300 $mi^2$). |
| | | Florida | Government Cut, Miami-Dade County to Dry Tortugas. | 0.5–20 m (1.6–65.6 ft). | |
| | OANN–2 | Puerto Rico | All islands | 0.5–20 m (1.6–65.6 ft). | 2,100 $km^2$ (830 $mi^2$). |
| | OANN–3 | USVI | All islands of St. Thomas and St. John. | 0.5–20 m (1.6–65.6 ft). | 100 $km^2$ (40 $mi^2$). |
| | OANN–4 | USVI | All islands of St. Croix | 0.5–20 m (1.6–65.6 ft). | 230 $km^2$ (89 $mi^2$). |
| | OANN–5 | Navassa | Navassa Island | 0.5–20 m (1.6–65.6 ft). | 0.13 $km^2$ (0.05 $mi^2$). |

TABLE 7—DESCRIPTION AND EXTENT OF EACH CRITICAL HABITAT UNIT BY SPECIES—Continued

| Species | Critical habitat unit name | Location | Geographic extent | Water depth range | Area (approx. rounded) |
| --- | --- | --- | --- | --- | --- |
| | OANN–6 | FGB | East Flower Garden Bank and West Flower Garden Bank. | 17–90 m (55–295 ft). | 41 km² (16 mi²). |
| *Orbicella faveolata* | OFAV–1 | Florida | St. Lucie Inlet, Martin County to Government Cut, Miami-Dade County. | 2–90 m (6.5–295 ft). | 7,900 km² (3,100 mi²). |
| | | Florida | Government Cut, Miami-Dade County to Dry Tortugas. | 0.5–90 m (1.6–295 ft). | |
| | OFAV–2 | Puerto Rico | All islands of Puerto Rico | 0.5–90 m (1.6–295 ft). | 5,500 km² (2,100 mi²). |
| | OANN–3 | USVI | All islands of St. Thomas and St. John. | 0.5–90 m (1.6–295 ft). | 1,400 km² (520 mi²). |
| | OFAV–4 | USVI | All islands of St. Croix | 0.5–90 m (1.6–295 ft). | 360 km² (140 mi²). |
| | OFAV–5 | Navassa | Navassa Island | 0.5–90 m (1.6–295 ft). | 11 km² (4 mi²). |
| | OFAV–6 | FGB | East Flower Garden Bank and West Flower Garden Bank. | 17–90 m (55–295 ft). | 41 km² (16 mi²). |
| *Orbicella franksi* | OFRA–1 | Florida | St. Lucie Inlet, Martin County to Government Cut, Miami-Dade County. | 2–90 m (6.5–295 ft). | 7,900 km² (3,100 mi²). |
| | | Florida | Government Cut, Miami-Dade County to Dry Tortugas. | 0.5–90 m (1.6–295 ft).. | |
| | OFRA–2 | Puerto Rico | All islands of Puerto Rico | 0.5–90 m (1.6–295 ft). | 5,500 km² (2,100 mi²). |
| | OFRA–3 | USVI | All islands of St. Thomas and St. John. | 0.5–90 m (1.6–295 ft). | 1,400 km² (520 mi²). |
| | OFRA–4 | USVI | All islands of St. Croix | 0.5–90 m (1.6–295 ft). | 360 km² (140 mi²). |
| | OFRA–5 | Navassa | Navassa Island | 0.5–90 m (1.6–295 ft). | 11 km² (4 mi²). |
| | OFRA–6 | FGB | East Flower Garden Bank and West Flower Garden Bank. | 17–90 m (55–295 ft). | 41 km² (16 mi²). |
| *Dendrogyra cylindrus.* | DCYL–1 | Florida | Lake Worth Inlet, Palm Beach County to Government Cut, Miami-Dade County. | 2–25 m (6.5–82 ft) | 4,300 km² (1,700 mi²). |
| | | Florida | Government Cut, Miami-Dade County to Dry Tortugas. | 1–25 m (3.3–82 ft). | |
| | DCYL–2 | Puerto Rico | All islands | 1–25 m (3.3–82 ft) | 2,800 km² (1,100 mi²). |
| | DCYL–3 | USVI | All islands of St. Thomas and St. John. | 1–25 m (3.3–82 ft)). | 170 km² (65 mi²). |
| | DCYL–4 | USVI | All islands of St. Croix | 1–25 m (3.3–82 ft) | 300 km² (120 mi²). |
| | DCYL–5 | Navassa | Navassa Island | 1–25 m (3.3–82 ft)). | 0.5 km² (0.2 mi²). |
| *Mycetophyllia ferox* | MFER–1 | Florida | Broward County to Dry Tortugas | 5–90 m (16.4–295 ft). | 6,400 km² (2,500 mi²). |
| | MFER–2 | Puerto Rico | All islands of Puerto Rico | 5–90 m (16.4–295 ft). | 5,000 km² (1,900 mi²). |
| | MFER–3 | USVI | All islands of St. Thomas and St. John. | 5–90 m (16.4–295 ft). | 1,300 km² (510 mi²). |
| | MFER–4 | USVI | All islands of St. Croix | 5–90 m (16.4–295 ft). | 310 km² (120 mi²). |
| | MFER–5 | Navassa | Navassa Island | 5–90 m (16.4–295 ft). | 11 km² (4 mi²). |

**Effects of Critical Habitat Designations**

Section 7(a)(2) of the ESA requires Federal agencies, including NMFS, to insure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any threatened or endangered species or destroy or adversely modify designated critical habitat. Federal agencies are also required to confer with NMFS regarding any actions likely to jeopardize a species proposed for listing under the ESA, or likely to destroy or adversely modify proposed critical habitat, pursuant to section 7(a)(2).

A conference involves informal discussions in which NMFS may recommend conservation measures to minimize or avoid adverse effects. The discussions and conservation recommendations are documented in a conference report provided to the Federal agency. If requested by the Federal agency, a formal conference report may be issued, including a biological opinion prepared according to 50 CFR 402.14. A formal conference report may be adopted as the biological opinion when the species is listed or critical habitat designated, if no significant new information or changes to the action alter the content of the opinion.

When a species is listed or critical habitat is designated, Federal agencies must consult with NMFS on any agency actions that may affect a listed species or its critical habitat. During the consultation, we evaluate the agency action to determine whether the action may adversely affect listed species or critical habitat and issue our findings in a letter of concurrence or in a biological opinion. If we conclude in the biological opinion that the agency action would likely result in the destruction or adverse modification of critical habitat, we would also identify any reasonable and prudent alternatives to the action. Reasonable and prudent alternatives are defined in 50 CFR 402.02 as alternative actions identified during formal consultation that can be implemented in a manner consistent with the intended purpose of the action, that are consistent with the scope of the Federal agency's legal authority and jurisdiction, that are economically and technologically feasible, and that would avoid the destruction or adverse modification of critical habitat.

Regulations at 50 CFR 402.16 require Federal agencies that have retained discretionary involvement or control over an action, or where such discretionary involvement or control is authorized by law, to reinitiate consultation on previously reviewed actions in instances where: (1) Critical habitat is subsequently designated; or (2) new information or changes to the action may result in effects to critical habitat not previously considered in the biological opinion. Consequently, some Federal agencies may request reinitiation of consultation or conference with NMFS on actions for which formal consultation has been completed, if those actions may affect designated critical habitat or adversely modify or destroy proposed critical habitat.

Activities subject to the ESA section 7 consultation process include activities on Federal lands and activities on private or state lands requiring a permit from a Federal agency or some other Federal action, including funding. ESA section 7 consultation would not be required for Federal actions that do not affect listed species or critical habitat and for actions that are not federally funded, authorized, or carried out.

## Activities That May Be Affected

Section 4(b)(8) of the ESA requires that we describe briefly, and evaluate in any proposed or final regulation to designate critical habitat, those activities that may adversely modify such habitat or that may be affected by such designation. As described in our Draft Information Report, a wide variety of Federal activities may require ESA section 7 consultation because they may affect the essential feature of critical habitat. Specific future activities will need to be evaluated with respect to their potential to destroy or adversely modify critical habitat, in addition to their potential to affect and jeopardize the continued existence of listed species. For example, activities may adversely modify the substrate portion of the essential feature by removing or altering the substrate or adversely modify the water column portion of the essential feature by reducing water clarity through turbidity. These activities would require ESA section 7 consultation when they are authorized, funded, or carried out by a Federal agency. A private entity may also be affected by these proposed critical habitat designations if it is a proponent of a project that requires a Federal permit or receives Federal funding.

Categories of activities that may be affected by the designations include coastal and in-water construction, channel dredging, beach nourishment and shoreline protection, water quality management, and military activities. Questions regarding whether specific activities may constitute destruction or adverse modification of critical habitat should be directed to us (see **ADDRESSES** and **FOR FURTHER INFORMATION CONTACT**). Identifying concentrations at which the conservation value of habitat for listed corals may be affected is inherently complex and influenced by taxa, exposure duration, and acclimatization to localized seawater regimes. Consequently, the actual responses of the critical habitat (and listed corals) to changes in the essential feature resulting from future Federal actions will be case and site-specific, and predicting such responses will require case and site-specific data and analyses.

## Public Comments Solicited

We request that interested persons submit comments, information, and suggestions concerning this proposed rule during the comment period (see **DATES**). We are soliciting comments or suggestions from the public, other concerned governments and agencies, the scientific community, industry, or any other interested party concerning the areas proposed for designation. We also request comment on areas we are proposing for exclusion, including but not limited to the types of areas that qualify as managed area (*e.g.,* areas adjacent to dredged channels, nearshore placement areas). Additionally, we request comment on all aspects of this proposal, including whether specific language regarding such areas should be included in the text of the regulations and whether any discussion of or references to this topic in this preamble or the regulatory text should otherwise be further clarified or defined. We also solicit comments regarding specific, foreseeable benefits and impacts stemming from this designation. We also seek comments on the identified geographic area and depths occupied by the species. You may submit your comments and materials concerning this proposal by any one of several methods (see **ADDRESSES**). We will consider all comments pertaining to these designations received during the comment period in preparing the final rule. Accordingly, the final designations may differ from this proposal.

## Information Quality Act and Peer Review

The data and analyses supporting this proposed action have undergone a pre-dissemination review and have been determined to be in compliance with applicable information quality guidelines implementing the Information Quality Act (Section 515 of Pub. L. 106–554). On December 16, 2004, OMB issued its Final Information Quality Bulletin for Peer Review (Bulletin). The Bulletin was published in the **Federal Register** on January 14, 2005 (70 FR 2664), and went into effect on June 16, 2005. The primary purpose of the Bulletin is to improve the quality and credibility of scientific information disseminated by the Federal government by requiring peer review of ''influential scientific information'' and ''highly influential scientific information'' prior to public dissemination. ''Influential scientific information'' is defined as information the agency reasonably can determine will have or does have a clear and substantial impact on important public policies or private sector decisions. The Bulletin provides agencies broad discretion in determining the appropriate process and level of peer review. Stricter standards were established for the peer review of highly influential scientific assessments, defined as information whose dissemination could have a potential impact of more than $500 million in any one year on either the public or private sector or that the dissemination is novel, controversial, or precedent-setting, or has significant interagency interest.

The information in the Draft Information Report supporting this proposed critical habitat rule is considered influential scientific information and subject to peer review. To satisfy our requirements under the OMB Bulletin, we obtained independent peer review of the information used to draft this document, and incorporated the peer review comments into this draft prior to dissemination of this proposed rulemaking. Comments received from peer reviewers are available on our website at *http://www.cio.noaa.gov/services_programs/prplans/ID346.html.*

## Classification

*Takings (Executive Order 12630)*

Under E.O. 12630, Federal agencies must consider the effects of their actions on constitutionally protected private property rights and avoid unnecessary takings of private property. A taking of property includes actions that result in physical invasion or occupancy of private property, and regulations imposed on private property that substantially affect its value or use. In accordance with E.O. 12630, this proposed rule would not have significant takings implications. A takings implication assessment is not required. These designations would affect only Federal agency actions (*i.e.,* those actions authorized, funded, or carried out by Federal agencies). Therefore, the critical habitat designations does not affect landowner actions that do not require Federal funding or permits.

*Regulatory Planning and Review (Executive Order 12866), Reducing Regulation and Controlling Regulatory Costs (Executive Order 13771)*

This proposed rule has been determined to be significant for purposes of E.O. 12866 review. This proposed rulemaking is expected to be regulatory under E.O. 13771. A draft report evaluating the economic impacts of the proposed rule has been prepared and is included the Draft Information Report, incorporating the principles of E.O. 12866.

Based on the economic impacts evaluation in the Draft Information Report, Total incremental costs resulting from the five corals critical habitat are estimated to range from $140,000 to $1.02 million over 10 years, an annualized cost of $20,000 to $140,000 (discounted at 7 percent). The low-end costs are a result of the increased administrative effort to analyze impacts to the proposed critical habitat in future consultations on activities that are not projected to affect Acropora critical habitat (*i.e.,* in areas outside the boundaries, projects with impacts to water temperature, or pesticide registrations). The high-end costs are a result of the increased administrative effort (*i.e.,* low-end costs) plus the incremental project modification costs that stem solely from the proposed critical habitat. Incremental project modification costs are a result of future consultations that are not projected to have effects on Acropora critical habitat. The high-end costs also assume that the project modifications will be solely a result of the proposed critical habitat, and not the presence of the species. However, the high-end estimate is very likely an overestimate on incremental costs because an undetermined number of future consultations will have project modifications that address adverse effects to one or more of the five corals, as well as adverse effects to the new critical habitat.

*Federalism (Executive Order 13132)*

Pursuant to the Executive Order on Federalism, E.O. 13132, we determined that this proposed rule does not have significant federalism effects and that a federalism assessment is not required. However, in keeping with Department of Commerce policies and consistent with ESA regulations at 50 CFR 424.16(c)(1)(ii), we will request information for this proposed rule from state and territorial resource agencies in Florida, Puerto Rico, and USVI. The proposed designations may have some benefit to state and local resource agencies in that the proposed rule more clearly defines the essential feature and the areas in which that feature is found. It may also assist local governments in allowing them to engage in long-range planning (rather than waiting for case by-case ESA section 7 consultations to occur).

*Energy Supply, Distribution, and Use (Executive Order 13211)*

Executive Order 13211 requires agencies to prepare Statements of Energy Effects when undertaking an action expected to lead to the promulgation of a final rule or regulation that is a significant regulatory action under E.O. 12866 and is likely to have a significant adverse effect on the supply, distribution, or use of energy. OMB Guidance on Implementing E.O. 13211 (July 13, 2001) states that significant adverse effects could include any of the following outcomes compared to a world without the regulatory action under consideration: (1) Reductions in crude oil supply in excess of 10,000 barrels per day; (2) reductions in fuel production in excess of 4,000 barrels per day; (3) reductions in coal production in excess of 5 million tons per year; (4) reductions in natural gas production in excess of 25 million cubic feet per year; (5) reductions in electricity production in excess of 1 billion kilowatt-hours per year or in excess of 500 megawatts of installed capacity; (6) increases in energy use required by the regulatory action that exceed any of the thresholds above; (7) increases in the cost of energy production in excess of one percent; (8) increases in the cost of energy distribution in excess of one percent; or (9) other similarly adverse outcomes. A regulatory action could also have significant adverse effects if it: (1) Adversely affects in a material way the productivity, competition, or prices in the energy sector; (2) adversely affects in a material way productivity, competition or prices within a region; (3) creates a serious inconsistency or otherwise interferes with an action taken or planned by another agency regarding energy; or (4) raises novel legal or policy issues adversely affecting the supply, distribution or use of energy arising out of legal mandates, the President's priorities, or the principles set forth in E.O. 12866 and 13211.

This rule, if finalized, will not have a significant adverse effect on the supply, distribution, or use of energy. Therefore, we have not prepared a Statement of Energy Effects.

*Regulatory Flexibility Act (5 U.S.C. 601 et seq.)*

We prepared an initial regulatory flexibility analysis (IRFA) pursuant to section 603 of the Regulatory Flexibility Act (RFA) (5 U.S.C. 601, *et seq.*). The IRFA analyzes the impacts to small entities that may be affected by the proposed designations and is included as Appendix B of the Draft Information Report and is available upon request (see **ADDRESSES** section). The IRFA is summarized below, as required by section 603 of the RFA.

Our IRFA uses the best available information to identify the potential impacts of critical habitat on small entities. However, a number of uncertainties complicate quantification of these impacts. This includes (1) the fact that the manner in which these potential impacts will be allocated between large and small entities is unknown; and (2) as discussed in the main body of the report, uncertainty regarding the potential effects of critical habitat designations, which requires some categories of potential impacts be described qualitatively. This IRFA analysis therefore focuses on providing the best available information regarding the potential magnitude of impacts to small entities in affected industries. As the proposed critical habitat is marine habitat, this analysis references the number of small businesses in each affected industry that is associated with counties and territories sharing coastline with the designations.

The total maximum annualized impacts to small entities are estimated to be $130,000, which represents approximately 90 percent of the total quantified incremental impacts forecasted to result from the proposed rule. This impact assumes that all of the incremental project modification costs will be incurred by small entities. These impacts are anticipated to be borne by the small entities that obtain funds or permits from Federal agencies that consult with NMFS regarding the five coral species critical habitat in the next 10 years. Given the uncertainty regarding which small entities in a given industry will obtain funds or permits from Federal agencies that will need to consult with NMFS, this analysis estimates impacts to small entities under two different scenarios. These scenarios are intended to reflect the range of uncertainty regarding the number of small entities that may be affected by the designations and the potential impacts of critical habitat designations on their annual revenues within that range.

Under Scenario 1, this analysis assumes that all third parties participating in future consultations are small, and that incremental impacts are distributed evenly across all of these entities. Scenario 1 accordingly reflects a high estimate of the number of potentially affected small entities and a low estimate of the potential effect in terms of percent of revenue. This scenario therefore most likely overstates the number of small entities likely to be affected by the rule and potentially understates the revenue effect. This analysis anticipates that 43 small entities will collectively incur approximately $130,000 in annualized costs under Scenario 1. These costs are distributed between two industries: (1) Approximately $85,000 expected to be borne by 38 entities engaged in coastal and in-water construction and dredging activities (NAICS Codes 237310, 237990, 237990), and (2) approximately $43,000 expected to be borne by 5 entities engaged in water quality activities (NAICS Codes 221112, 324110, 221320). However, because these costs are shared among 38 and 5 entities, respectively, annualized impacts of the rule are estimated to make up less than 0.05 percent of annual revenues for each affected small entity.

Under Scenario 2, this analysis assumes costs associated with each consultation action are borne by a single small entity within an industry. This method understates the number of small entities affected but overstates the likely impacts on an entity. Therefore, this method arrives at a low estimate of potentially affected entities and a high estimate of potential effects on revenue, assuming that quantified costs represent a complete accounting of the costs likely to be borne by private entities. For the coastal and in-water construction and dredging industry, this scenario forecasts $85,000 in annualized impacts would be borne by a single small entity. Though this estimate is almost certainly an overstatement of the costs borne by a single small entity, the impact is nonetheless expected to result in impacts that are less than 3 percent of the average annual revenues for a small entity in this industry. Estimated annualized impacts under this scenario for the industries related to water quality are expected to be $48,000 and comprise less than 2 percent of annual revenues.

While these scenarios present a broad range of potentially affected entities and the associated revenue effects, we expect the actual number of small entities affected and revenue effects will be somewhere in the middle. In other words, some subset greater than 2 and less than 43 of the small entities will participate in section 7 consultations on the five corals' critical habitat and bear associated impacts annually. Regardless, our analysis demonstrates that, even if we assume a low-end estimate of affected small entities, the greatest potential revenue effect is still less than 3 percent.

Even though we cannot definitively determine the numbers of small and large entities that may be affected by this proposed rule, there is no indication that affected project applicants would be only small entities or mostly small entities. It is unclear whether small entities would be placed at a competitive disadvantage compared to large entities. However, as described in the Draft Information Report, consultations and project modifications will be required based on the type of permitted action and its associated impacts on the essential critical habitat feature. Because the costs of many potential project modifications that may be required to avoid adverse modification of critical habitat are unit costs (*e.g.,* per mile of shoreline, per cubic yard of sand moved), such that total project modification costs would be proportional to the size of the project, it is not unreasonable to assume that larger entities would be involved in implementing the larger projects with proportionally larger project modification costs.

There are no record-keeping requirements associated with the rule. Similarly, there are no reporting requirements other than those that might be associated with reporting on the progress and success of implementing project modifications, which do not require specific skills to satisfy.

No Federal laws or regulations duplicate or conflict with this proposed rule. However, other aspects of the ESA may overlap with the critical habitat designations. For instance, listing of the threatened corals under the ESA requires Federal agencies to consult with NMFS to avoid jeopardy to the species, and large portions of the proposed designations overlap with existing *Acropora* critical habitat. However, this analysis examines only the incremental impacts to small entities from these proposed critical habitat designations.

The alternatives to the designations considered consisted of a no-action alternative and an alternative based on identical geographic designations for each of the five corals. The no-action, or no designation, alternative would result in no additional ESA section 7 consultations relative to the status quo of the species' listing. Critical habitat must be designated if prudent and determinable. NMFS determined that the proposed critical habitat is prudent and determinable, and the ESA requires critical habitat designation in that circumstance. Further, we have determined that the physical feature forming the basis for our critical habitat designations is essential to the corals' conservation, and conservation of these species will not succeed without this feature being available. Thus, the lack of protection of the critical habitat feature from adverse modification could result in continued declines in abundance of the five corals. We rejected this no action alternative because it does not provide the level of conservation necessary for the five Caribbean corals. In addition, declines in abundance of the five corals would result in loss of associated economic and other values these corals provide to society, such as recreational and commercial fishing and diving services and shoreline protection services. Thus, small entities engaged in some coral reef-dependent industries would be adversely affected by the continued declines in the five corals. As a result, the no action alternative is not necessarily a ''no cost'' alternative for small entities.

The identical geographic designation alternative would designate exactly the same geography for each of the five corals (*i.e.,* 0.5 to 90 m throughout the maximum geographic extent of all the corals' ranges collectively). This alternative would likely result in the same number and complexity of consultations as the proposed rule, because collectively all of the units in the proposed rule cover the same geography as the identical geographic designation alternative. However, this alternative does not provide the appropriate conservation benefits for each species, as it would designate areas in which one particular species may not exist (*e.g., Dendrogyra cylindrus* only occupies 1 to 25 m). Therefore, we rejected the identical geographic designation alternative because it does not provide the level of conservation necessary for the five Caribbean corals. The agency seeks specific comments from small entities on its Initial Regulatory Flexibility Act analysis.

*Coastal Zone Management Act*

We have determined that this action will have no reasonably foreseeable effects on the enforceable policies of approved Florida, Puerto Rico, and USVI coastal zone management plans. Upon publication of this proposed rule, these determinations will be submitted to responsible state agencies for review under section 307 of the Coastal Zone Management Act.

*Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.)*

This proposed rule does not contain any new or revised collection of information requirements. This rule, if adopted, would not impose recordkeeping or reporting requirements on State or local governments, individuals, businesses, or organizations.

*Unfunded Mandates Reform Act (2 U.S.C. 1501 et seq.)*

This proposed rule will not produce a Federal mandate. The designation of critical habitat does not impose a legally-binding duty on non-Federal government entities or private parties. The only regulatory effect is that Federal agencies must ensure that their actions are not likely to destroy or adversely modify critical habitat under section 7 of the ESA. Non-Federal entities that receive Federal funding, assistance, permits or otherwise require approval or authorization from a Federal agency for an action may be indirectly impacted by the designation of critical habitat, but the Federal agency has the legally binding duty to avoid destruction or adverse modification of critical habitat.

We do not anticipate that this rule, if finalized, will significantly or uniquely affect small governments. Therefore, a Small Government Action Plan is not required.

*Consultation and Coordination With Indian Tribal Governments (Executive Order 13175)*

The longstanding and distinctive relationship between the Federal and tribal governments is defined by treaties, statutes, executive orders, judicial decisions, and agreements, which differentiate tribal governments from the other entities that deal with, or are affected by, the Federal Government.

This relationship has given rise to a special Federal trust responsibility involving the legal responsibilities and obligations of the United States toward Indian Tribes and with respect to Indian lands, tribal trust resources, and the exercise of tribal rights. Pursuant to these authorities, lands have been retained by Indian Tribes or have been set aside for tribal use. These lands are managed by Indian Tribes in accordance with tribal goals and objectives within the framework of applicable treaties and laws. Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, outlines the responsibilities of the Federal Government in matters affecting tribal interests.

In developing this proposed rule, we reviewed maps and did not identify any areas under consideration for critical habitat that overlap with Indian lands. Based on this, we preliminarily found the proposed critical habitat designations for threatened Caribbean corals do not have tribal implications.

*References Cited*

A complete list of all references cited in this rulemaking can be found on our website at [*https://www.fisheries.noaa.gov/action/proposed-rule-designate-critical-habitat-threatened-caribbean-corals*] and is available upon request from the NMFS SERO in St. Petersburg, Florida (see **ADDRESSES**).

**List of Subjects**

*50 CFR Part 223*

Endangered and threatened species, Exports, Imports, Transportation.

*50 CFR Part 226*

Endangered and threatened species.

Dated: September 22, 2020.

**Samuel D. Rauch III,**

*Deputy Assistant Administrator for Regulatory Programs, National Marine Fisheries Service.*

For the reasons set out in the preamble, we propose to amend 50 CFR parts 223 and 226 as follows:

## PART 223—THREATENED MARINE AND ANADROMOUS SPECIES

■ 1. The authority citation for part 223 continues to read as follows:

**Authority:** 16 U.S.C. 1531–1543; subpart B, § 223.201–202 issued under 16 U.S.C. 1361 *et seq.;* 16 U.S.C. 5503(d) for § 223.206(d)(9).

■ 2. Amend § 223.102(e), under the heading ''Corals'' by revising the entries ''Coral, boulder star''; ''Coral, lobed star''; ''Coral, mountainous star''; ''Coral, pillar''; and ''Coral, rough cactus''.

**§ 223.102 Enumeration of threatened marine and anadromous species.**

(e) * * *

| Species[1] | | | Citation(s) for listing determination(s) | Critical habitat | ESA rules |
|---|---|---|---|---|---|
| Common name | Scientific name | Description of listed entity | | | |
| **Corals** | | | | | |
| * * | * | * | * * | | * |
| Coral, boulder star | *Orbicella franksi* | Entire species | 79 FR 53852, Sept. 10, 2014 | *226.227* | NA. |
| Coral, lobed star | *Orbicella annularis* | Entire species | 79 FR 53852, Sept. 10, 2014 | *226.227* | NA. |
| Coral, mountainous star | *Orbicella faveolata* | Entire species | 79 FR 53852, Sept. 10, 2014 | *226.227* | NA. |
| Coral, pillar | *Dendrogyra cylindrus* | Entire species | 79 FR 53852, Sept. 10, 2014 | *226.227* | NA. |
| Coral, rough cactus | *Mycetophyllia ferox* | Entire species | 79 FR 53852, Sept. 10, 2014 | *226.227* | NA. |
| * * | * | * | * * | | * |

[1] Species includes taxonomic species, subspecies, distinct population segments (DPSs) (for a policy statement, see 61 FR 4722; February 7, 1996), and evolutionarily significant units (ESUs) (for a policy statement, see 56 FR 58612; November 20, 1991).

## PART 226—DESIGNATED CRITICAL HABITAT

■ 3. The authority citation for part 226 continues to read as follows:

**Authority:** 16 U.S.C. 1533.

■ 4. Add § 226.227 to read as follows:

### § 226.227 Critical habitat for the Caribbean Boulder Star Coral (*Orbicella franksi*), Lobed Star Coral (*O. annularis*), Mountainous Star Coral (*O. faveolata*), Pillar Coral (*Dendrogyra cylindrus*), and Rough Cactus Coral (*Mycetophyllia ferox*).

Critical habitat is designated in the following states and counties for the following species as depicted in the maps below and described in paragraphs (a) through (h) of this section. The maps can be viewed or obtained with greater resolution (*https://www.fisheries.noaa.gov/action/proposed-rule-designate-critical-habitat-threatened-caribbean-corals*) to enable a more precise inspection of proposed critical habitat for *Orbicella franksi, O. annularis, O. faveolata, Dendrogyra cylindrus,* and *Mycetophyllia ferox.*

(a) *Critical habitat locations.* Critical habitat is designated for the following five Caribbean corals in the following states and counties, and offshore locations:

TABLE 1 TO PARAGRAPH (a)

| Species | State—counties |
|---|---|
| *Orbicella annularis* | FL—Palm Beach, Broward, Miami-Dade, and Monroe.<br>PR—All.<br>USVI—All.<br>Flower Garden Banks.<br>Navassa Island. |
| *O. faveolata* | FL—Martin, Palm Beach, Broward, Miami-Dade, and Monroe.<br>PR—All.<br>USVI—All.<br>Flower Garden Banks.<br>Navassa Island. |
| *O. franksi* | FL—Palm Beach, Broward, Miami-Dade, and Monroe.<br>PR—All.<br>USVI—All.<br>Flower Garden Banks.<br>Navassa Island. |
| *Dendrogyra cylindrus* | FL—Palm Beach, Broward, Miami-Dade, and Monroe.<br>PR—All.<br>USVI—All.<br>Navassa Island. |
| *Mycetophyllia ferox* | FL—Broward, Miami-Dade, and Monroe.<br>PR—All.<br>USVI—All.<br>Navassa Island. |

(b) *Critical habitat boundaries.* Except as noted in paragraphs (d) and (e) of this section, critical habitat for the five Caribbean corals is defined as all marine waters in the particular depth ranges relative to mean low water as depicted in the maps below and described in the Table of the locations of the critical habitat units for *Orbicella franksi, O. annularis, O. faveolata, Dendrogyra cylindrus,* and *Mycetophyllia ferox.* Depth contours or other identified boundaries on the maps form the boundaries of the critical habitat units. Specifically, the COLREGS Demarcation Lines (33 CFR 80), the boundary between the South Atlantic Fishery Management Council (SAFMC) and the Gulf of Mexico Fishery Management Council (GMFMC; 50 CFR 600.105), the Florida Keys National Marine Sanctuary (15 CFR part 922 subpart P, appendix I), and the Caribbean Island Management Area (50 CFR part 622, appendix E), create portions of the boundaries in several units.

TABLE 2 TO PARAGRAPH (c)—TABLE OF THE LOCATIONS OF THE CRITICAL HABITAT UNITS FOR ORBICELLA FRANKSI, O. ANNULARIS, O. FAVEOLATA, DENDROGYRA CYLINDRUS, AND MYCETOPHYLLIA FEROX

| Species | Critical habitat unit name | Location | Geographic extent | Water depth range |
|---|---|---|---|---|
| *Orbicella annularis* | OANN–1 | Florida | Lake Worth Inlet, Palm Beach County to Government Cut, Miami-Dade County. | 2–20 m, (6.5–65.6 ft). |
| | | Florida | Government Cut, Miami-Dade County to Dry Tortugas | 0.5–20m, (1.6–65.6 ft). |
| | OANN–2 | Puerto Rico | All islands | 0.5–20m, (1.6–65.6 ft). |
| | OANN–3 | USVI | All islands of St. Thomas and St. John | 0.5–20m, (1.6–65.6 ft). |
| | OANN–4 | USVI | All islands of St. Croix | 0.5–20m, (1.6–65.6 ft). |
| | OANN–5 | Navassa | Navassa Island | 0.5–20m, (1.6–65.6 ft). |
| | OANN–6 | FGB | East Flower Garden Bank and West Flower Garden Bank. | 17–90 m, (55–295 ft). |
| *Orbicella faveolata* | OFAV–1 | Florida | St. Lucie Inlet, Martin County to Government Cut, Miami-Dade County. | 2–90 m, (6.5–295 ft). |
| | | Florida | Government Cut, Miami-Dade County to Dry Tortugas | 0.5–90 m, (1.6–295 ft). |
| | OFAV–2 | Puerto Rico | All islands of Puerto Rico | 0.5–90 m, (1.6–295 ft). |

TABLE 2 TO PARAGRAPH (c)—TABLE OF THE LOCATIONS OF THE CRITICAL HABITAT UNITS FOR ORBICELLA FRANKSI, O. ANNULARIS, O. FAVEOLATA, DENDROGYRA CYLINDRUS, AND MYCETOPHYLLIA FEROX—Continued

| Species | Critical habitat unit name | Location | Geographic extent | Water depth range |
|---|---|---|---|---|
| | OANN–3 | USVI | All islands of St. Thomas and St. John | 0.5–90 m, (1.6–295 ft). |
| | OFAV–4 | USVI | All islands of St. Croix | 0.5–90 m, (1.6–295 ft). |
| | OFAV–5 | Navassa | Navassa Island | 0.5–90 m, (1.6–295 ft). |
| | OFAV–6 | FGB | East Flower Garden Bank and West Flower Garden Bank. | 17–90 m, (55–295 ft). |
| *Orbicella franksi* | OFRA–1 | Florida | St. Lucie Inlet, Martin County to Government Cut, Miami-Dade County. | 2–90 m, (6.5–295 ft). |
| | | Florida | Government Cut, Miami-Dade County to Dry Tortugas | 0.5–90 m, (1.6–295 ft). |
| | OFRA–2 | Puerto Rico | All islands of Puerto Rico | 0.5–90 m, (1.6–295 ft). |
| | OFRA–3 | USVI | All islands of St. Thomas and St. John | 0.5–90 m, (1.6–295 ft). |
| | OFRA–4 | USVI | All islands of St. Croix | 0.5–90 m, (1.6–295 ft). |
| | OFRA–5 | Navassa | Navassa Island | 0.5–90 m, (1.6–295 ft). |
| | OFRA–6 | FGB | East Flower Garden Bank and West Flower Garden Bank. | 17–90 m, (55–295 ft). |
| *Dendrogyra cylindrus* | DCYL–1 | Florida | Lake Worth Inlet, Palm Beach County to Government Cut, Miami-Dade County. | 2–25 m, (6.5–82 ft). |
| | | Florida | Government Cut, Miami-Dade County to Dry Tortugas | 1–25 m, (3.3–82 ft). |
| | DCYL–2 | Puerto Rico | All islands | 1–25 m, (3.3–82 ft). |
| | DCYL–3 | USVI | All islands of St. Thomas and St. John | 1–25 m, (3.3–82 ft).) |
| | DCYL–4 | USVI | All islands of St. Croix | 1–25 m, (3.3–82 ft). |
| | DCYL–5 | Navassa | Navassa Island | 1–25 m, (3.3–82 ft)). |
| *Mycetophyllia ferox* | MFER–1 | Florida | Broward County to Dry Tortugas | 5–90 m, (16.4–295 ft). |
| | MFER–2 | Puerto Rico | All islands of Puerto Rico | 5–90 m, (16.4–295 ft). |
| | MFER–3 | USVI | All islands of St. Thomas and St. John | 5–90 m, (16.4–295 ft). |
| | MFER–4 | USVI | All islands of St. Croix | 5–90 m, (16.4–295 ft). |
| | MFER–5 | Navassa | Navassa Island | 5–90 m, (16.4–295 ft). |

(c) *Essential feature.* The feature essential to the conservation of *Orbicella franksi, O. annularis, O. faveolata, Dendrogyra cylindrus,* and *Mycetophyllia ferox* is: Reproductive, recruitment, growth, and maturation habitat. Sites that support the normal function of all life stages of threatened corals are natural, consolidated hard substrate or dead coral skeleton, which is free of algae and sediment at the appropriate scale at the point of larval settlement or fragment reattachment, and the associated water column. Several attributes of these sites determine the quality of the area and influence the value of the associated feature to the conservation of the species:

(1) Substrate with the presence of crevices and holes that provide cryptic habitat, the presence of microbial biofilms, or presence of crustose coralline algae;

(2) Reefscape with no more than a thin veneer of sediment and low occupancy by fleshy and turf macroalgae;

(3) Marine water with levels of temperature, aragonite saturation, nutrients, and water clarity that have been observed to support any demographic function; and

(4) Marine water with levels of anthropogenically-introduced (from humans) chemical contaminants that do not preclude or inhibit any demographic function.

(d) *Areas not included in critical habitat.* Critical habitat does not include the following particular areas where they overlap with the areas described in paragraphs (a) through (c) of this section:

(1) Pursuant to ESA section 4(a)(3)(B), all areas subject to the 2014 Naval Air Station Key West Integrated Natural Resources Management Plan.

(2) Pursuant to ESA section 3(5)(A)(i)(I), areas where the essential feature does not occur;

(3) Pursuant to ESA section 3(5)(A)(i)(I), all managed areas that may contain natural hard substrate but do not provide the quality of substrate essential for the conservation of threatened corals. Managed areas that do not provide the quality of substrate essential for the conservation of the five Caribbean corals are defined as particular areas whose consistently disturbed nature renders them poor habitat for coral growth and survival over time. These managed areas include specific areas where the substrate has been disturbed by planned management authorized by local, state, or Federal governmental entities at the time of critical habitat designation, and will continue to be periodically disturbed by such management. Examples include, but are not necessarily limited to, dredged navigation channels, shipping basins, vessel berths, and active anchorages. Specific federally-authorized channels and harbors considered as managed areas not included in the designations are:

(i) St. Lucie Inlet.
(ii) Palm Beach Harbor.
(iii) Hillsboro Inlet.
(iv) Port Everglades.
(v) Baker's Haulover Inlet.
(vi) Miami Harbor.
(vii) Key West Harbor.
(viii) Arecibo Harbor.
(ix) San Juan Harbor.
(x) Fajardo Harbor.
(xi) Ponce Harbor.
(xii) Mayaguez Harbor.
(xiii) St. Thomas Harbor.
(xiv) Christiansted Harbor.

(4) Pursuant to ESA section 3(5)(A)(i), artificial substrates including but not limited to: Fixed and floating structures, such as aids-to-navigation (AToNs), seawalls, wharves, boat ramps, fishpond walls, pipes, submarine cables, wrecks, mooring balls, docks, and aquaculture cages.

(e) *Areas excluded from critical habitat.* Pursuant to ESA Section 4(b)(2), the following area is excluded from critical habitat where it overlaps with the areas described in paragraphs (a) through (c) of this section: The designated restricted area managed by the South Florida Ocean Measuring Facility, defined in 33 CFR 334.580.

(f) *Maps.* Critical habitat maps for the Caribbean Boulder Star Coral, Lobed Star Coral, Mountainous Star Coral, Pillar Coral, and Rough Cactus Coral:

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Figure 1 to paragraph (f)

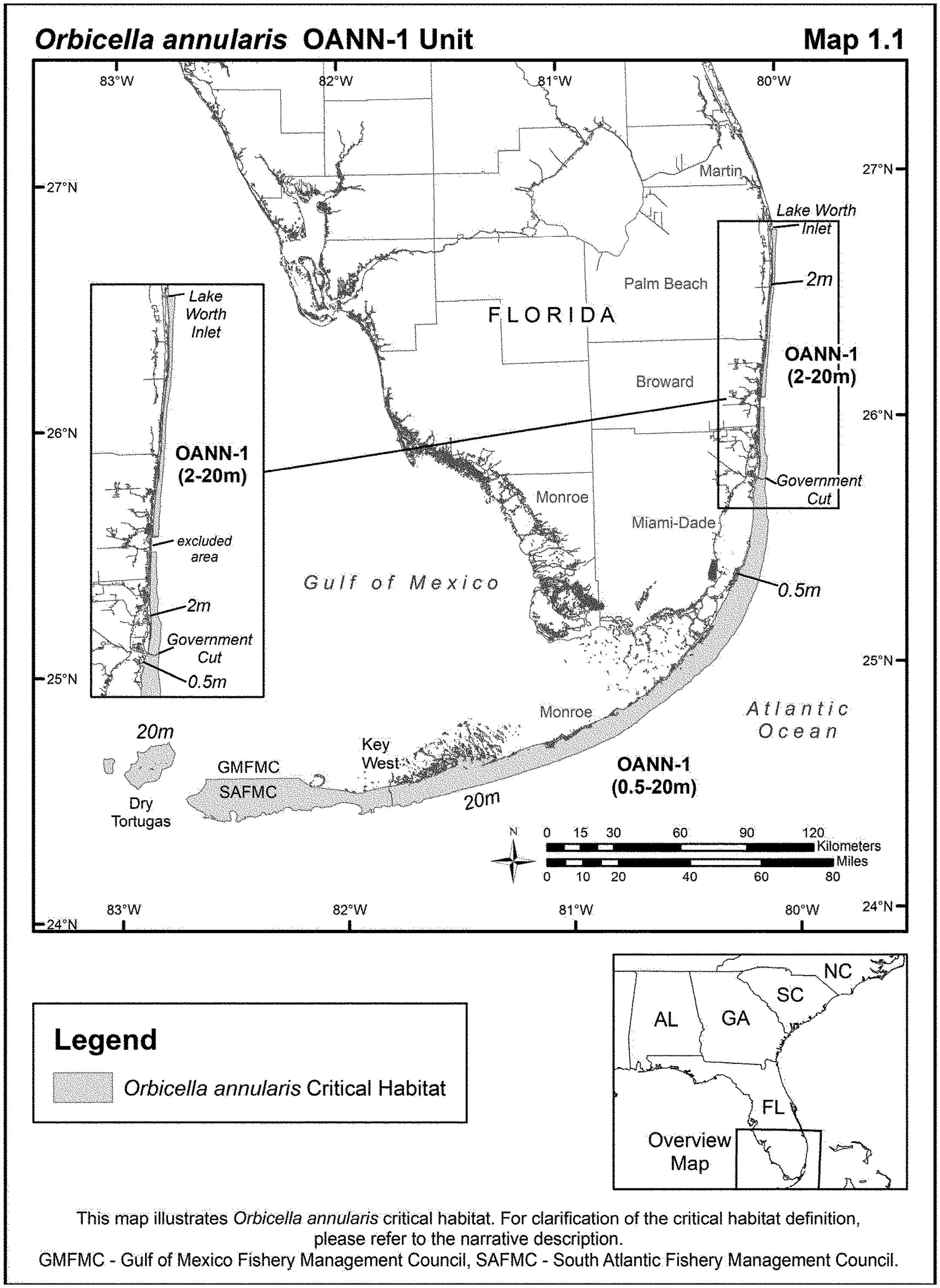
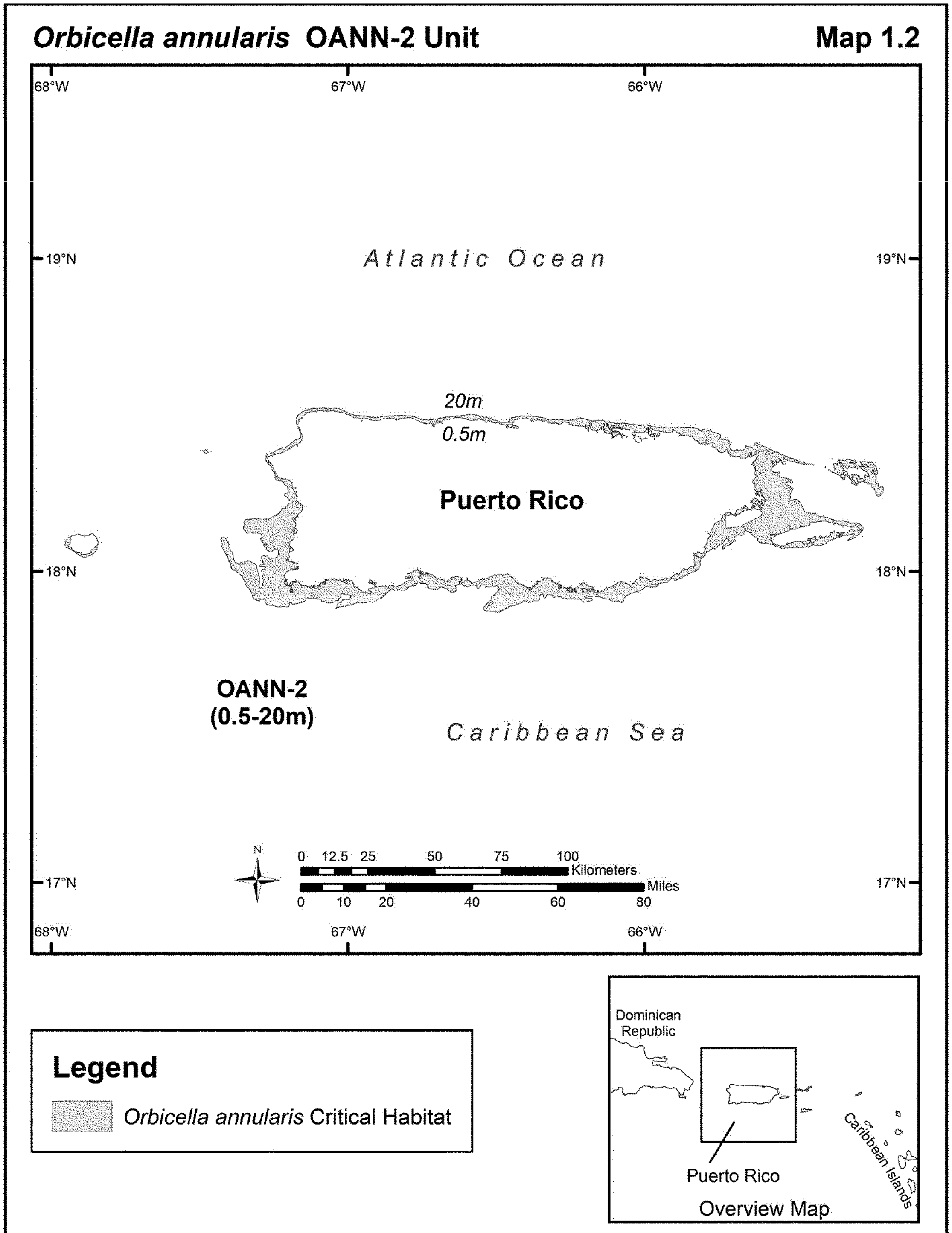


Figure 2 to paragraph (f)




This map illustrates *Orbicella annularis* critical habitat. For clarification of the critical habitat definition, please refer to the narrative description.

Figure 3 to paragraph (f)

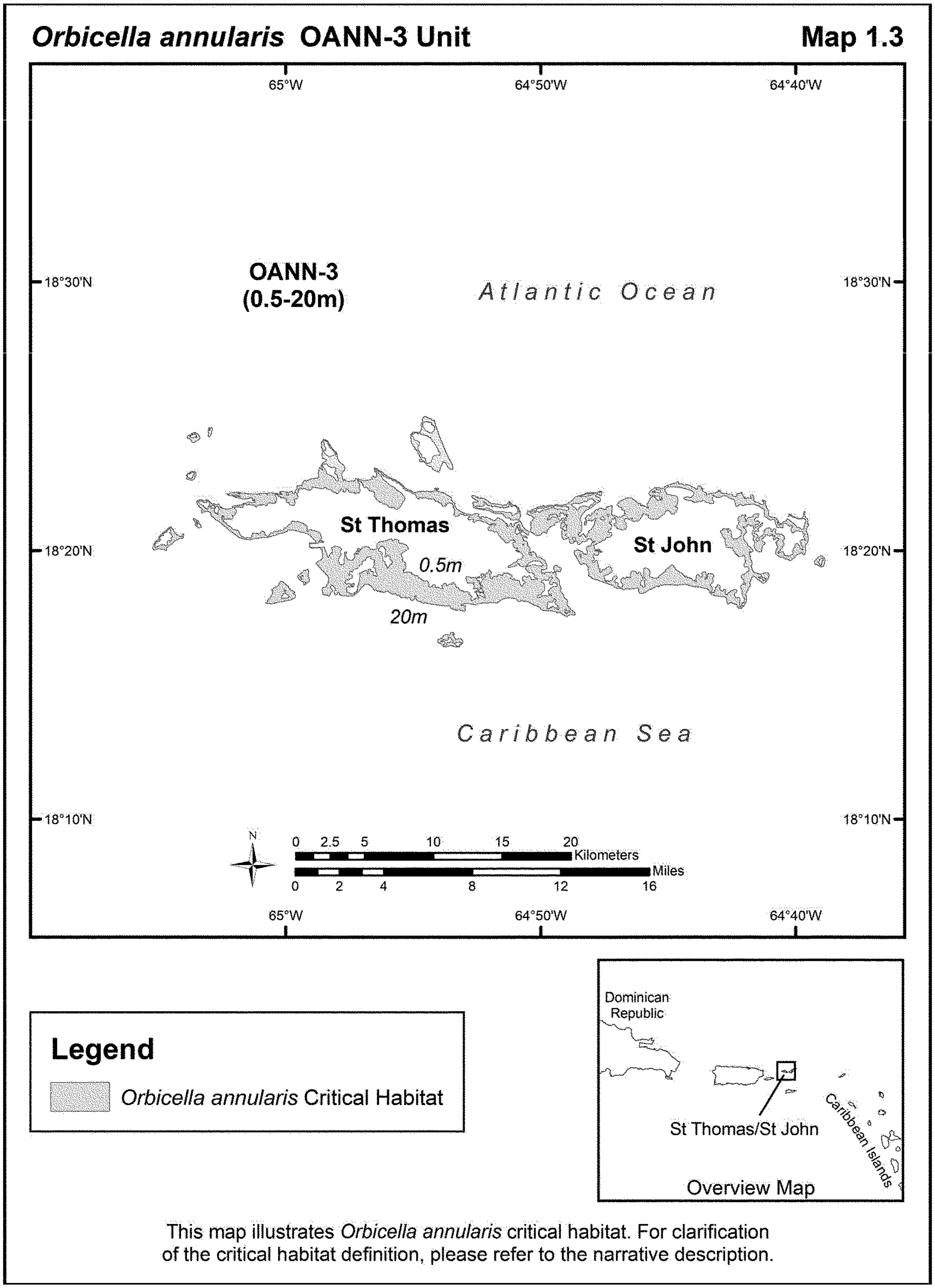


Figure 4 to paragraph (f)

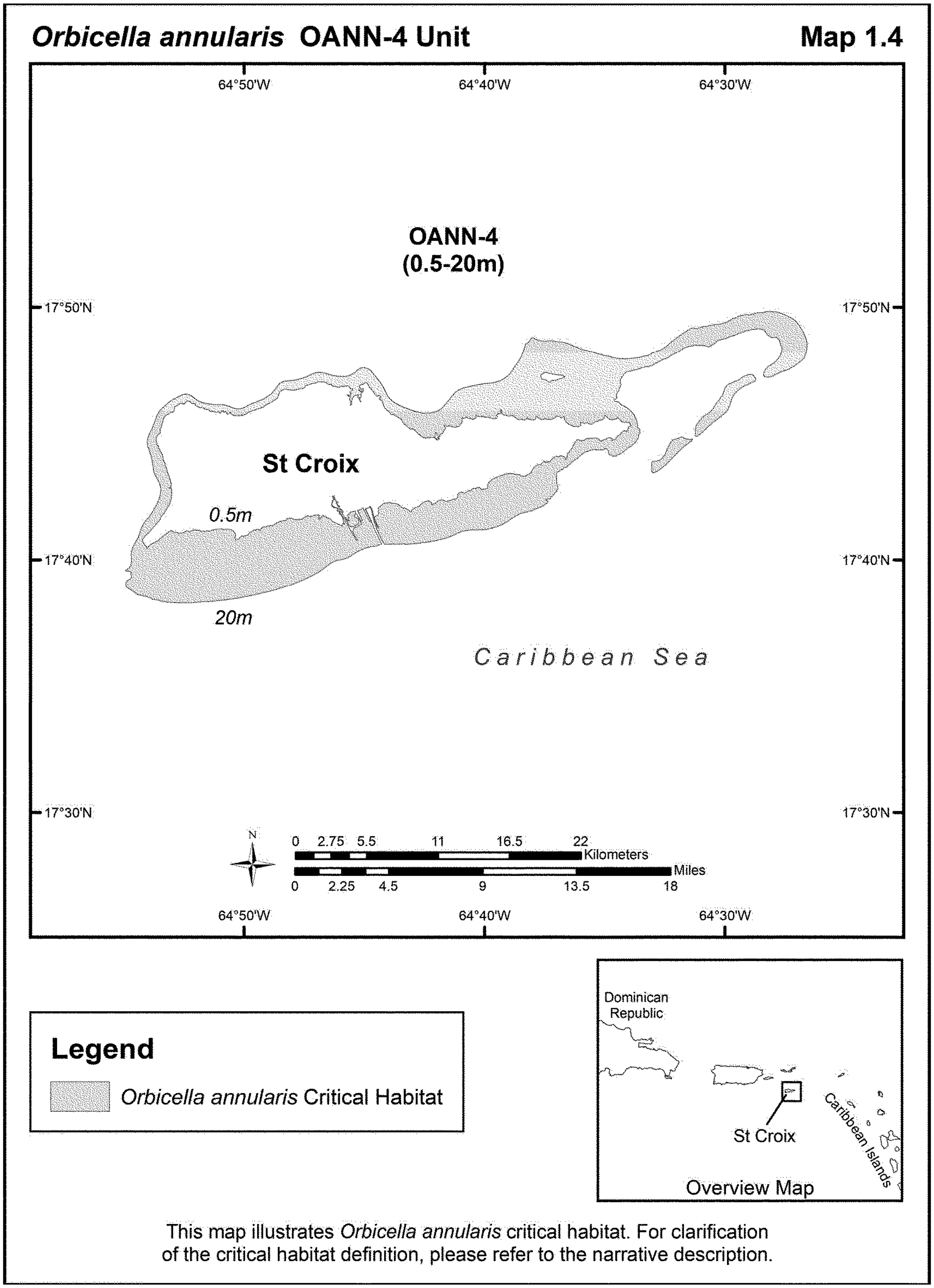


Figure 5 to paragraph (f)

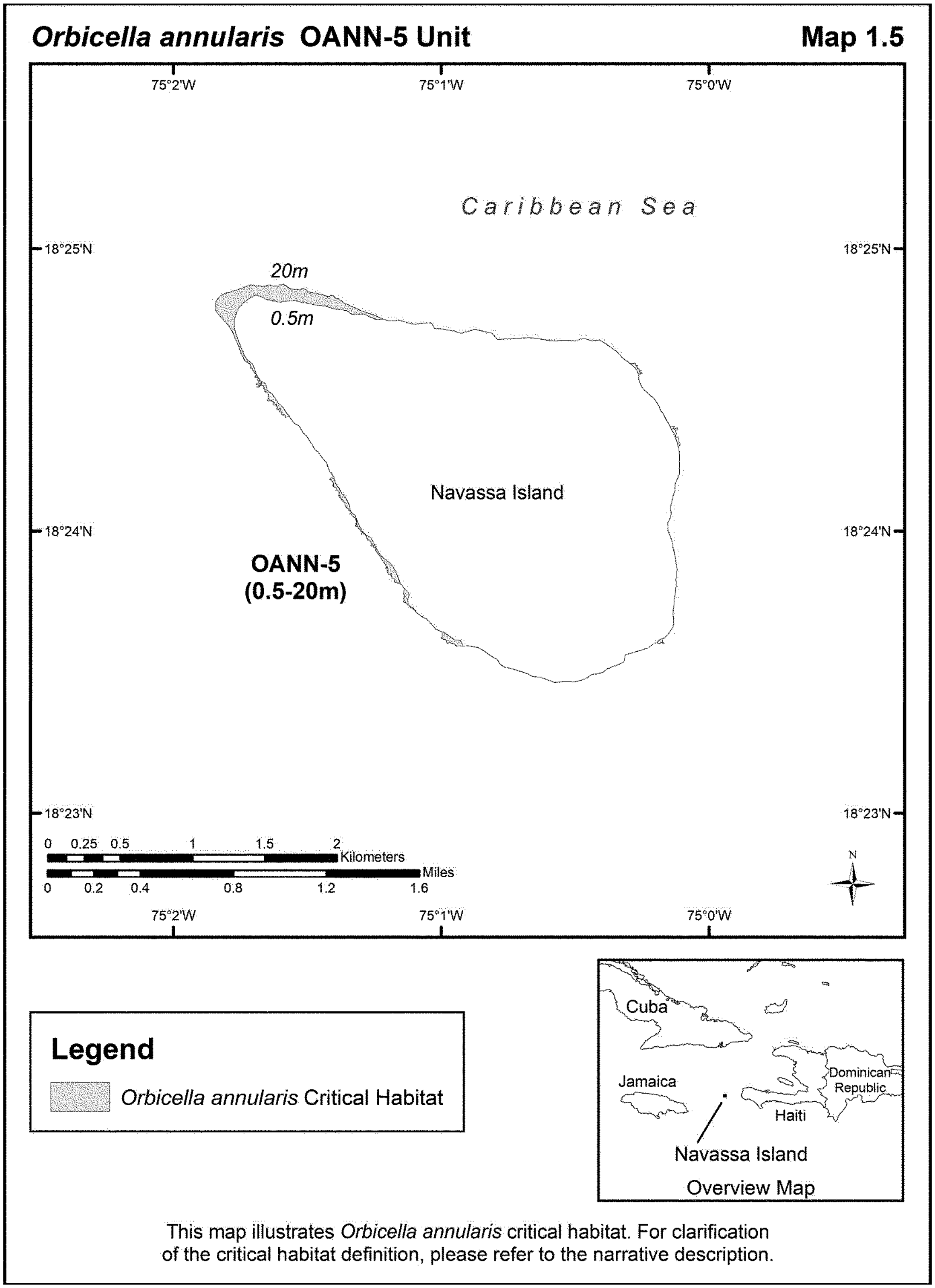


Figure 6 to paragraph (f)

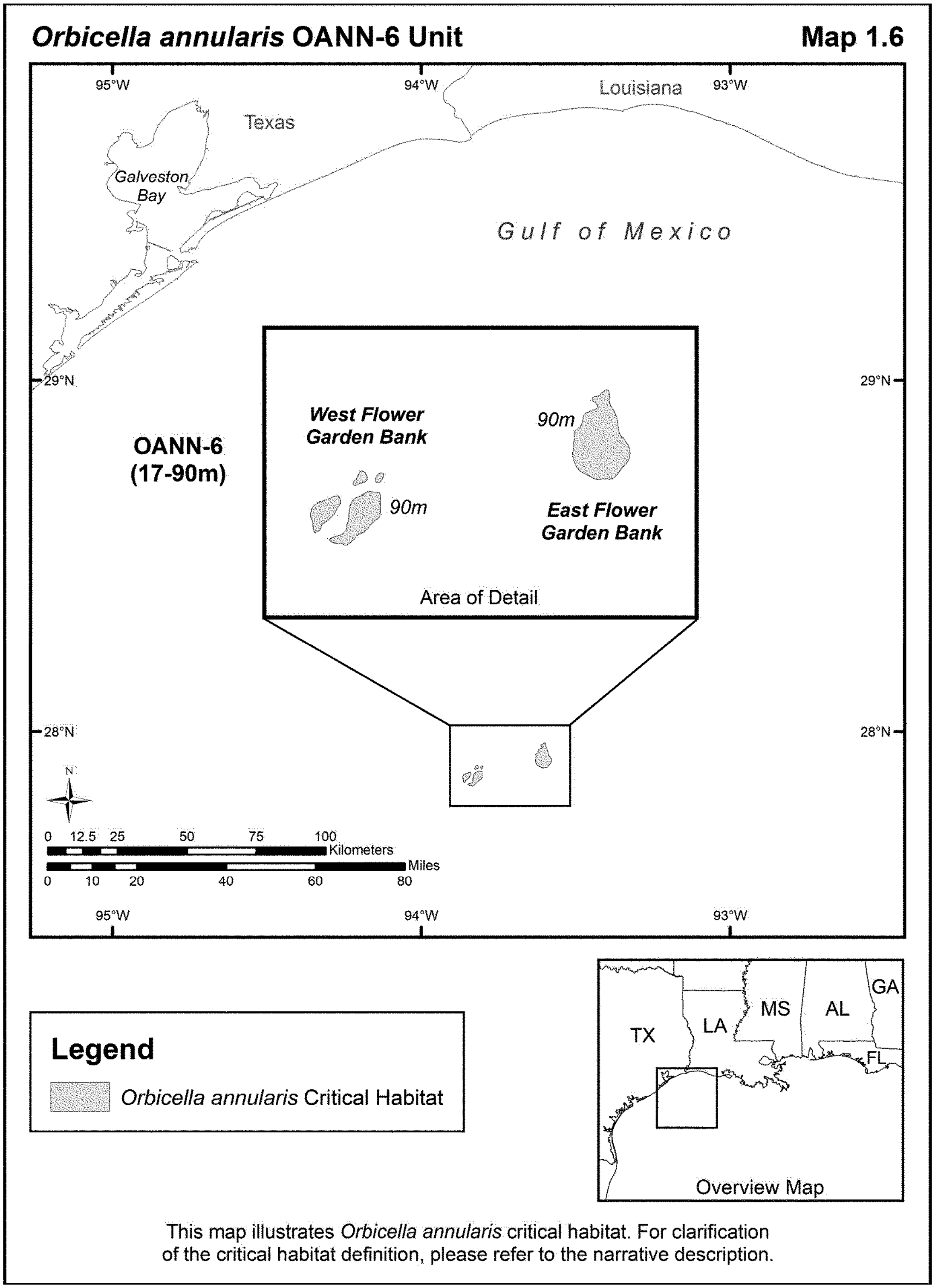


Figure 7 to paragraph (f)

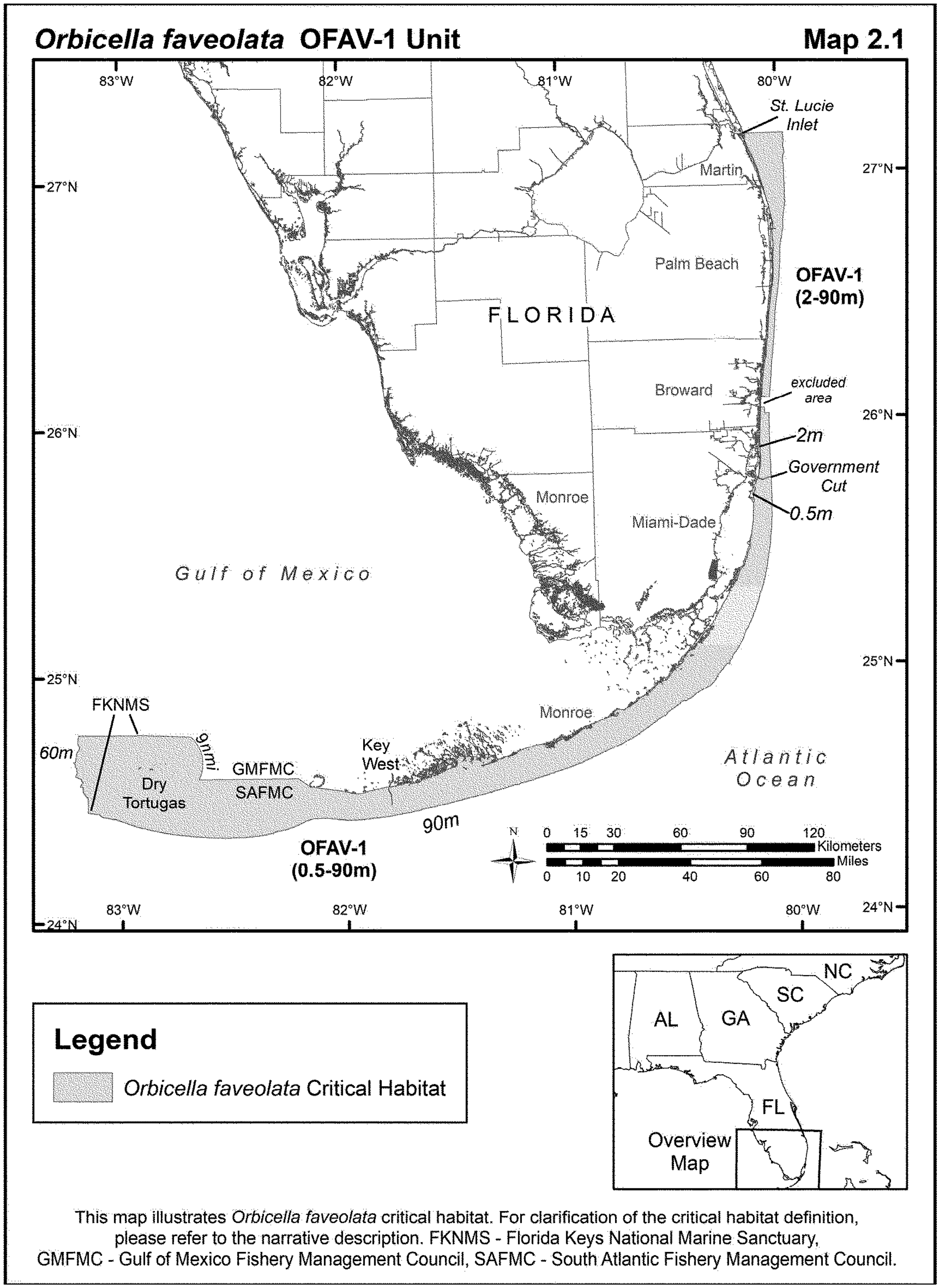


Figure 8 to paragraph (f)

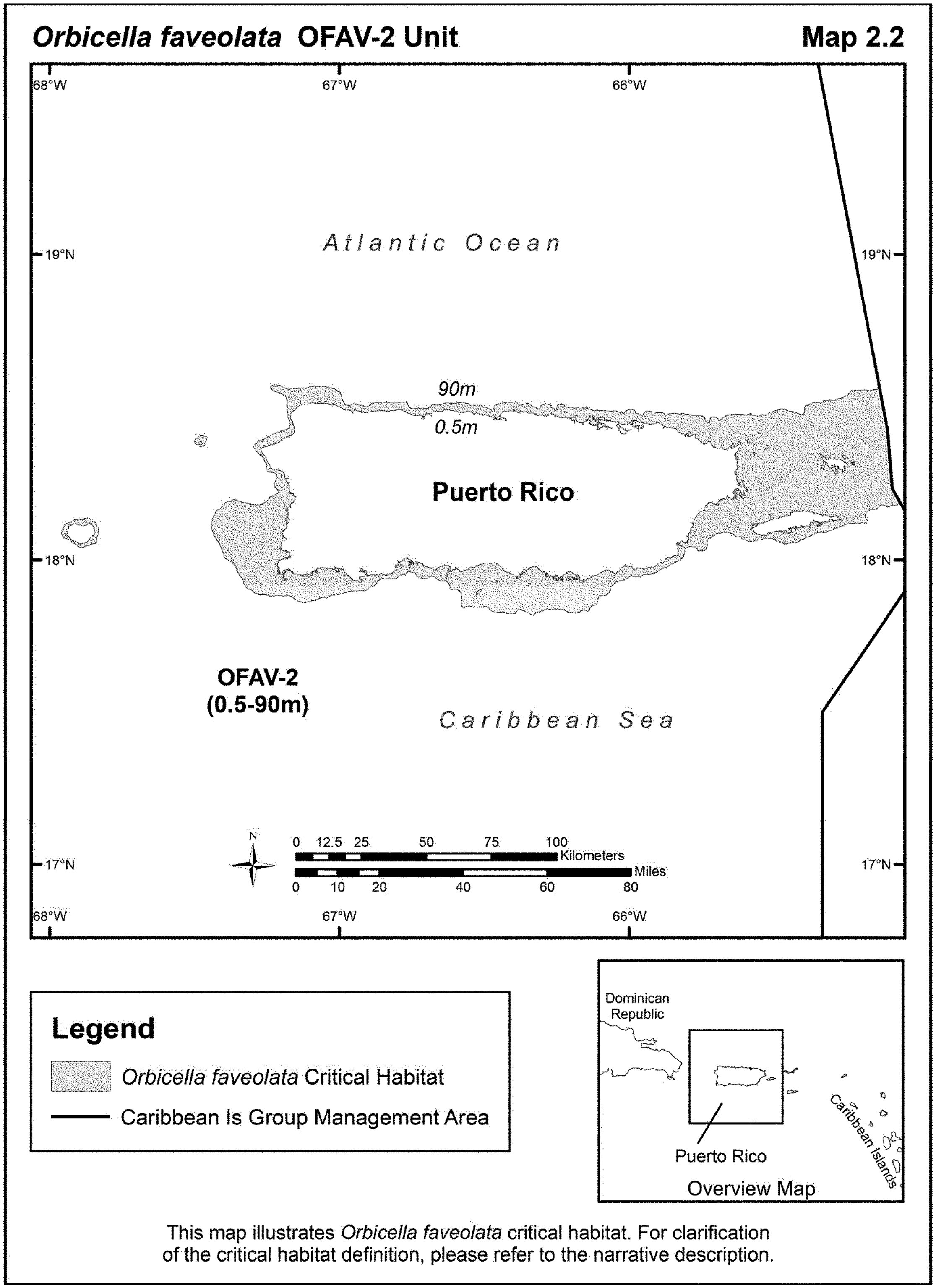


Figure 9 to paragraph (f)

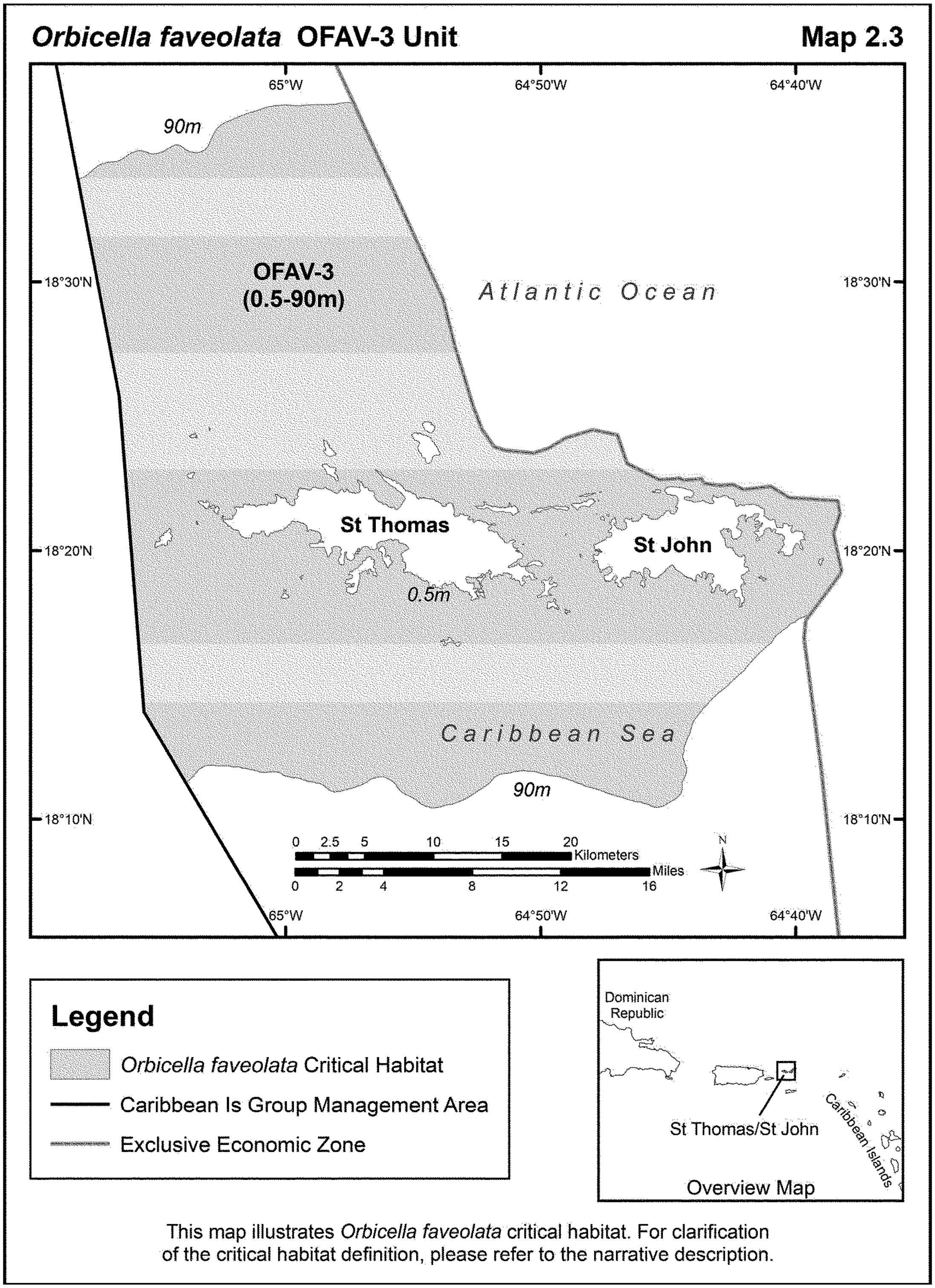


Figure 10 to paragraph (f)

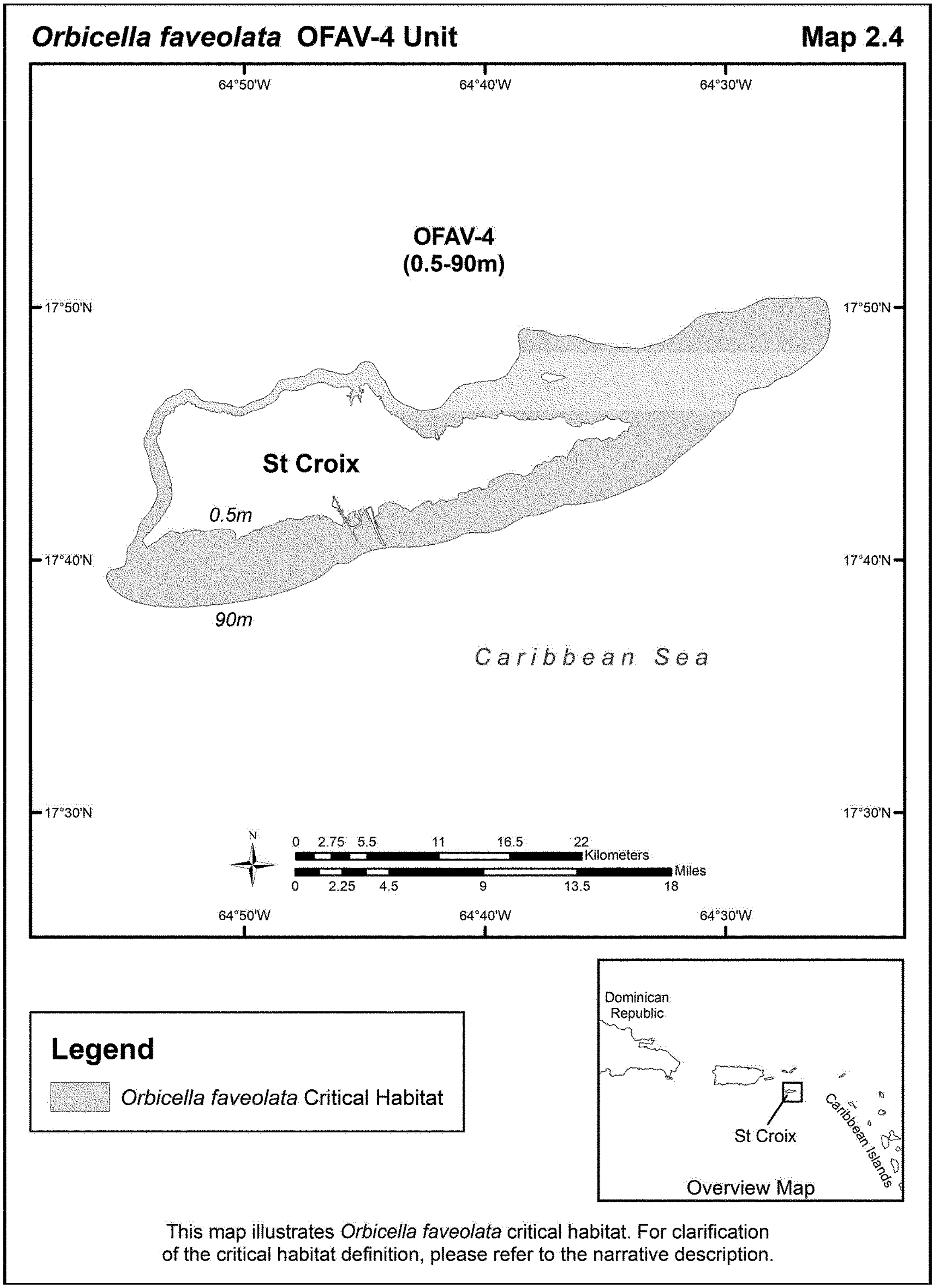


Figure 11 to paragraph (f)

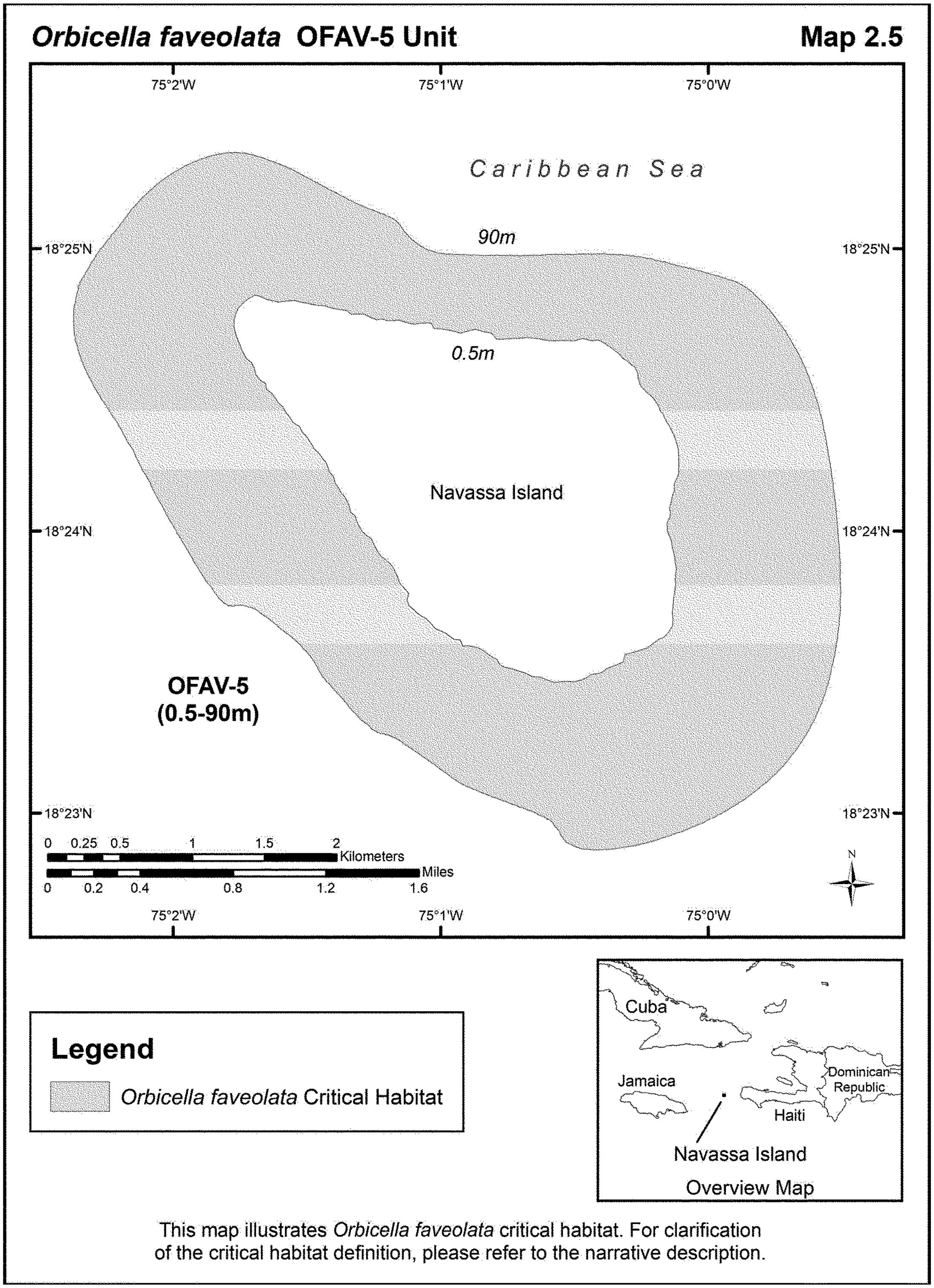


Figure 12 to paragraph (f)

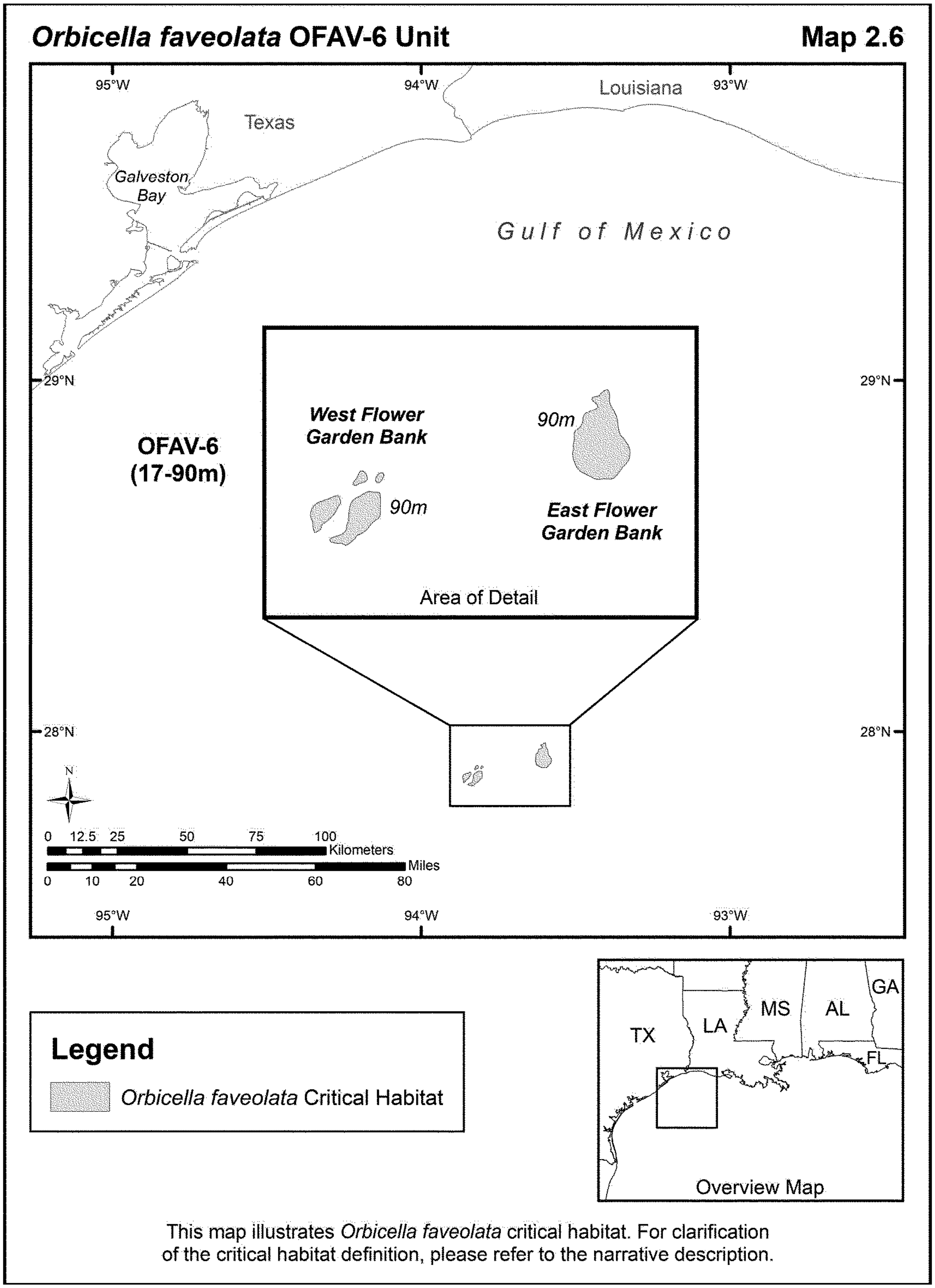


Figure 13 to paragraph (f)

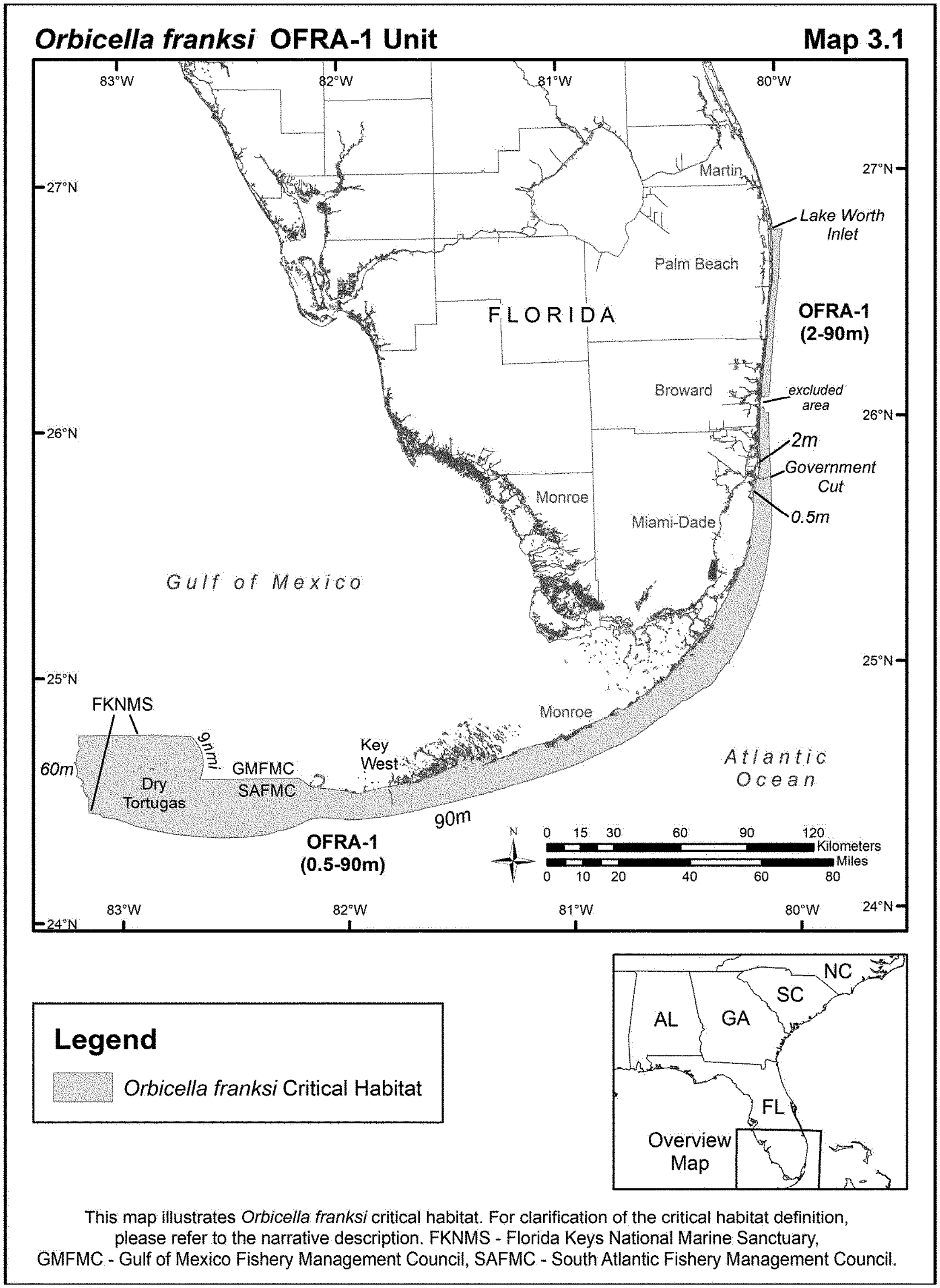
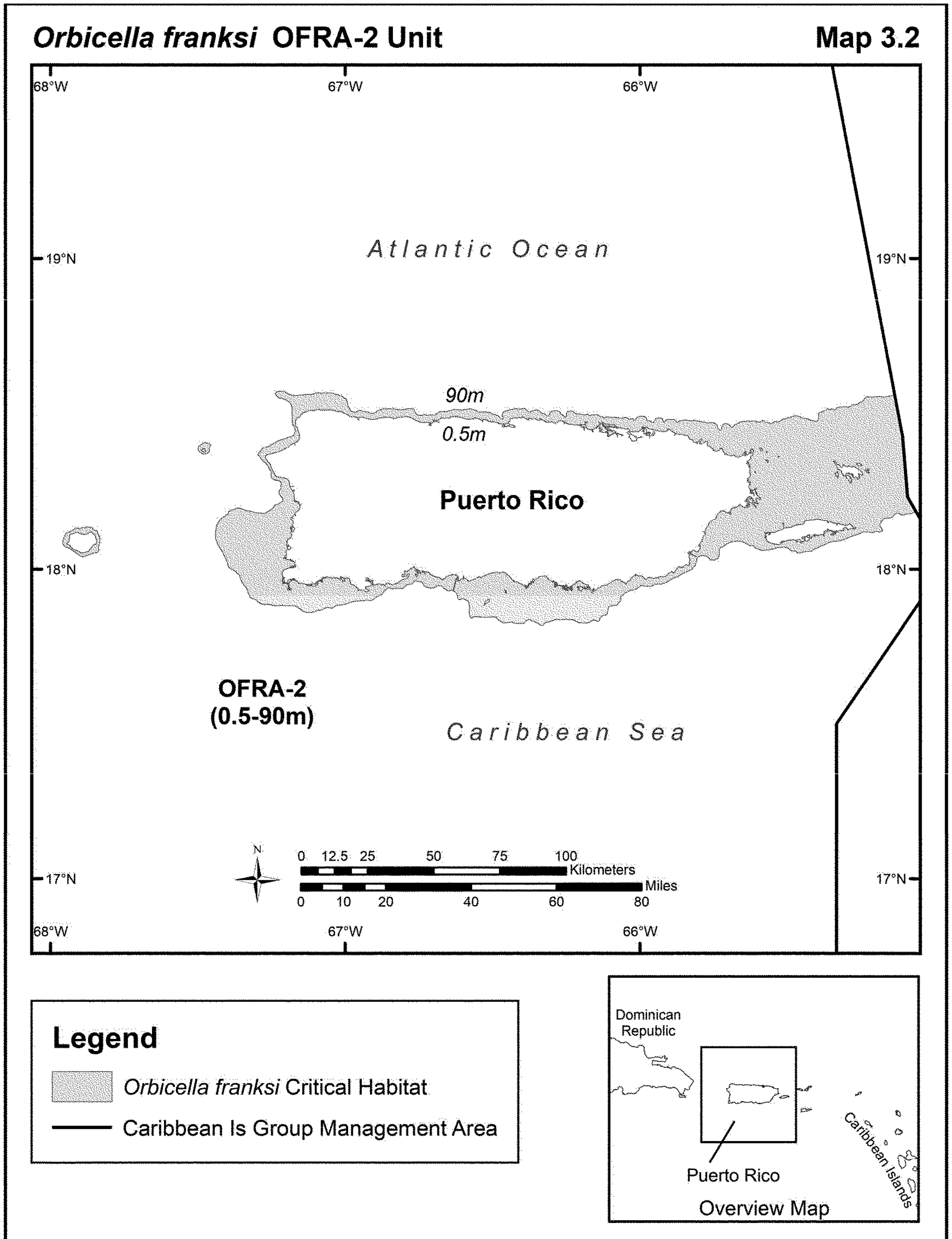
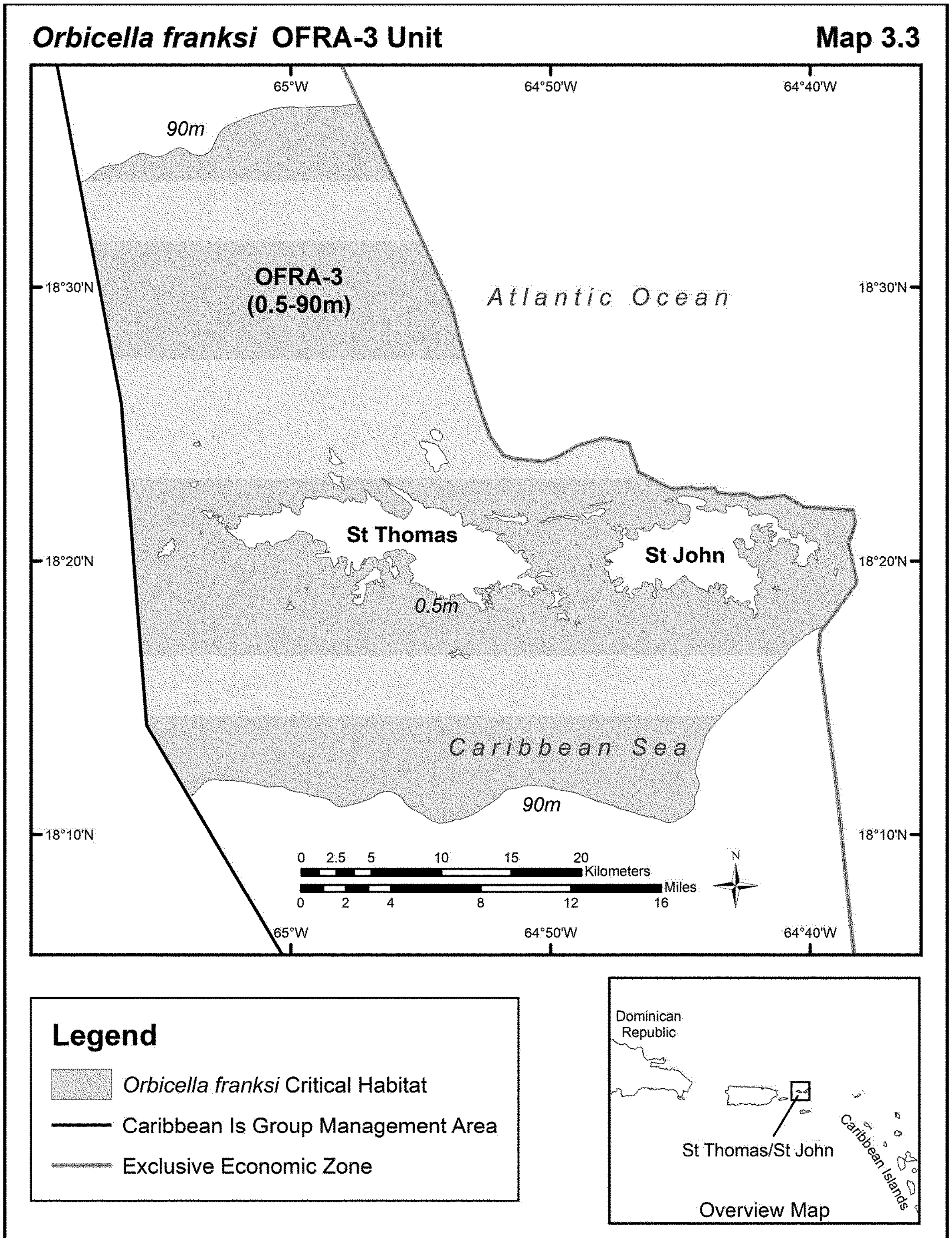


Figure 14 to paragraph (f)



This map illustrates *Orbicella franksi* critical habitat. For clarification of the critical habitat definition, please refer to the narrative description.

Figure 15 to paragraph (f)




This map illustrates *Orbicella franksi* critical habitat. For clarification of the critical habitat definition, please refer to the narrative description.

Figure 16 to paragraph (f)

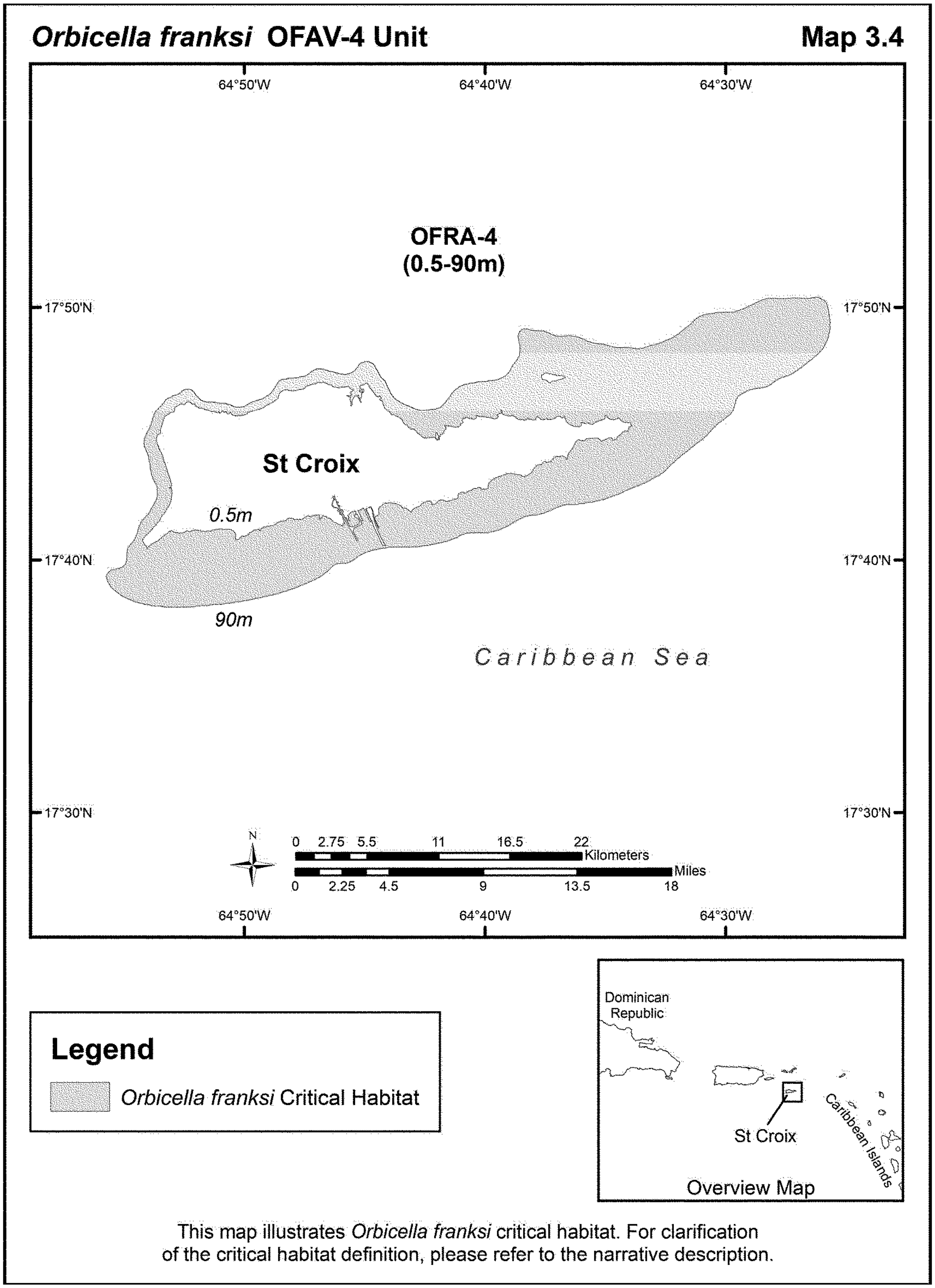


Figure 17 to paragraph (f)

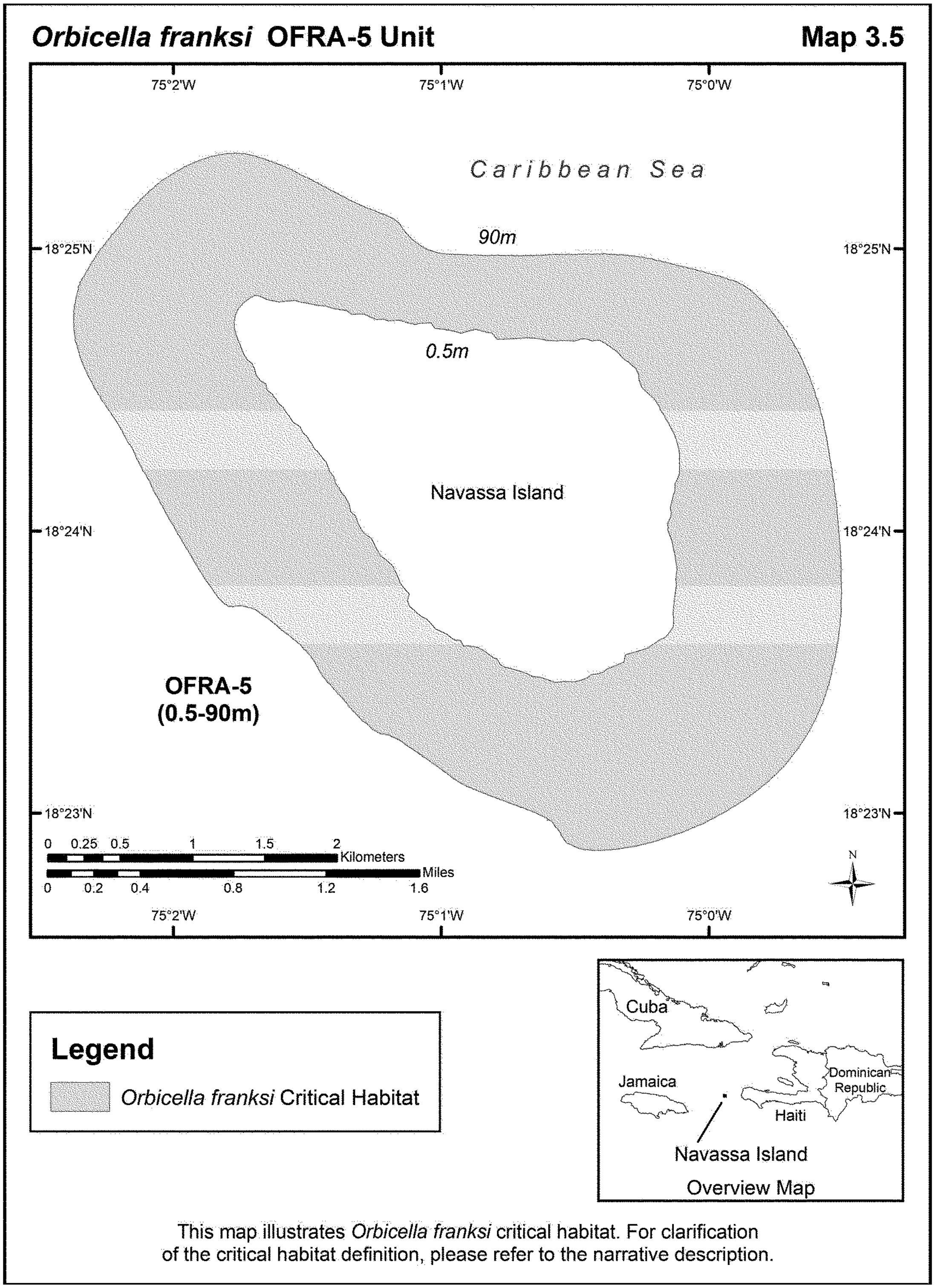


Figure 18 to paragraph (f)

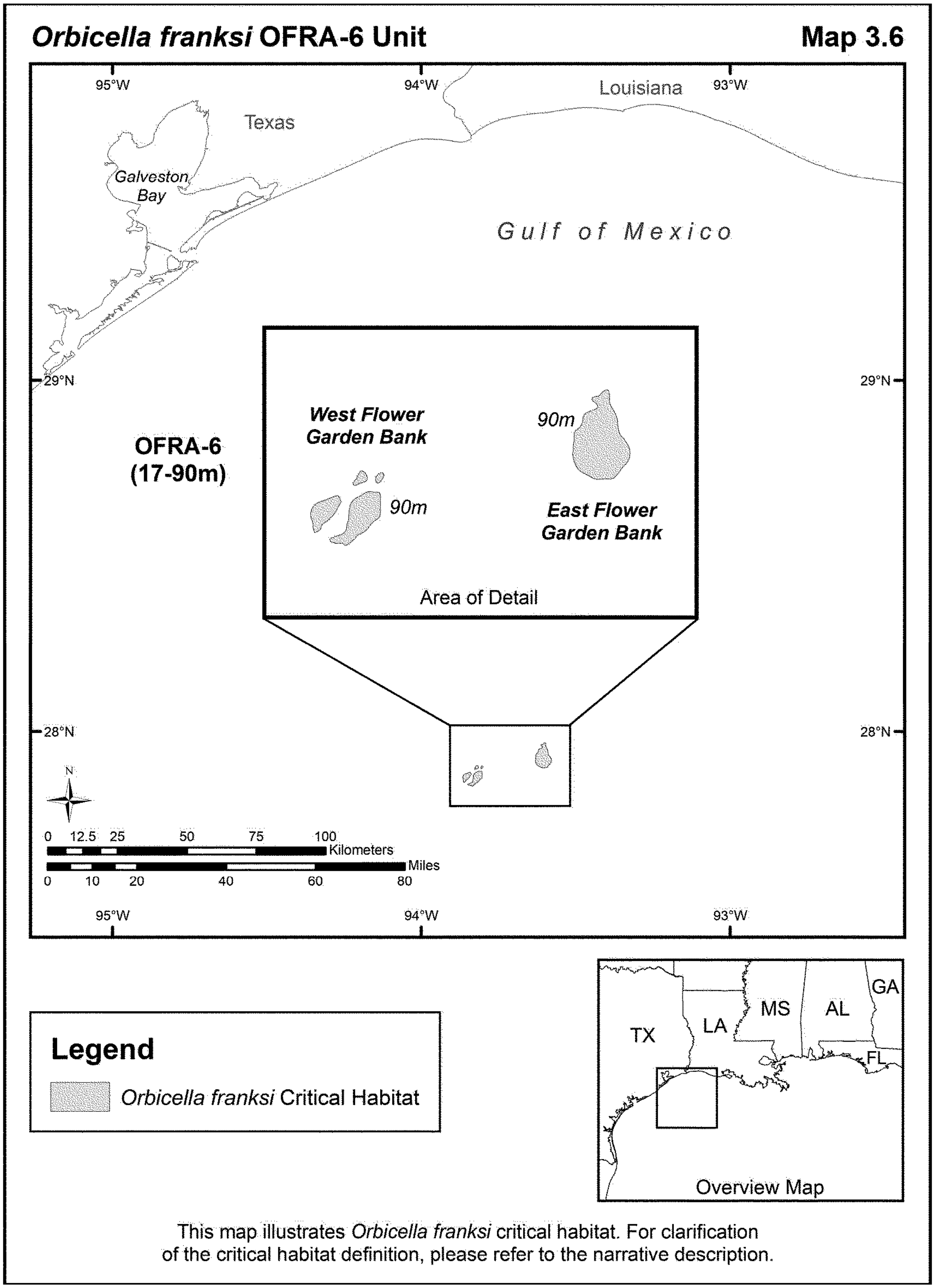


Figure 19 to paragraph (f)

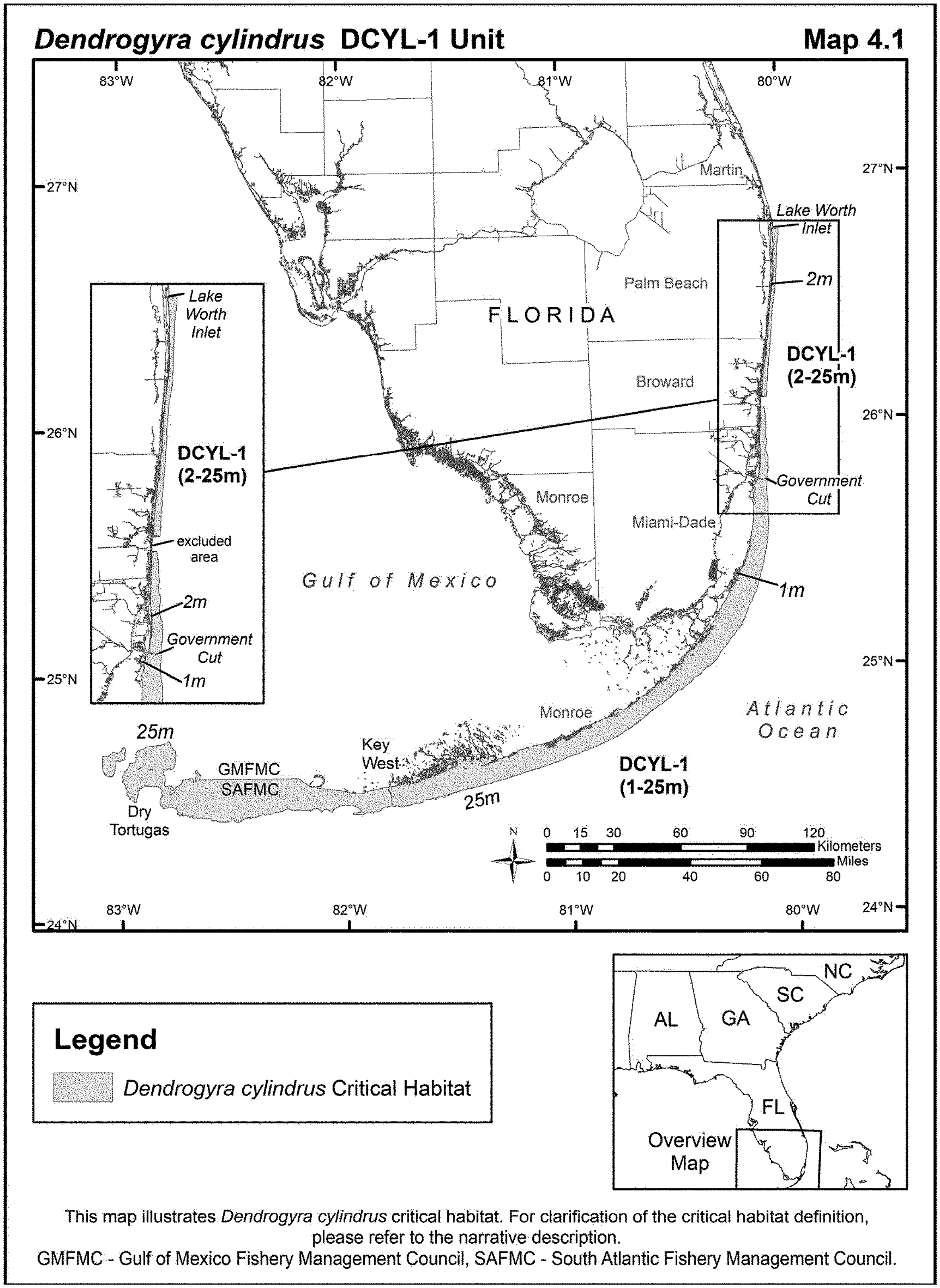
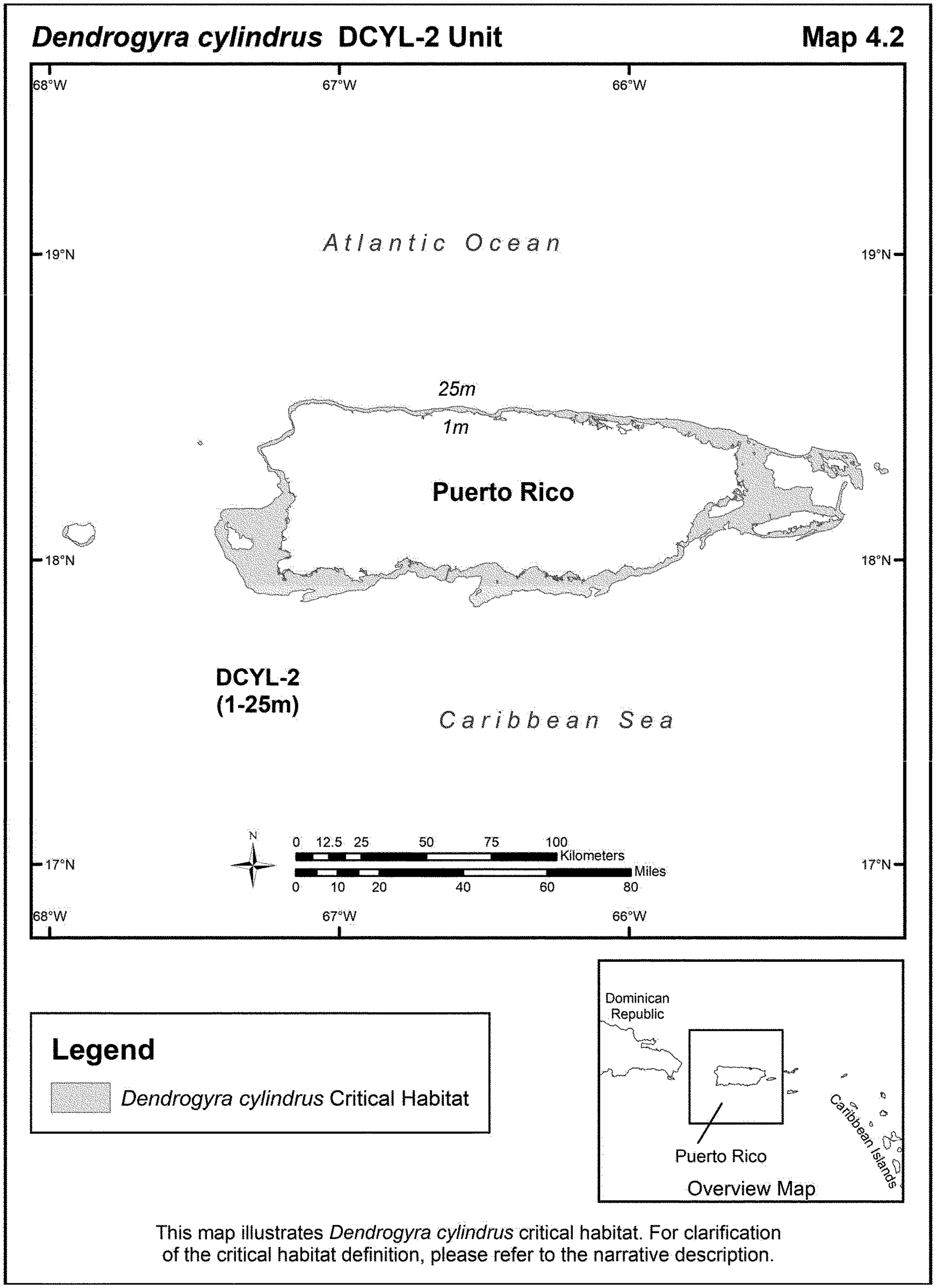
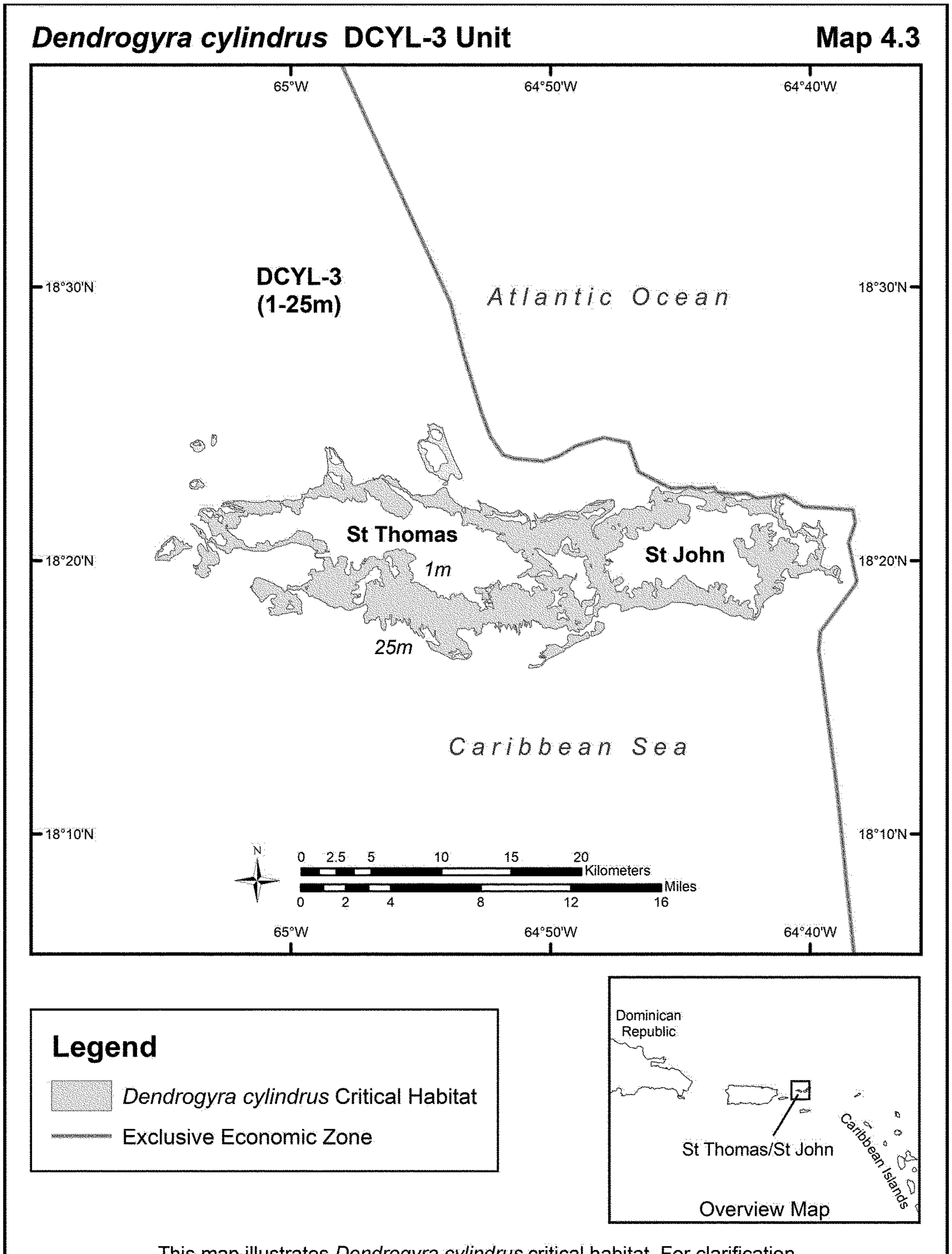


Figure 20 to paragraph (f)




This map illustrates *Dendrogyra cylindrus* critical habitat. For clarification of the critical habitat definition, please refer to the narrative description.

Figure 21 to paragraph (f)




This map illustrates *Dendrogyra cylindrus* critical habitat. For clarification of the critical habitat definition, please refer to the narrative description.

Figure 22 to paragaph (f)

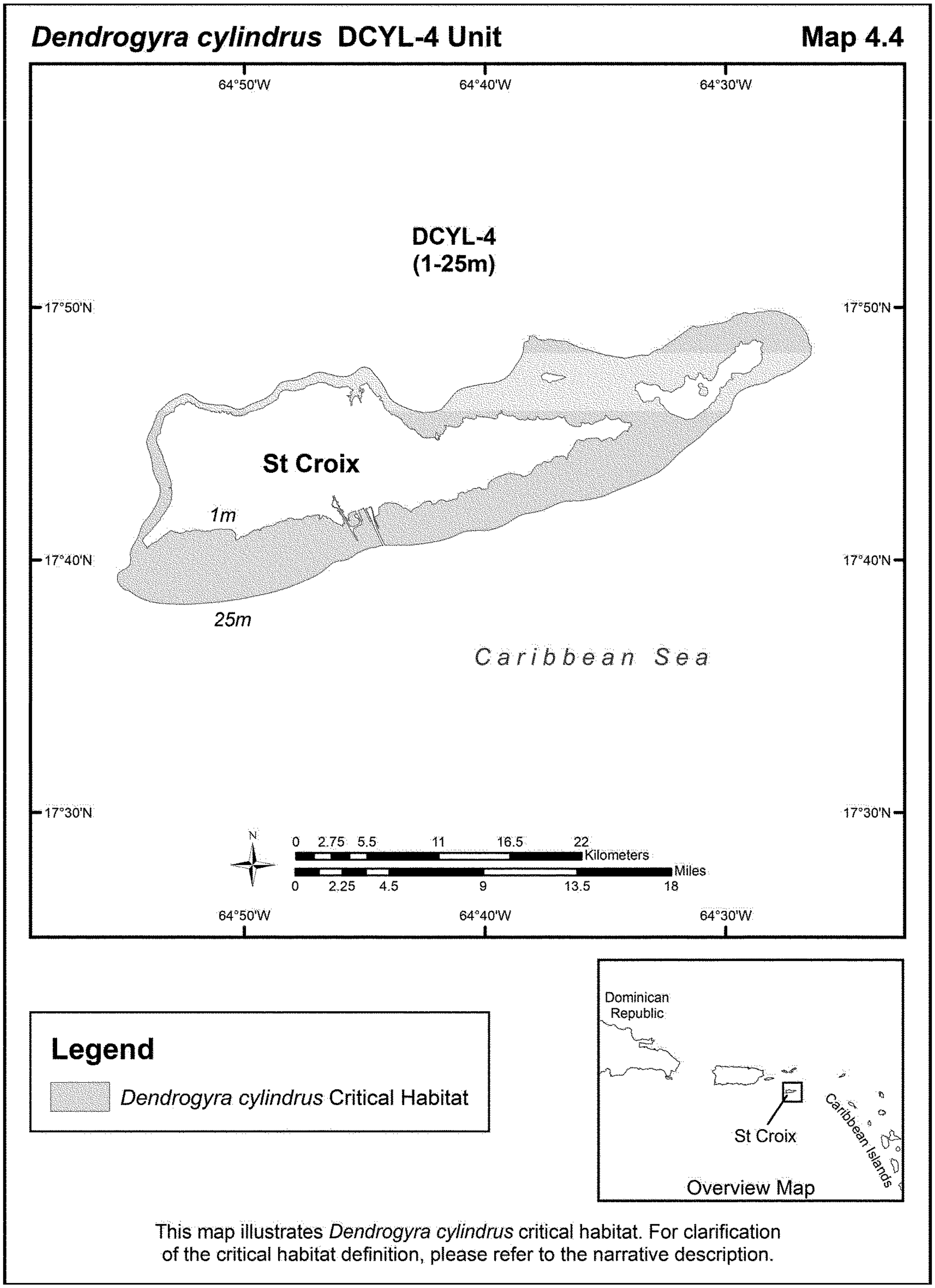


Figure 23 to paragraph (f)

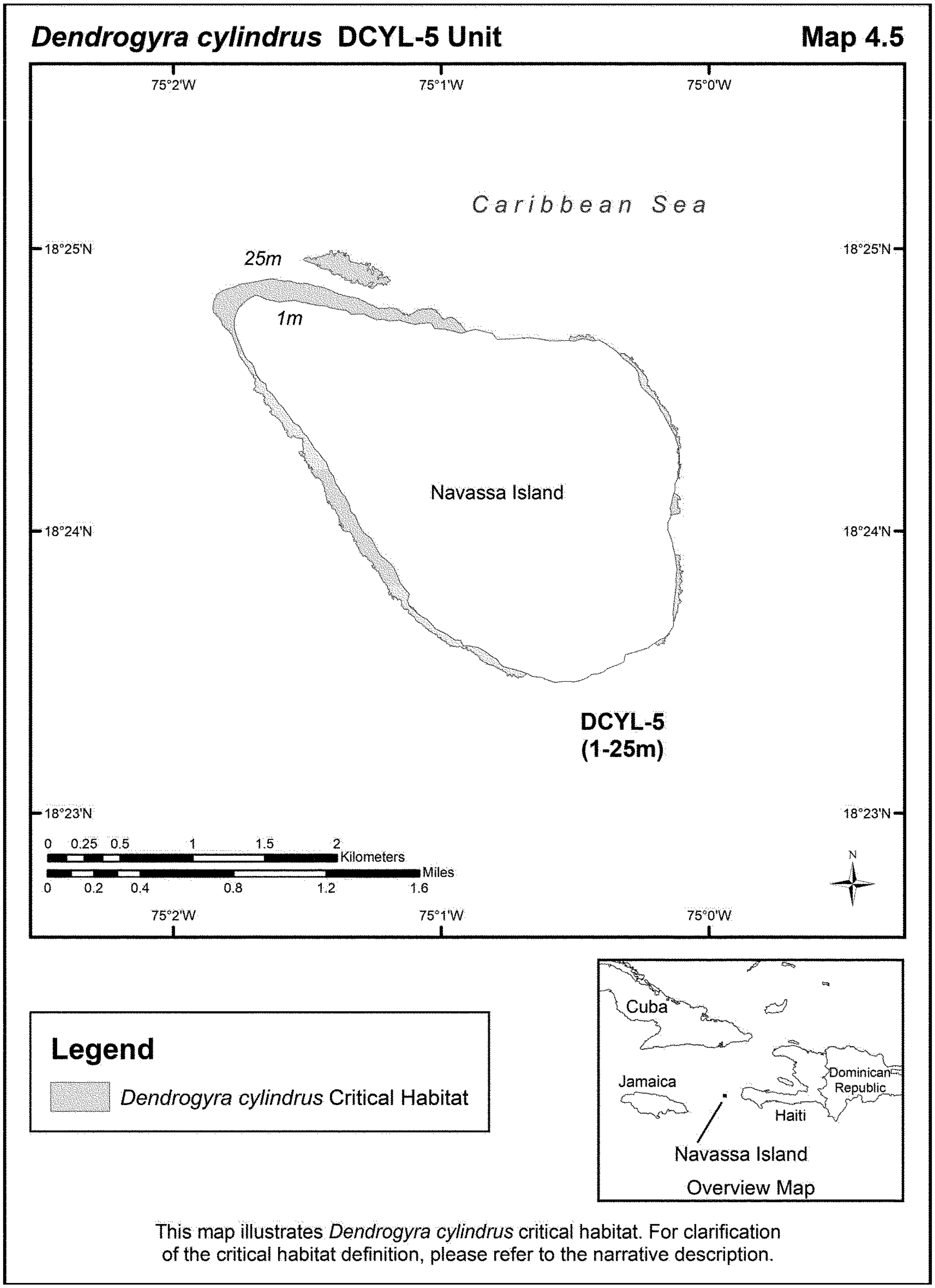


Figure 24 to paragraph (f)

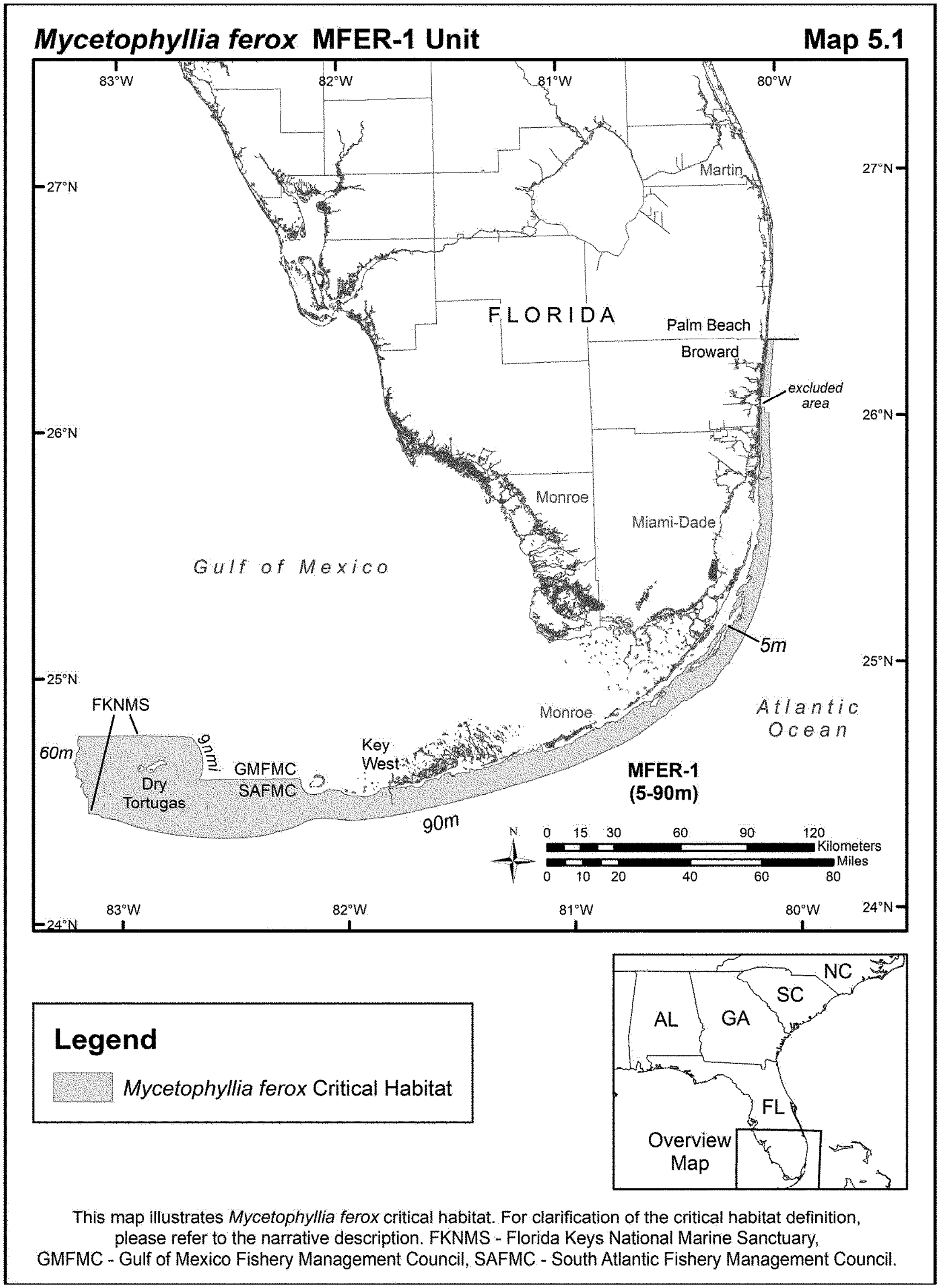


Figure 25 to paragraph (f)

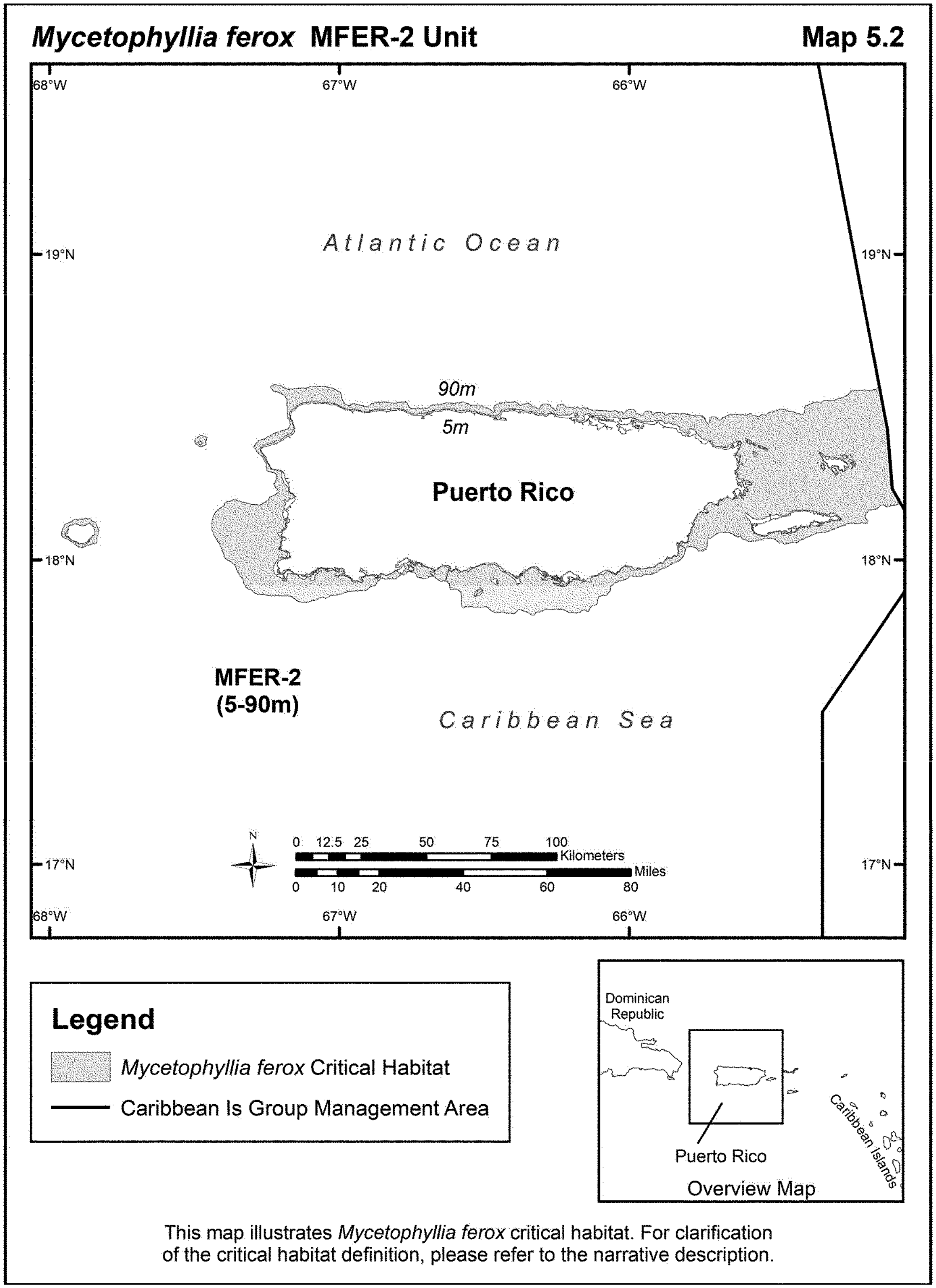


Figure 26 to paragraph (f)

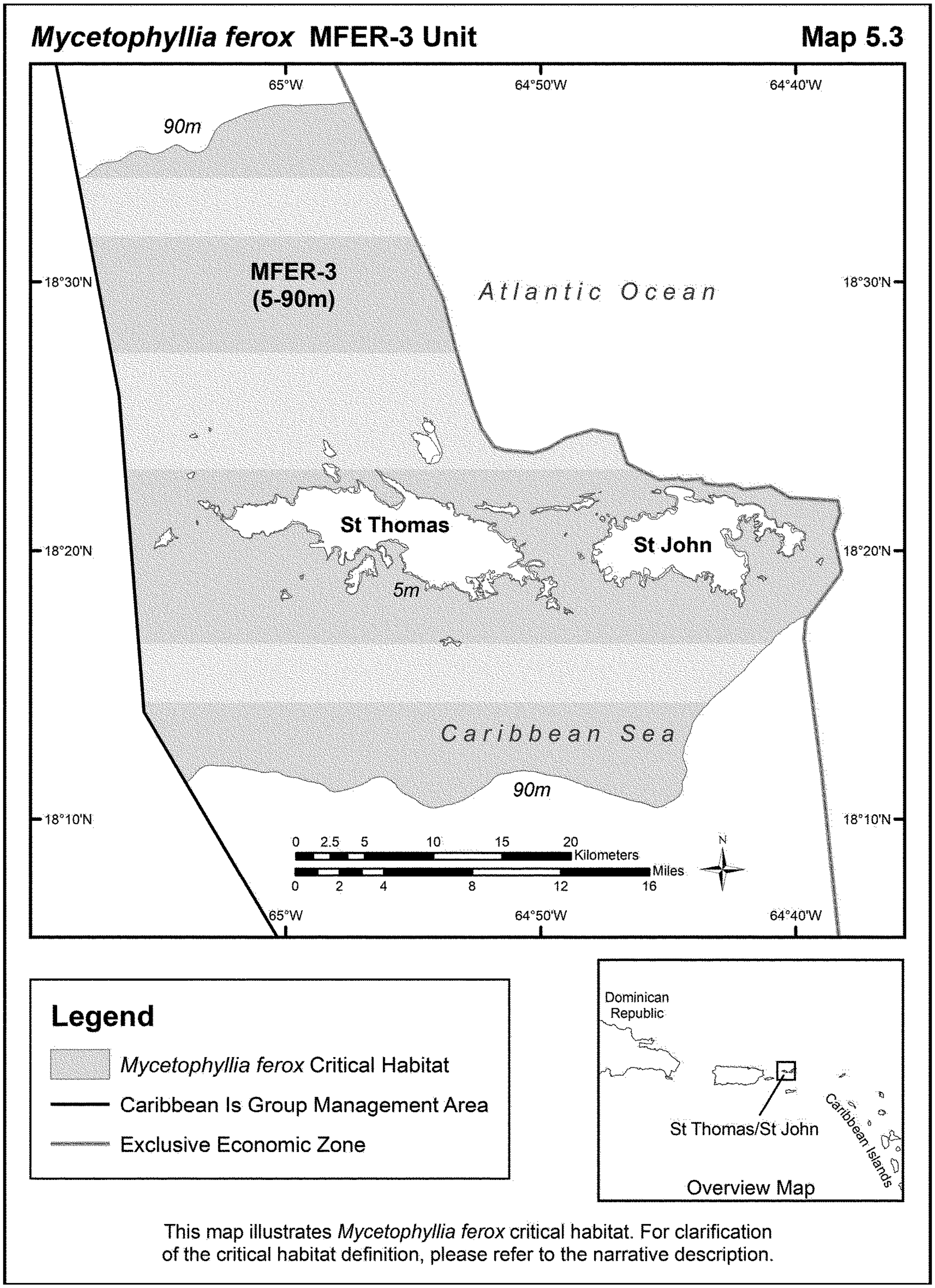


Figure 27 to paragraph (f)

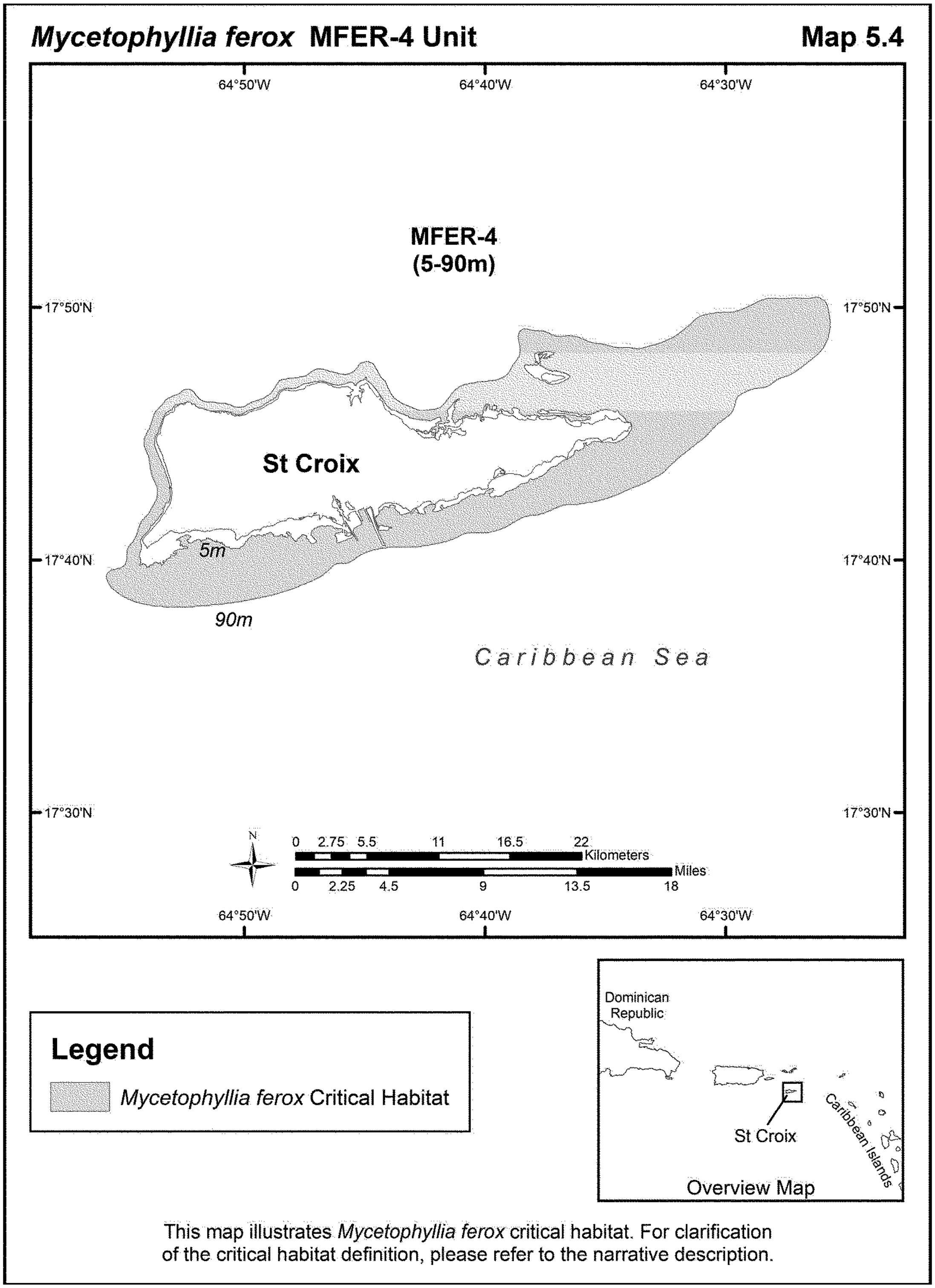
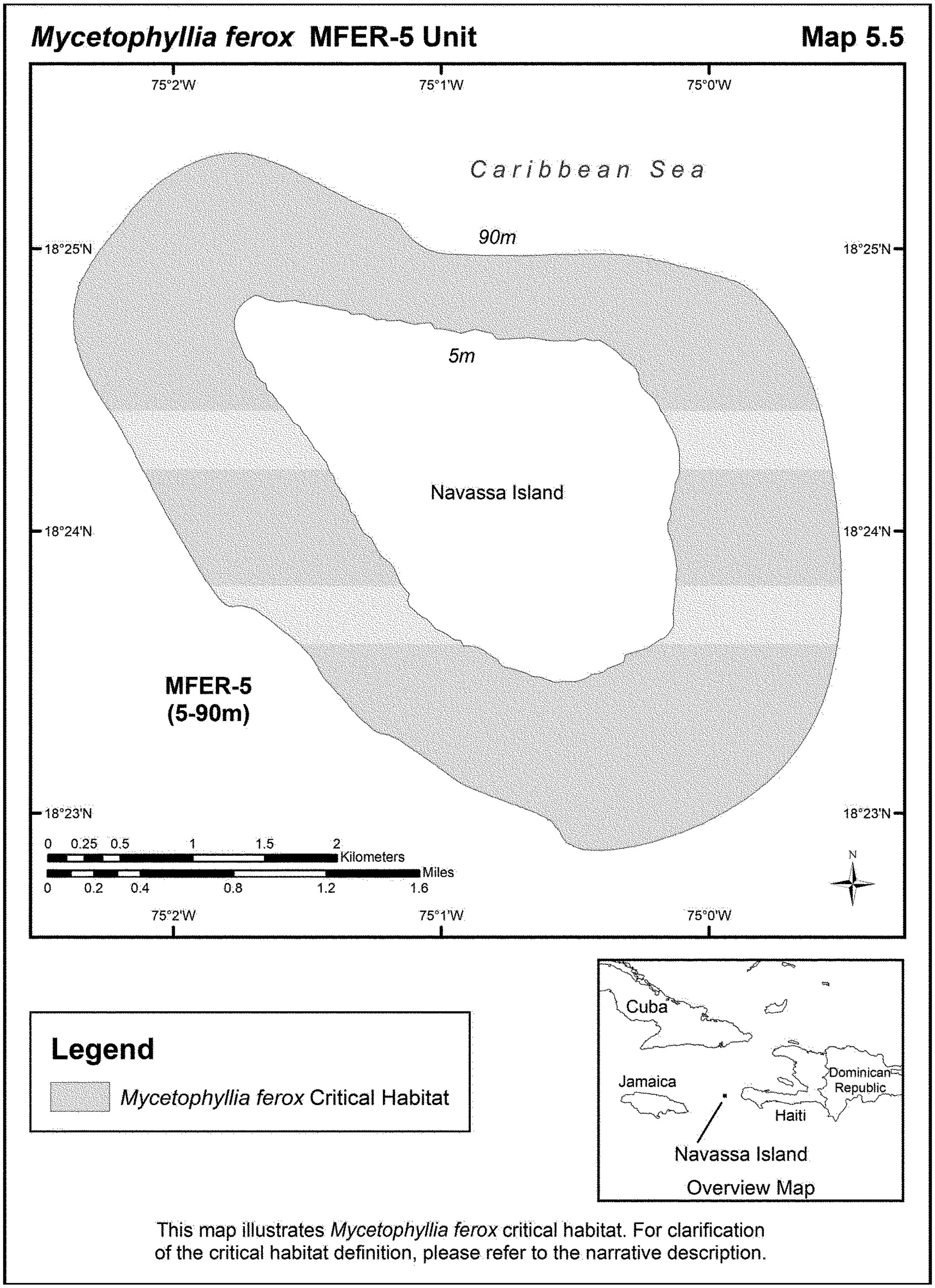


Figure 28 to paragraph (f)




[FR Doc. 2020–21229 Filed 11–25–20; 8:45 am]

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