Amendment 4

to the Fishery Management Plan for Corals and Reef Associated Plants and Invertebrates of Puerto Rico and the U.S. Virgin Islands

Seagrass Management

Including Environmental Assessment, Regulatory Impact Review, Regulatory Flexibility Act Analysis

May 2013

Abbreviations and Acronyms Used

ACL	annual catch limit
AM	accountability measure
APA	Administrative Procedures Act
BVI	British Virgin Islands
CEA	cumulative effects analysis
CEQ	Council on Environmental Quality
CFMC	Caribbean Fishery Management Council
CZMA	Coastal Zone Management Act
DPNR	Department of Planning and Natural Resources of the USVI
EA	environmental assessment
EC	ecosystem component species
EEZ	exclusive economic zone
EFH	essential fish habitat
ESA	Endangered Species Act
FEIS	final environmental impact statement
FIS	Fishery Impact Statement
FMP	fishery management plan
FMU	fishery management unit
HAPC	habitat area of particular concern
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MMPA	Marine Mammal Protection Act
MSY	maximum sustainable yield
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OMB	Office of Management and Budget
OY	optimum yield
PAR	photosynthetically active radiation
PRA	Paperwork Reduction Act
PSU	practical salinity units
RFA	Regulatory Flexibility Act
RIR	Regulatory Impact Review
SEFSC	Southeast Fisheries Science Center
SEIS	supplemental environmental impact statement
SERO	Southeast Regional Office
USVI	United States Virgin Islands

Amendment 4
to the Fishery Management Plan for Corals and Reef Associated Plants and Invertebrates of Puerto Rico and the U.S. Virgin Islands (Coral FMP): Seagrass Management

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Proposed actions: Modify management measures for seagrasses in the U.S. Caribbean

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Abstract

The Caribbean Fishery Management Council (Caribbean Council) prepared Amendment 4 to address the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requirement to establish annual catch limits (ACLs) and accountability measures (AMs) for seagrass species in the Coral FMP. Seagrasses provide essential habitat for many important fishery species in the U.S. Caribbean, but there is no directed harvest of these species. If seagrasses are kept in the coral reef resources fishery management unit of the Coral FMP, the establishment of ACLs and AMs is required. These were not established for seagrasses in the 2011 Caribbean ACL Amendment. Amendment 4 considers four alternatives: 1) No action; 2) a prohibition on the harvest of seagrasses and the establishment of an ACL; 3) the classification of seagrasses as ecosystem component species; and 4) the removal of seagrasses from the Coral FMP. Alternative 4 is the Caribbean Council's preferred alternative. The National Marine Fisheries Service, in collaboration with the Caribbean Council, has developed Amendment 4 and its Environmental Assessment to describe and analyze these management alternatives and address the requirements of the Magnuson-Stevens Act.

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Fishery Impact Statement

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requires a Fishery Impact Statement (FIS) be prepared for all amendments to fishery management plans (FMPs). The FIS contains an assessment of the likely biological and socio-economic effects of the conservation and management measures on: 1) fishery participants and their communities; 2) participants in the fisheries conducted in adjacent areas under the authority of another Council; and 3) the safety of human life at sea.

The reauthorization of the Magnuson-Stevens Act in 2007 brought changes to the way fisheries are managed in U.S. waters. One of the requirements of the Magnuson-Stevens Act is to establish annual catch limits (ACLs) and accountability measures (AMs) for all federally managed species. While this requirement was fulfilled with the recent passing of the 2010 and 2011 Caribbean ACL Amendments (CFMC 2011 a, b) for species managed in U.S. Caribbean federal waters, seagrasses included in the Corals and Reef Associated Plants and Invertebrates FMP (Coral FMP) were not taken into account when setting these values. This amendment addresses the future management of seagrasses present in the U.S. Caribbean exclusive economic zone (EEZ).

Assessment of the Biological Effects

Seagrass meadows provide essential habitat for many important fisheries' species in the U.S. Caribbean, but there is no directed harvest of these species. If seagrasses are left in the Coral FMP, ACLs and AMs need to be specified as required by the Magnuson-Stevens Act or these seagrasses need to be designated ecosystem component (EC) species. The Caribbean Fishery Management Council's (Caribbean Council) preferred alternative would remove seagrass species from the Coral FMP because federal fisheries management is not necessary for seagrasses. There is presently no known targeted or indirect harvest of any of the seagrass species included in the Coral FMP, either from the EEZ or from Puerto Rico commonwealth and U.S. Virgin Islands territorial waters (state waters), and future harvest is not anticipated.

None of the alternatives proposed would have any impacts on the physical or biological/ecological environment. Although the location, presence, and distribution of seagrasses in the EEZ is not well known, the best available scientific information indicates that the vast majority of seagrasses are in state waters due to depth limitations. Both jurisdictions regulate activities involving seagrasses through their respective coastal zone management programs. Therefore, removing seagrasses from the Coral FMP, a largely administrative action, is not expected to result in significant effects to the biological environment.

None of the alternatives proposed, including the preferred alternative, would affect the designation of seagrasses as essential fish habitat (EFH) for stocks within the Queen

Conch, Reef Fish, Spiny Lobster, and Coral FMPs. Seagrasses would continue to be protected by this designation, which requires, in part, that FMPs minimize to the extent practicable adverse effects on EFH caused by fishing. If seagrasses are removed from federal fisheries management, as proposed by **Preferred Alternative 4**, other management measures currently in place, such as gear restrictions and closed areas, would confer protection to these important habitats. These actions could serve to further protect the seagrass species and seagrass habitat, especially when implemented in conjunction with management measures designed to protect these habitats in state waters where seagrass habitat is more common.

The Caribbean Council and the National Marine Fisheries Service expect the net impacts of removing seagrasses from the Coral FMP to be positive, as this would allow management efforts to be concentrated on the heavily targeted and exploited stocks that are in need of management, which would provide beneficial results to the biological/ecological environment.

Assessment of the Social Effects

Retention of seagrass species in the FMP would not be expected to afford any greater protection to the resource, and associated services and indirect social benefits, than the removal of seagrass species from the FMP. The level of protection for seagrasses as habitat would remain at status quo. Seagrasses would continue to receive protection through their designation as EFH and thus, would continue to provide indirect social benefits to fishermen and fishing communities from the services provided by seagrass habitat. Therefore, the proposed removal of all species of seagrass from the FMP would not result in any direct social effects on fishermen or fishing communities.

Assessment of Economic Effects

There has been no documented recreational or commercial harvest of seagrass from either the EEZ or state waters. Retention of seagrass species in the FMP in either the fishery management unit or as EC species would not be expected to afford any greater protection to the resource, and associated services and economic benefits, than removal of seagrass species from the FMP. Therefore, the proposed removal of all species of seagrass from the FMP would not be expected to result in any economic effects on fishermen or associated businesses or communities. Removal of seagrass species from the FMP, however, would eliminate the need to specify ACLs and AMs, which are required for all species in the fishery management unit, and as a result, would be expected to result in a reduction in the administrative costs of management of the FMP.

The action contained in this amendment would not change any current fishing operations, therefore it is not expected to affect safety at sea.

Chapter 1. Introduction

1.1 What Action is Being Proposed?

Fishery managers are proposing changes to the federal management of seagrass species through Amendment 4 to the Fishery Management Plan (FMP) for Corals and Reef Associated Plants and Invertebrates of Puerto Rico and the U.S. Virgin Islands (USVI; Coral FMP). Changes proposed respond to requirements of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). Four species and one species group of seagrasses are presently included in the Coral FMP.

Photo: R.P.vanDam

1.2 Who is Proposing the Action?

The Caribbean Fishery Management Council (Caribbean Council) is proposing the action. The Caribbean Council develops the plan amendments and submits them to the National Oceanic and Atmospheric Administration's National Marine Fisheries Service who ultimately approves, disapproves, or partially approves the actions in the amendment on behalf of the Secretary of Commerce, and implements the regulations.

Caribbean Fishery Management Council

- Responsible for conservation and management of U.S. Caribbean fish stocks.
- Consists of seven voting members:
  - Four voting members appointed by the Secretary of Commerce
  - One voting member appointed by each of the Governors of Puerto Rico and the U.S. Virgin Islands
  - The Regional Administrator of the National Marine Fisheries Service (NMFS) for the Southeast Region
- Manages the area from 3 to 200 nautical miles (nm) off the coasts of the U.S. Virgin Islands, and 9 to 200 nm off the coast of Puerto Rico.
- Develops fishery management plans and recommends regulations to NMFS and the Secretary of Commerce for implementation.

1.3 Where is the Project Located?

Seagrasses in federal waters located off the USVI in the 3-200 nautical mile (nm) U.S. exclusive economic zone (EEZ), and off Puerto Rico in the 9-200 nm EEZ, are managed under the Coral FMP (CFMC 1994) (Figure 1-1).

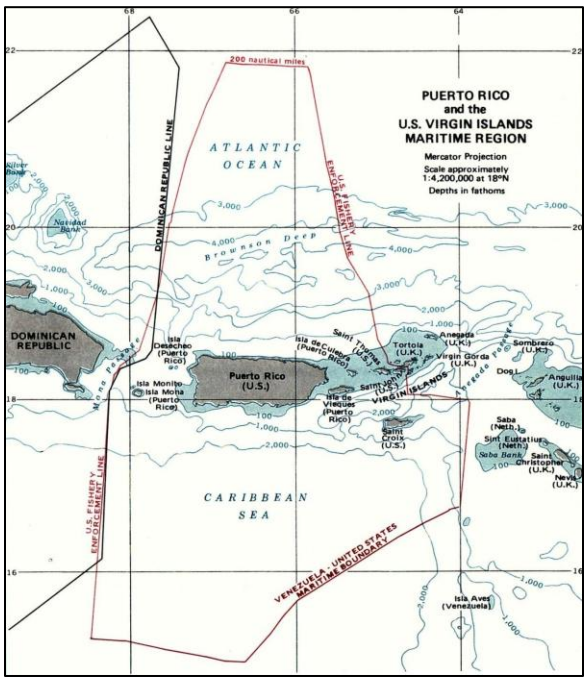

Figure 1-1. Jurisdictional boundaries of the Caribbean Fishery Management Council.

The presence, location, and distribution of seagrass resources in U.S. Caribbean federal waters are not well known. The maximum reported depth of seagrass distribution is 20 fathoms (120 feet (ft), 37 meters (m)) (Fonseca et al. 1992 cited in CFMC 2004; Miller and Lugo 2009). However, because seagrasses require a relatively high light intensity, they are commonly limited to water depths that do not exceed 65 ft (20 m) unless the overlying water is extremely clear and transparent (Livingston 1982). *Halophila decipiens* (paddle grass) is expected to occur in deep unconsolidated sediments (beyond 100 ft (30 m)) in clear waters (V. Vicente, pers. communication, March 2012). In Puerto Rico commonwealth waters, *H. decipiens* has been reported to a depth of 130 ft (40 m) (J. García-Sais pers. communication, March 2012). In the USVI, the deepest reported seagrass (*H. baillonis)* occurs in approximately 135 ft (41 m) of water in the no take marine conservation district (MCD) located in the U.S. Caribbean EEZ off St. Thomas, USVI (Armstrong et al. 2006a). Thus, there are reports of seagrasses in EEZ waters, but seagrasses of any species appear to be rare in the U.S. Caribbean EEZ due to the depth of those waters.

1.4 Why is the Caribbean Council Considering Action?

The Caribbean Council is proposing Amendment 4 to the Coral FMP to address the management of seagrasses in the U.S. Caribbean EEZ to comply with requirements of the Magnuson-Stevens Act. The Magnuson-Stevens Act requires that FMPs contain mechanisms for specifying annual catch limits (ACLs) and implementing regulations or annual specifications, at a level such that overfishing does not occur in a fishery. Accountability measures (AMs) are also required to prevent or address an overage of an ACL. The 2011 Caribbean ACL Amendment (CFMC 2011b) set ACLs for species within the Coral FMP but did not set ACLs for seagrasses included in the management plan. In addition, the 1995 federal regulations implementing the management measures contained within the Coral FMP (60 FR 58221) do not prohibit the harvest of or fishing[1] for seagrasses.

The Coral FMP currently includes four separate species of seagrasses: turtle grass (*Thalassia testudinum*), manatee grass (*Syringodium filiforme)*, shoal grass (*Halodule wrightii)*, widgeon grass (*Ruppia maritima)*, and one group of species, the sea vines (*Halophila* spp., including *H. decipiens*, *H. baillonis*, *H. engelmannii*, and *H. stipulacea* (exotic)) all of which occur in the U.S. Caribbean. Seagrasses have not been well documented from the U.S. Caribbean EEZ. Seagrasses were included in the plan based on ecosystem considerations. The Coral FMP defined the coral reef resources fishery management unit (FMU) to include a vast array of plants and invertebrates that provide habitats that are essential to the growth, development, and survival of managed finfish and other marine organisms (Appendix A).

Purpose for Action

This amendment reviews and evaluates alternatives to address the Magnuson-Stevens Fishery Conservation and Management Act requirements to establish annual catch limits (ACLs) and accountability measures (AMs) for seagrass species in the Coral FMP.

Need for Action

Seagrasses provide essential habitat for many important fisheries species in the U.S. Caribbean, but there is no directed harvest of these species. However, seagrasses are included in the coral reef resources fishery management unit of the Coral FMP, thus requiring the establishment of ACLs and AMs. These were not established for seagrass species in the 2011 Caribbean ACL Amendment.

[1] *Fishing*, or *to fish*, is defined as:
(1) The catching, taking, or harvesting of fish (i.e., any finfish, mollusk, crustacean, or parts thereof, and all other forms of marine animal and plant life other than marine mammals and birds); (2) the attempted catching, taking, or harvesting of fish; (3) any other activity that can reasonably be expected to result in the catching, taking, or harvesting of fish; or (4) any operations at sea in support of, or in preparation for, any activity described in paragraphs (1), (2), or (3) of this definition (50 C.F.R. § 600.10 Definitions).

Seagrasses have been reportedly used as a source of fertilizer, chemicals, and fodder in other areas around the world (McRoy and Helffrich 1980 cited in DPNR 2005). However, there is no known commercial or recreational harvest of seagrasses in federal waters or in Puerto Rico commonwealth and USVI territorial waters (state waters). If seagrasses are left in the FMP, ACLs and AMs need to be specified as required by the Magnuson-Stevens Act (USDOC 2007) or these seagrasses need to be designated ecosystem component (EC) species (See definition of EC species in Section 2.2).

1.5 Management History

Seagrasses in the U.S. Caribbean EEZ have been managed since 1994 as part of the coral reef resources FMU of the Corals and Reef Associated Plants and Invertebrates Fishery Management Plan (Coral FMP) (CFMC 1994). The Coral FMP included a Final Environmental Impact Statement (EIS), and a Regulatory Impact Review (RIR). The Coral FMP regulations were effective in December 1995 (60 FR 58221). The Coral FMP:

- Defined the coral reef resources FMU and described objectives for coral resources in the Caribbean.
- Prohibited the take or possession of octocorals, stony corals, and any species in the FMU if attached or existing upon live rock;
- Established the optimum yield (OY) and maximum sustainable yield (MSY) in the EEZ at zero for seagrasses and for stony corals, octocorals, and live-rock, except as authorized for scientific research, education, and restoration purposes;
- Prohibited the sale or possession of any prohibited coral unless fully documented as to point of origin;
- Prohibited the use of chemicals, plants, or plant-derived toxins, and explosives to take species in the coral reef resources FMU;
- Included a requirement that dip nets, slurp guns, hands, and other non-habitat destructive gear types be used to harvest allowable corals;
- Required local or federal permits for the harvest of allowable corals;
- Established framework measures to modify management measures within the Coral FMP.

Amendment 1 to the Coral FMP of Puerto Rico and the USVI (CFMC 1999) established a Marine Conservation District (MCD) in the EEZ in an area known as Hind Bank, southwest of St. Thomas, USVI. The MCD is a closed area to protect important marine resources. Fishing for any species, and anchoring by all fishing vessels, is prohibited year round.

This amendment included a RIR, an Initial Regulatory Flexibility Analysis (RFA), and a Final Supplemental Environmental Impact Statement (SEIS) (CFMC 1999). Amendment 1 regulations were implemented in December 1999 (64 FR 60132).

The Essential Fish Habitat (EFH) Generic Amendment to the FMPs of the U.S. Caribbean, including a Draft Environmental Assessment (CFMC 1998; 64 FR 14884), and FEIS (CFMC 2004; 69 FR 29693) was partially approved in February 1999, and the Record of Decision for the FEIS was published in May 2004. The Amendment accomplished the following:

- Identified seagrasses as EFH for stocks within the four FMPs (Reef Fish, Queen Conch, Spiny Lobster, and Corals) (CFMC 1998, 2004), and furthermore identified them as habitat areas of particular concern (HAPC) within special areas in state waters;
- Identified other actions to encourage the conservation and enhancement of EFH;
- Identified measures to minimize to the extent practicable the adverse effects of fishing on EFH.

The Comprehensive Amendment to the FMPs of the U.S. Caribbean to address required provisions of the Magnuson-Stevens Fishery Conservation and Management Act (2005 Comprehensive SFA Amendment) included an SEIS, RIR, and RFA (CFMC 2005). Regulations were implemented in November 2005 (70 FR 62073). The amendment accomplished the following:

- Redefined the FMUs for the four FMPs;
- Established seasonal closures;
- Imposed gear restrictions and requirements;
- Established biological reference points and stock status criteria;
- Established rebuilding schedules and strategies to end overfishing and rebuild overfished stocks;
- Designated EFH and EFH HAPCs; and minimized adverse impacts on such habitat to the extent practicable.

Amendment 2 to the FMP for the Queen Conch Fishery of Puerto Rico and the U.S. Virgin Islands and Amendment 5 to the Reef Fish FMP of Puerto Rico and the U.S. Virgin Islands (2010 Caribbean ACL Amendment), including EIS, RIR**,** and RFA (CFMC 2011a) became effective on January 30, 2012 (76 FR 82404) and accomplished the following:

- Amended the unit composition in the Reef Fish FMUs;
- Revised management reference points (MSY, OY, overfishing limit, acceptable biological catch) for snapper, grouper, parrotfish, and queen conch in the U.S. Caribbean;
- Established island-specific management to enable determination of ACLs and application of AMs in reponse to harvesting activities on a single island (Puerto Rico, St. Croix) or island group (St. Thomas/St. Croix) while minimizing the effects of fishing activities on the other islands or island groups;
- Established separate ACLs for each of the commercial and recreational sectors for the Puerto Rico EEZ management area where landings data are available for the commercial and recreational sectors;
- Set management measures with specific emphasis on harvest prohibition for three parrotfish species (midnight, blue,

rainbow) that serve and essential ecological function and that are relatively long-lived;

- Established recreational bag limits for snappers, groupers, and parrotfishes.
- Provided guidelines for triggering AMs and applying those AMs;
- Established framework provisions separately for the Reef Fish and Queen Conch FMPs.

Amendment 6 to the Reef Fish FMP, Amendment 5 to the FMP for the Spiny Lobster Fishery, Amendment 3 to the FMP for the Queen Conch Resources, and Amendment 3 to the Coral FMP of Puerto Rico and the U.S. Virgin Islands (2011 Caribbean ACL Amendment), including EIS, Biological Assessment, RIR, RFA, and Social Impact Assessment (CFMC 2011b) became effective on January 29, 2012 (76 FR 82414) and accomplished the following:

- Established ACLs and AMs for reef fish, spiny lobster, and aquarium trade species within the Reef Fish and Coral FMPs that were not determined to be undergoing overfishing. The 2011 Caribbean ACL Amendment set ACLs for species within the Coral FMP but did not set ACLs and AMs for those seagrasses included in the FMP;
- Allocated ACLs among island management areas;
- Established recreational bag limits for reef fish and spiny lobster;
- Removed eight conch species from the Queen Conch FMP;
- Established framework procedures for the Spiny Lobster FMP and modified framework measures for the Coral FMP;
- Revised management reference points and status determination criteria for selected reef fish, spiny lobster, and aquarium trade species.

Chapter 2. Proposed Action and Alternatives

2.1 What is the Proposed Action?

There is one action proposed in this amendment: to modify the management of seagrass species included in the Corals and Reef Associated Plants and Invertebrates Fishery Management Plan (Coral FMP). There are four alternatives proposed for this action (Table 2-1) that are analyzed in this amendment:

- ***Alternative 1*** is the no action alternative, and would not modify the current status of seagrass species listed in the Coral FMP. This alternative would not establish annual catch limits (ACLs) or accountability measures (AMs) for seagrasses.
- ***Sub-Alternative 2(a)*** and ***Sub-Alternative 2(b)*** of ***Alternative 2*** would prohibit the harvest of seagrasses in the U.S. Caribbean exclusive economic zone (EEZ) through federal regulations, and would establish an ACL for the seagrasses as required by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) (i.e., **Sub-Alternative 2(a):** ACL= 0; **Sub-Alternative 2(b):** ACL = number $\geq$1 lbs wet weight).
- ***Alternative 3*** would classify seagrasses as ecosystem component (EC) species.
- ***Alternative 4*** (***Preferred***) would remove seagrasses from federal fisheries management.

2.2 List of Alternatives to Modify Seagrass Management in the U.S. Caribbean

Action 1: Modify the management of seagrass species listed in the Corals and Reef Associated Plants and Invertebrates Fishery Management Plan.

Table 2-1. List of alternatives to modify seagrass management in the U.S. Caribbean.

Alternative 1: No Action. Do not modify the management of seagrass species listed in the Corals and Reef Associated Plants and Invertebrates Fishery Management Plan.
Retain current management reference points or proxies for seagrass species.

Alternative 2: Prohibit the harvest in the U.S. Caribbean exclusive economic zone of seagrass species listed in the Corals and Reef Associated Plants and Invertebrates Fishery Management Plan.

Sub-Alternative 2(a):
Prohibit harvest and establish an annual catch limit = 0 for seagrass species listed in the Corals and Reef Associated Plants and Invertebrates Fishery Management Plan.

Sub-Alternative 2(b):

Prohibit harvest and establish an annual catch limit $\geq$ 1 lbs wet weight for the seagrass species listed in the Corals and Reef Associated Plants and Invertebrates Fishery Management Plan to account for harvest associated with scientific research, exempted fishing, or exempted educational activities as described in 50 C.F.R. § 600.745.

Alternative 3: Designate the seagrass species listed in the Corals and Reef Associated Plants and Invertebrates Fishery Management Plan as ecosystem component species as defined in the Magnuson-Stevens Act National Standard 1 Guidelines.

Alternative 4: **Preferred** Remove all species of seagrass from the Corals and Reef Associated Plants and Invertebrates Fishery Management Plan.

Discussion

Alternative 1 is the no action alternative and would not change the current management of seagrasses as part of the coral reef resources fishery management unit (FMU) in the Coral FMP. Under the Coral FMP, harvest of stony corals, octocorals, live-rock and seagrasses is not permitted except for purposes of scientific research, education, and restoration. While the harvest of stony corals, octocorals, and live-rock is prohibited by regulation (50 CFR § 622.32), the harvest of seagrasses is not. The Coral FMP established the optimum yield (OY) and maximum sustainable yield at zero for seagrasses and for stony corals, octocorals, and live-rock, except as may be authorized for scientific research[2], education, and restoration purposes. The Coral FMP intended that the harvest of reef-associated plants and invertebrates would be allowed under permit from the National Marine Fisheries Service (NMFS), subject to possible future harvest limits should information on stock abundance and/or harvest levels merit the establishment of these in the future. Permits from the Regional Administrator of NMFS are required for scientific collection, and for education and restoration programs, and are evaluated on a case-by-case basis (CFMC 1994).

The Magnuson-Stevens Act requires that fishery management plans (FMPs) contain mechanisms for specifying ACLs, and implementing regulations or annual specifications, at a level such that overfishing does not occur in a fishery. The Magnuson-Stevens Act also requires AMs to prevent or address an overage of an ACL. The 2011 Caribbean ACL Amendment (CFMC 2011b) set ACLs for species within the Coral FMP but did not address those seagrasses included in the management plan. By taking no action, **Alternative 1** would not comply with the requirements of the Magnuson-Stevens Act. If seagrasses remain in the Coral FMP, the Caribbean Fishery Management Council (Caribbean Council) must specify ACLs and AMs or classify them as EC species.

Alternative 2 would implement a regulatory prohibition on the harvest of seagrasses in the U.S. Caribbean EEZ. The Coral FMP states that seagrasses (in addition to corals and live-rock) provide the greatest overall benefit to the nation by being effective habitat, providing food and shelter for fish, conch, lobster, turtles, and manatees. The Coral FMP also states that: "the best available scientific information indicates that corals, live-rock, and seagrasses should not be harvested at any levels, unless necessary for medical research, habitat restoration, or other scientific purposes" (CFMC 2004). As previously discussed, currently there is no regulation prohibiting the harvest of seagrass in federal waters. **Alternative 2** would prohibit the harvest of seagrasses, as was the objective of the Caribbean Council. Because this alternative will keep the

[2] The Coral FMP does not define "scientific research." However, the Magnuson-Stevens Act expressly excludes from the definition of "fishing" "any scientific research activity conducted by a scientific research vessel." 16 U.S.C. § 1802(15). Although scientific research activity conducted by a scientific research vessel cannot be prohibited under the Magnuson-Stevens Act, regulations at 50 C.F.R. § 600.745 encourage persons planning to conduct scientific research in the EEZ to obtain a Letter of Acknowledgement from the Regional Administrator.

seagrasses under federal FMP management, ACLs and AMs need to be set to comply with Magnuson-Stevens Act requirements. **Sub-Alternative 2(a)** will prohibit the harvest of seagrass species included in the Coral FMP to provide maximum protection for this resource, and will set the ACL as zero consistent with this prohibition. The Caribbean Council may have to develop AMs specific for seagrass.

Sub-Alternative 2(a) is compliant with the provisions of the Magnuson-Stevens Act, but does not address the issue of potential harvest for scientific research activity, exempted fishing, or exempted educational activities under the procedures set for in 50 C.F.R. § 600.745.

Under **Sub-Alternative 2(b)** the harvest of seagrasses would be prohibited, and an ACL of some quantity greater than zero will be assigned to account for the harvest for scientific research, exempted fishing, or exempted educational activities. Any possible effects resulting from implementation of this alternative would depend on the level of allowable harvest chosen and would have to be further analyzed. Magnuson-Stevens Act national standard 2 states that conservation and management measures shall be based upon the best scientific information available. Because there is no known historical or current harvest of seagrasses in Puerto Rico commonwealth or USVI territorial waters (state waters) or in federal waters, setting an ACL would be difficult. **Sub-Alternative 2(b)** is compliant with the provisions of the Magnuson-Stevens Act, as it would set an ACL for the seagrasses. The Caribbean Council may have to develop AMs specific for seagrass.

Alternative 3 would designate the seagrass species listed in the Coral FMP as ecosystem component (EC) species as defined in the Magnuson-Stevens Act National Standard 1 Guidelines (USDOC 2009 (Magnuson-Stevens Act National Standard 1 Guidelines)). Section 303(a)(2) of the Magnuson-Stevens Act requires that an FMP contain, among other things, a description of the species of fish involved in the fishery. A Council may, but is not required to, use an "ecosystem component species" classification. As a default, all stocks in an FMP are considered to be "in the fishery", unless they are identified as EC species (50 CFR § 600.310(d)(5)) through an FMP amendment process (Appendix B). EC species are non-target species that are not considered as part of the fishery but may be included in the FMP for data collection purposes, for ecosystem considerations related to specification of OY for the associated fishery, as considerations in the development of conservation and management measures for the associated fishery, and/or to address other ecosystem issues (50 C.F.R. § 600.310(d)(5)).

In order to be considered for possible classification as an EC species, the species should meet the following criteria: A) Be a non-target species or non-target stock; B) Not be determined to be subject to overfishing, approaching overfished, or overfished; C) Not be likely to become subject to overfishing or overfished, according to the best available information, in the absence of conservation and management measures; and D) Not generally be retained for sale or personal

use. Because EC species are not considered to be in the fishery, specification of status determination criteria, reference points, and ACLs and AMs are not required, but their status should be reconsidered if any new scientific information becomes available (e.g., catch trends, vulnerability) to determine changes in their status or their vulnerability to the fishery. If necessary, they could be reclassified to be part of the fishery (USDOC 2009).

Under **Alternative 3**, seagrasses included in the Coral FMP would be classified as EC species, ostensibly due to their importance as habitat for commercial and recreational fisheries in the U.S. Caribbean, including reef fish, conch, and lobster. Retaining the listed seagrass species in the Coral FMP by classifying them as EC species, as proposed by **Alternative 3**, would be consistent with Magnuson-Stevens Act conservation and management requirements and would facilitate monitoring. Seagrasses could be classified as EC species because they fulfill the requirements mentioned above: they are non-target species; they are not generally retained for sale or personal use; the best scientific information indicates that none of the seagrass species are overfished or subject to overfishing, as well as they are not likely to become subject to overfishing or overfished in the absence of conservation and management measures.

The classification of managed seagrasses as EC species would be consistent with their role as essential fish habitat[3] (EFH). In the U.S. Caribbean, these habitats sustain populations of turtles, manatees, and fish[4]. The relationships vary from serving as food and foraging habitat to providing surface area for egg-laying by fish or habitat for reproductive purposes.

Under the Caribbean Council's **Preferred Alternative 4,** seagrass species would be removed from the Coral FMP because the Caribbean Council believes there is no need for federal management of these species. Although seagrasses have been reportedly used as a source of fertilizer, chemicals, and fodder in other areas around the world[5] (McRoy and Helffrich 1980 cited in DPNR 2005), there is presently no known targeted or indirect harvest of any of the seagrass species included in the Coral FMP, either from the EEZ or from Puerto Rico and USVI state waters, and future harvest is not anticipated. Magnuson-Stevens Act National Standard 7 guidelines requires Councils to prepare FMPs only for overfished fisheries and other fisheries where regulation would serve some useful purpose. The Caribbean Council does not anticipate that federal management is necessary for seagrasses because they are not targeted species, and they are not overfished or undergoing overfishing. The Magnuson-Stevens Act National

[3] "Essential Fish Habitat (EFH)" is defined by the Magnuson-Stevens Act as those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity. Seagrasses are considered to be EFH for stocks within the four FMPs (Reef Fish, Queen Conch, Spiny Lobster, and Corals).

[4] The term *"fish"* means finfish, mollusks, crustaceans, and all other forms of marine animal and plant life other than marine mammals and birds (Magnuson-Stevens Act, Sec. 3. Definitions 16 U.S.C. 1802, 99-659, 101-627).

[5] In coastal areas around the world, seagrasses of particular species are used by coastal populations as: (1) food (e.g., seeds used to prepare flour, rhizomes to prepare salads; (2) as filling material for mattresses and shock absorbing materials for the transport of glasswares; (3) as raw materials in paper industry; (4) in the production of fertilizer (e.g., for coconut plantations), fodder and feed; and (5) to prepare medicines and chemicals (Kannan and Thangaradjou (2008) and references therein).

Standard 7 guidelines also have factors to consider in deciding whether a fishery needs management: (i) The importance of the fishery to the Nation and to the regional economy; (ii) The condition of the stock or stocks of fish and whether an FMP can improve or maintain that condition; (iii) The extent to which the fishery could be or is already adequately managed by states, by state/Federal programs, by Federal regulations pursuant to FMPs or international commissions, or by industry self-regulation, consistent with the policies and standards of the Magnuson-Stevens Act; (iv) The need to resolve competing interests and conflicts among user groups and whether an FMP can further that resolution; (v) The economic condition of a fishery and whether an FMP can produce more efficient utilization; (vi) The needs of a developing fishery, and whether an FMP can foster orderly growth; and (vii) The costs associated with an FMP, balanced against the benefits (USDOC 2009). Application of these factors supports a decision not to manage seagrasses.

Seagrasses were included as a member of the coral reef resources FMU of the Coral FMP in 1994 for ecosystem considerations. The Caribbean Council viewed the ecosystem as a whole and defined the coral reef resources FMU to be all-inclusive, including a vast array of plants and invertebrates that provide habitats that are essential to the growth, development, and survival of managed finfish, shellfish, and other marine organisms. It should be noted that although the presence of seagrasses in the U.S. Caribbean EEZ may be limited due to depth considerations, information about seagrasses in the EEZ is limited, with the exception of some areas that have been mapped for other purposes. When the Coral FMP was developed, the presence, location, and distribution of seagrasses was also unknown. Regardless, the Coral FMP states that, given the vulnerability of all components of the coral reef resources FMU to land-based activities and to activities in state waters, it is critical that these resources be managed consistently and comprehensively throughout the area. Furthermore, given the importance of the reef and seagrass habitats for other fisheries of commercial and recreational importance, their condition is clearly of significance for the management of other consumptive resources in waters under both state and federal authority (CFMC 1994).

As previously discussed, seagrasses are designated as EFH and HAPC for stocks within the four U.S. Caribbean FMPs (Reef Fish, Queen Conch, Spiny Lobster, and Corals). Removing seagrass species from the Coral FMP would not affect those EFH and HAPC designations. Seagrasses would still be protected by these designations and by other provisions, such as the Coastal Zone Management Act. If seagrasses are removed from federal fisheries management, as proposed by **Preferred Alternative 4,** other management measures currently in place, such as gear restrictions and closed areas, would confer protection to these important habitats (See discussion in Section 4.1).

Chapter 3. Affected Environment

This section describes the affected environment in the proposed project area. The affected environment is divided into four major components:

- **Physical/Habitat environment** (Section 3.1)

  Examples include geology, climate, and habitat (essential fish habitat, habitat areas of particular concern)

- **Biological/Ecological environment** (Section 3.2)

  Examples include seagrass meadows, affected seagrass species

- **Human environment** (Section 3.3)

  Examples include fishing communities and economic descriptions of the fishery

- **Administrative environment** (Section 3.4)

  Example include the fishery management process

Affected Area

- The area affected by this action is located is the U.S. Caribbean exclusive economic zone (EEZ), and it includes 14.39% of the total mapped fishable habitat (waters from 0-100 fathoms) in the U.S. Caribbean.
- The area affected by this action includes all seagrass habitat present in the EEZ.

3.1 Physical Environment

The physical and geological environments of the U.S. Caribbean were described in detail in the Generic Essential Fish Habitat (EFH) Amendment to the FMPs of the U.S. Caribbean and in the EFH Final Environmental Impact Statement (EFH-FEIS) (CFMC 1998, 2004), and is incorporated herein by reference.

The U.S. Caribbean is located in the eastern portion of the Caribbean archipelago, about 1,100 miles (mi) (1,770 kilometers (km)) east-southeast of Miami, Florida (Olcott 1999). It comprises the Commonwealth of Puerto Rico in the Greater Antilles and the Territory of the U.S. Virgin Islands (USVI) in the Lesser Antilles island chain (Figure 3-1), both of which separate the Caribbean Sea from the western central Atlantic Ocean.

The USVI are part of the Virgin Islands chain, which lies about 80 km (50 mi) east of Puerto Rico and consist of about 80 islands and cays (Olcott 1999). The USVI include the largest and most important islands of the Virgin Islands chain: St. Croix, St. Thomas, and St. John. Together, the USVI total approximately 347 square kilometers) (km^2) (134 square miles (mi^2)) of land space area (Catanzaro et al 2002).

St. Croix is located about 74 km (46 mi) south of St. Thomas and St. John (CFMC 2004). Covering about 207 km^2 (80 mi^2), St. Croix is entirely surrounded by the Caribbean Sea. The islands of St. Thomas and St. John are bordered by the Atlantic Ocean to the north and the Caribbean Sea to the south. Their respective areas are approximately 83 km^2 (32 mi^2) and 52 km^2 (20 mi^2) (Catanzaro et al. 2002). The island of St. Thomas is bordered to the west by Vieques and Culebra, Puerto Rico, and to the east by St. John, USVI. St. John is bordered to the east by the British Virgin Islands (BVI).

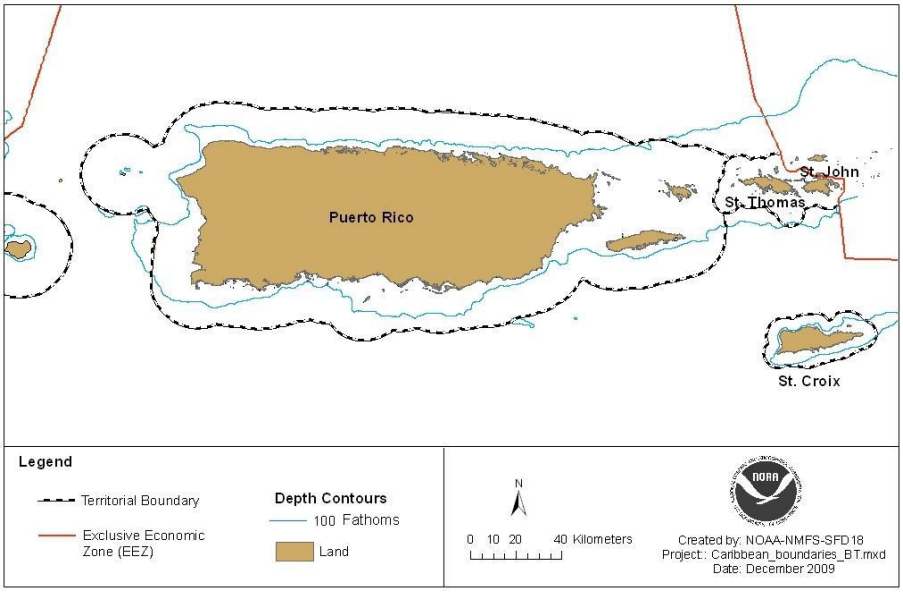

Figure 3-1. Location of Puerto Rico and the U.S. Virgin Islands.

The island of Puerto Rico is almost rectangular in shape, about 110 by 35 mi (177 by 56 km), and is the smallest and the most eastern island of the Greater Antilles (CFMC 1998; Morelock et al. 2000). Its coast measures approximately 700 mi (1,227 km) and includes the adjacent inhabited islands of Vieques and Culebra. In addition, the Commonwealth of Puerto Rico includes the islands of Mona, Monito, and various other small islands without permanent populations. Deep ocean waters fringe Puerto Rico. The Mona Passage, which separates the island from Hispaniola to the west, is about 75 mi (120 km) wide and more than 3,300 feet (ft) (1,000 meters (m)) deep. Off the northern coast is the 28,000 ft (8,500 m) deep Puerto Rico Trench, and to the south the sea bottom descends to the 16,400 ft (5,000 m) deep Venezuelan Basin of the Caribbean Sea.

3.1.1 Geology

The shelf shared by the islands of St. Thomas and St. John is about 12.9 km (8 mi) wide on the south and 32.2 km (20 mi) wide on the north (Goenaga and Boulon 1991). St. Croix, which lies on a different geological platform, is separated from the other islands by a 4,000 m (2.5 mi) deep trench (CFMC 2004) (Figure 3-2). The St. Croix shelf is much narrower and shallower than that of the northern islands (Goenaga and Boulon 1991), extending only 4 km (2.5 mi) wide in the south, less than 0.2 km (0.1 mi) wide on the northwest, though up to several kilometers wide in the northeast and on the Lang Bank (CFMC 2004).

Puerto Rico shares the same shelf platform as St. Thomas and St. John, and that shelf also extends east to include the BVI. The St. Croix platform connects through a deep submerged mountain range (including Grappler Bank and Investigador, among other banks in the EEZ) to the southeast platform of Puerto Rico (Figure 3-2).

Section 3 of the EFH-FEIS (CFMC 2004) summarizes the available information on the geology of the U.S. Caribbean.

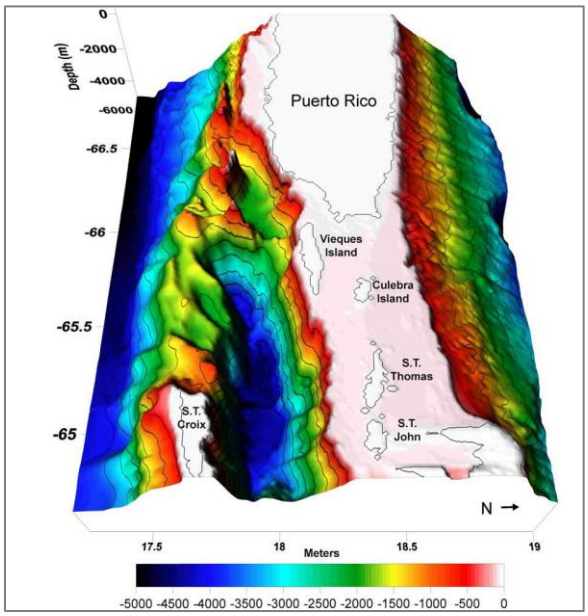

Figure 3-2. Shared platform between the east coast of Puerto Rico and St. Thomas/St. John. The deep trough between the Puerto Rico/St. Thomas/St. John platform and St. Croix is clearly seen in this graphic representation of depth (Source: García-Sais et al. 2005).

3.1.2 Oceanography and Climate

The Caribbean Current flows about 100 km (62 mi) south of the U.S. Caribbean islands

at an average speed of 0.5 to 1 knots (CFMC 2004). The current is characterized by large cyclonic and anticyclonic gyres. Its strength is influenced by changes in the position of the inter-tropical convergence zone (ITCZ).

The zonal shift of the ITCZ is also responsible for the seasonal change in precipitation in the Caribbean. The dry season occurs when the ITCZ is near the equator, generally in the late winter to spring. The wet season occurs when the ITCZ is at its most northerly position in the Caribbean, generally in the late summer into late fall (CFMC 2011a and references therein).

Surface water salinity changes along with the seasonal change in precipitation. However, precipitation affects salinity only indirectly. Discharge from the Amazon, Orinoco, and Magdalena rivers is the main contributor to buoyancy in the Caribbean Sea, increasing silica concentrations, decreasing salinity (Yoshioka et al. 1985) and increasing chlorophyll and pigments, as well as increasing the input of terrestrial materials (Kjerfve 1981). These parameters vary with changes in the outflow from these South American rivers, dependent on rainfall in the areas supplying water to these rivers.

Sea surface temperature ranges from a minimum of 25 degrees Celsius (ºC) (77 degrees Farenheit (ºF)) in February-March to a maximum of about 28.5ºC (83.3ºF) in August-September. Temperature is important in controlling flowering in seagrass (Miller and Lugo 2009). Critical flowering temperature for seagrass in Puerto Rico and the USVI is 25ºC (77 ºF). Tidal regimes differ between the north and south coasts. The fluctuations range from a diurnal tide of about 10 centimeters (cm) (3.9 inches (in)) on the south coast to a semi-diurnal regime of between 60-100 cm (24-39 in) along the north coast, where waves are larger (CFMC 2004). But the astronomical tidal range is slight (20-30 cm (8-12 in)) (Kjerfve 1981).

The most significant parameter for seagrass growth is turbidity. Seagrasses are dependent on light, and light decreases with water depth. The depth of light penetration is also influenced by materials found in the water. Photosynthetically Active Radiation (PAR) is the range of light frequency that is specifically important for seagrass growth. Light availability and the quality of the light available for photosynthesis is impacted by dissolved material in the water column, including but not limited to sediments and pollutants (e.g., Dixon 2000; Miller and Lugo 2009).

Seagrass, in addition to needing clear water, also does better in waters of high salinity. Salinity in the waters of the U.S. Caribbean varies between 34 practical salinity units (PSU) during September-October and 36.3 PSU in January-March (Morelock et al. 2000). This seasonality is also seen in the temperature (26 to 30ºC (78.8 to 86ºF), density, and depth of the thermocline (which can be as shallow as 25 m (82 ft). Increase in temperature results in increasing evaporation; a local factor contributing to increased salinity in a local area. These

distributions can be altered by the presence of South America river waters, by the transient eddies broken off from the Equatorial and Brazil Currents, and significantly by water runoff from local rivers and precipitation, all of which have increased in recent years. Although seagrasses are very tolerant of variations in salinity, having a salinity tolerance range of 10 to 48 PSU, salinity variations will impact these plants such as decreased growth of leaves (Vicente 1992).

Seagrass habitat is unique because it provides nursery grounds, feeding grounds and/or habitat for reproduction and shelter for a variety of marine species.

Seagrasses have been identified as essential fish habitat (EFH) (CFMC 1998, 2004), and furthermore identified as habitat areas of particular concern within special areas in state waters.

Seagrasses are highly productive ecosystems that are also important in stabilizing sediment, thereby controlling and reducing erosion and turbidity.

Growth of seagrass is dependent on light availability, thus seagrasses are generally confined to relatively shallow waters that are also most susceptible to impacts by precipitation, winds, surface currents, salinity and temperature changes.

Additional information regarding the oceanography and climate of the U.S. Caribbean can be found in Section 5.1.2 of the Comprehensive SFA Amendment (CFMC 2005).

3.1.3 Major Habitat Types

A description of the major habitat types in the U.S. Caribbean EEZ can be obtained in Section 3.2 of the EFH-FEIS (CFMC 2004) and in Section 5.1.3 of the Comprehensive SFA Amendment (CFMC 2005). This section describes the seagrass habitat, as this action pertains only to this component of the coral reef resources FMU.

The major habitat type where seagrass grows is sand and unconsolidated sediment but it also has been reported from muddy areas. The potential habitat for seagrass is shown in Figure 3-3. The depth to which seagrass can grow is a function of light, quality of light and the degree to which they are impacted by storms (friction). In the U.S. Caribbean, given that these conditions can be met in shallower waters as well as in waters up to 100 m deep (328 ft) (inferred from Armstrong et al. 2000), Figure 3-3 then shows all of the potential habitat were seagrasses could occur (Armstrong et al. 2006b). These areas have not been mapped to date.

The coastal-marine environment of Puerto Rico and the USVI is characterized by a wide variety of habitat types. Kendall et al. (2001) delineated 21 distinct benthic habitats types. The EFH-FEIS (CFMC 2004) summarized the percent distribution for all habitats, including submerged aquatic vegetation (SAV) (seagrass and algae) present in the U.S. Caribbean from the total of 5,494 km^2 (2,121 mi^2) of bottom mapped from aerial photographs. These 5,494 km^2 include both Puerto Rico (5,009 km^2 (1,934

mi^2)) and the USVI (485 km^2 (187 mi^2)), and covered from the shore line to about 20 m (66 ft) depth.

In the USVI, 24 km^2 (9 mi^2) of unconsolidated sediment, 161 km^2 (62 mi^2) of SAV, 2 km^2 (0.8 mi^2) of mangroves, and 300 km^2 (116 mi^2) of coral reef and hard bottom were mapped over an area of 485 km^2 (187 mi^2). In Puerto Rico, 49 km^2 (19 mi^2) of unconsolidated sediment, 721 km^2 (278 mi^2) of SAV (of which 625 km^2 (241 mi^2) are seagrasses), 73 km^2 (28 mi^2) of mangroves, and 756 km^2 (292 mi^2) of coral reef and colonized hard bottom were mapped.

Armstrong et al. (2006b) estimated that, of the total amount of benthic area mapped, 43.3% is between 30 and 100 m (100-328 ft). Very little of this area has been surveyed. Of the total benthic area mapped, 22.8% includes depths of less than 50 m (164 ft), all potential habitat for seagrasses.

The EFH-FEIS (CFMC 2004) provides an in-depth description of the distribution of these habitats, along with information on their ecological functions and condition.

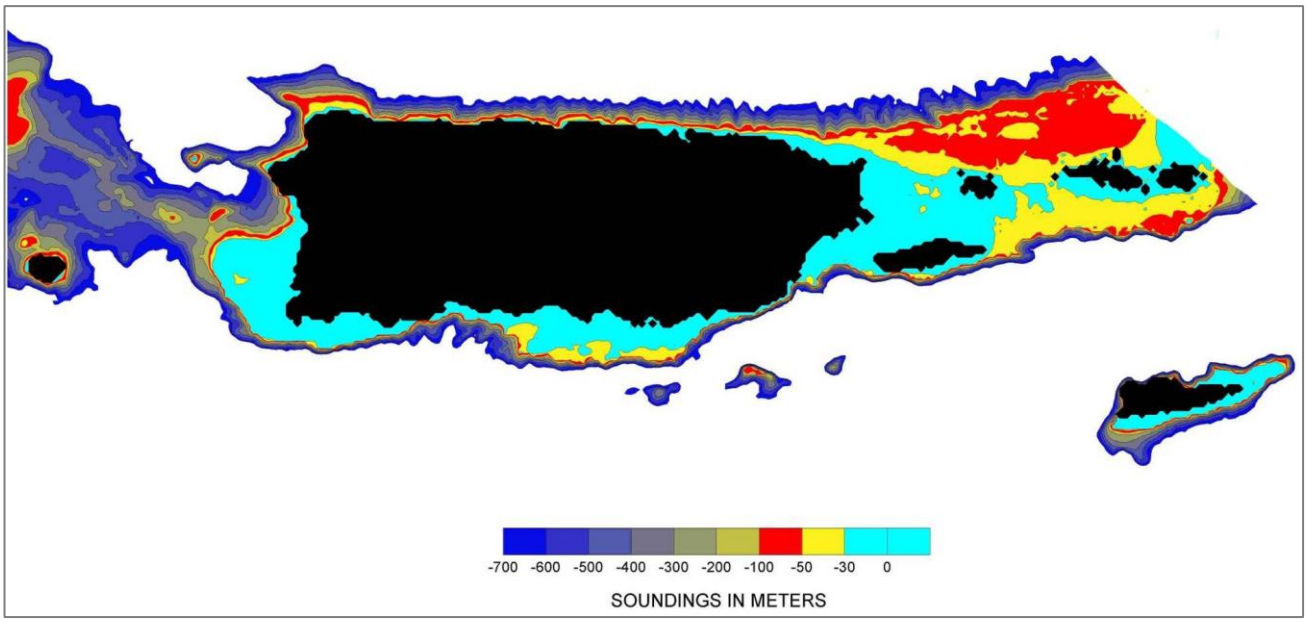

Figure 3-3. Bathymetric map of U.S. Caribbean nearshore waters, including areas between 30 m and 100 m (100-328 ft) where little mapping has been done and shallower areas with potential for seagrass development. (Sources: Jorge Sabater (personal communication); Armstrong et al. 2006b; García-Sais 2005).

Seagrass Habitat

Seagrass forms meadows (beds) over shallow, unconsolidated sediments. Their ecological role includes the provision of nutrients and habitat for a wide range of organisms including many coastal fishery resources (e.g., fishes, queen conch), their prey (e.g., mollusks, crabs, shrimp and urchins), one endangered species (manatee), and a threatened species (green turtle) (Tetra Tech 1992).

Seagrass meadows also play an important role in the modification of physical, chemical, and geological properties of coastal areas such as water filtration and protection from shoreline erosion (Fonseca et al. 1992; Vicente 1992). The longevity of seagrass meadows mediates short- and long-term biological and chemical interactions because of the plants' physical stability. Seagrass communities are highly productive systems. Seagrass meadows also act to protect coral reefs by trapping sediment and thereby reducing turbidity.

Although not usually harvested directly, seagrasses are considered to be under threat from human activities. In addition, although seagrass habitat is used extensively as nursery grounds, they are poorly documented in terms of their geographic distribution and areal extent (CFMC 1998).

Seagrass Distribution

There is a lack of knowledge regarding the location, distribution, and presence of seagrass beds in the U.S. Caribbean EEZ. However, the available evidence suggests that seagrass presence in the EEZ may be minimal and this could be related to limitations due to depth and light requirements. The autotrophic nature of seagrasses sets the depth limits at between 30 cm and 20 m (0.9-66 ft) (Figure 3-4). The shallower limit appears to be set by tidal considerations (exposure) and sediment load (buried meadows). The deeper limit is attributed to turbidity and resultant water transparency that controls the depth to which the required amount of PAR (e.g., light range of 400-700 nm) reaches.

Width of insular shelf, depth, and the patchy distribution of non-optimal bottom (rocky substrate) limit the areal extent of seagrass beds (CFMC 2004). In the U.S Caribbean EEZ, seagrasses have been documented to 135 ft (41 m) depth in the Marine Conservation District off St. Thomas, USVI (Armstrong et al. 2006a). However, the euphotic zone in the oligotrophic waters surrounding Puerto Rico and the USVI can be as deep as 328 ft (100 m) (e.g., see Armstrong et al. 2006b). This means that the light penetrating to those depths is sufficient for photosynthesis to occur.

Otero and Carruba (2007) explain that the underestimation of the extent of seagrass habitats often results in lesser protection for these important communities. Factors such as temporal changes due to seasons, changes in light penetration, wave energy, and direct human disturbances (e.g., propeller wash and scars, and anchoring), as well as variations in the morphology and growth of individual species, can confound the definition of the extent of seagrass habitat.

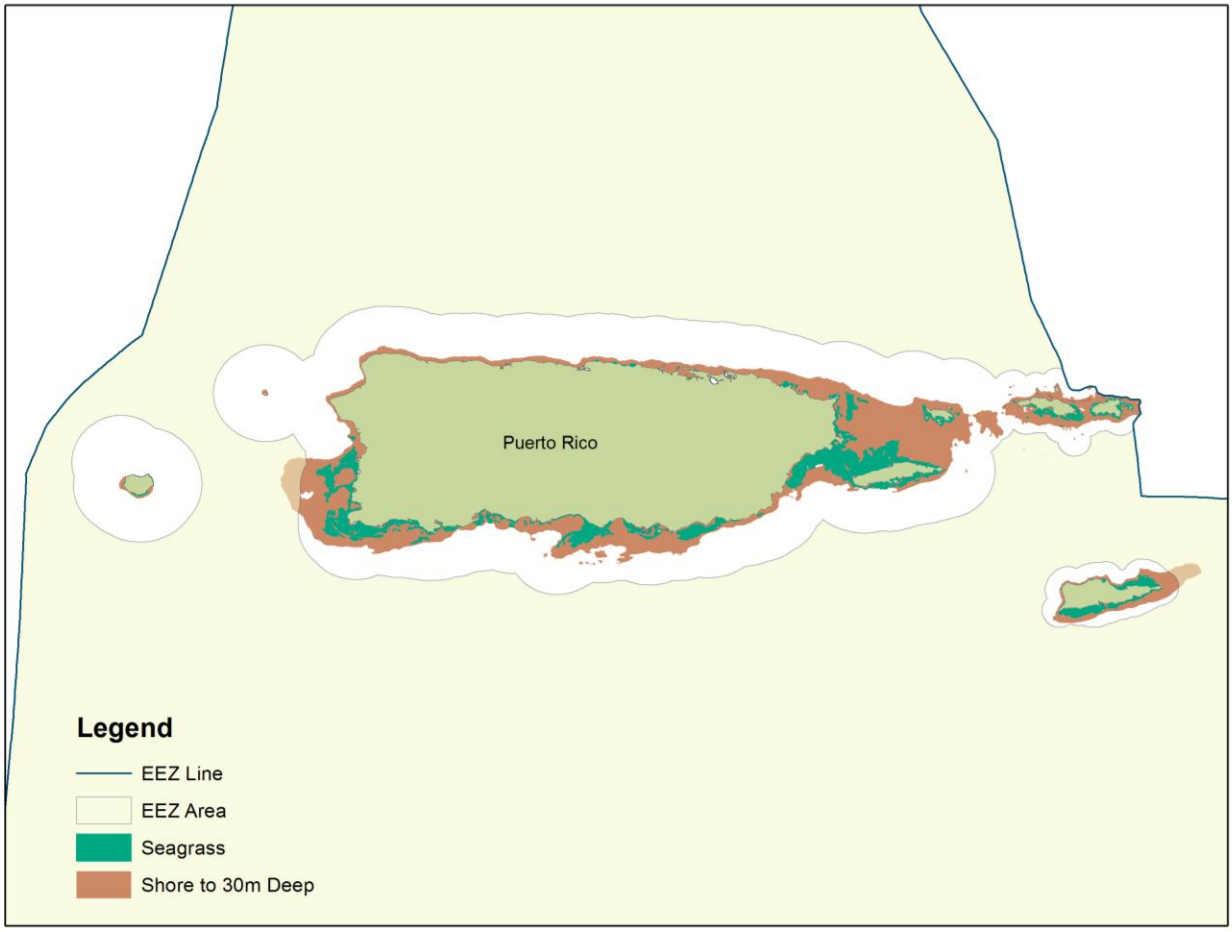

Figure 3-4. Location of seagrass habitats in the U.S. Caribbean. Map only contains information available from aerial photographs to a depth equal to or less than 30 m (100 ft). Area in brown (shore to 30 m) may be potential habitat for seagrass, but the information is not available at this time because of the limitation of the aerial photographs, the presence of clouds or sunlight in the photographs or the turbidity of the water that prevent mapping of seagrass (Source: Kendall et al. 2001, overlay by NMFS–Protected Resources (2012)).

3.1.3.1 Essential Fish Habitat

Essential fish habitat (EFH) is defined in the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) as "those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S. C. 1802(10)). Specific categories of EFH identified in Puerto Rico and the USVI, which are utilized by federally managed fish and invertebrate species, include both estuarine/inshore and marine/offshore areas. Specifically, estuarine/inshore EFH includes estuarine emergent and mangrove wetlands, submerged aquatic vegetation, intertidal flats, palustrine emergent and forested systems, and the estuarine water column. Additionally, marine/offshore EFH includes live/hard bottom habitats, coral and coral reefs, seagrass and algal plains, sand and shell substrate, and the marine water column. EFH utilized by fish species in this region includes coral reefs, live/hard bottom, and submerged aquatic vegetation. EFH includes the spawning area in the water column above the adult habitat.

For specific life stages of estuarine dependent and near-shore fish species and invertebrates, EFH includes areas from the outer boundary of the EEZ (or the 100 fathom (600-foot) contour line, whichever is greater) to the mean high water line, and includes habitats such as attached macro algae, submerged rooted vascular plants (seagrasses), estuarine emergent vegetated wetlands, tidal creeks, estuarine scrub/shrub (mangrove fringe), shell banks, unconsolidated bottom (soft sediments), coral reefs, and live/hard bottom habitats. Seagrasses are more likely to occur in water depths that are less than 30 m (100 ft).

The specific basis of seagrass as fishery habitat is recognized in four interrelated features of the meadows: 1) primary productivity; 2) structural complexity; 3) modification of energy regimes and sediment and shoreline stabilization; and 4) nutrient cycling (SAFMC 1998).

3.1.3.2 Habitat Areas of Particular Concern

Areas that meet the criteria for designation as habitat areas of particular concern (HAPC) include habitats required during each life stage (including egg, larval, post larval, juvenile, and adult stages). HAPC was designated for the Coral FMP as those EFH habitat areas or sites identified as having particular ecological importance to Caribbean coral species. These HAPC include areas in state waters of Puerto Rico and St. Croix only.

In Puerto Rico, designated HAPC include: The reefs of Desecheo Island, Steps and Tres Palmas at Rincón, Mona and Monito Islands, Tourmaline off Mayagüez, La Parguera at Lajas, Guánica State Forest, Caja de Muertos Island, Punta Petrona at Santa Isabel, Guayama Reefs, Ceiba State Forest, La Cordillera at Fajardo, and Luis Peña Channel and Los Corchos at Culebra Island.

Designated HAPC include in St. Croix, USVI: The reefs of the East End Marine

Park, Buck Island Reef National Monument, South Shore Industrial Area Patch and Deep Reef system, Frederiksted Reef System, Cane Bay, and Green Cay Wildlife Refuge.

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3.2 Biological/ Ecological Environment

This section summarizes the available information on the biology of Caribbean Council-managed seagrass species (Table 3-1). Descriptions of the seagrasses as a functional group are provided in detail in the Coral FMP (CFMC 1994), in the Generic EFH Amendment (CFMC 1998), and in the EFH-FEIS (CFMC 2004), and are incorporated herein by reference.

Table 3-1. Seagrass species listed in the coral reef resources FMU

Common name (English)	Nombre Común (Español)	*Scientific Name / Nombre Científico*
Turtle grass	Yerba tortuga	*Thalassia testudinum*
Manatee grass	Yerba manatí	*Syringodium filiforme*
Shoal grass	Yerba del bajo	*Halodule wrightii*
Widgeon grass	Yerba de pato	*Ruppia maritima*
Sea vines	Enredaderas	*Halophila decipiens*
		Halophila baillonis
		Halophila englemannii
		Halophila stipulacea (exotic)

Seagrass beds are highly productive ecosystems that are quite extensive in the Caribbean and often occur in close association with shallow-water coral reefs. Seagrasses are true flowering plants (angiosperms) that spread through the growth of roots and rhizomes (horizontal underground stems that form extensive networks below the surface (CFMC 1998; Coles et al. 2004). Seagrasses are the only vascular plants able to complete their life cycle fully submerged in the marine environment. They have a high rate of net primary production that provides a large supply of organic matter. To obtain adequate light for growth, they require shallow water or clear deep water (CFMC 1998).

In Puerto Rico and the USVI, seagrasses occur in both the estuarine and marine zones. Of the total 5,009 km^2 (1,934 mi^2) of benthic habitat mapped by NOAA's National Ocean Service (NOS) in Puerto Rico, 625 km^2 (241 mi^2) (12.5%) was seagrass. In the USVI, 161 km^2 (62 mi^2) (33%) of the total 485 km^2 (187 mi^2) mapped by NOS was submerged aquatic vegetation (including macroalgae) (Kendall et al. 2001; CFMC 2004).

Seagrass Reproduction

Seagrasses can reproduce sexually or asexually. In sexual reproduction, the plants produce flowers and transfer pollen from the male flower to the ovary of the female flower. Seagrasses can also grow by asexual (or vegetative) reproduction. This means that new plants are formed without the need of flowers or seeds. Seagrasses grow vegetatively by extending and branching their rhizomes, allowing significant areas of seagrass meadow to form from only a few shoots (Cole et al. 2004).

Mechanisms for the dispersal of seeds vary widely, from small hard-coated seeds released below the sediment surface (e.g., shoal grass) to fleshy pre-germinated seeds that are expelled from a fruit (e.g., turtle grass) (Björk et al. 2008).

Seagrass Productivity

Seagrasses and coral reefs are among the most productive systems in the tropics (CFMC 2004). The primary production of seagrass meadows is a combination of seagrass leaf growth and the growth of micro- and macro-epiphytic and benthic seaweeds, with the latter groups occasionally contributing as much to the ecosystem production as the seagrass itself (Björk et al. 2008 and references therein). Vicente (1992) reported that in Puerto Rico, primary production and biomass of seagrasses are very high (6,898 $gC/m^2/yr$ and 2,260 gC/m^2, respectively).

Seagrasses in the U.S. Caribbean EEZ have been managed since 1994 as a fishery management unit (FMU) of the Coral FMP. The Caribbean coral reef resource FMU includes a vast array of plants and invertebrates that provide habitats that are essential to the growth, development, and survival of managed finfish and other marine organisms (CFMC 2005). The seagrasses were included as managed species in the Coral FMP because of their significance as habitat for invertebrate and vertebrate organisms of commercial, medical, recreational, and economic importance. Seagrasses also play an important role in coastal stabilization (McRoy and Helfrich 1980 cited in DPNR 2005) by controlling and reducing erosion via their extensive root and rhizome network, which traps and consolidates bottom sediments (CFMC 1998).

Seagrass as habitat

Seagrass communities provide nutrients and habitat for many reef species of plants, fish, and invertebrates. The complex trophic interactions within seagrasss communities are paramount in sustaining juvenile and adult populations of special interest, including commercially important fishery and protected species (Otero and Carruba 2007). Many vertebrates and invertebrates utilize seagrass beds during some phase of their life history. Juveniles utilize this habitat as a nursery area for food and shelter, and both adults and young graze on the organisms and detritus attached to the blades. These, in turn, are preyed upon by larger carnivores (Thayer et al. 1984).

Seagrass habitat provides food and shelter for fish, conch, lobster, turtles, and manatees. Post-larvae of spiny lobster recruit into seagrass beds, and lobster reside in these areas for their first 9-12 months, and even after they migrate to deeper water, they return at night to feed in the seagrass beds (Croz et al. 1975 cited in CFMC 1998). Adults and juveniles of the threatened green turtle (*Chelonia mydas*) and the endangered West Indian manatee (*Trichechus manatus*) depend on seagrass meadows for forage (Fonseca et al. 1992; Vicente et al. 1992 cited in CFMC 2004).

The queen conch (*Strombus gigas*) is found in a variety of grass beds, from dense turtle

grass (*Thalassia testudinum)* beds to sparse manatee grass (*Syringodium filiforme)* and sea vine (*Halophila* spp.) beds (Thayer et al. 1984). The queen conch as well as the sea star (*Oreaster reticulatus*), consume seagrass detritus, live leaves, and epiphytes (Ogden 1980 cited in Jacobsen and Browder 2006). The queen conch feeds by rasping the epiphytes from the turtle grass leaves as opposed to eating the turtle grass (Ogden 1980 cited in Thayer et al. 1984). However, in sparse grass beds, conchs have been reported to consume large quantities of manatee grass and sea vines (Randall 1964 cited in Thayer et al. 1984).

The nurse shark (*Ginglystoma cirratum*) uses seagrass habitat for reproductive purposes. Gonzalez-Liboy (1979) compiled a list of 100 fish species occurring in seagrass beds of Puerto Rico (cited in Jacobsen and Browder 2006).

Threats to seagrass habitat

Direct and indirect effects of human activities threaten seagrass beds. Activities such as anchor and propeller scarring, vessel groundings, restoration activities, among others are conducted directly on seagrass beds. Human activities that indirectly affect seagrass beds include for example sediment and nutrient runoff from terrestrial sources, ocean acidification, and global warming. The impact of these activities could prevent the normal development of seagrasses and jeopardize the survival of the beds (Oceana, no date) (Table 3-2).

Table 3-2. Threats to seagrass habitat in the Caribbean

- ✓ Raw sewage disposal (high nutrients)
- ✓ Construction of ramps, piers, docks, and other construction on the coast (shadings of large portions of the beds)
- ✓ Destruction or removal by the construction of coastal developments associated with tourism or other coastal activities
- ✓ Any upland development in Puerto Rico and the U.S. Virgin Islands generates sediment erosion which inevitably runs off to the nearshore environment
- ✓ Telephone, water and electricity underwater pipes (especially those not held in place)
- ✓ Anchor and propeller scarring due to increased traffic of ships and recreational vessels; groundings
- ✓ Deforestation resulting in increased sedimentation
- ✓ Removal of seagrasses to make way for salt production and mariculture
- ✓ Storms and hurricanes (direct sand burial and indirect impacts due to destruction of the mangrove forest, resulting in sediment re-suspension and redistribution, increased turbidity)
- ✓ Dynamite fishing
- ✓ Illegal sand mining from beaches
- ✓ Pollution from land-based sources including sewage, agricultural fertilizers, hydrocarbons, pesticides, and other toxic wastes.
- ✓ Diseases
- ✓ Effects of global warming and sea-level rise

(Sources: http://www.seagrasswatch.org/Caribbean.html); CFMC 1998)

3.2.1 Seagrass species description

As defined in the Caribbean Council's Coral FMP, the coral reef resource FMU currently is composed of four individual species of seagrass including turtle grass (*Thalassia testudinum*), manatee grass (*Syringodium filiforme)*, shoal grass (*Halodule wrightii*, also known as *H. beaudettei)*, widgeon grass (*Ruppia maritima)*, and one group of species, the sea vines (*Halophila* spp. (*H. decipiens, H. baillonis, H. englemannii*, and *H. stipulacea* (exotic)) (CFMC 1994; V. Vicente, pers. comm., March 2012) (Figure 3-5).

The most common species found in shallow waters around Puerto Rico and the USVI are *Syringodium filiforme*, *Thalassia testudinum*, and *Halodule wrightii*. In the USVI, *Halophila baillonis* can also be found. The species of *Halophila* found around Puerto Rico are usually not abundant in shallow areas and are thus less frequently reported (Otero and Carruba 2007). While all of the species mentioned for the USVI can be found in St. Croix (probably because of well-protected lagoons), shoal grass, turtle grass, and manatee grass are reported from St. John, while only turtle grass and manatee grass are known to occur in St. Thomas (NOAA/CoRIS. Available at: http://coris.noaa.gov/about/eco_essays/virgin_islands/vg_eco.html (May 2012)).

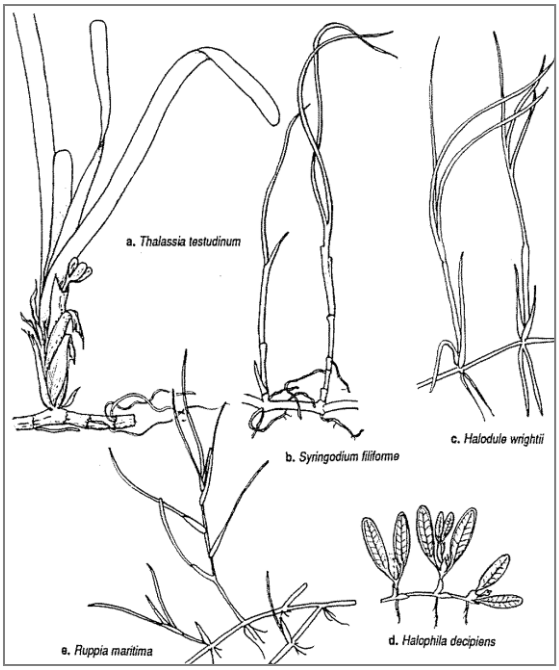

Figure 3-5. Diagram representing some of the seagrass species found in the U.S. Caribbean. (Source: García-Ríos 1990).

1) Turtle grass, *Thalassia testudinum*

Of the species of seagrass recognized in the U.S. Caribbean, turtle grass is the most abundant. These plants grow on sand or mud bottoms, from the shoreline to depths of 20 to 30 ft (6-9 m), depending on the species and the depth of light penetration (Stephens 1966 cited in CFMC 1998). In the clear waters of the USVI, turtle grass beds have been found to depths of 43 feet (13 m) (Randall 1965 cited in CFMC 1998). Turtle grass has a horizontal rhizome, buried as much as 9.8 inches (25 cm) deep in the sediment, which gives rise to erect and flattened blades (Colin 1978 cited in CFMC 1998). In Puerto Rico, male and female turtle grass flowers may be found from March-June in the shallow subtidal zone (Vicente 1992; CFMC 1998). Turtle grass beds exposed to high wave energy, sand

burial, poor water quality, and heated effluents do not reproduce sexually (Vicente 1992; CFMC 2004 and references therein).

Turtle grass leaves are the primary source of food for a wide range of organisms that include fishes, sirenians, turtles, sea urchins, and gastropods. The great number of species that feed exclusively or nearly so on *Thalassia testudinum* leaves or the epiphytes on their blades makes turtle grass a unique resource (Ogden 1976 cited in CFMC 1998). Turtle grass leaves provide a substrate for more than 100 species of algae and other organisms (e.g., crustaceans, hydrozoans, snails) which live on the blades. The beds themselves provide shelter and nursery grounds for larvae and juveniles of several fish and invertebrate species such as grunts, wrasses, parrotfish, snappers, and conch (Stephens 1966 cited in CFMC 1998). More than one hundred species are known to rely on turtle grass beds for protection and food (Croz et al. 1975 cited in CFMC 1998).

Turtle grass is a climax species (i.e., species characteristic of a stable biotic community) (Gallegos et al. 1994). Because of stored starch in the rhizomes, turtle grass can withstand environmental stress for some time. Turtle grass is slow spreading, thus physical damage is extremely long-lasting (Fonseca et al. 1987, Zieman 1976, Durako et al. 1992, cited in Fonseca et al. 1998). It is estimated to take approximately 2 to 5 years for a *Thalassia testudinum* bed to recover from physical disturbance of the rhizome system (Zieman 1976).

2) Manatee grass, *Syringodium filiforme*

The manatee grass has a similar geographical distribution as turtle grass. Manatee grass occurs in the western tropical Atlantic from Florida (USA) to Venezuela, including the Gulf of Mexico and the Caribbean Sea, as well as Bermuda (Carruthers et al. 2010a).

Manatee grass is typically found on sand to mud bottoms down to at least 20 m (66 ft), but it can occur at deeper depths in transparent waters (Kenworthy and Fonseca 1996). This is locally a major habitat-forming species. In the Caribbean, it usually grows intermixed with *Thalassia testudinum* and/or *Halodule wrightii*, but also grows in mono-specific areas, beds, or patches from the upper sub-littoral down to more than 20 m (Green and Short 2003 cited in Carruthers et al. 2010a). In Puerto Rico, manatee grass usually occurs in shallow areas where wave action is higher. It can also be dominant in areas of low salinities (e.g., 14 ppm) (García-Ríos 1990).

Manatee grass, along with the shoal grass (*Halodule wrightii)*, plays an important role as a pioneer species (i.e., a species with a growth strategy that enables it to rapidly colonize unoccupied or recently disturbed habitat) in the Caribbean Sea. Both of these species colonize denuded sediments following perturbations, preceding the *Thalassia testudinum* climax community sequence of Caribbean seagrasses (Gallego et al. 1994 and references therein).

Manatee grass has rounded leaves, usually two leaves per shoot (Fonseca et al. 1998),

and a dense mat of rhizomes that varies from 1-10 cm (0.3-3.94 in) in depth.

Manatee grass is heavily grazed by parrotfish in back reef areas and is an important food source for manatees. Other species grazing on this seagrass species include surgeonfish, sea urchins, and perhaps pinfish. Other grazers, such as the queen conch, eat the epiphytic algae on the seagrass leaves (Zieman 1982 cited in Carruthers et al. 2010a).

3) Shoal grass, *Halodule wrightii* (also known as *H. beaudettei)*

Shoal grass occurs throughout the wider Caribbean region, typically growing on sand and mud substrates from the intertidal down to 5 m (16 ft), and in mixed seagrass beds (Carruthers et al. 2010c). It is considered a pioneer species. The species is tolerant of a range of environmental conditions including salinity, temperature, turbidity, and eutrophication (Carruthers et al. 2010c and references therein).

Shoal grass has a lower depth limit equal to that of turtle grass and manatee grass, but also occurs in very shallow water (Fonseca et al. 1998). This species forms very dense beds, with upwards of 5000 shoots per m^2. Rhizomes are fairly shallow, rarely being deeper than 5 cm (2 in), although roots may extend for 25 cm (9.8 in) or more below the sediment surface (Fonseca et al. 1998).

4) Widgeon grass, *Ruppia maritima*

The widgeon grass (*Ruppia maritima*) is a circum-global species, present throughout arctic, temperate, and tropical regions. It is a shallow water species found in the brackish waters of bays and estuaries between 0 and 2.5 m (0-8 ft) deep. Although extremely wide spread, the species is only locally abundant in some regions.

Widgeon grass occurs in freshwater, brackish, and marine environments (Carruthers et al. 2010d; Fonseca et al. 1998). It is tolerant of a wide range of environmental conditions, including disturbance and extreme temperatures (García-Ríos 1990). Widgeon grass is threatened locally by habitat loss from industrialization and agriculture (Carruthers et al. 2010d).

5) Sea vines, *Halophila* spp.

Four species of *Halophila* have been identified in the U.S. Caribbean: *Halophila decipiens*, *Halophila baillonis*, *Halophila engelmanni* (Vicente 1992), and the exotic *Halophila stipulacea* (V. Vicente, pers. comm., March 2012).

Sea vines do not usually occur in mixed species beds but may be mixed with *Syringodium filiforme*. They may be found in shallow turbid water, in silty or muddy substrates, and to depths of 50 m (164 ft) in clear water because they are adapted to low light intensity (Ogden 1980 cited in CFMC 1994). Sea vines are eaten by a variety of fishes and the queen conch. Sea vines occur widely in the tropical western Atlantic (Colin 1978 cited in CFMC 1994). *Halophila* spp. are considered colonizer species and are typically found in disturbed habitats or habitats where low light/high turbidity conditions limit the distribution of

other seagrass species (Williams 1988 and references therein). The biomass and areal productivity of *Halophila* spp. are low compared to most other tropical seagrasses, its turnover is rapid, and it can provide important sources of organic matter and habitat for other organisms (Williams et al. 1988 and references therein).

The paddle grass *(Halophila decipiens*) is widespread and locally abundant. It can achieve dense cover but low biomass (Carruthers et al. 2010b). *H. decipiens* commonly occurs to depths beyond 100 ft (30 m) in clear waters (Vicente, pers. communication, March 2012). Although it is a deep-water species, it can also sometimes be found in shallow waters under docks or in turbid areas (Carruthers et al. 2010b). The low representation of paddle grass in the shallow areas could be due to being displaced by superior competitor species, or by not tolerating the physical environment, as its structure is more delicate and can suffer damage from wave action (Vicente et al. 1980 cited in García-Ríos 1990).

Halophila decipiens is monoecious, with male and female flowers occurring on the same spathe. Female flowers produce approximately 30 seeds. *H. decipiens* is considered a stenohaline species, in that it is intolerant of variation in salinity (Dawes et al. 1989).

Halophila decipiens can propagate through budding, but primarily relies on a buried seed bank for population re-establishment in seasonally fluctuating or high disturbance environments. It is an opportunistic species that may be favored by disturbance, but is unable to compete once the other species are established (Carruthers et al. 2010b and references therein).

Halophila decipiens has few major threats partly because it is found in deeper waters, thus escaping impacts of reduced water quality on seagrass beds occurring in more shallow areas (Carruthers et al. 2010b).

Halophila baillonis and *Halophila engelmanni* both occur in silty or muddy substrates, and reach depths of 30 to 100 ft (9 to 30 m) or more (Colin 1978 cited in CFMC 2005). In the USVI, *H. baillonis* is the deepest seagrass reported, and occurs in approximately 135 feet (41 m) of water in the Marine Conservation District off St. Thomas (Armstrong et al. 2006a). *Halophila engelmanni* is found only down to 16 feet (5 m) and is restricted to the Bahamas, Florida, the Greater Antilles, and the western Caribbean.

Halophila stipulacea is found in the Indian Ocean and is an invasive species in the Mediterranean and Caribbean. This species is widespread and can form dense stands. *H. stipulacea* is a fast growing species that grows in a wide range of environmental conditions and in a variety of coastal substrates (Carruthers et al. 2010e), in sheltered localities as isolated patches, and on muddy bottoms and coral rubble. It can expand rapidly from small populations, and is well adapted to high levels of disturbance. This species can occur in the shallows as well as in much deeper waters, and has been

recorded to depths greater than 50 m (164 ft) (Lipkin 1977 cited in Carruthers et al. 2010e).

Halophila stipulacea, although scarce, is the deepest occurring seagrass reported worldwide (Short et al. 2007 cited in Carruthers et al. 2010e). These various characteristics contribute to its invasive potential in the Caribbean Sea (Ruiz and Ballantine 2004; Carruthers et al. 2010e).

3.2.2 Protected Species

There are 32 different species of marine mammals that may occur in the Caribbean (UNEP 2008). All 32 species are protected under the Marine Mammal Protection Act and six (sperm, sei, fin, blue, and humpback whales, and the West Indian manatee) are also listed as endangered under the Endangered Species Act (ESA). All of these species are managed by NMFS, with the exception of West Indian manatee (*Trichechus manatus*), which is managed by the U.S. Fish and Wildlife Service (USFWS). None of the whale species are known to closely associate with seagrass meadows. However, the West Indian manatee depends on seagrass meadows for forage.

A sub-species of the West Indian manatee, the Antillean manatee (*Trichechus manatus manatus*) occurs in Puerto Rico and the USVI (USFWS 2007). Antillean manatees in Puerto Rico inhabit the island's coastal regions. Manatee habitat in Puerto Rico includes seagrass beds, sources of fresh water, quiet backwaters, and open areas used as travel corridors (Magor 1979 and Lefebvre et al. 2000, cited in USFWS 2007). Manatees are virtually nonexistent in the USVI, as sightings and strandings in this area are extremely rare (USFWS 2007).

The presence of West Indian manatees in federal waters of the U.S. Caribbean is unknown. However, it is unlikely that manatees are present in the U.S. Caribbean EEZ given the lack of suitable habitat (e.g., shallow seagrasses, secluded embayments) and sources of fresh water for drinking. Even if manatees are present in the action area, this amendment is not anticipated to have any effect on these mammals because there is no known commercial or recreational harvest of seagrasses in the Caribbean EEZ.

Other ESA-listed species occurring in the Caribbean include four species of sea turtle (green, hawksbill, leatherback, and loggerhead) and two *Acropora* coral species (elkhorn (*Acropora palmata*) and staghorn (*A. cervicornis*)). Critical habitat has also been designated for green, hawksbill, and leatherback sea turtles, and for *Acropora*, in the Caribbean region.

Acropora do best in areas free of seagrass. Seagrass can shade coral and inhibit growth. Likewise, because *Acropora* critical habitat is defined primarily as areas of bare substrate, it does not occur in seagrass meadows. This amendment is unlikely to have any effect on *Acropora* or its critical habitat, because neither are likely to occur in seagrass meadows.

Of the listed sea turtle species, the green sea turtle is the species that depends most on seagrasses. Both adults and juveniles of the green sea turtle feed almost exclusively on seagrasses and extensively on the younger portions of seagrass blades (Fonseca et al. 1992; Vicente 1992; Bjorndal 1995).

Critical habitat for green sea turtles has been designated in the Caribbean region, in the coastal waters around Culebra, Puerto Rico (state waters). Seagrass beds were specifically identified in the designation as a feature essential to the conservation of the green sea turtle. For greater detail on the ESA-listed species discussed in this section, please refer to NMFS (2011).

Green Sea Turtles

The following section is a brief overview of the general life history characteristics of the green sea turtle in the Caribbean region. Several volumes exist that more thoroughly cover the biology and ecology of this species (i.e., Lutz and Musick 1997; Lutz et al. 2002).

Green sea turtle hatchlings are thought to occupy pelagic areas of the open ocean and are often associated with *Sargassum* rafts (Carr 1987; Walker 1994). Pelagic stage green sea turtles are thought to be carnivorous. Stomach samples of these animals found ctenophores and pelagic snails (Frick 1976; Hughes 1974). At approximately 20 to 25 cm (7.8-9.8 in) carapace length, juveniles migrate from pelagic habitats to benthic foraging areas (Bjorndal 1997). As juveniles move into benthic foraging areas, a diet shift towards herbivory occurs. They then consume primarily seagrasses and algae, but are also known to consume jellyfish, salps, and sponges (Bjorndal 1980, 1997; Paredes 1969; Mortimer 1981, 1982). The diving abilities of all sea turtles species vary by their life stage. The maximum diving range of green sea turtles is estimated at 110 m (360 ft) (Frick 1976), but they are most frequently making dives of less than 20 m (65 ft.) (Walker 1994). The duration of these dives also varies by life stage. The maximum dive length is estimated at 66 minutes with most dives lasting from 9 to 23 minutes (Walker 1994). Because there is no known commercial or recreational harvest of seagrasses in the EEZ, this amendment is not anticipated to have any effect on green sea turtles.

Green Sea Turtle Critical Habitat

The importance of the Culebra archipelago as green sea turtle developmental habitat has been well documented. Researchers have established that Culebra coastal waters support juvenile and sub-adult green sea turtle populations and have confirmed the presence of a small population of adults (Collazo et al. 1992). Seagrasses are the principal dietary component of juvenile and adult green sea turtles throughout the Wider Caribbean region (Bjorndal 1995). The seagrass beds of Culebra consist primarily of turtle grass (*Thalassia testudinum*). In the Caribbean, turtle grass beds consist primarily of turtle grass, but may include other species of seagrass such as manatee grass (*Syringodium filiforme*), shoal grass (*Halodule wrightii*), and sea vine (*Halophila decipiens*). Green sea turtles also may

consume several species of algae including green algae of the genera *Halimeda*, *Caulerpa*, and *Udotea*. The natal beaches of Culebra's juvenile green sea turtles have not yet been identified. After emerging from nests on natal beaches, post-hatchlings may move into offshore convergence zones for an undetermined length of time (Carr 1986; Collazo et al. 1992; 63 FR 46693, September 2, 1998). This amendment addresses the management of seagrass harvest in the Caribbean EEZ and will have no effect on the area designated as green sea turtle critical habitat.

3.3 Economic and Social Environment

3.3.1 Economic Description of the Fishery

Seagrasses are not harvested commercially or recreationally in the U.S. Caribbean. However, seagrasses are important as habitat for invertebrate and vertebrate organisms subject to commercial and recreational harvest. Economic descriptions of the reef fish, spiny lobster, queen conch, and corals and reef associated invertebrate fisheries of the U.S. Caribbean are contained in Kojis and Quinn (2012), Tonioli and Agar (2011), CFMC (2011a), and CFMC (2011b) and are incorporated herein by reference.

3.3.2 Social and Cultural Environment

This description of the social and cultural environment includes a discussion of the human uses of seagrasses in the Caribbean, a description of the communities involved in the harvesting of the resources that are dependent of seagrasses, and an explanation of the protection that seagrasses receive through their designation as Essential Fish Habitat (EFH). The discussion of EFH has been included to provide an understanding of the protections that currently exist regardless of whether or not seagrasses continue to be included in the Coral FMP.

Human uses of seagrasses in the U.S. Caribbean: There is no current commercial or recreational harvest of seagrasses in the USVI or Puerto Rico, and there has been no known historical harvest. During the 141st Caribbean Council meeting held in December 2011, it was suggested that seagrasses are used to bait some fishermen's traps; however it is thought that this seagrass is gathered as flotsam or from windrows along the shore. As discussed in Section 3.3.1, although seagrasses are not directly harvested commercially or recreationally, they serve as important habitat for species that are harvested commercially or recreationally.

Description of communities: National Standard 8 of the Magnuson-Stevens Act requires that the importance of fishery resources on human communities be considered when making changes to fishery management plans. Detailed descriptions of the communities and the fishermen that are engaged in the harvesting of species that depend on seagrasses as habitat, are included in previous amendments (CMFC 2011a, b), community profiles and

community descriptions (Griffith and Valdés-Pizzini 2002; Impact Assessment 2007; Stoffle et al. 2009), and in descriptions of commercial fishing and fishermen (Kojis and Quinn 2012; Tonioloi and Agar 2011) and are incorporated herein by reference.

Seagrass protection through EFH designation: Seagrasses are designated as EFH in the U.S. Caribbean. The Magnuson-Stevens Act requires federal agencies to consult with NMFS "when any activity proposed to be permitted, funded, or undertaken by a Federal agency may have adverse impacts on designated EFH" (NMFS 2000). Also, if NMFS learns of an activity by either a state or federal agency that "may have an adverse effect on EFH, NMFS is required to develop EFH conservation recommendations for the activity, even if consultation has not been initiated by the action agency" (NMFS 2000). These consultations and conservation recommendations serve as protection measures for EFH designated areas by requiring the consideration of the impacts of actions by agencies on this critical habitat. Thus, the seagrasses and the organisms that depend on them for habitat receive consideration when activities that might negatively impact these areas are conducted.

3.3.3 Environmental Justice Considerations

Executive Order 12898 requires federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. This executive order is generally referred to as environmental justice.

It is not expected that this amendment would cause disproportionately high impacts to minority or low-income populations. It is difficult to link the impacts of proposed management actions for directed fisheries to the minority participants or the impoverished participants of those fisheries because of the lack of demographic information available on fishermen, crewmembers, and dealers. Because this action is proposed to modify the management of species that provide habitat and not the management of a directed fishery, it is even more difficult to link any sort of higher rate of impacts to minority and low-income populations expected to result from the proposed action since there are no identifiable people or communities that are particularly dependent on these resources.

The social impacts of any of the alternatives in this amendment would be expected to be minimal. These impacts would be distributed across the population regardless of minority status or income level, and information is not available to suggest that minorities or lower income persons would be impacted to a greater extent.

In addition, the general participatory process used in the development of fishery management measures (e.g., scoping meetings, public hearings, and open

Caribbean Council meetings) is expected to provide sufficient opportunity for meaningful involvement by potentially affected individuals to participate in the development process of this amendment and have their concerns factored into the decision process.

3.4 Administrative Environment

3.4.1 Federal Fishery Management

Federal fishery management is conducted under the authority of the Magnuson-Stevens Act (16 U.S.C. 1801 et seq.), originally enacted in 1976 as the Fishery Conservation and Management Act. The Magnuson-Stevens Act claims sovereign rights and exclusive fishery management authority over most fishery resources within the U.S. EEZ, an area extending from the seaward boundary of each coastal state to 200 nautical miles from shore, as well as authority over U.S. anadromous species and continental shelf resources that occur beyond the U.S. EEZ.

Responsibility for federal fishery management decision-making is divided between the Secretary of Commerce (Secretary) and eight regional fishery management councils that represent the expertise and interests of constituent states/territories. Regional councils are responsible for preparing, monitoring, and revising management plans for fisheries needing management within their jurisdiction. The Secretary is responsible for promulgating regulations to implement plans and amendments after ensuring management measures are consistent with the Magnuson-Stevens Act and with other applicable laws. In most cases, the Secretary has delegated this authority to NMFS.

The Caribbean Council is responsible for fishery resources in federal waters of the U.S. Caribbean. These waters extend to 200 nautical miles offshore from the nine-mile seaward boundary of the Commonwealth of Puerto Rico and the three-mile seaward boundary of the Territory of the United States Virgin Islands.

The total area of fishable habitat in the U.S. Caribbean is estimated to be approximately 2,467 square nautical miles (nm^2) (8,462 km^2). Fishable habitat is defined as those waters less than or equal to 100 fathoms (183 m). The fishable habitat within the EEZ is 355 nm^2 (1,218 km^2) or 14.39 % of the U.S. Caribbean total, with 116 nm^2 (398 km^2) (4.7%) occurring off Puerto Rico and 240 nm^2 (823 km^2) (9.7%), occurring off the USVI. The vast majority of the fishable habitat in federal waters off Puerto Rico is located off the west coast.
The vast majority of the fishable habitat in federal waters off the USVI is located off the north coast of St. Thomas. The majority of fishable habitat occurs in that area, as does the majority of fishing activity for Caribbean Council-managed species, except for fishing for deep water snappers, which occurs primarily in the EEZ (at depths greater than 100 fathoms) (CFMC 2005).

The Caribbean Council consists of seven voting members: four public members appointed by the Secretary, one each from the fishery agencies of Puerto Rico and the USVI, and one from NMFS. Public interests are also involved in the fishery management process through participation on advisory panels and through Council meetings that, with few exceptions for discussing personnel matters, are open to the public. In addition, the regulatory process is in accordance with the Administrative Procedures Act, in the form of "notice and comment" rulemaking, which provides extensive opportunity for public scrutiny and comment, and requires consideration of and response to those comments.

Regulations that implement the management measures in the fishery management plans (FMPs) are enforced through actions of NOAA's Office of Law Enforcement, the United States Coast Guard, and various territorial authorities. To better coordinate enforcement activities, federal and territory enforcement agencies have developed cooperative agreements to enforce the Magnuson-Stevens Act. However, enforcement in the Caribbean region is severely underfunded. Because personnel and equipment are limited, compliance with federal regulations depends largely on voluntary compliance (Heinz Center 2000).

The Fishery Conservation Amendments of 1990 (P.L. 101-627) conferred management authority for Atlantic highly migratory species (HMS), including tunas, oceanic sharks, marlins, sailfishes, and swordfish, to the Secretary from the Fishery Management Councils. For additional information regarding the HMS management process and authority in the Caribbean, please refer to the Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks (HMS FMP, http://www.nmfs.noaa.gov/sfa/hms/).

Recreational fishing in the EEZ requires fishermen register in the National Registry. For information, please visit the Marine Recreational Information Program Web site at: http://www.countmyfish.noaa.gov/.

3.4.2 Commonwealth and Territory Fishery Management

The governments of the Commonwealth of Puerto Rico and the Territory of the USVI have the authority to manage their respective state fisheries. As a Commonwealth, Puerto Rico has an autonomous government, but is voluntarily associated with the United States. The USVI is an unincorporated territory with a semi-autonomous government and its own constitution (OTA 1987).

Puerto Rico has jurisdiction over fisheries in waters extending up to nine nautical miles from shore. Those fisheries are managed by Puerto Rico's Department of Natural and Environmental Resources. Section 19 of Article VI of the Constitution of the Commonwealth of Puerto Rico provides the foundation for the fishery rules and regulations. Puerto Rico Law 278 of 1998 establishes public policy regarding fisheries.

The USVI has jurisdiction over fisheries in waters extending up to three nautical miles from shore, with the exception of about 5,650 acres of submerged lands off St. John which are owned and managed by the National Park Service (Goenaga and Boulon 1991). The Virgin Islands Department of Planning and Natural resources is the USVI's fishery management agency.

Each state fishery management agency has a designated seat on the Caribbean Council. The purpose of local government representation at the council level is to ensure local participation in federal fishery management decision-making. The state governments have the authority to manage their respective state fisheries. Each of the states exercises legislative and regulatory authority over their natural resources through discrete administrative units. Although each agency is the primary administrative body with respect to the states' natural resources, both Puerto Rico and USVI cooperate with numerous state and federal regulatory agencies when managing marine resources.

Both Puerto Rico and the USVI require commercial fishing licenses, permits for some species, and reporting. Puerto Rico requires a license for commercial fishers, and has categories for full-time, part-time, novice, and non-resident commercial fishers, ornamental fisheries, and owners of rental boats, including charter and party/head boats. Additional commercial permits are required for the harvest of spiny lobster, queen conch, common land crab, incidental catch, and sirajo goby (i.e., ceti) fisheries. Although Puerto Rico fishing regulations state that a license for all recreational fishermen 13 years and older (excluding fishermen on charter or head boats) is required, this requirement is not currently in place. Additional recreational permits are required for the harvest of spiny lobster, queen conch, common land crab, billfish (HMS), freshwater shrimp, and sirajo goby.

The USVI only has a license requirement for commercial fishers who are permanent USVI residents, with the exception of a recreational shrimp permit for Altona Lagoon and Great Pond on St. Croix, and for fishing activities in the Great St. James Marine Reserve off St. Thomas. The USVI government is currently developing recreational fishing regulations for the Territory.

Additional information regarding fishery management in state or federal waters can be found in Section 2.1 of the Comprehensive SFA Amendment (CFMC 2005) and in the 2010 Caribbean ACL Amendment (CFMC 2011a).

Chapter 4. Environmental Effects

Chapter 4 describes the effects to the physical, biological/ecological, economic, social, and administrative environments from the alternatives in Action 1**.**

ACTION 1: Modify management of all seagrass species within the Coral and Reef Associated Plants and Invertebrates Fishery Management Plan (Coral FMP).

Alternatives

Alternative 1 – No action

Alternative 2 **–** Prohibit harvest of seagrasses

Sub-Alternative 2(a) – Prohibit harvest, ACL= 0

Sub-Alternative 2(b) **–** Prohibit harvest, ACL= X $\geq$ 1 lbs wet weight

Alternative 3 –classify as ecosystem component species

Alternative 4 **(*Preferred*)** – remove from the Coral FMP

4.1 Direct and Indirect Effects on the Physical Environment

The Caribbean coral reef resources fishery management unit (FMU) as currently defined, includes a vast array of plants and invertebrates that provide habitats essential to the growth, development, and survival of managed finfish and other marine organisms (CFMC 1994; CFMC 2004). Seagrasses are part of the coral reef resources FMU, and are identified as essential fish habitat (EFH) (CFMC 1998, 2004) and as habitat areas of particular concern (HAPC) within special areas in Puerto Rico commonwealth and U.S. Virgin Islands (USVI) territorial waters (state waters). Seagrasses would continue to be identified as EFH under all of the alternatives proposed for this action because it is a necessary "*substrate"* for some fishery management plan (FMP) regulated fishes to "*spawn or breed or for growth to maturity*" (16 U.S. C. 1802(10)).

Alternative 1 is the no action alternative and would not modify the current management of the coral reef resources FMU under the Coral FMP. **Alternative 1**, as well as **Alternative 2,** including **Sub-Alternatives 2(a)** and **2(b)**, would all retain the seagrasses in the coral reef resources FMU. The organisms that constitute the coral reef resources FMU could be adversely affected by fishing gear interactions. Because the Caribbean Fishery Management Council's (Caribbean Council) authority to manage the direct harvest of marine species is dependent on their inclusion in an FMU, the current definition of the Caribbean coral reef resource FMU could be expected to indirectly benefit the physical environment. This would be accomplished by providing the Caribbean Council the authority to manage fishing for seagrasses that constitute EFH for other managed species, although there is no known harvest of seagrasses in state or federal waters at this time.

Under **Alternative 1**, **Alternative 2**, **Sub-Alternatives 2(a) and 2(b), Alternative 3**, and **Preferred Alternative 4**, seagrasses would continue to be protected by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), which requires, among other things, that FMPs minimize to the extent practicable adverse effects on EFH caused by

fishing. In addition, the physical environment is protected by gear restrictions in the U.S. Caribbean exclusive economic zone (EEZ) established by the 2005 Comprehensive SFA Amendment (CFMC 2005). These include anchoring restrictions and year-round prohibitions to use pots, traps, bottom longlines, gillnets, or trammel nets in federal closed areas, all of which contribute direct protection to seagrasses as EFH (CFMC 2011c). Other management measures currently in place such as: 1) the prohibition on the harvest of corals and live rock; 2) the prohibition on the use of chemicals, plant or plant-derived toxins, or explosives to harvest reef associated species; and 3) the restriction on the gear for collection of marine aquarium fishes to hand-held dip nets and slurp guns, provide direct and indirect physical benefits to the seagrass habitat by protecting it from the adverse effects of fishing gear.

Other than the indirect effects mentioned above, **Alternative 2** and either of its sub-alternatives would not have any physical effects on the environment because there is no known current harvest of seagrasses. However, if harvest were to begin in the future, then **Alternative 2**, **Sub-Alternative 2(a)** would provide the best protection to the physical environment. This sub-alternative would prohibit the harvest of seagrasses in the EEZ and would also establish an annual catch limit (ACL) of zero that would be consistent with the harvest prohibition. Similarly, **Sub-Alternative 2(b)** would also provide benefit to the physical environment by prohibiting the harvest of seagrasses in the EEZ. However, the effect of **Sub-Alternative 2(b)** in the environment would depend on the ACL established for potential scientific research, exempted fishing, or exempted educational activities.

The designation of seagrass as ecosystem component (EC) species, as proposed by **Alternative 3**, is not expected to have direct or indirect effects on the physical environment. EC species are not considered to be in the fishery, therefore, there are no direct management measures applied to them. Thus, if seagrass harvest were to begin in the future, then this harvest would have a direct effect on the physical environment due to the removal of the species. In this case, **Alternative 2** would confer better protection to the physical environment than would **Alternative 3** because harvest would be prohibited under **Alternative 2** and either of its sub-alternatives. In contrast, **Alternative 3** would require the Caribbean Council to change the status of the seagrass species by amending the Coral FMP before they could establish management measures to prohibit harvest.

Preferred Alternative 4 would remove seagrass species from the Coral FMP and is not expected to have direct or indirect effects on the physical environment unless directed harvest of these species occurred in the future. As with **Alternative 3**, **Preferred Alternative 4** would require the Caribbean Council to take action in the future if a fishery developed. The location, presence and distribution of seagrasses in the U.S. Caribbean EEZ, although expected to be minimal due to the deeper waters characteristic of the EEZ, is unknown. Habitat mapping of deeper areas is needed. There are ongoing efforts to map deeper areas in the U.S. Caribbean EEZ and some have already been completed (e.g., Bajo de Sico, Abrir La Sierra, Hind Bank Marine Conservation District (MCD)) (CFMC 2011c). Until now, the presence of seagrass

patches in deeper waters of the U.S. Caribbean EEZ has only been identified by Armstrong (2006a) in the Hind Bank MCD off St. Thomas, USVI. However, an abundant literature exists on the use of seagrass detritus in the deep sea (Wolff 1980 and references therein), so we know it does play a significant role in transferring organic matter to that ecosystem, which is also regulated by other Caribbean Council FMPs.

In summary, because there is no known current harvest of seagrasses, the effect of all the alternatives on the physical environment would be expected to be the same and negligible. If harvest were to begin in the future, then the alternatives that would provide the most benefit to the physical environment are **Sub-Alternative 2(a)** and **Sub-Alternative 2(b)**. Under **Alternative 3** and **Preferred Alternative 4**, seagrasses would not be managed as part of a fishery, thus the effect of either of these alternatives on the physical environment would not be expected to differ. Although retaining the EC species in the Coral FMP under **Alternative 3** may provide some advantage because seagrass species could continue to be monitored, if harvest were to begin in the future, the Coral FMP would have to be amended under both alternatives in order to reclassify them into the fishery and apply management measures. **Alternative 1** is not a viable option because it does not comply with Magnuson-Stevens Act requirements.

4.2 Direct and Indirect effects on the Biological/Ecological Environment

Alternative 1 is the no action alternative and would not modify the current status of the Coral FMP, which includes the seagrass species as part of the coral reef resources FMU. However, **Alternative 1** would not establish an ACL for seagrasses as required by the Magnuson-Stevens Act. Further, although the Caribbean Council's authority to manage the direct harvest of marine species is dependent on their inclusion in an FMU, there is currently no regulation restricting harvest of these species. Therefore, **Alternative 1** does not provide any biological and ecological benefits.

Although there is no known historical or current harvest of seagrasses, and no future directed harvest is anticipated, prohibiting the harvest of seagrasses in **Alternative 2**, under either of the sub-alternatives, could result in maximum protection to the seagrasses and the biological and ecological services they provide. Seagrasses provide a critically important habitat for vertebrate and invertebrate organisms of commercial significance and are perceived to be under considerable threat from human activities. The Coral FMP, based on the best available scientific information, indicates that seagrasses, as well as corals and live-rock, should not be harvested at any level, unless necessary for medical research, habitat restoration, or other scientific purposes (CFMC 1994). The Coral FMP set the optimum yield (OY) and the maximum sustainable yield (MSY) for seagrasses at zero, the same as for stony corals, octocorals, and live-rock, except as

may be authorized for research, education, and habitat restoration. Under this FMP, harvest of stony corals, octocorals, live-rock, and seagrasses is not permitted except for those purposes on a case-by-case basis. As discussed in Section 2.2, the harvest of stony corals, octocorals, and live-rock is accompanied by a regulatory prohibition on harvest (50 CFR § 622.32), but the harvest of seagrasses is not. The Coral FMP also listed as a special recommendation the development of management regulations for seagrass species. **Alternative 2** would be consistent with this recommendation by implementing a regulatory prohibition on the harvest of seagrasses in the EEZ. However, since the time the Coral FMP was established there has been no known directed harvest of seagrasses. Thus, it is not clear that a prohibition on harvest is necessary to best ensure the continued biodiversity of coastal waters, and the habitat (e.g., nursery, feeding grounds, refuge, detritus export function to deep sea) and coastal stabilization services that seagrass provides.

Sub-Alternative 2(a) would set the ACL equal to zero, which is consistent with the statements in the Coral FMP. This sub-alternative is compliant with the provisions of the Magnuson-Stevens Act, but does not address the issue of potential harvest for scientific research, exempted fishing, or exempted educational activities. **Sub-Alternative 2(a)** could have the greatest biological benefit for species that depend heavily on seagrass habitat because it would eliminate any possible future directed harvest.

Under **Sub-Alternative 2(b)**, an ACL for seagrasses would be established to account for permitted harvest for scientific research, exempted fishing, or exempted educational activities. The effect of **Sub-Alternative 2(b)** in the biological and ecological environment would depend on the level of allowable harvest for those purposes. Since **Sub-Alternative 2(b)** would allow for some seagrass harvest, its potential biological benefits could to be less than **Sub-Alternative 2(a)**.

Alternative 3 would classify seagrasses as EC species within the Coral FMP. This could support the development of conservation and management measures for the associated fisheries, due to the importance of seagrass as habitat for commercial and recreational fisheries in the U.S. Caribbean, and could allow for data collection. Another benefit of **Alternative 3** is that the status of seagrasses could be reconsidered if any new scientific information becomes available (e.g., catch trends, vulnerability, etc.) to determine changes in their status or their vulnerability to the fishery and they could be reclassified as part of the fishery if necessary (USDOC 2009 (Magnuson-Stevens Act National Standard 1 Guidelines)).

The expected biological effects of **Alternative 3** are the same as those of **Alternative 2** because there is no current harvest of seagrasses in state or federal waters. If directed harvest were desired in the future, **Alternative 2** and any of its sub-alternatives would confer better immediate

protection to the seagrasses than **Alternative 3** because it prohibits harvest and sets limits to any permitted harvest.

Alternative 3 is expected to have equivalent biological and ecological effects (e.g., enhance the biodiversity and habitat diversity, act as nursery and foraging areas for a number of commercially and recreationally important fish and shellfish and other organisms, stabilize sediments, carbon and nutrient cycling) as **Alternative 1** because seagrass species would still be retained in the Coral FMP. In addition, because ACLs and accountability measures (AMs) would not be established by either **Alternative 3** or **Alternative 1**, the current situation would not change from a biological perspective. The protection from overfishing, which is the purpose of the establishment of ACLs and AMs, in this case would not be distinguishable from the status quo (**Alternative 1**) or the classification of EC species (**Alternative 3**) because there is no harvest of seagrass species, and seagrasses are not targeted or overfished species. However, **Alternative 1** is not a viable option under Magnuson-Stevens Act standards.

In addition, if harvest were to begin in the future, by placing no limit on seagrass harvest **Alternative 1** and **Alternative 3** may jeopardize the direct and indirect biological and ecological benefits that seagrasses provide. The establishment of regulatory protection could be beneficial to limit any adverse biological/ecological effects on the ecosystem and on target species that depend on seagrass habitat if these seagrass resources were to be harvested in any manner.

The removal of species that are not in need of management, as proposed by **Preferred Alternative 4**, would allow management efforts to be concentrated on the heavily targeted and exploited stocks that are in need of management, which would provide beneficial results to the biological/ecological environment. However, if seagrasses were to be removed from the plan, this could delay federal management action to conserve seagrass species in the future should the need arise (indirect effect). However, the Caribbean Council does not anticipate that federal management is necessary for seagrasses because they are not targeted species, and they are not overfished or undergoing overfishing. The potential for future exploitation of these species for harvest purposes is also not anticipated by the Caribbean Council. Although the location, presence, and distribution of seagrasses in the EEZ is not well known, the best available scientific information indicates that the vast majority of seagrasses are in state waters due to depth limitations. There is no known harvest of seagrasses in state waters of Puerto Rico and the USVI. Removing seagrasses from the Coral FMP is not expected to result in significant direct or indirect effects to the biological or ecological environment.

Management measures set for other species that use seagrass habitat could have indirect effects on the biology and ecology of seagrasses, regardless of whether seagrasses are included in the FMP (See discussion in Section 4.1). In addition, under **Alternative 1**, **Alternative 2**, **Sub-Alternatives 2(a)** and **2(b)**, **Alternative 3**, and **Preferred Alternative 4**, seagrasses would

continue to be protected by the Magnuson-Stevens Act, which requires, among other things, that FMPs minimize to the extent practicable adverse effects on EFH caused by fishing. More recent actions such as: 1) the prohibition on harvest of three parrotfish species set by the 2010 Caribbean ACL Amendment (which may use seagrass areas at some part of their life histories (e.g., juveniles of blue parrotfish (*Scarus coerulus*)) (CFMC 2011a); 2) the establishment of ACLs for reef fish, spiny lobster, queen conch, and aquarium trade species; and 3) the establishment of recreational bag limits for reef fish species and spiny lobster set by the 2010 and 2011 Caribbean ACL Amendments (CFMC 2011a, b), may provide biological and ecological indirect benefits to the seagrass habitat as an indirect effect of these actions, regardless of its retention or not in an FMP. Indirect biological/ecological benefits provided by these actions are in the form of enhanced protection of the ecosystem as a whole, by increasing its aesthetic value and/or by contributing to reduce the overfishing of the species they aim to protect. These actions also contribute to enhance the health of the ecosystem by maintaining a natural biological balance of interacting organisms. These actions serve to further protect the seagrass species and seagrass habitat, especially when implemented in conjunction with management measures designed to protect these habitats in state waters where seagrass habitat is more common.

If a directed fishery for seagrass develops in the future, **Alternative 3** and **Preferred Alternative 4** could have the fewest biological benefits for species that depend on seagrass habitat. Without the no harvest or low harvest provisions of **Alternative 2** and its sub-alternatives, the harvest of seagrass under these alternatives could occur at levels that negatively affect those species. However, the likelihood of significant seagrass harvest appears to be minimal.

In summary, based on the discussion above and given that there is no known current directed harvest of seagrass and no future directed fishery for seagrass is anticipated, the effect of all the alternatives on the biological environment would be expected to be the same and negligible. If directed harvest of seagrass were desired in the future, **Sub-Alternative 2(a)** and **Sub-Alternative 2(b)** would provide the greatest benefits to the biological and ecological environment. **Alternative 3** and **Preferred Alternative 4** would both require future action by the Caribbean Council to addresses future directed harvest. **Alternative 1** is not a viable option under the Magnuson-Stevens Act.

4.3 Direct and Indirect Effects on the Economic Environment

Because **Alternative 1** would not modify the management of seagrass species in the U.S. Caribbean EEZ, this alternative would not be expected to result in any direct economic effects on fishermen or associated fishing communities. There is no documented recreational or commercial harvest from either the EEZ or state waters. Despite the absence of documented

commercial or recreational harvest of seagrass species, however, fishermen and the U.S. Caribbean communities in general receive economic benefits from the ecosystem and coastal stabilization services that seagrass provides. These services, and associated economic benefits, would be expected to continue to be provided under **Alternative 1**.

The Magnuson-Stevens Act requires that all species in the FMU have an ACL and AMs. The Coral FMP set the OY and MSY for seagrass species at zero with the intent that seagrass harvest be prohibited except for scientific research, education, or restoration purposes. These specifications would effectively satisfy the AM requirements if not for the regulatory oversight discussed in the following paragraph. However, because the Caribbean Council has not set an ACL for seagrass species, the FMP would continue to not be compliant with the Magnuson-Stevens Act requirements under **Alternative 1**, necessitating duplicative future management action, with associated administrative costs.

Continued lack of an ACL, however, would not be expected to affect the quantity or quality of the ecosystem and coastal stabilization services, and associated economic benefits, provided by seagrass species because harvest is not expected to occur and sufficient protection may be afforded from the specification of seagrass as EFH. However, although the OY and MSY for seagrass species is zero, the Caribbean Council's intent was to prohibit harvest, and harvest has been zero. Seagrass harvest is not explicitly prohibited because the specification of the OY and MSY was not accompanied with a regulatory prohibition on harvest. As a result, although harvest has not occurred, the continued absence of regulatory prohibition could allow harvest to occur without limitation until appropriate regulatory action is taken. Thus, continued receipt of the ecosystem and coastal stabilization services, and associated economic benefits, could be negatively affected under **Alternative 1**. Subsequent regulatory action to prohibit harvest, if **Alternative 1** were adopted, would also be required to implement the Caribbean Council's original intent. However, this could be accomplished in tandem with the specification of the ACL to avoid additional duplication of administrative costs of management.

Neither **Alternative 2** (both sub-alternatives), **Alternative 3**, or **Preferred Alternative 4** would be expected to materially affect the current quantity or quality of the ecosystem and coastal stabilization services, and associated economic benefits, provided by seagrass. While **Alternative 2** would retain the seagrass species in the FMU, **Sub-Alternative 2(a)** would set the ACL at zero and prohibit seagrass harvest. It could be argued that establishing a regulatory prohibition on seagrass harvest would afford greater resource protection despite the absence of historical harvest, or expected demand for such, and increase the likelihood that the economic benefits accruing to the resource continue unreduced. Producing an estimate of the monetary value of any enhanced protection relative to **Alternative 1**, **Alternative 3**, or **Preferred Alternative 4**, however, is not possible with available data.

Sub-Alternative 2(b) would specify a non-zero ACL. Although the limit is not currently identified, it is logical to expect that the limit would be set at a level that would not be expected to significantly reduce the value of the ecosystem and coastal stabilization services provided by seagrass. Despite the specification of a zero OY and MSY in the Coral FMP, it is reasonable to expect that some level of positive harvest might be allowable, especially if the roots of individual plants are not disturbed, but possibly even allowing for whole plants to be taken. If this limit can be identified, **Sub-Alternative 2(b)** would be expected to result in greater economic benefits than any of the other alternatives because the unreduced economic benefits accruing to the ecosystem and coastal stabilization services would be augmented by the economic benefits associated with harvest. If, however, harvest should remain zero for biological, ecosystem, coastal stabilization, or other purposes, or harvest can occur but the specified ACL exceeds the optimal limit, then **Sub-Alternative 2(b)** would be expected to result in lower economic benefits than **Sub-Alternative 2(a)**.

As previously discussed, the Magnuson-Stevens Act AM requirement could be satisfied with the setting of an appropriate ACL. This would be the case under **Sub-Alternative 2(a)** because an ACL of zero and a prohibition on harvest establish both an ACL and AM. The adoption of **Sub-Alternative 2(b)**, however, regardless of the limit specified, would necessitate the specification of AMs to address potential harvest overages. Because no AMs are considered in this proposed amendment, the adoption of **Sub-alternative 2(b)** would require additional management action, with associated costs, to make the FMP compliant with the Magnuson-Stevens Act.

The economic effects of **Alternative 3** would be expected to be equivalent to those of **Alternative 1** with the exception, as previously discussed, that the costs of additional duplicative management action to set the ACL would not be required. Otherwise, retaining seagrass species in the FMP as ecosystem component species affords no better protection of the resource than **Alternative 1**, or the ecosystem and coastal stability services, and associated economic benefits. Despite the absence of harvest to date, or any indication that any entity intends to begin harvest in the future, seagrass harvest would not be prohibited under **Alternative 1**, nor would it be prohibited under **Alternative 3**. As a result, any costs or benefits that would occur under any harvest level could result from the adoption of either alternative. Because **Alternative 3** would allow the costs of duplicative management action to be avoided, although these costs may not be substantial, the expected economic effects of **Alternative 3** would be expected to be greater than those of **Alternative 1**.

The economic effects of **Preferred Alternative 4** would be expected to be virtually indistinguishable from those of **Alternative 3**. Retention of seagrass species in the FMP as ecosystem species, which would occur under **Alternative 3**, would not be expected to afford any greater protection to the resource, and associated services and economic benefits, than removal of seagrass species from the FMP. Regardless of the absence of recorded seagrass harvests, a

system to adequately collect seagrass harvest data may not currently exist because of differences in the nature of the resource or product relative to other marine species, or possible differences in harvesters and market channels. If the current data collection system is not adequate, a system to collect this data would have to be created under **Alternative 3** (and **Sub-Alternatives 2(a)** and **2(b)**). An equivalent system could, however, be established under **Preferred Alternative 4**, particularly if the entities expected to be involved in future seagrass harvest also engage in other federally managed fisheries in the U.S. Caribbean. However, the regulatory authority to implement a data collection system may be greater under **Alternative 3** than under **Preferred Alternative 4**. As a result, there may be an economic efficiency to establish a data collection program under **Alternative 3** compared to **Preferred Alternative 4**. If so, this would be the only difference in the expected economic effects of these two alternatives.

As discussed above, there is presently no known harvest of seagrass in the U.S. Caribbean, but such harvest could begin in the future. It is noted that, while **Alternative 1**, **Alternative 3**, and **Preferred Alternative 4** would place no limit on seagrass harvest, which may negatively affect the short-term direct and indirect economic benefits that seagrass provides, regulatory protection could be enacted to limit the severity and duration of any adverse economic effects.

In summary, based on the discussion above, the economic benefits of the proposed alternatives would be expected to be the greatest for **Sub-Alternative 2(b)**, followed by **Sub-Alternative 2(a)**, **Alternative 3**, **Preferred Alternative 4**, and **Alternative 1**.

4.4 Direct and Indirect Effects on the Social Environment

Effects from fishery management changes on the social environment are difficult to analyze due to complex human-environment interactions and a lack of quantitative data about those interactions. Generally, social effects can be categorized according to changes in: human behavior (what people do), social relationships (how people interact with one another), and human-environment interactions (how people interact with other components of their environment, including enforcement agents and fishery managers). It is generally accepted that a positive correlation exists between economic effects and social effects. Thus, in Section 4.3, alternatives predicting positive or negative economic effects are expected to have correlating positive or negative social effects.

Alternative 1 would not modify current management of seagrass species included in the Coral FMP. This alternative would not be expected to result in any direct negative social impacts on fishermen or fishing communities. As discussed in Section 4.3, there is no commercial or recreational harvest for seagrasses in the EEZ or state waters of the USVI or Puerto Rico; however, these species provide important habitat for other marine species and result in social benefits for fishing communities and fishermen through the provision of this habitat and the

services it provides. **Alternative 1** would be expected to continue to provide these indirect social benefits.
In addition, as discussed in Section 4.3, since an ACL for seagrasses has not been previously set by the Caribbean Council, under **Alternative 1** the fishery management plan would not be compliant with the Magnuson-Stevens Act (which requires that species included in the FMU have an established ACL and AMs). Further action would be required to establish an ACL resulting in additional administrative burden. Also, as detailed in Section 4.3, since harvest has not been explicitly prohibited by a regulatory prohibition, the absence of this prohibition could theoretically allow harvest of seagrasses to occur under **Alternative 1**, and could negatively affect the important habitat services and resulting indirect social benefits that seagrasses provide (if commercial harvest were to begin).

Alternative 2 would address this need to explicitly prohibit the harvest of seagrasses in the regulations and **Sub-Alternative 2(a)** would establish the ACL at zero. This explicit prohibition would likely result in more indirect social benefits through the higher level of regulatory protection for seagrass; however with the ACL established at zero, this would not allow for the harvest associated with educational or restoration purposes. **Sub-Alternative 2(b)** would provide for these purposes by establishing the ACL at a yet undetermined level. An ACL would have to be established at some point and this would cause additional administrative burden. As explained in Section 4.2.1, **Sub-Alternative 2(b)** could allow for some harvest if a directed harvest were ever desired. This could be socially beneficial if done in a way that would not degrade the resource and its positive services to the ecosystem.

Because **Alternative 3** would designate the species of seagrasses included in the Coral FMP as EC species, this alternative would obviate the requirement to establish an ACL in order to be compliant with Magnuson-Stevens Act. Seagrasses would continue to be included in the fishery management plan under **Alternative 3** but as non-target species. This designation may support the more likely possibility of the collection of data on seagrasses (because they would remain in the fishery management plan) which would be beneficial. Both **Alternative 1** and both options of **Alternative 2** would include this likelihood as well because they both would continue to include seagrasses in the fishery management plan.

Under **Alternative 3**, seagrasses could be reclassified as part of the fishery if desired and this would allow the possibility of a directed fishery for seagrasses in the future; however, this reclassification would require additional administrative costs. Although seagrasses are not currently harvested commercially, this reclassification could allow the possibility. If seagrasses were harvested in a manner that would not negatively impact the benefits provided by this habitat, this could provide direct social benefits to future harvesters of this resource (if there were an interest in harvesting this resource).

Preferred Alternative 4 would remove all species of seagrass from the Coral FMP because the Caribbean Council determined that federal management of these species is not necessary. If removed from the fishery management plan, seagrasses would be expected to continue to receive protection through their designation as EFH. This designation provides consideration of the impacts on these resources through consultation and conservation recommendations on activities that might impact EFH. Therefore, it is expected that the social benefits to fishermen and fishing communities from the services provided by seagrass habitat would continue to be received under **Preferred Alternative 4**.

The greatest social benefits would likely be provided by a mix of all the following elements: the continued protection of seagrasses as a habitat for other marine organisms (the highest level of protection appears to be provided through both options of **Alternative 2**, **Alternative 3**, and **Preferred Alternative 4**), the possibility of the collection of data on seagrass species (a higher likelihood of this would be provided through **Alternative 1**, both options of **Alternative 2**, and **Alternative 3** because these alternatives include seagrasses remaining a part of the fishery management plan), and the possibility of some sort of harvest if a directed harvest were ever to be desired (provided through **Alternative 1**, **Sub-Alternative 2(b)**, **Alternative 3**, and **Preferred Alternative 4**). The social benefits would likely be the greatest and the fewest negative social impacts (discussed above in each alternative's explanation) would likely occur under **Sub-Alternative 2(b)** and under **Alternative 3.**

4.5 Direct and Indirect Effects on the Administrative Environment

All of the alternatives proposed for this action would have direct effects on the administrative environment. Modifying the composition of an FMU directly affects the administrative environment because FMUs define the specific species that are to be the target of conservation and management. The coral reef resources FMU includes the seagrasses, although these species seldom occur in federal waters and are not part of a targeted fishery. The administrative effects of the no action **Alternative 1** are expected to be negative because it would require the Caribbean Council to set an ACL for seagrass species in order to be compliant with the Magnuson-Stevens Act. This will necessitate future management action.

Alternative 2 would retain seagrass species in the coral reef resources FMU. **Sub-Alternatives 2(a)** and **2(b)** of **Alternative 2** would prohibit the harvest of seagrasses in the U.S. Caribbean EEZ. Currently there is no regulation in place to prohibit the harvest of seagrasses, thus this alternative and either **Sub-Alternative 2(a)** or **Sub-Alternative 2(b)** would add a short-term administrative burden to promulgate the required regulations. In the long term, this would increase the ACLs that would have to be monitored, and increase the number of stocks subject to regulation.

Sub-Alternative 2(b) also poses the administrative problem of how to determine an appropriate ACL level to account for scientific research, exempted fishing, or exempted educational activities, given that there is no data available to calculate this number. Because there is no historical or current harvest of seagrasses, the definition of a unit to quantify future "landings" of seagrasses would also present a problem.

The administrative effects of **Alternative 3** and **Preferred Alternative 4** are expected to be the same. Both **Alternative 3** and **Preferred Alternative 4** result in an organizational change to the Coral FMP. Neither classifying seagrasses in the Coral FMP as EC species under **Alternative 3** nor removing seagrasses from the FMP under **Preferred Alternative 4** would require any future regulatory action. Thus, no immediate direct or indirect impacts on the administrative environment would be expected.

The action proposed by this amendment is intended to satisfy the requirements of the Magnuson-Stevens Act by modifying management of seagrasses in the U.S. Caribbean. The proposed action would not change current restrictions on fisheries occurring in federal waters of the U.S. Caribbean. The Caribbean Council's **Preferred Alternative 4** would remove seagrasses from the Coral FMP. The Caribbean Council believes federal management of these species is unnecessary because there is no known targeted or indirect harvest of any of the seagrass species included in the Coral FMP in federal waters of the U.S. Caribbean and future harvest is not anticipated. In fact, removing seagrass species from the FMP, would eliminate the need to specify ACLs and AMs, which are required for all species in the fishery management unit, resulting in a reduction in the administrative costs of management of the FMP, consistent with National Standard 7 of the Magnuson-Stevens Act.

As with **Preferred Alternative 4**, the classification of seagrasses as EC species (**Alternative 3**) would also in the long term result in fewer ACLs that need to be monitored and in fewer stocks subject to regulation (contrary to what would happen if **Sub-Alternative 2(a)** or **Sub-Alternative 2(b)** of **Alternative 2** is chosen), creating a simplified administrative environment.

In summary, based on the discussion above, the alternatives that would benefit the administrative environment the most are **Alternative 3** and **Preferred Alternative 4**, followed by **Sub-Alternative 2(a)**, **Sub-Alternative 2(b)**, and **Alternative 1**.

4.6 Cumulative Effects Assessment

As directed by the Council on Environmental Quality (CEQ) regulations, federal agencies are mandated to assess not only the direct and indirect impacts, but the cumulative impacts of proposed actions as well. The CEQ regulations define a cumulative impact as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions." Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 C.F.R. 1508.7). Cumulative effects can either be additive or synergistic. A synergistic effect occurs when the combined effects are greater than the sum of the individual effects.

This section uses an approach for assessing cumulative effects based upon guidance offered by the CEQ publication ―Considering Cumulative Effects Under the National Environmental Policy Act (1997). The report outlines 11 items for consideration in drafting a Cumulative Effects Assessment (CEA) for a proposed action.

1. Identify the significant cumulative effects issues associated with the proposed action and define the assessment goals.
2. Establish the geographic scope of the analysis.
3. Establish the timeframe for the analysis.
4. Identify the other actions affecting the resources, ecosystems, and human communities of concern.
5. Characterize the resources, ecosystems, and human communities identified in scoping in terms of their response to change and capacity to withstand stress.
6. Characterize the stresses affecting these resources, ecosystems, and human communities and their relation to regulatory thresholds.
7. Define a baseline condition for the resources, ecosystems, and human communities.
8. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities.
9. Determine the magnitude and significance of cumulative effects.
10. Modify or add alternatives to avoid, minimize, or mitigate significant cumulative effects.
11. Monitor the cumulative effects of the selected alternative and adapt management.

This CEA for the biophysical environment will follow a modified version of the 11 steps. Cumulative effects for the socio-economic environment will be analyzed separately.

4.6.1. Effects to the Biological Environment

1. Identify the significant cumulative impacts issues associated with the proposed action and define the assessment goals.

The CEQ cumulative impacts guidance states this step is accomplished through three activities as follows:

I. The direct and indirect effects of the proposed action (Chapter 4);
II. Which resources, ecosystems, and human communities are affected (Chapter 3); and
III. Which effects are important from a cumulative effects perspective (information revealed in this CEA).

2. Establish the geographic scope of the analysis.

The immediate areas affected by this action and analyzed in this CEA are the federal waters of the U.S. Caribbean. These waters extend off Puerto Rico from 9 nautical miles (nm) to 200 nm and from 3 nm to 200 nm off the USVI. Those areas in federal waters that contain seagrasses are the primary areas that would be affected by the action in this amendment. Managed resources, non-target species, habitat, and protected species present in federal waters of the U.S. Caribbean are also within this geographic scope. The immediate areas affecting humans would include fishing communities of Puerto Rico and the USVI. These are discussed in Section 3.3. A detailed description of the geographic range for the seagrass species primarily affected by this proposed amendment can be found in section 3.2. The ranges of other protected species as well as the role of seagrass as essential fish habitat are described in Sections 3.1.1 and 3.1.2.

3. Establish the timeframe for the analysis.

The timeframe for the CEA should take into account both historical efforts to manage seagrasses, as well as future considerations if this amendment and its subsequent regulation are approved and implemented by NMFS. The timeframe for the CEA begins with the implementation of the Coral FMP in 1994. Seagrasses in the U.S. Caribbean EEZ have been managed since 1994 as part of the coral reef resources FMU of the Coral FMP (CFMC 1994). Section 1.5 describes the history of management regarding the coral reef resources FMU in U.S. Caribbean federal waters. Management actions specifically aimed at seagrasses have been focused on the role of seagrasses as essential habitat for many important fisheries species in the U.S. Caribbean. Seagrasses are not directly harvested in the EEZ or in state waters.

Biological information in this amendment is updated until the last action concerning coral reef resources, which was through the 2011 Caribbean ACL Amendment (CFMC 2011b). However,

this action did not address seagrass species within the coral reef resources FMU. The 2011 Caribbean ACL Amendment (CFMC 2011b) set ACLs for species within the Coral FMP but did not set ACLs for seagrasses included in the management plan. This amendment proposes to review and evaluate alternatives to address Magnuson-Stevens Act requirements to establish ACLs and AMs for seagrass species in the Coral FMP.

4. Identify the other actions affecting the resources, ecosystems, and human communities of concern.

The following are some past, present, and future actions that could impact the coral reef resources, which include the seagrasses. However, the proposed action is unlikely to have additional cumulative effects as discussed in Sections 4.1 and 4.2, given that there is no past or present harvest of seagrass species in the U.S. Caribbean, and future harvest is not anticipated in either federal or state waters of the U.S. Caribbean. In addition, the Caribbean Council preferred alternative of removing seagrass species from the Coral FMP is essentially an administrative action.

a. <u>Past</u>

The reader is referred to Section 1.5 of this amendment, Management History, for past federal actions affecting the coral reef resources, including seagrasses. Management measures set by the Coral FMP in 1994 that are most relevant to seagrasses include: 1) The prohibition on the take or possession of octocorals, stony corals, and any species in the coral reef resources FMU if attached or existing upon live rock; and 2) the establishment of an OY and MSY in the EEZ at zero for seagrasses and for stony corals, octocorals, and live-rock, except as authorized for scientific research, education, and restoration purposes. While the harvest of stony corals, octocorals, and live-rock is accompanied by a regulatory prohibition on harvest (50 CFR § 622.32), the harvest of seagrasses is not. The Coral FMP intended that the harvest of reef-associated plants and invertebrates would be allowed under permit from NMFS, subject to possible future harvest limits should information on stock abundance and/or harvest levels merit the establishment of such limits in the future (CFMC 1994).

Important conservation measures for seagrasses were set through the Generic EFH Amendment to the FMPs and the EFH-FEIS (CFMC 1998, 2004). These include the identification of seagrasses as EFH for stocks within the four FMPs (Reef Fish, Queen Conch, Spiny Lobster, and Corals), and their identification as HAPC within special areas in the state waters. Measures to conserve and enhance EFH as well as measures to minimize to the extent practicable the adverse effects of fishing on EFH were also established in the Generic EFH Amendment and its FEIS. In 2005, the Comprehensive SFA Amendment (CFMC 2005) designated the identified EFH and EFH HAPCs and minimized adverse impacts on such habitat.

Management measures have been set in the past for species that utilize seagrass habitat. These management measures could indirectly contribute to the cumulative effects of this proposed action, regardless of the alternative ultimately chosen. Please see section 4.1 of this document for a thorough discussion.

The CEA included in the 2010 Caribbean ACL Amendment (CFMC 2011a) analyzes cumulative effects to the queen conch and reef fish fisheries, which utilize seagrass as essential habitat. In addition, the 2011 Caribbean ACL Amendment (CFMC 2011b) analyzed cumulative effects to the coral reef resources, including seagrasses, managed in U.S. Caribbean federal waters, and is incorporated herein by reference. The effects of modifying management of seagrass species, including the preferred alternative of removing seagrass species from the Coral FMP, are analyzed in Chapter 4 of this document.

b. <u>Present</u>

An effort to develop Island-based fishery management plans is currently under development. This initiative would create FMPs specific to each island or island group. This action would affect the way coral reef resources are managed in the U.S. Caribbean, as management would be tailored to each island or island group. However, if the Caribbean Council's preferred alternative is chosen, seagrasses would be removed from federal fisheries management, therefore this action under development would not be expected to have an impact on the management of the seagrass resource in U.S. Caribbean federal waters.

There are no other actions currently in development for the U.S. Caribbean EEZ that would directly affect the seagrass resource. Seagrasses are rare in the EEZ and are more common in state waters. Activities and threats that could potentially impact seagrass habitat are listed in Table 3-2. Because seagrasses are designated as EFH and as HAPC in some areas in state waters, NMFS should be consulted whenever activities could potentially impact seagrass as EFH and/or HAPCs.

c. <u>Reasonably Foreseeable Future</u>

The Caribbean Council's preferred alternative of removing seagrasses from the Coral FMP is an administrative action and no cumulative effects are expected from it. In addition, because seagrass species are not harvested in state or federal waters, it is not expected that any action that would take place in the near future would contribute or reduce the cumulative impacts of the action contained in this Amendment (if any).

5. Characterize the resources, ecosystems, and human communities identified in scoping in terms of their response to change and capacity to withstand stress.

In terms of the biophysical environment, the resources/ecosystems identified in earlier steps of the CEA are the seagrass species directly affected by the regulations, and those reef fish, corals, spiny lobster, and queen conch populations that are indirectly affected by the regulations. This step should identify the trends, existing conditions, and the ability to withstand stresses of the environmental components.

The species that would be directly impacted by the action proposed in Amendment 4 to the Coral FMP are four seagrass species and one group of species present in the U.S. Caribbean: turtle grass (*Thalassia testudinum),* manatee grass (*Syringodium filiforme*), widgeon grass (*Ruppia maritima*), *Halodule wrightii,* and the sea vines (*Halophila* spp.). Information on the species most affected by this amendment is provided in Section 3.2 of this document.

6. Characterize the stresses affecting these resources, ecosystems, and human communities and their relation to regulatory thresholds.

This section examines whether resources, ecosystems, and human communities are approaching conditions where additional stresses could have an important cumulative effect beyond any current plan, regulatory, or sustainability threshold (CEQ 1997). Sustainability thresholds can be identified for some resources, which are levels of impact beyond which the resources cannot be sustained in a stable state. Other thresholds are established through numerical standards, qualitative standards, or management goals. This CEA should address whether thresholds could be exceeded because of the contribution of the proposed action to other cumulative activities affecting resources.

Amendment 4 addresses the management of seagrass species included in the Coral FMPs, which are not harvested in any manner in federal waters, and which are not overfished or undergoing overfishing. The specification of thresholds for these seagrass species to ensure that future overfishing does not occur is not necessary for these species, as there is no directed harvest of these species, and no future harvest is anticipated. The intention of the Caribbean Council is to remove them from fisheries management, an action that is largely administrative in nature.

Stresses affecting the seagrass resource are listed in Table 3-2, and include anthropogenic threats (e.g., habitat loss and degradation, sedimentation, pollution, boating, dredging and landfill activities) and environmental changes (e.g., natural disturbances, potential threats from climate change, ocean acidification). For example, how global climate change will affect seagrass meadows, the ecosystems they support, and the ecosystem services they provide is unclear. Seagrass areas along coastlines that are already affected by human activities are most vulnerable to climate change impacts (Bjork et al. 2008). Climate change can potentially affect seagrasses through rising sea levels, changing tidal regimes, ultraviolet radiation damage, sediment hypoxia and anoxia, increased storm and flooding events, and by causing changes in temperatures (Bjork

et al. 2008) that could alter ecological processes such as productivity and species interactions. On the other hand, the ecological balance between seagrass and its competitors could be altered by higher levels of carbon dioxide (CO_2) in the oceans (i.e., ocean acidification). It has been suggested that ocean acidification may benefit seagrass species with growth limitations determined by CO_2 levels by reducing light requirements and enabling seagrasses to grow in deeper waters (references in Pacific Islands Climate Change Virtual Library 2012). Other current research suggests that tropical seagrass meadows that are found near or among coral reefs could help offset the local effects of ocean acidification. Seagrasses can store carbon, and thus can change seawater carbon chemistry by increasing the pH of surrounding waters, making it less acidic. Under the right conditions, this could potentially help corals and algae build stronger skeletons through enhanced calcification, providing resilience to coral reef biodiversity and function (Unsworth et al. 2012).

The levels of impacts resulting from climate change and ocean acidification cannot be quantified at this time, nor is the time frame known in which these impacts will occur. The action in this amendment is not expected to contribute to increase or decrease the potential impacts of global climate change and ocean acidification on seagrass species and/or the species that depend on these ecosystems.

7. Define a baseline condition for the resources, ecosystems, and human communities.

The purpose of defining a baseline condition for the resource and ecosystems in the area of the proposed action is to establish a point of reference for evaluating the extent and significance of expected cumulative effects.

As previously mentioned, seagrasses provide essential habitat for many important fisheries species in the U.S. Caribbean, but there is no directed harvest of these species. The role of seagrasses as EFH is discussed in Section 3.1.1. A description of the physical and biological environment affected by this action is included in Sections 3.1. and 3.2. Seagrasses are discussed extensively in Section 2.4. of the Coral FMP (CFMC 1994) and in Section 5.2.1.4.5 of the 2005 Comprehensive SFA Amendment.

The status and health of EFH have been extensively described (CFMC 1998, 2004, 2011c). A thorough description of seagrasses as EFH and the baseline condition for species that utilize seagrasses as EFH can be found in Section 2.0 of the Generic EFH Amendment (CFMC 1998) and is incorporated herein by reference. For further details on the history of management of coral reef resources, which include seagrasses, please see Section 1.5 of this amendment.

8. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities.

The action proposed in this Amendment is largely administrative in nature and will not change current fishing activities. Therefore, it is not expected to have any effect on the identified resources, ecosystems, or human communities. Chapter 4 describes the effect of the proposed action and alternatives on the affected environment, including the physical, biological, socio-economic, and administrative environment.

9. Determine the magnitude and significance of cumulative effects.

The proposed management action, as summarized in Chapter 2 of this document, would modify the management of seagrass species included in the coral reef resources FMU of the Coral FMP. The proposed action is not dependent on or related to any other foreseeable actions that would impact the same affected environment. This action does not change current fishing activities or affect current fishing operations. The action is intended to modify seagrass management to satisfy the requirements of the Magnuson-Stevens Act. The Caribbean Council preferred alternative would remove seagrass species from the Coral FMP. This action is not expected to cause or contribute to any direct or indirect significant impacts on the biological and physical environment. The Caribbean Council determined that federal fisheries' management is not necessary for seagrasses because they are not targeted species, they are not overfished or undergoing overfishing, and future exploitation of these species is unlikely. Although the location, presence, and distribution of seagrasses in the EEZ is not well known, the best available scientific information indicates that the vast majority of seagrasses are in state waters due to depth associated light limitations, and there is no known harvest of seagrasses in state waters of Puerto Rico and the USVI.

Detailed discussions of the magnitude and significance of **Preferred Alternative 4** and other alternatives considered can be found in Chapter 4 of this document.

10. Modify or add alternatives to avoid, minimize, or mitigate significant cumulative effects.

As discussed elsewhere, the proposed action is unlikely to have additional cumulative effects as discussed in Sections 4.1 and 4.2 of this document, given that there is no past or present harvest of seagrass species in the U.S. Caribbean, and future harvest is not anticipated in either federal or state waters of the U.S. Caribbean. The removal of species that are not in need of management, as proposed by **Preferred Alternative 4**, would allow management efforts to be concentrated on the heavily targeted and exploited stocks that are in need of management, which would provide beneficial results to the biological/ecological environment. This action would also be expected to result in a reduction in the administrative costs of management of the FMP. Because this action is largely administrative, avoidance, minimization, and mitigation are not applicable.

11. Monitor the cumulative effects of the selected alternative and adopt management.

Since the Caribbean Council's preferred alternative would remove seagrasses from the FMP, monitoring the effects of the preferred alternative is not considered to be necessary, as no cumulative effects are expected.

No data collection programs are currently in place in the EEZ to specifically monitor seagrasses; however, the interactions between seagrass habitat and managed fishery species and/or protected species could be assessed through collection of fisheries data by NMFS and state governments, life history studies, economic and social analyses, and other scientific observations for seagrass associated fisheries.

If the Caribbean Council desires to revise the status of seagrass species in the Caribbean EEZ in the future, these can be reincorporated into the fishery through an FMP amendment, and a monitoring program can be implemented.

4.6.2. Effects to the Socio-Economic Environment

The human environment affected by the proposed action is described in Section 3.3 and is incorporated herein by reference. A description of the history of management of coral reef resources, including seagrasses, is contained in Section 1.5. There is no fishery for seagrasses, and no fishing communities are directly associated with seagrasses. Fisheries and fishing communities that are indirectly dependent on seagrass meadows (i.e., queen conch, reef fish, spiny lobster, and coral reef resources) are described in the 2010 and 2011 Caribbean ACL Amendments (CFMC 2011a, b). In addition, cumulative effects for past actions affecting those species have been analyzed in the aforementioned amendments and are included in here by reference.

The socio-economic impacts of this action are expected to be minimal. The proposed action is unlikely to have additional cumulative effects on the socio-economic environment given that there is no past or present recreational or commercial harvest of seagrass species in the U.S. Caribbean, and future harvest is not anticipated in either federal or state waters of the U.S. Caribbean. This action intends to modify the management of species that provide habitat and not the management of a directed fishery, and there are no identifiable people, communities, or businesses that are directly dependent on these resources. In addition, since the proposed action does not affect actual fishing operations, there would be no impacts to other fisheries as a result of implementing any of the alternatives.

A detailed description of the expected economic and social impacts of the action in this Amendment is contained elsewhere in Section 4.3 and 4.4 respectively, and is incorporated herein by reference. In general, the preferred alternative for the proposed action would not impact the human environment but would improve the efficiency of the federal fishery management process by eliminating species that are not in need of management from the Coral FMP, allowing management efforts and resources to be concentrated on the heavily targeted and exploited stocks that are in need of management. Seagrasses would continue to receive protection through their designation as EFH and thus would continue to provide indirect social benefits to fishermen and fishing communities from the services provided by seagrass habitat. No additional cumulative effects on the economic and social environments are expected from this action. Positive effects in the form of reduced administrative costs of management of the FMP could be expected from the removal of seagrass species from the FMP, because this would eliminate the need to specify ACLs and AMs, which are required for all managed species.

4.7 Council Conclusions

The Caribbean Council, at its 141st Meeting (December 13-14, 2011), discussed the need to address ACLs for the seagrass species included in the coral reef resources FMU of the Coral FMP (CFMC 1994). In 2011, the Caribbean ACL Amendment (CFMC 2011b) set ACLs for species within the Coral FMP but did not set ACLs for seagrasses included in the management plan.

At its 142nd meeting (April 10-11, 2012), the Caribbean Council discussed the following four alternatives to modify management of seagrasses in the EEZ (Section 2.2): (1) taking no action; (2) prohibiting the harvest of seagrasses and establishing an ACL; (3) classifying seagrasses as EC species; and (4) removing seagrasses from the Coral FMP. During this meeting, the Caribbean Council requested the development of a public hearing draft document that discussed these proposed modifications to the current management of seagrasses in the U.S. Caribbean EEZ.

The Caribbean Council noted that the intent of the Magnuson-Stevens Act is to manage fisheries in the EEZ that are in need of regulation and that there is no indication that there is substantial directed harvest of seagrasses in the U.S. Caribbean (142nd Meeting, St. Croix, USVI). The Caribbean Council also noted removing seagrasses from the Coral FMP would have no effect on the designation of seagrass as EFH and HAPC. Thus, the Caribbean Council chose **Alternative 4**, the removal of seagrasses from the Coral FMP, as the preferred alternative.

Public hearings were conducted during July 2012 in Puerto Rico and the USVI. A summary of the public hearings and its outcomes can be found in Appendix D of this document. In summary, most deponents at the public hearings supported **Preferred Alternative 4**.

During its 143rd Meeting (August 28-29, 2012, Fajardo, Puerto Rico), the Caribbean Council discussed the comments received during the public hearings, and listened to recommendations from their Advisory Panel (AP). The AP recommended the Caribbean Council remove the seagrass species from the Coral FMP, but expressed concern about the need to prevent damage to seagrass habitat (e.g., anchoring damage) given the importance of seagrass as nursery habitat.

The Caribbean Council reviewed all of the alternatives and concluded regarding **Alternatives 1**, **2**, and **3** that: (1) **Alternative 1**, the no action alternative, did not meet the requirement of the Magnuson-Stevens Act, because it does not set ACLs and AMs as required for managed species; and (2) since there is no known directed harvest of seagrass in the EEZ, there is no need to prohibit harvest and establish an ACL as proposed by **Alternative 2**; and (3) classifying seagrasses as EC species, as proposed in **Alternative 3**, would not confer any additional advantage.

The Caribbean Council selected **Preferred Alternative 4** for the following reasons: (1) seagrasses are not targeted species, and they are not overfished or undergoing overfishing; (2) there is no commercial or recreational harvest of seagrasses in federal or state waters and future harvest is not anticipated; (3) the presence of seagrasses in the EEZ is expected to be minimal due to deep waters characteristic and resultant light limitation; (4) identified seagrass meadows are more common in state waters of Puerto Rico and the USVI; and (5) seagrasses are designated as EFH and HAPC in all of the Caribbean Council FMPs. Additionally, the Caribbean Council determined that there are numerous protected areas in state waters that include seagrass habitat and there is no need to include additional management measures for seagrasses.

The Caribbean Council, during its 144th Meeting (December 19-20, 2012), approved this amendment for submission to the Secretary of Commerce.

Chapter 5. Regulatory Impact Review

5.1 Introduction

NMFS conducts a Regulatory Impact Review (RIR) as required by Executive Order 12866, as amended. The RIR: (1) Provides a comprehensive review of the incidence and level of impacts associated with a proposed or final regulatory action; (2) provides a review of the problems and the policy objectives prompting the regulatory proposals and an evaluation of alternatives that could be used to solve the problem; and (3) ensures that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost-effective way.

The RIR provides the information needed to determine if the proposed regulations constitute a significant regulatory action under Executive Order 12866.

5.2 Problems and Objectives

The purpose and need of this action are discussed in Section 1.4. In summary, this action is intended to modify seagrass management to satisfy the requirements of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). Because seagrass is not harvested, has not been subject to any management action, and a management need has not been identified, the proposed action would remove all seagrass species from the Fishery Management Plan (FMP) for Corals and Reef Associated Plants and Invertebrates of Puerto Rico and the U.S. Virgin Islands.

5.3 Description of the Fishery

A description of the fishery is contained in Section 3.3.

5.4 Impacts of the Proposed Action

A complete discussion of the expected economic effects of the proposed action and the alternatives considered is contained in Chapter 4.3. There has been no documented recreational or commercial harvest of seagrass from either the U.S. Caribbean exclusive economic zone or state waters. Retention of seagrass species in the FMP in either the fishery management unit or

as ecosystem component species would not be expected to afford any greater protection to the resource, and associated services and economic benefits, than removal of seagrass species from the FMP. Therefore, the proposed removal of all species of seagrass from the FMP would not be expected to result in any economic effects on fishermen or associated businesses or communities. Removal of seagrass species from the FMP, however, would eliminate the need to specify annual catch limits and accountability measures, which are required for all managed species, for seagrass and, as a result, would be expected to result in a reduction in the administrative costs of management of the FMP.

5.5 Public and Private Costs of Regulations

Costs associated with this action include:

Council costs of document preparation, meetings, public hearings, and information dissemination $20,000

NMFS administrative costs of document preparation, meetings, and review .....$ 50,000

Law enforcement costs 0

TOTAL.....$ 70,000

5.6 Determination of Significant Regulatory Action

Pursuant to E.O. 12866, a regulation is considered a "significant regulatory action" if it is likely to result in: (1) An annual effect of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities; (2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; (3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights or obligations of recipients thereof; or (4) raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this executive order. Based on the information provided above, this regulatory action has been determined to not be economically significant for the purposes of E.O. 12866.

Chapter 6. Regulatory Flexibility Act Analysis

6.1 Introduction

The purpose of the Regulatory Flexibility Act (RFA) is to establish a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure that such proposals are given serious consideration. The RFA does not contain any decision criteria; instead, the purpose of the RFA is to inform the agency, as well as the public, of the expected economic impacts of various alternatives contained in the fishery management plan (FMP) or amendment (including framework management measures and other regulatory actions) and to ensure that the agency considers alternatives that minimize the expected impacts while meeting the goals and objectives of the FMP and applicable statutes.

With certain exceptions, the RFA requires agencies to conduct a regulatory flexibility analysis for each proposed rule. The regulatory flexibility analysis is designed to assess the impacts various regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize those impacts. In addition to analyses conducted for the Regulatory Impact Review, the regulatory flexibility analysis provides: (1) a statement of the reasons why action by the agency is being considered; (2) a succinct statement of the objectives of, and legal basis for the proposed rule; (3) a description and, where feasible, an estimate of the number of small entities to which the proposed rule will apply; (4) a description of the projected reporting, record-keeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirements of the report or record; (5) an identification, to the extent practical, of all relevant Federal rules which may duplicate, overlap, or conflict with the proposed rule; and (6) a description of any significant alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities.

In addition to the information provided in this section, additional information on the expected economic impacts of the proposed action are included in Chapters 4 and 5.

6.2 Statement of Need for, Objectives of, and Legal Basis for the Rule

The purpose and objectives of this proposed action are presented in Section 1.4. In summary, this proposed action is intended to make the seagrass regulations consistent with the requirements of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). The proposed action would remove all seagrass species from the Fishery Management Plan for Corals and Reef Associated Plants and Invertebrates of Puerto Rico and the U.S. Virgin Islands, thereby eliminating the need for specification of annual catch limits and accountability measures for these species. The Magnuson-Stevens Act provides the statutory basis for the proposed action.

6.3 Identification of All Relevant Federal Rules Which May Duplicate, Overlap or Conflict with the Proposed Rule

No duplicative, overlapping, or conflicting Federal rules have been identified.

6.4 Description and Estimate of the Number of Small Entities to Which the Proposed Rule will Apply

No small entities have been identified that would be expected to be affected by this proposed action. As stated in Section 6.2, the proposed action would remove all seagrass species from the FMP. No harvest of these species by any entities has been documented. As a result, this proposed action would not be expected to apply to any small entities.

6.5 Description of the Projected Reporting, Record-keeping and Other Compliance Requirements of the Proposed Rule, Including an Estimate of the Classes of Small Entities Which will be Subject to the Requirement and the Type of Professional Skills Necessary for the Preparation of the Report or Records

This proposed action would not establish any new reporting, record-keeping, or other compliance requirements.

6.6 Significance of economic impacts on small entities

Substantial number criterion

Because no small entities that would be expected to be affected by this proposed action have been identified, the issue of substantial number of small entities is not relevant.

Significant economic impacts

The outcome of "significant economic impact" can be ascertained by examining two issues: disproportionality and profitability.

Disproportionality: Do the regulations place a substantial number of small entities at a significant competitive disadvantage to large entities?

Because no small entities that would be expected to be affected by this proposed action have been identified, the issue of disproportionality does not arise.

Profitability: Do the regulations significantly reduce profit for a substantial number of small entities?

This proposed action would remove all seagrass species from the FMP. Removal of these species from the FMP would eliminate federal management of seagrass species. However, other than the essential fish habitat and habitat areas of particular concern designations discussed in Chapters 2 and 3, no regulations have been implemented to protect seagrasses or otherwise manage seagrass harvest or the resource since the development of the FMP. There has been no documented recreational or commercial harvest of seagrass from either the U.S. Caribbean exclusive economic zone or state waters. As a result, no entities, either large or small, would be expected to incur any direct reduction in revenue or profit if this rule is implemented.

Based on the discussion above, it is determined that, this rule, if implemented, would not be expected to have a significant economic effect on a substantial number of small entities.

6.7 Description of Significant Alternatives

This proposed rule, if implemented, would not be expected to have a significant economic effect on a substantial number of small entities. As a result, the issue of significant alternatives is not relevant.

Chapter 7. List of Preparers

Table 7-1. List of Interdisciplinary Plan Team (IPT) Members

Name	Agency	Title
María del Mar López	NMFS/SF	IPT Lead/Fishery Biologist
Bill Arnold	NMFS/SF	Caribbean Branch Chief / Fishery Biologist
Graciela García-Moliner	CFMC	Fishery Biologist
Jose A. Rivera	NMFS/HC	EFH Specialist
David Dale	NMFS/HC	EFH Specialist
Stephen Holiman	NMFS/SF	Economist
Christina Package	NMFS/SF	Anthropologist
Andrew Herndon	NMFS/PR	Fishery Biologist
Mara Levy	NOAA/GC	Attorney
Anne Marie Eich	NMFS/SF	Technical Writer Editor
David Keys	NMFS/SERO	Regional NEPA Coordinator
Brent Stoffle	NMFS/SEFSC	Social Scientist
Michael Bailey	NMFS/SERO	Fishery Biologist
Lynn Rios	NOAA/OLE	Enforcement Officer

NMFS = National Marine Fisheries Service, SF = Sustainable Fisheries Division, CFMC = Caribbean Fishery Management Council, HC = Habitat Conservation Division, PR = Protected Resources Division, GC = General Counsel, SERO= Southeast Regional Office, SEFSC= Southeast Fisheries Science Center, OLE= Office of Law Enforcement.

Chapter 8. List of Agencies and Persons Consulted

Responsible Agencies

Caribbean Fishery Management Council
270 Muñoz Rivera Ave., Suite 401
San Juan, Puerto Rico 00918-1903
(787) 766-5926 (Telephone)
(787) 766-6239 (Fax)
http://www.caribbeanfmc.com/

NMFS, Southeast Region
263 13th Avenue South
St. Petersburg, Florida 33701
(727) 824-5301 (Telephone)
(727) 824-5320 (Fax)
http://sero.nmfs.noaa.gov/

List of Agencies, Organizations, and Persons Consulted

Department of Commerce Office of General Counsel
National Marine Fisheries Service Office of General Counsel
National Marine Fisheries Service Office of General Counsel Southeast Region
National Marine Fisheries Service Southeast Regional Office
National Marine Fisheries Service Southeast Fisheries Science Center
National Marine Fisheries Service Silver Spring Office
National Marine Fisheries Service Office of Law Enforcement
National Marine Fisheries Service Office of Law Enforcement Southeast Division
United States Coast Guard
United States Department of the Interior
USVI Department of Planning and Natural Resources
Puerto Rico Department of Natural and Environmental Resources
Puerto Rico Department of Agriculture
Puerto Rico Junta de Calidad Ambiental (Puerto Rico Environmental Quality Board)
Puerto Rico Junta de Planificación (Puerto Rico Planning Board)

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APPENDIX A. LIST OF SPECIES INCLUDED IN THE CARIBBEAN CORAL REEF RESOURCES FISHERY MANAGEMENT UNIT

(Source: Part 622 – Fisheries of the Caribbean, Gulf, and South Atlantic, Appendix A to Part 622, Species Tables).

I. Coelenterates--Phylum Coelenterata
A. Hydrocorals--Class Hydrozoa
1. Hydroids--Order Anthoathecata
Family Milleporidae
Millepora spp., Fire corals
Family Stylasteridae
Stylaster roseus, Rose lace corals

B. Anthozoans--Class Anthozoa

1. Soft corals--Order Alcyonacea
Family Anthothelidae
Erythropodium caribaeorum, Encrusting gorgonian
Iciligorgia schrammi, Deepwater sea fan
Family Briareidae
Briareum asbestinum, Corky sea finger
Family Clavulariidae
Carijoa riisei
Telesto spp.

2. Gorgonian corals--Order Gorgonacea
Family Ellisellidae
Ellisella spp., Sea whips
Family Gorgoniidae
Gorgonia flabellum, Venus sea fan
G. mariae, Wide-mesh sea fan
G. ventalina, Common sea fan
Pseudopterogorgia acerosa, Sea plume
P. albatrossae
P. americana, Slimy sea plume
P. bipinnata, Bipinnate plume
P. rigida
Pterogorgia anceps, Angular sea whip
P. citrina, Yellow sea whip
Family Plexauridae
Eunicea calyculata, Warty sea rod
E. clavigera
E. fusca, Doughnut sea rod
E. knighti
E. laciniata
E. laxispica
E. mammosa, Swollen-knob
E. succinea, Shelf-knob sea rod
E. tourneforti
Muricea atlantica
M. elongata, Orange spiny rod
M. laxa, Delicate spiny rod
M. muricata, Spiny sea fan
M. pinnata, Long spine sea fan
Muriceopsis spp.
M. flavida, Rough sea plume
M. sulphurea
Plexaura flexuosa, Bent sea rod
P. homomalla, Black sea rod
Plexaurella dichotoma, Slit-pore sea rod
P. fusifera
P. grandiflora
P. grisea
P. nutans, Giant slit-pore
Pseudoplexaura crucis
P. flagellosa
P. porosa, Porous sea rod
P. wagenaari

3. Hard Corals--Order Scleractinia
Family Acroporidae
Acropora cervicornis, Staghorn coral
A. palmata, Elkhorn coral
A. prolifera, Fused staghorn
Family Agaricidae
Agaricia agaricites, Lettuce leaf coral
A. fragilis, Fragile saucer
A. lamarcki, Lamarck's sheet
A. tenuifolia, Thin leaf lettuce
Leptoseris cucullata, Sunray lettuce
Family Astrocoeniidae
Stephanocoenia michelinii, Blushing star
Family Caryophylliidae

Eusmilia fastigiata, Flower coral
Tubastraea aurea, Cup coral
Family Faviidae
Cladocora arbuscula, Tube coral
Colpophyllia natans, Boulder coral
Diploria clivosa, Knobby brain coral
D. labyrinthiformis, Grooved brain
D. strigosa, Symmetrical brain
Favia fragum, Golfball coral
Manicina areolata, Rose coral
M. mayori, Tortugas rose coral
Montastrea annularis, Boulder star coral
M. cavernosa, Great star coral
Solenastrea bournoni, Smooth star coral
Family Meandrinidae
Dendrogyra cylindrus, Pillar coral
Dichocoenia stellaris, Pancake star
D. stokesi, Elliptical star
Meandrina meandrites, Maze coral
Family Mussidae
Isophyllastrea rigida, Rough star coral
Isophyllia sinuosa, Sinuous cactus
Mussa angulosa, Large flower coral
Mycetophyllia aliciae, Thin fungus coral
M. danae, Fat fungus coral
M. ferox, Grooved fungus
M. lamarckiana, Fungus coral
Scolymia cubensis, Artichoke coral
S. lacera, Solitary disk
Family Oculinidae
Oculina diffusa, Ivory bush coral
Family Pocilloporidae
Madracis decactis, Ten-ray star coral
M. mirabilis, Yellow pencil
Family Poritidae
Porites astreoides, Mustard hill coral
P. branneri, Blue crust coral
P. divaricata, Small finger coral
P. porites, Finger coral
Family Rhizangiidae
Astrangia solitaria, Dwarf cup coral
Phyllangia americana, Hidden cup coral
Family Siderastreidae
Siderastrea radians, Lesser starlet
S. siderea, Massive starlet

4. Black Corals--Order Antipatharia
Antipathes spp., Bushy black coral
Stichopathes spp., Wire coral

II. Sea grasses--Phylum Angiospermae
Halodule wrightii, Shoal grass
Halophila spp., Sea vines
Ruppia maritima, Widgeon grass
Syringodium filiforme, Manatee grass
Thalassia testudium, Turtle grass

Aquarium Trade Species in the Coral FMP:
I. Sponges--Phylum Porifera
A. Demosponges--Class Demospongiae
Amphimedon compressa, Erect rope sponge
Chondrilla nucula, Chicken liver sponge
Cinachyrella alloclada
Geodia neptuni, Potato sponge
Haliclona spp., Finger sponge
Myriastra spp.
Niphates digitalis, Pink vase sponge
N. erecta, Lavender rope sponge
Spinosella plicifera
S. vaginalis
Tethya crypta

II. Coelenterates-–Phylum Coelenterata
A. Anthozoans–-Class Anthozoa

1. Anemones--Order Actiniaria
Aiptasia tagetes, Pale anemone
Bartholomea annulata, Corkscrew anemone
Condylactis gigantea, Giant pink-tipped anemone
Heteractis lucida, Knobby anemone
Lebrunia spp., Staghorn anemone
Stichodactyla helianthus, Sun anemone

2. Colonial Anemones--Order Zoanthidea
Zoanthus spp., Sea mat

3. False Corals--Order Corallimorpharia
Discosoma spp. (formerly Rhodactis), False coral
Ricordea florida, Florida false coral

III. Annelid Worms--Phylum Annelida
A. Polychaetes--Class Polychaeta
Family Sabellidae, Feather duster worms
Sabellastarte spp., Tube worms
S. magnifica, Magnificent duster
Family Serpulidae
Spirobranchus giganteus, Christmas tree worm

IV. Mollusks--Phylum Mollusca
A. Gastropods--Class Gastropoda
Family Elysiidae
Tridachia crispata, Lettuce sea slug
Family Olividae
Oliva reticularis, Netted olive
Family Ovulidae
Cyphoma gibbosum, Flamingo tongue

B. Bivalves--Class Bivalvia
Family Limidae
Lima spp., Fileclams
L. scabra, Rough fileclam
Family Spondylidae
Spondylus americanus, Atlantic thorny oyster

C. Cephalopods--Class Cephalopoda
1. Octopuses--Order Octopoda
Family Octopodidae
Octopus spp. (except the Common octopus, *O. vulgaris*)

V. Arthropods--Phylum Arthropoda
A. Crustaceans--Subphylum Crustacea

1. Decapods--Order Decapoda
Family Alpheidae
Alpheus armatus, Snapping shrimp
Family Diogenidae
Paguristes spp., Hermit crabs
P. cadenati, Red reef hermit
Family Grapsidae
Percnon gibbesi, Nimble spray crab
Family Hippolytidae
Lysmata spp., Peppermint shrimp
Thor amboinensis, Anemone shrimp
Family Majidae, Coral crabs
Mithrax spp., Clinging crabs
M. cinctimanus, Banded clinging
M. sculptus, Green clinging
Stenorhynchus seticornis, Yellowline arrow
Family Palaemonida
Periclimenes spp., Cleaner shrimp
Family Squillidae, Mantis crabs
Gonodactylus spp.
Lysiosquilla spp.
Family Stenopodidae, Coral shrimp
Stenopus hispidus, Banded shrimp
S. scutellatus, Golden shrimp

VI. Echinoderms--Phylum Echinodermata

A. Feather stars--Class Crinoidea
Analcidometra armata, Swimming crinoid
Davidaster spp., Crinoids
Nemaster spp., Crinoids

B. Sea stars--Class Asteroidea
Astropecten spp., Sand stars
Linckia guildingii, Common comet star
Ophidiaster guildingii, Comet star
Oreaster reticulatus, Cushion sea star

C. Brittle and basket stars--Class Ophiuroidea
Astrophyton muricatum, Giant basket star
Ophiocoma spp., Brittlestars
Ophioderma spp., Brittlestars
O. rubicundum, Ruby brittlestar

D. Sea Urchins--Class Echinoidea
Diadema antillarum, Long-spined urchin
Echinometra spp., Purple urchin
Eucidaris tribuloides, Pencil urchin
Lytechinus spp., Pin cushion urchin
Tripneustes ventricosus, Sea egg

E. Sea Cucumbers--Class Holothuroidea
Holothuria spp., Sea cucumbers

VII. Chordates--Phylum Chordata
A. Tunicates--Subphylum Urochordata

APPENDIX B. DEFINITION OF ECOSYSTEM COMPONENT SPECIES

Table. 1. 50 CFR Section 600.310(d)(5)) National Standard 1 – Optimum Yield. (d) Classifying stocks in an FMP. (5) Ecosystem component (EC) species. (Source: USDOC 2009).

50 CFR Section 600.310(d)(5)) National Standard 1 – Optimum Yield (OY). (d) Classifying stocks in a fishery management plan. (5) Ecosystem component (EC) species
i. To be considered for possible classification as an EC species, the species should: A. Be a non-target species or non-target stock; B. Not be determined to be subject to overfishing, approaching overfished, or overfished; C. Not be likely to become subject to overfishing or overfished, according to the best available information, in the absence of conservation and management measures; and D. Not generally be retained for sale or personal use.
ii. Occasional retention of the species would not, in and of itself, preclude consideration of the species under the EC classification. In addition to the general factors noted in paragraphs (d)(5)(i)(A)–(D) of this section, it is important to consider whether use of the EC species classification in a given instance is consistent with Magnuson-Stevens Fishery Conservation and Management Act conservation and management requirements.
iii. EC species may be identified at the species or stock level, and may be grouped into complexes. EC species may, but are not required to, be included in an FMP or FMP amendment for any of the following reasons: For data collection purposes; for ecosystem considerations related to specification of OY for the associated fishery; as considerations in the development of conservation and management measures for the associated fishery; and/or to address other ecosystem issues. While EC species are not considered to be "in the fishery," a Council should consider measures for the fishery to minimize bycatch and bycatch mortality of EC species consistent with National Standard 9, and to protect their associated role in the ecosystem. EC species do not require specification of reference points but should be monitored to the extent that any new pertinent scientific information becomes available (e.g., catch trends, vulnerability, etc.) to determine changes in their status or their vulnerability to the fishery. If necessary, they should be reclassified as "in the fishery."

APPENDIX C. OTHER APPLICABLE LAW

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) (16 U.S.C. 1801 et seq.) provides the authority for fishery management in federal waters of the exclusive economic zone. However, fishery management decision-making is also affected by a number of other federal statutes designed to protect the biological and human components of U.S. fisheries, as well as the ecosystems that support those fisheries. Major laws affecting federal fishery management decision-making are summarized below.

Administrative Procedures Act

All federal rulemaking is governed under the provisions of the Administrative Procedure Act (APA) (5 U.S.C. Subchapter II), which establishes a "notice and comment" procedure to enable public participation in the rulemaking process. Under the APA, the National Marine Fisheries Service (NMFS) is required to publish notification of proposed rules in the *Federal Register* and to solicit, consider and respond to public comment on those rules before they are finalized. The APA also establishes a 30-day wait period from the time a final rule is published until it takes effect.

Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) of 1972 (16 U.S.C. 1451 et seq.) encourages state and federal cooperation in the development of plans that manage the use of natural coastal habitats, as well as the fish and wildlife those habitats support. When proposing an action determined to directly affect coastal resources managed under an approved coastal zone management program, NMFS is required to provide the relevant state agency with a determination that the proposed action is consistent with the enforceable policies of the approved program to the maximum extent practicable at least 90 days before taking final action. The Caribbean Fishery Management Council (Caribbean Council) and NMFS determined that this action is consistent to the maximum extent practicable with the enforcement policies of the approved coastal management programs of Puerto Rico and the U.S. Virgin Islands (USVI). This determination was submitted to Puerto Rico and the USVI on January 14, 2013 for review by the responsible state agency(ies) under section 307 of the CZMA. NMFS may presume state agency concurrence if the state agency's response is not received within 60 days from receipt of the agency's consistency determination and supporting information as required by 15 C.F.R. §930.41(a).

Data Quality Act

The Data Quality Act (Public Law 106-443), which took effect October 1, 2002, requires the government for the first time to set standards for the quality of scientific information and statistics used and disseminated by federal agencies. Information includes any communication or representation of knowledge such as facts or data, in any medium or form, including textual, numerical, cartographic, narrative, or audiovisual forms (includes web dissemination, but not hyperlinks to information that others disseminate; does not include clearly stated opinions). Specifically, the Act directs the Office of Management and Budget (OMB) to issue government wide guidelines that "provide policy and procedural guidance to federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information disseminated by federal agencies." Such guidelines have been issued, directing all federal agencies to create and issue agency-specific standards to: 1) Ensure information quality and develop a pre-dissemination review process; 2) establish administrative mechanisms allowing affected persons to seek and obtain correction of information; and 3) report periodically to OMB on the number and nature of complaints received.

Scientific information and data are key components of fishery management plans (FMPs) and amendments and the use of best available information is the second national standard under the Magnuson-Stevens Act. To be consistent with the Act, FMPs and amendments must be based on the best information available. They should also properly reference all supporting materials and data, and be reviewed by technically competent individuals. With respect to original data generated for FMPs and amendments, it is important to ensure that the data are collected according to documented procedures or in a manner that reflects standard practices accepted by the relevant scientific and technical communities. Data will also undergo quality control prior to being used by the agency and a pre-dissemination review. Pursuant to Section 515 of Public Law 106-554 IQA, this information product has undergone a pre-dissemination review by the NMFS Southeast Regional Office, Sustainable Fisheries Division, completed on February 15, 2013.

Endangered Species Act

The Endangered Species Act (ESA) of 1973 (16 U.S.C. Section 1531 et seq.) requires that federal agencies use their authorities to conserve endangered and threatened species, and that they ensure actions they authorize, fund, or carry out are not likely to harm the continued existence of those species or the habitat designated to be critical to their survival and recovery. The ESA requires NMFS, when proposing a fishery action that “may affect” critical habitat or endangered or threatened species, to consult with the appropriate administrative agency (itself for most marine species, the U.S. Fish and Wildlife Service for all remaining species) to determine the potential impacts of the proposed action. Consultations are concluded informally

when proposed actions "may affect but are not likely to adversely affect" endangered or threatened species or designated critical habitat. Formal consultations, resulting in a biological opinion, are required when proposed actions may affect and are "likely to adversely affect" endangered or threatened species or designated critical habitat. If jeopardy or adverse modification is found, the consulting agency is required to suggest reasonable and prudent alternatives.

Effects of the U.S. Caribbean coral reef fishery managed under the FMP for Corals and Reef Associated Plants and Invertebrates of Puerto Rico and the USVI (Coral FMP) were last analyzed as part of a May 19, 2005, biological opinion (opinion). The opinion determined that olive ridley sea turtles, listed marine mammals, and designated critical habitat for sea turtles in the U.S. Caribbean were not likely to be adversely affected by the continued authorization of any U.S. Caribbean exclusive economic zone (EEZ) fisheries, including the coral reef fishery. The opinion then analyzed the possible effects of the gear types used in the U.S. Caribbean fisheries on green, hawksbill, leatherback, and loggerhead sea turtles and determined that hand-harvest by divers was not likely to adversely affect these sea turtles. Overall, the opinion concluded that the continued authorization of all U.S. Caribbean fisheries in the EEZ (including the coral reef fishery) is not likely to jeopardize the continued existence of green, hawksbill, leatherback, or loggerhead sea turtles. As outlined in a memorandum dated January 25, 2013, determined that fishing activities authorized pursuant to this rule would not affect endangered and/or threatened species or critical habitat in any manner not considered in prior consultations on this fishery. However, subsequent to the completion of the 2005 opinion, NMFS listed two *Acropora* species as threatened under the ESA and designated critical habitat for these species. These *Acropora* species and their designated critical habitat overlap in some areas where fishing managed by the Coral FMP is authorized. NMFS is also considering listing an additional 66 species of coral (seven of which occur in the Caribbean) under the ESA, as well as uplisting two Caribbean *Acropora* species from threatened to endangered. In the same January 25, 2013, memo, NMFS determined that it is unnecessary to initiate a conference consultation on the coral species proposed to be listed in the Caribbean and that the continued authorization of the coral reef fishery with seagrass species removed from the Coral FMP is not likely to adversely affect listed *Acropora* or *Acropora* critical habitat. NMFS' Protected Resources Division concurred with the not likely to adversely affect determination in a memorandum dated February 8, 2013.

Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA) established a moratorium, with certain exceptions, on the taking of marine mammals in U.S. waters and by U.S. citizens on the high seas. It also prohibits the importing of marine mammals and marine mammal products into the United States. Under the MMPA, the Secretary of Commerce (authority delegated to NMFS) is responsible for the conservation and management of cetaceans and pinnipeds (other than walruses). The

Secretary of the Interior is responsible for walruses, sea otters, polar bears, manatees, and dugongs.

In 1994, Congress amended the MMPA, to govern the taking of marine mammals incidental to commercial fishing operations. The MMPA requires a commercial fishery to be placed in one of three categories, based on the relative frequency of incidental serious injuries and mortalities of marine mammals. Category I designates fisheries with frequent serious injuries and mortalities incidental to commercial fishing; Category II designates fisheries with occasional serious injuries and mortalities; Category III designates fisheries with a remote likelihood or no known serious injuries or mortalities. To legally fish in a Category I and/or II fishery, a fisherman must obtain a marine mammal authorization certificate by registering with the Marine Mammal Authorization Program (50 CFR 229.4) and accommodate an observer if requested (50 CFR 229.7(c)) and they must comply with any applicable take reduction plans.

While there is no directed fishery for seagrass species affected by this Amendment, seagrasses are part of the Corals and Reef Associated Plants and Invertebrates FMP (Coral FMP). According to the List of Fisheries for 2012 published by NMFS, all gear (dive, hand/mechanical collection fisheries) used in the coral resources fishery are considered Category III (76 FR 73912), meaning annual mortality and serious injury of marine mammals in the coral resources fishery is less than or equal to one percent of the potential biological removal level. NMFS has determined that fishing activities conducted under this amendment will have no adverse impact on marine mammals. The action in this amendment is largely administrative and will not change any fishing practices or current activities, therefore it will not change the way the fishery is currently prosecuted.

Paperwork Reduction Act

The Paperwork Reduction Act (PRA) of 1995 (44 U.S.C. 3501 et seq.) regulates the collection of public information by federal agencies to ensure that the public is not overburdened with information requests, that the federal government's information collection procedures are efficient, and that federal agencies adhere to appropriate rules governing the confidentiality of such information. The PRA requires NMFS to obtain approval from the Office of Management and Budget before requesting most types of fishery information from the public. This action contains no new collections of information.

Small Business Act

The Small Business Act of 1953, as amended, Section 8(a), 15 U.S.C. 634(b)(6), 636(j), 637(a) and (d); Public Laws 95-507 and 99-661, Section 1207; and Public Laws 100-656 and 101-37 are administered by the Small Business Administration. The objectives of the act are to

foster business ownership by individuals who are both socially and economically disadvantaged; and to promote the competitive viability of such firms by providing business development assistance including, but not limited to, management and technical assistance, access to capital and other forms of financial assistance, business training and counseling, and access to sole source and limited competition federal contract opportunities, to help the firms to achieve competitive viability. Because most businesses associated with fishing are considered small businesses, NMFS, in implementing regulations, must assess how those regulations will affect small businesses.

Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Provisions

The Magnuson-Stevens Act includes essential fish habitat (EFH) requirements, and as such, each existing, and any new FMPs must describe and identify EFH for the fishery, minimize to the extent practicable adverse effects on that EFH caused by fishing, and identify other actions to encourage the conservation and enhancement of that EFH.

The area affected by the proposed action in the coral reef fishery has been identified as EFH for the reef fish, queen conch, coral, and spiny lobster FMPs of the Caribbean Council. The proposed action in the context of the fishery as a whole would not have an adverse impact on EFH; therefore, an EFH consultation is not required. The basis of this determination is described in a February 6, 2013 memorandum to NMFS' Habitat Conservation Division, contained in the file.

National Environmental Policy Act

The National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321 et seq.) requires federal agencies to consider the environmental and social consequences of proposed major actions, as well as alternatives to those actions, and to provide this information for public consideration and comment before selecting a final course of action. This document contains an Environmental Assessment to satisfy the NEPA requirements. The Purpose and Need can be found in Section 1.4, Alternatives are found in Section 2.2, the Environmental Consequences are found in Chapter 4, the List of Preparers is in Chapter 7, and a list of the agencies/people consulted is found in Chapter 8.

Regulatory Flexibility Act (RFA)

The purpose of the Regulatory Flexibility Act (RFA 1980, 5 U.S.C. 601 et seq.) is to ensure that federal agencies consider the economic impact of their regulatory proposals on small entities, analyze effective alternatives that minimize the economic impacts on small entities, and make their analyses available for public comment. The RFA does not seek preferential treatment for small entities, require agencies to adopt regulations that impose the least burden on small entities, or mandate exemptions for small entities. Rather, it requires agencies to examine public policy issues using an analytical process that identifies, among other things, barriers to small business competitiveness and seeks a level playing field for small entities, not an unfair advantage.

After an agency determines that the RFA applies, it must decide whether to conduct a full regulatory flexibility analysis (Initial Regulatory Flexibility Analysis (IRFA) and Final Regulatory Flexibility Analysis) or to certify that the proposed rule will not "have a significant economic impact on a substantial number of small entities. In order to make this determination, the agency conducts a threshold analysis, which has the following 5 parts: 1) Description of small entities regulated by proposed action, which includes the SBA size standard(s), or those approved by the Office of Advocacy, for purposes of the analysis and size variations among these small entities; 2) descriptions and estimates of the economic impacts of compliance requirements on the small entities, which include reporting and recordkeeping burdens and variations of impacts among size groupings of small entities; 3) criteria used to determine if the economic impact is significant or not; 4) Criteria used to determine if the number of small entities that experience a significant economic impact is substantial or not; and 5) Descriptions of assumptions and uncertainties, including data used in the analysis. If the threshold analysis indicates that there will not be a significant economic impact on a substantial number of small entities, the agency can so certify. The RFA Analysis for this action can be found in Chapter 6.

Executive Orders

E.O. 12630: Takings

The Executive Order on Government Actions and Interference with Constitutionally Protected Property Rights, which became effective March 18, 1988, requires that each federal agency prepare a Takings Implication Assessment for any of its administrative, regulatory, and legislative policies and actions that affect, or may affect, the use of any real or personal property. Clearance of a regulatory action must include a takings statement and, if appropriate, a Takings Implication Assessment. The NOAA Office of General Counsel will determine whether a Taking Implication Assessment is necessary for this amendment.

E.O. 12866: Regulatory Planning and Review

Executive Order 12866: Regulatory Planning and Review, signed in 1993, requires federal agencies to assess the costs and benefits of their proposed regulations, including distributional impacts, and to select alternatives that maximize net benefits to society. To comply with E.O. 12866, NMFS prepares a Regulatory Impact Review (RIR) for all fishery regulatory actions that either implement a new fishery management plan or significantly amend an existing plan. RIRs provide a comprehensive analysis of the costs and benefits to society associated with proposed regulatory actions, the problems and policy objectives prompting the regulatory proposals, and the major alternatives that could be used to solve the problems. The reviews also serve as the basis for the agency's determinations as to whether proposed regulations are a "significant regulatory action" under the criteria provided in E.O. 12866 and whether proposed regulations will have a significant economic impact on a substantial number of small entities in compliance with the Regulatory Flexibility Act Analysis. The RIR for this action can be found in Chapter 5.

E.O. 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations

This Executive Order mandates that each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions. See Section 3.3.3 for Environmental Justice considerations as they relate to Amendment 4.

E.O. 12962: Recreational Fisheries

This Executive Order requires federal agencies, in cooperation with states and tribes, to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities through a variety of methods including, but not limited to, developing joint partnerships; promoting the restoration of recreational fishing areas that are limited by water quality and habitat degradation; fostering sound aquatic conservation and restoration endeavors; and evaluating the effects of federally-funded, permitted, or authorized actions on aquatic systems and recreational fisheries, and documenting those effects. Additionally, it establishes a seven-member National Recreational Fisheries Coordination Council responsible for, among other things, ensuring that social and economic values of healthy aquatic systems that support recreational fisheries are considered by federal agencies in the course of their actions, sharing the latest resource information and management technologies, and reducing duplicative and cost-inefficient programs among federal agencies involved in conserving or managing recreational fisheries. The Council also is responsible for developing, in

cooperation with federal agencies, States and Tribes, a Recreational Fishery Resource Conservation Plan - to include a five-year agenda. Finally, the Order requires NMFS and the U.S. Fish and Wildlife Service to develop a joint agency policy for administering the ESA.

E.O. 13089: Coral Reef Protection

The Executive Order on Coral Reef Protection (June 11, 1998) requires federal agencies whose actions may affect U.S. coral reef ecosystems to identify those actions, utilize their programs and authorities to protect and enhance the conditions of such ecosystems; and, to the extent permitted by law, ensure that actions they authorize, fund or carry out not degrade the condition of that ecosystem. By definition, a U.S. coral reef ecosystem means those species, habitats, and other national resources associated with coral reefs in all maritime areas and zones subject to the jurisdiction or control of the United States (e.g., federal, state, territorial, or commonwealth waters).

The action proposed in this amendment has no implications to coral reefs. Regulations are already in place to limit or reduce impact to coral reef habitat and seagrass habitat in the U.S. Caribbean EEZ. In addition, NMFS approved and implemented the 2011 Caribbean Annual Catch Limit (ACL) Amendment, which established ACLs and accountability measures for species within the Coral FMP. These actions will prevent overfishing of coral reef resources, which contain species that play important roles on coral reef ecosystems of the U.S. Caribbean.

E.O. 13132: Federalism

The Executive Order on Federalism requires agencies in formulating and implementing policies, to be guided by the fundamental Federalism principles. The Order serves to guarantee the division of governmental responsibilities between the national government and the states that was intended by the framers of the Constitution. Federalism is rooted in the belief that issues not national in scope or significance are most appropriately addressed by the level of government closest to the people. This Order is relevant to FMPs and amendments given the overlapping authorities of NMFS, the states, and local authorities in managing coastal resources, including fisheries, and the need for a clear definition of responsibilities. It is important to recognize those components of the ecosystem over which fishery managers have no direct control and to develop strategies to address them in conjunction with appropriate states, tribes and local entities (international too).

No Federalism issues have been identified relative to the action proposed in this amendment. Therefore, consultation with state officials under Executive Order 13132 is not necessary.

E.O. 13112: Invasive Species

The Executive Order requires agencies to use authorities to prevent introduction of invasive species, respond to and control invasions in a cost effective and environmentally sound manner, and to provide for restoration of native species and habitat conditions in ecosystems that have been invaded. Further, agencies shall not authorize, fund, or carry out actions that are likely to cause or promote the introduction or spread of invasive species in the U.S. or elsewhere unless a determination is made that the benefits of such actions clearly outweigh the potential harm; and that all feasible and prudent measures to minimize the risk of harm will be taken in conjunction with the actions. The actions undertaken in this amendment will not introduce, authorize, fund, or carry out actions that are likely to cause or promote the introduction or spread of invasive species in the U.S. or elsewhere.

E.O. 13158: Marine Protected Areas

Executive Order 13158 (May 26, 2000) requires federal agencies to consider whether their proposed action(s) will affect any area of the marine environment that has been reserved by federal, state, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural or cultural resource within the protected area. This action is not expected to affect any marine protected areas in federal waters of the U.S. Caribbean.

APPENDIX D. PUBLIC HEARINGS LOCATIONS AND SUMMARIES

The Council, during its 143rd Regular Meeting (August 28-29 2012 held in Fajardo, Puerto Rico) discussed the comments received during the public hearings. Written comments were also received and these were presented at the Council Meeting. No additional comments were received during the 143rd meeting.

Public Hearings for this Amendment were held at the following locations:

PUERTO RICO

July 23, 2012 – San Juan, Puerto Rico

Doubletree by Hilton, San Juan, PR
San Juan, 105 De Diego Avenue,
San Juan, Puerto Rico 00914.

The meeting was opened at 7:10 p.m. There were no participants at this meeting. Council staff Graciela García-Moliner and Iris Oliveras attended the meeting. Council Vice-Chair Marcos Hanke closed the public hearing at 8:00 pm.

July 24, 2012 – Naguabo, Puerto Rico

Asociación de Pescadores, Villa Pesquera Playa Húcar,
66.7 Km Highway 3 Naguabo, Puerto Rico 00718.

The meeting was opened at 7:24 p.m. There were 24 participants at this meeting. Council staff Graciela García-Moliner and Iris Oliveras attended the meeting. Council Vice-Chair Marcos Hanke closed the public hearing at 8:00 p.m.
A brief presentation of the alternatives under consideration was presented to the participants. Most deponents supported **Preferred Alternative 4**: Remove all species of seagrass from the Corals and Reef Associated Plants and Invertebrates Fishery Management Plan. Most comments received addressed the issue that there was little seagrass in the EEZ and that seagrass was an issue for the States. Other comments addressed the fact that seagrass is habitat and that harvest should be prohibited; and if needed, to set an ACL equal to 1 pound.

July 25, 2012 – Mayaguez, Puerto Rico

Holiday Inn, Mayagüez, Puerto Rico
2701 Highway #2, Mayaguez,
Puerto Rico 00680.

The meeting was opened at 7:10 p.m. There were no participants at this meeting. Council staff Graciela García-Moliner and Iris Oliveras attended the meeting. Council Vice-Chair Marcos Hanke closed the public hearing at 7:40 p.m.

July 26, 2012 – Ponce, Puerto Rico
Ponce Holiday Inn,
3315 Ponce by Pass, Ponce,
Puerto Rico 00731.

The meeting was opened at 7:10 p.m. There were no participants at this meeting. Council staff Graciela García-Moliner and Iris Oliveras attended the meeting. Council Vice-Chair Marcos Hanke closed the public hearing at 7:40 p.m.

U.S. VIRGIN ISLANDS
July 24, 2012, Windward Passage Hotel,
Veterans Drive, Charlotte Amalie,
St. Thomas, U.S. Virgin Islands 00804.

Eleven persons participated in this meeting. NMFS staff Bill Arnold attended the meeting. The comments were minimal and generally supportive of the Caribbean Council's preferred alternative of removing seagrasses from the Corals and Reef Associated Plants and Invertebrates Fishery Management Plan.

July 25, 2012, The Buccaneer Hotel,
5007 Estate Shoys, Christiansted,
St. Croix, U.S. Virgin Islands 00820.

Eight persons participated in this meeting. NMFS staff Bill Arnold attended the meeting. Participants commented that there is little seagrass present in the EEZ. They also supported the Caribbean Council's preferred alternative.

The following table indicates the number of attendees (in parenthesis) and the number of deponents at each of the meetings. The asterisk* indicates that representatives of various fishers organizations were present, therefore representing more than one person.

Location / Date	Deponents (Attendees)	Alternative supported	Comments
PUERTO RICO			
San Juan / July 23, 2012	0	--	--
Naguabo / July 24, 2012	9 (24)*	Alt. 2 - Prohibit harvest Alt.4 (Preferred) - Remove from FMP	7 persons - importance of seagrass as habitat 2 persons - seagrasses are a state waters issue
Mayaguez/ July 25, 2012	0	--	--
Ponce/ July 26, 2012	0	--	--
USVI			
St. Thomas / July 24, 2012	3 (11)*	Alt. 4 (Preferred) - Remove from FMP	
St. Croix / July 25, 2012	8 (8)*	Alt. 4 (Preferred) - Remove from FMP	Little seagrass in EEZ