Amendments to the U.S. Caribbean Reef Fish, Spiny Lobster, and Corals and Reef Associated Plants and Invertebrates Fishery Management Plans:

Timing of Accountability Measure-Based Closures

Including Environmental Assessment, Regulatory Impact Review, Regulatory Flexibility Act Analysis, and Fisheries Impact Statement

Version 4, October 2016

Amendments to the U.S. Caribbean Reef Fish, Spiny Lobster, and Corals and Reef Associated Plants and Invertebrates Fishery Management Plans: Timing of Accountability Measure-Based Closures

Amendment 8 to the Fishery Management Plan for the Reef Fish Fishery of Puerto Rico and the U.S. Virgin Islands

Amendment 7 to the Fishery Management Plan for the Spiny Lobster of Puerto Rico and the U.S. Virgin Islands

Amendment 6 to the Fishery Management Plan for the Corals and Reef Associated Plants and Invertebrates of Puerto Rico and the U.S. Virgin Islands

Proposed Action:

Modify the timing for the application of accountability measures in the Reef Fish, Spiny Lobster, and Corals and Reef Associated Plants and Invertebrates Fishery Management Plans of Puerto Rico and the U.S. Virgin Islands.

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Abbreviations and Acronyms Used

ACL	annual catch limit
AM	accountability measure
APA	Administrative Procedure Act
CEA	cumulative effects assessment
CEQ	Council on Environmental Quality
CFMC	Caribbean Fishery Management Council; Council
CZMA	Coastal Zone Management Act
DNER	Department of Natural and Environmental Resources of Puerto Rico
DPNR	Department of Planning and Natural Resources of the U.S. Virgin Islands
DPNR	Department of Planning and Natural Resources of the U.S. Virgin Islands
EA	environmental assessment
EEZ	exclusive economic zone
EFH	essential fish habitat
EIS	environmental impact statement
ESA	Endangered Species Act
FEIS	final environmental impact statement
FMP	fishery management plan
FMU	fishery management unit
GU	grouper unit
HAPC	habitat area of particular concern
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MMPA	Marine Mammal Protection Act
MPA	marine protected area
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OMB	Office of Management and Budget
PRA	Paperwork Reduction Act
RFA	Regulatory Flexibility Act
RIR	Regulatory Impact Review
SEFSC	Southeast Fisheries Science Center
SEIS	supplemental environmental impact statement
SERO	Southeast Regional Office
SFA	Sustainable Fisheries Act
SU	snapper unit
USVI	United States Virgin Islands

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Fisheries 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 National Marine Fisheries Service (NMFS), in collaboration with the Caribbean Fishery Management Council (Council), has developed this amendment to the Reef Fish FMP of Puerto Rico and the U.S. Virgin Islands (USVI), the Spiny Lobster FMP of Puerto Rico and the USVI, and the FMP for the Corals and Reef Associated Plants and Invertebrates of Puerto Rico and the USVI to establish an alternative timeframe for the implementation of accountability measures (AMs) applied when a species or species complex exceeds its assigned annual catch limit (ACL).

This amendment aims to minimize to the extent practicable, adverse socio-economic impacts of AM-based fishery closures while constraining harvest to the applicable ACL and preventing overfishing, as required by the Magnuson-Stevens Act.

The affected area of this proposed action encompasses federal waters off Puerto Rico and the USVI as well as their fishing communities dependent on fishing for reef fish, spiny lobster, and coral resources and the ecosystem services they provide.

The actions proposed in this amendment include: Action 1-Modifying the timing for implementation of AM-based closures in the U.S. Caribbean exclusive economic zone (EEZ), and Action 2-Specifying a time period for revisiting the approach to set the timing of AM-based closures selected in Action 1.

The Council selected **Alternative 2**, an AM-based closure end date of September 30th going backward toward the beginning of the year, as the preferred alternative in Action 1, applicable to all fishery management units across all island management areas. This AM-based closure date has been identified by fishers as desirable because it avoids high demand market periods for fish so that they do not risk losing markets, and thus is expected to minimize general effects from the implementation of AMs. In Action 2, the Council also selected as a preferred **Alternative 2**, which would ensure that the approach and date selected for the implementation of AM closure dates in Action 1 is revisited, and possibly revised, no longer than two years from implementation and every two years thereafter.

Assessment of Biological Effects

The actions in this amendment are not expected to have significant beneficial or adverse effects on the biological/ecological environments as they would minimally affect fishing practices (Action 1) or have no effect at all on fishing practices (administrative action) (Action 2).

In Action 1, modifying the date for the implementation of AM-based closures would not change the total allowable landings; it would redistribute those landings throughout the year relative to the no action alternative (AM closure date of December 31st going backward into the year). The difference between all the alternatives proposed is in the length of an AM closure for a particular species/species complex, because the length of an AM-based closure is determined based on the applicable fishing rate, which varies throughout the year. There is no significant difference between the biological effects expected from a shorter versus a longer closure on the species/species complex experiencing the AM because the reduction in landings for the affected species/species complex would be the same. Thus, the biological effects of all alternatives, including **Preferred Alternative 2**, are expected to be substantially the same. In general, the biological/ecological environment of a species/species complex to which an AM is applied is expected to benefit positively from the AM because the AM will constrain landings to the ACL and prevent an overage in the following year. Any indirect effects on the biological environment would depend on how much closing a fishery on a specific date results in changes in the quantity and time spent in fishing activities. These effects are very species- and time-specific. Positive effects that could be expected are, for example, a reduction in fishing effort on species that could be experiencing overfishing, resulting in a more natural size distribution of individuals, and an increase in the abundance of individuals in the population. Other effects from a shortened fishing season for a particular species due to AMs is a reduction in the bycatch of co-occurring species, although regulatory discards could increase. But this is not expected to change regardless of the alternative chosen.

Assessment of Economic Effects

The actions in this amendment change the AM-based closure end date from December 31st to September 30th with the requirement that the end date be reviewed by the Council every two years. The September 30th end date does not change the amount of landings allowed but it can impact the ex-vessel price received for fish, resulting in direct effects to fishermen. The change in the AM-based closure end date reduces the likelihood of closures during the month of December when there is increased demand for fish in the USVI and some parts of Puerto Rico. A closure that ends in September, instead of December, allows for more stable market supply and potentially higher prices for fish during the high demand month of December. While a lack of ex-vessel price and cost and earnings data does not allow for a quantitative measurement of the economic benefits, a large amount of qualitative information from fishermen

supports the conclusion that the economic benefits are expected to be positive. In general, the actions in this amendment are expected to result in short-term and long-term economic benefits.

Assessment of the Social Effects

The actions proposed in this amendment could benefit fishermen and the public by establishing an AM closure end date which purposely avoids conflict, to the extent possible, with times of greater demand, cultural importance, and social importance and by establishing a frequent review of the closure end date.

Under **Preferred Alternative 2** in Action 1, the time period preceding September 30th, was identified as a time of slow fishing (although it does not appear to be a period of low landings, in general) and lower demand, particularly in the USVI. Therefore, there is a higher likelihood that important market dates such as the culturally and economically important Christmas season would not be included in an AM closure. Negative social effects of an AM closure would be expected to be reduced, when compared to the no action alternative. But if overages were high enough, the likelihood of affecting periods during summer and spring such as summer vacation and Lent would increase. Negative social impacts could result from an AM closure during these important times, to commercial fishermen (loss of money from inability to fish for these species), recreational fishermen (loss of access to these particular fish), recreational guides (loss of ability to make money from that particular species during the closure), individuals and communities (loss of access to socially and culturally important fish during the particular time), and customers (inability to purchase these particular fish). However, the endorsement of **Preferred Alternative 2** by the District Advisory Panels from each island management area suggests that the benefits associated with open fisheries in December will exceed those that may be lost if overlap with these other important periods occurs.

The frequent (no longer than two years) review of the established AM-closure date under **Preferred Alternative 2** in Action 2, is expected to result in positive effects from the ability to change the method based on new information, such as how fishermen are actually impacted. It could result in a continuation of the social effects from the chosen method for up to two years; however fishermen or managers could comment or initiate efforts to change the start closure date at any time if negative effects were experienced.

Assessment of Effects on Safety at Sea

The actions in this amendment would not present safety at sea issues, as none of them have safety implications or will significantly change the way in which the subject fisheries operate. Action 1 would minimally affect fishing practices and Action 2 is an administrative action. In Action 1, changing the end date for implementing AMs from December 31st to September 30th, which falls within hurricane season, may increase safety at sea by reducing fishing for the species affected by the AM during hurricane

season (June 1 – November 30). However, this would only apply if there was an AM-based closure, and only to those fishing for the AM-closed species, and it would not occur if fishers still go out to fish for other open species. In general, given that both December and September are considered slow fishing periods in Puerto Rico and the USVI, any changes in the current level of safety at sea should be minor.

Chapter 1. Introduction

1.1 What Actions are Being Proposed?

Accountability measure (AM) regulations in U.S. Caribbean federal waters require the National Marine Fisheries Service (NMFS) to shorten the length of the fishing season for a fishery management unit (FMU) (i.e., species/species complex) for which the annual catch limit (ACL) has been exceeded. The fishing season is shortened in the year following an overage determination (which is determined based on the average of the last three years of available landings data), by the amount necessary to constrain landings to the ACL. These AM-based reductions in the length of the fishing season, for any FMU (e.g., goatfish, parrotfish) for which the ACL has been exceeded[1] currently end on December 31st of the closure year and extend backward into the year for the number of days necessary to achieve the required reduction in landings. The timing of these AM-based closures may result in negative socio-economic impacts to U.S. Virgin Islands (USVI) and Puerto Rico fishers. Therefore, this amendment to the Fishery Management Plan (FMP) for the Reef Fish Fishery of Puerto Rico and the USVI (Reef Fish FMP), the FMP for the Spiny Lobster of Puerto Rico and the USVI (Spiny Lobster FMP), and the FMP for the Corals and Reef Associated Plants and Invertebrates FMP (Coral FMP) evaluates alternative timeframes for the implementation of fishery closure dates, designed to minimize, to the extent practicable, such socio-economic impacts in the event a species or species complex exceeds its assigned ACL. This amendment aims to minimize such socio-economic impacts to the extent practicable while constraining harvest to the applicable ACL and preventing overfishing, as required by the Magnuson-Stevens Fishery Conservation and Management Act of 2007 (Magnuson Stevens Act).

[1]See Section 1.5 for more information about AMs in federal waters of the U.S. Caribbean and their applicability.

1.2 Who is Proposing the Actions?

The Caribbean Fishery Management Council (Council) proposes the actions in this amendment. The proposed actions would be implemented through amendments to the Reef Fish, Spiny Lobster, and Coral FMPs. The Council develops the FMP amendments and submits them to the Secretary of Commerce for approval, disapproval, or partial approval of the proposed actions in the amendment, and promulgation of the regulations.

Through this document, NMFS and the Council evaluate potential actions and alternatives to address identified issues with the current approach to implement AMs in the U.S. Caribbean exclusive economic zone (EEZ). The actions in this amendment may result in changes to the management of federal fisheries in the U.S. Caribbean.

Caribbean Fishery Management Council

- Responsible for conservation and management of U.S. Caribbean fish stocks, except highly migratory species, which are managed directly by NMFS.
- Consists of seven voting members:
  - Four voting members appointed by the Secretary of Commerce upon recommendations of the Governors of Puerto Rico and the U.S. Virgin Islands;
  - One voting member appointed by the Governor of Puerto Rico and one voting member appointed by the Governor of the U.S. Virgin Islands;
  - The Regional Administrator of 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 for implementation on behalf of the Secretary of Commerce.

1.3 Where is the Project Located?

Fishery resources in federal waters of the U.S. Caribbean are presently managed by the Council under four FMPs. Federal waters in the U.S. Caribbean are located in the 3 - 200 nautical mile (nm) (6 - 370 kilometers [km]) U.S. exclusive economic zone (EEZ) off the USVI, and in the 9 - 200 nm (17 - 370 km) EEZ off the Commonwealth of Puerto Rico (Fig. 1.3.1).

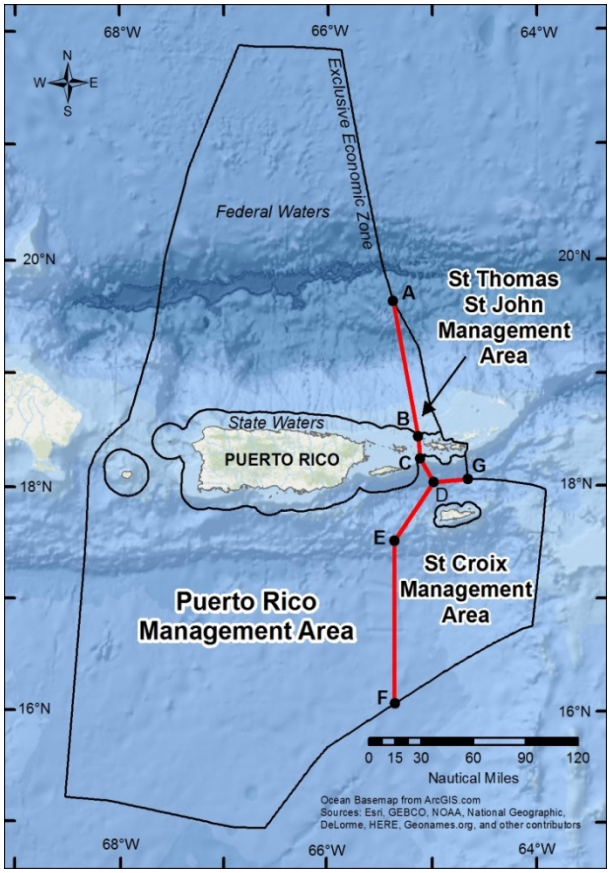

Figure 1.3.1. Jurisdictional boundaries of the Caribbean Fishery Management Council, the Commonwealth of Puerto Rico, and the Territory of the U.S. Virgin Islands, including management areas in federal waters.

1.4 Why is the Council Considering Action?

Fishers in the USVI and Puerto Rico have expressed to the Council that implementing AM-based closures at the end of the year results in negative socio-economic impacts, for example, by resulting in repetitive and potentially overlapping closures during the important Christmas holiday season. To address this issue, the Council evaluated alternative timeframes for AM-based closure dates. The Council's goal for this action is, to the extent practicable, to minimize the socio-economic impact of AM-based closures, while still constraining catch levels to the applicable ACLs. The proposed AM-based closure dates may occur during times of the year when the economic and/or cultural impacts are less severe.

Purpose for Action

Limit harvest to the annual catch limits while minimizing adverse socio-economic effects of accountability measure-based closures.

Need for Action

Ensure accountability measure-based closures successfully achieve their conservation objective and, to the extent practicable, minimize adverse economic impacts to fishers and fishing communities, consistent with National Standard 8 of the Magnuson-Stevens Fishery Conservation and Management Act.

Background

In 2013, the Council established a committee (Ad Hoc Committee) to evaluate options for choosing AM-based closure periods that would be more socially and economically advantageous to the fishermen. This committee was composed of representatives from the USVI and Puerto Rico fishery sectors, and representatives from the Council and NMFS. For this purpose, the Council's economist prepared a model template (the "Seasonal Choices Model") and examples for specific FMUs that incorporated ecological, economic, and social considerations to help guide the selection of the most appropriate closure periods for each FMU and island management area. Although the model was not directly used for the development of the current management alternatives, it provided invaluable guidance.

Council members and meeting attendees at the 147th Regular Council Meeting, held in August 2013 in Puerto Rico, expressed the need to engage fishers in the process to identify and select potential AM-based closure dates. Factors such as revenue maximization and minimizing the number of closure days for a species/species complex were identified by fishers as important in the selection of closure dates.

This amendment evaluates alternative timeframes for AM-based closures. The analysis of the effects of alternative closure dates considers information provided by Council members, representatives of the fishing communities in Puerto Rico and the USVI, and participants at public hearings, regarding dates (date ranges) when important economic, cultural, and market conditions are present (e.g., higher demand, lower demand) (Table 1.4.1).

Table 1.4.2 presents existing federal and/or Territorial/Commonwealth seasonal closures for various species, which also are considered when evaluating alternative timeframes for AM-based closures.

Table 1.4.1. Example of important market dates identified by Caribbean Fishery Management Council members and fishery participants for each of Puerto Rico, St. Thomas/St. John, and St. Croix.

Island Management Area	Identified Date Ranges	Reason (change in demand from average)
Puerto Rico	Mar 1- Apr 30	Higher demand due to Lent
	May 1 - Jul 31	Higher demand due to summer vacation
	Aug 1 - Oct 31	Lower demand due to back to school costs
St. Thomas/St. John, USVI	Jan 1 - Jun 30	Higher demand due to tourism (lobster, yellowtail)
	Mar 1 - Apr 30	Higher demand due to Lent (all reef fish)
	Jul 1 - Sep 30	Lower demand due to summer hotel/restaurant closures (yellowtail, lobster)
	Aug 1 - Sep 30	Lower demand due to saving for beginning of school year (all species)
	Sep 1 - Nov 30	Higher demand due to elections activities (all species, alternate years)
	Oct 1 - Dec 31	Higher demand due to tourism season (yellowtail, lobster)
	Dec 1 - Dec 31	Higher demand due to Christmas holiday (all species)
St. Croix, USVI	Jan 1 - May 31	Higher demand due to tourism season
	Feb 1 - Feb 28	Higher demand before, during, and after Agriculture and Food Fair
	Mar 1 - Apr 30	Higher demand due to Lent
	Aug 1 – Sep 30	Lower demand due to back to school costs
	Nov 1 - Nov 30	Slightly higher demand due to tourism season and election activities
	Dec 1 - Dec 31	Higher demand due to tourism season

Table 1.4.2. Calendar of seasonal fishing closures in federal waters, Puerto Rico commonwealth waters, and U.S. Virgin Islands territorial waters (state waters).

Island Management Area	Species	Seasonal Closure Dates in Federal and in State Waters
Puerto Rico	yellowfin, red, tiger, black, and yellowedge groupers	Federal: Feb 1 – Apr 30
	yellowfin grouper	State: Feb 1 – Apr 30
	red hind grouper	Federal: Dec 1 – last day of Feb, no fishing for or possession of red hind in or from the Caribbean EEZ west of 67°10' W. longitude
		State: Dec 1 – last day of Feb
	silk, black, blackfin, and vermilion snappers	Federal: Oct 1 – Dec 31
	silk and blackfin snappers	State: Oct 1 – Dec 31
	mutton and lane snappers	Federal: Apr 1 – Jun 30
	mutton snapper	State: Apr 1 – May 31
	All Council managed reef fish	Federal: Red Hind Spawning Aggregation Area of Bajo de Sico, western Puerto Rico - Oct 1 – Mar 31
	All species	Federal: Red Hind Spawning Aggregation Areas of Tourmaline Bank and Abrir La Sierra, western Puerto Rico - Dec 1 – Feb 28
U.S. Virgin Islands (St. Thomas/St. John, St. Croix)	yellowfin, red, tiger, black, and yellowedge groupers	Federal and State : Feb 1 – Apr 30
	red hind grouper	Federal: Red Hind Spawning Aggregation Area of Lang Bank in St. Croix – Dec 1 – Feb 28
	silk, black, blackfin, and vermilion snappers	Federal: Oct 1 – Dec 31
	silk and blackfin snappers	State: St. Thomas/St. John ONLY - Oct 1 – Dec 31
	mutton and lane snappers	Federal and State: Apr 1 – Jun 30
	All species (except HMS)	Grammanik Bank, St. Thomas - Feb 1 – Apr 30
	All species	Hind Bank, St. Thomas – YEAR ROUND
	All species	Mutton Snapper Spawning Aggregation Area, St. Croix - Mar 1 – Jun 30

1.5 Applicability of Accountability Measures for Caribbean-Council Managed Species

Accountability measures apply to all species managed by the Council.[2] Accountability measures require the NMFS' Assistant Administrator to reduce the length of the fishing season for a given species/species complex in the year following a determination that prior year(s) landings exceeded the respective ACL. If NMFS determines the ACL for a particular species/species complex has been exceeded based upon the applicable multi-year average of landings, the Southeast Fisheries Science Center, in consultation with the Council and its Scientific and Statistical Committee, evaluate whether the reported overage represents an actual increase in landings or reflects improved data collection and monitoring. The intent of this evaluation is to eliminate any incentive for fishermen to under-report or misreport catches to avoid exceeding ACLs and triggering associated AMs.

Annual catch limits are evaluated relative to the most recent multi-year average of landings. The extent to which fishing seasons are shortened to account for landings overages equals the amount necessary to constrain landings to the ACL. Accountability measure-based closures currently end on December 31st of the closure year and extend backward into the year for the number of days necessary to account for the overage[3].

U.S. Caribbean AM-Based Closures in Fishing Years 2013-2016

To determine the length of a required AM-based closure for the applicable species or species group, NMFS estimates monthly landing rates for the closure year (January to December). To determine the length of AM-based closures in fishing years 2013-2015, NMFS used the most recent year of available landings data to estimate monthly landings rates and determine the duration of required closures. In those instances, temporal trends in landings established that the most recent year of landings data best anticipated fishing conditions in the year of the closure.

For the 2013 fishing season, NMFS determined that several FMUs exceeded their applicable ACLs based on an analysis of the average landings for previous years, thus triggering AMs to reduce the length of the fishing seasons in 2013 by the amount necessary to ensure landings would not again exceed the assigned ACLs for those FMUs. In 2013, AM-based closures were implemented for the commercial sector of snapper unit 2 (SU2) (i.e., queen and cardinal snappers) in Puerto Rico, the

[2] For prohibited corals and species with harvest moratoria (e.g., goliath grouper and Nassau grouper), the harvest prohibition will function as the AM in the EEZ for those areas (76 FR 82404).

[3] December 31st is the last day of an AM-based closure in a fishing year. This date is used as the starting point to count backward into the year and determine the duration of the closure.

recreational sector of wrasses[4] in Puerto Rico, triggerfish and filefish in St. Croix (all fishing), spiny lobster in St. Croix (all fishing), and groupers in St. Thomas/St. John (all fishing) (78 FR 18247) (Table 1.5.1).

For the 2014 fishing year, commercial harvest of SU2 in Puerto Rico again exceeded its assigned ACL based on the average of the three most recent years of available landings data (2010-2012). However, AMs were not applied in 2014. As outlined above, upon determination that an AM-based closure may be appropriate, the next step is to determine the length of that closure. In the case of SU2, the needed length was determined to be zero days because the 2012 catch rate (identified as the best estimate for the 2014 landings rate) had decreased relative to the two previous years. Landings in the two previous years (2010-2011) drove average landings above the ACL, despite the substantial drop in effort and landings in the most recent year (2012). Thus, the ACL was exceeded but the estimated catch rate indicated it would not be exceeded in 2014 fishing year, even with a full 365 days of commercial access to the resource.

Also for the 2014 fishing year, NMFS determined that the Puerto Rico commercial ACL for wrasses was exceeded, based on 2010-2012 landings data, thus triggering an AM that reduced the length of the 2014 fishing season for wrasses (79 FR 62575). Commercial harvest of wrasses in Puerto Rico was closed from October 20, 2014 through December 31, 2014 (Table 1.5.1).

None of the FMUs in St. Croix, St. Thomas/St. John, Puerto Rico recreational sector, or U.S. Caribbean-wide exceeded their corresponding ACLs in 2014, and AMs were not triggered in those areas, or for Caribbean-wide FMUs, during 2014.

Accountability measure-based closures were not required in 2015 in Puerto Rico, St. Croix, St. Thomas/St. John, or for Caribbean-wide FMUs.

For the 2016 fishing year, NMFS determined that several FMUs in the Puerto Rico island management area exceeded their applicable ACLs based on an analysis of the average landings for previous years (2012-2014). Consequently, AMs will reduce the length of the fishing seasons in 2016 by the amount necessary to ensure landings would not again exceed the assigned ACLs for those FMUs. NMFS determined that, for 2012-2014 U.S. Caribbean landings data, no interannual trend in catch rate was identified. Thus, NMFS determined that the average of the most recent three years of landings data provided the most appropriate estimate of 2016 fishing rates. To determine the appropriate closure dates, 2012-2014 landings data were averaged within each month, and those monthly averages were used to determine the length of time necessary to ensure to the greatest degree possible that the ACL will not again be exceeded in 2016. Thus, in 2016, AM-based closures will be implemented for the commercial sectors of SU2, triggerfish and

[4] See Appendix A for a full list of species managed by the Council.

filefish, wrasses, and parrotfish, the recreational sector of jacks, and for both sectors of the spiny lobster in Puerto Rico (81 FR 29166) (Table 1.5.1)

Table 1.5.1. Accountability measure-based closures in the U.S. Caribbean exclusive economic zone since the implementation of accountability measures in 2012.

Fishery Management Unit	Island Management Area and Sector	Length of AM Closure
Snapper Unit 2 (queen and cardinal snappers)	Puerto Rico (Commercial)	Sep 21 – Dec 31, 2013
	Puerto Rico (Commercial)	*Nov 26 – Dec 31, 2016
Wrasses (hogfish, puddingwife, Spanish hogfish)	Puerto Rico (Recreational)	Oct 21 – Dec 31, 2013
	Puerto Rico (Commercial)	Oct 20 – Dec 31, 2014
	Puerto Rico (Commercial)	*Nov 16 – Dec 31, 2016
Triggerfish and Filefish (ocean, queen, and sargassum triggerfish)	St. Croix (All sectors)	Nov 21 – Dec 31, 2013
	Puerto Rico (Commercial)	*Oct 16 – Dec 31, 2016
Spiny Lobster	St. Croix (All sectors)	Dec 19 – 31, 2013
	Puerto Rico (All sectors)	*Dec 10 – 31, 2016
Groupers (coney, graysby, red hind, rock hind, black, red, tiger, yellowfin, misty, and yellowedge groupers)	St. Thomas/St. John (All sectors)	Dec 20 – 31, 2013
Parrotfish (princess, queen, redfin, redtail, stoplight, redband, and striped parrotfish)	Puerto Rico (Commercial)	*Dec 19 – 31, 2016
Jacks (blue runner, horse-eye, black, almaco, bar, yellow jack, and amberjack)	Puerto Rico (Recreational)	*Nov 4 – Dec 31, 2016

No AM-based closures were required in 2015 in Puerto Rico, St. Croix, St. Thomas/St. John, or for Caribbean-wide FMUs.
*AM-based closures for the 2016 fishing year.

1.6 Management History

A summary of federal fishery management actions implemented through 2011, for managed species in the U.S. Caribbean Reef Fish, Corals and Reef Associated Plants and Invertebrates, and Spiny Lobster FMPs, can be found in the 2010 and 2011 Caribbean ACL Amendments (CFMC 2011a, b) and is incorporated herein by reference. Below is a summary of the most recent actions affecting species addressed in this amendment.

2005 Caribbean Sustainable Fisheries Act (SFA) Amendment (CFMC 2005)

The Comprehensive Amendment to the FMPs of the U.S. Caribbean to address required provisions of the Magnuson-Stevens Act (2005 Caribbean SFA Amendment) included a supplemental environmental impact statement (SEIS), regulatory impact review (RIR), and regulatory flexibility analysis (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. The amendment established rebuilding plans for overfished units: grouper unit (GU)1, GU2, GU4, and queen conch;
- Designated essential fish habitat (EFH) and habitat areas of particular concern (HAPCs); and minimized adverse impacts on such habitat to the extent practicable.

2010 Caribbean ACL Amendment (CFMC 2011a)

Amendment 2 to the FMP for the Queen Conch Fishery of Puerto Rico and the USVI and Amendment 5 to the Reef Fish FMP of Puerto Rico and the USVI (2010 Caribbean ACL Amendment), including an environmental impact statement (EIS), RIR, and RFA (CFMC 2011a), became effective on January 30, 2012 (76 FR 82404) and accomplished the following:

- Amended the unit species composition in the Reef Fish FMUs;
- Revised management reference points (maximum sustainable yield (MSY), optimum yield (OY), overfishing limit (OFL), acceptable biological catch (ABC)) for snapper, grouper, parrotfish, and queen conch in the U.S. Caribbean;
- Established island-specific ACLs and AMs in response to harvesting activities on a single island (Puerto Rico, St. Croix) or island-group[5] (St. Thomas/St. John) while minimizing the effects of fishing activities on the other islands or island groups;

[5] In the Council FMPs, the islands of St. Thomas and St. John are managed together as a group.

- Established separate ACLs for each of the commercial and recreational sectors for the Puerto Rico EEZ management area, where island-specific landings data are available for both the commercial and recreational sectors;
- Set management measures with specific emphasis on harvest prohibition for three parrotfish species (midnight, blue, rainbow) that serve an 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.

2011 Caribbean ACL Amendment (CFMC 2011b)

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 USVI (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 and spiny lobster, and for aquarium trade species in the Reef Fish and Coral FMPs that were not determined to be undergoing overfishing.
- 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 (MSY, OY, OFL, ABC) for selected reef fish, spiny lobster, and aquarium trade species.

Amendment 4 to the Coral FMP of Puerto Rico and the USVI, including Environmental Assessment (EA), RIR, RFA, and Fisheries Impact Statement (FIS) (CFMC 2013a)

Amendment 4 removed seagrass species from the Coral FMP. The final rule implementing this amendment published in the *Federal Register* on June 4, 2013 (78 FR 33255), with an effective date of July 5, 2013. In this amendment, the Council determined that federal management of seagrass species was unnecessary because there is no known harvest of seagrasses, and these species occur predominantly in Puerto Rico commonwealth and USVI territorial waters. In addition, seagrasses are designated as EFH and HAPCs in all of the Council FMPs, and would continue to be protected by these designations.

Regulatory Amendment 4 to the Reef Fish FMP of Puerto Rico and the USVI (Regulatory Amendment 4), including EA, RFA, and RIR (CFMC 2013c).

Regulatory Amendment 4 established minimum size limits for parrotfish harvest in federal waters off St. Croix, USVI. It did not establish minimum size limits in federal waters off Puerto Rico and St. Thomas/St. John. The final rule published in the *Federal Register* on July 30, 2013 (78 FR 45894), with an effective date of August 29, 2013. Measures in Regulatory Amendment 4 included:

- A commercial and recreational minimum size limit of 8 inches fork length for redband parrotfish (*Sparisoma aurofrenatum*).
- A commercial and recreational minimum size limit of 9 inches fork length for all other allowable parrotfish species: redfin parrotfish (*Sparisoma rubripinne)*, redtail parrotfish (*S, chrysopterum*, stoplight parrotfish (*S. viride)*, princess parrotfish (*Scarus taeniopterus)*, queen parrotfish (*Scarus vetula)*, and striped parrotfish (*Scarus iserti*).

Comprehensive Amendment to the U.S. Caribbean FMPs: Application of AMs (AM Application Amendment), including EA, RFA, and RIR (CFMC 2016).

The AM Application Amendment revised language within the Reef Fish, Queen Conch, Spiny Lobster, and Coral FMPs to be consistent with language in the implementing regulations at 50 CFR Part 622 describing the application of AMs in the U.S. Caribbean EEZ. This change only revised language in the respective FMPs to reflect current regulatory language and did not change the regulations. The final rule published in the *Federal Register* on May 11, 2016 (81 FR 29166), with an effective date of June 10, 2016. The final rule also included three changes not contained in the AM Application Amendment:

- Clarified what restrictions on fishing occur when an ACL is exceeded and an AM is implemented.
- Clarified that the spiny lobster ACL for the Puerto Rico management area applies to both the commercial and recreational sectors.
- Clarified that for the queen conch, only one of the measurement descriptions (i.e., shell length or lip width) must be met to fulfill the minimum size limit requirement.

Chapter 2. Proposed Actions and Alternatives

2.1 What are the Proposed Actions?

This amendment consists of two actions. Action 1 proposes to modify the timing for implementation of accountability measure (AM)-based closures. Action 2 proposes to revisit the chosen approach for setting the timing of AM-based closures, after a specified time.

ACTION 1: Modify the timing for implementation of AM-based closures in the U.S. Caribbean exclusive economic zone (EEZ).

ACTION 2: Specify a time period for revisiting the approach to set the timing of AM-based closures selected in Action 1.

2.2 List of Alternatives for Action 1

ACTION 1: Modify the timing for the implementation of AM-based closures in the U.S. Caribbean EEZ.

Alternative 1: No Action. Continue AM-based closures resulting from an annual catch limit (ACL) overage, ending on December 31st of the closure year, and extending backward into the closure year for the number of days necessary to achieve the required reduction in landings.

Alternative 2 (Preferred): Accountability measure-based closures resulting from an ACL overage would end on September 30th of the closure year and extend backward toward the beginning of the year for the number of days necessary to achieve the required reduction in landings. The September 30th closure date would apply to all fishery management units (FMUs) for each of the Puerto Rico commercial and recreational sectors, St. Thomas/St. John, St. Croix, and Caribbean-wide. If Alternative 5 of this Action is also chosen for an FMU that includes species with seasonal closures in federal waters, closure dates for that FMU would be governed by Alternative 5. If, for any of the FMUs covered by **Preferred Alternative 2**, the number of days running from September 30th backward to the beginning of the year is not enough to achieve the required reduction in landings, then the additional days needed would be captured by extending the closure forward toward the end of the year,

beginning on October 1st and continuing for the number of days needed to achieve the required reduction.

Alternative 3: Accountability measure-based closures resulting from an ACL overage would begin on January 1st of the closure year and extend forward into the year for the number of days necessary to achieve the required reduction in landings. The January 1st closure start date would apply to all FMUs for each of Puerto Rico commercial and recreational sectors, St. Thomas/St. John, St. Croix, and Caribbean-wide. If Alternative 5 of this Action is also chosen for an FMU that includes species with seasonal closures in federal waters, closure dates for that FMU would be governed by Alternative 5.

Alternative 4: Establish a fixed fishing season closure end date for the implementation of AMs for each FMU by island management area and, in the case of Puerto Rico, fishing sector (A. Puerto Rico (I. Commercial sector[6], II. Recreational sector), B. St. Thomas/St. John, C. St. Croix, and D. Caribbean-wide), based on the highest or lowest average monthly landings of the most recent three years of available data (2012, 2013, 2014). A different closure date may be chosen for each FMU for each island management area and Puerto Rico fishing sector. The closure date will end on the last day of the identified month and extend backward toward the beginning of the year for the number of days necessary to achieve the required reduction in landings. If, for any FMU in any year, the number of available days running from the closure implementation date backward toward the beginning of the year is not enough to achieve the required reduction in landings, then the additional days needed would be captured by extending the closure forward toward the end of the year and continuing for the number of days needed to achieve the required reduction.

A. Puerto Rico

I. Commercial

Sub-Alternative 4a. Closure to end the last day of the month that has the highest landings based on monthly average landings through time, using 2012-2014 as the most recent three years of available landings data. A specific date for each FMU is shown in Table 2.2.1 (commercial) below.

Sub-Alternative 4b. Closure to end the last day of the month with lowest landings based on monthly average landings through time, using 2012-2014 as the

[6] The Puerto Rico spiny lobster FMU is addressed under the Commercial Sector sub-alternatives. This is because the spiny lobster ACL is governed by commercial landings. If the AM is triggered due to a Puerto Rico spiny lobster ACL overage, the commercial and recreational fishing seasons are reduced.

most recent three years of available landings data. A specific date for each FMU is shown in Table 2.2.1 (commercial) below.

II. Recreational

Sub-Alternative 4c. Closure to end the last day of the second month that has the highest landings based on bi-monthly average landings through time, using 2012-2014 as the most recent three years of available landings data. A specific date for each FMU is shown in Table 2.2.2 (recreational) below.

Sub-Alternative 4d. Closure to end the last day of the second month with lowest landings based on bi-monthly average landings through time, using 2012-2014 as the most recent three years of available landings data. A specific date for each FMU is shown in Table 2.2.2 (recreational) below.

B. St. Thomas/St. John, USVI (All sectors)

Sub-Alternative 4e. Closure to end the last day of the month that has the highest landings based on monthly average landings through time, using 2012-2014 as the most recent three years of available landings data. A specific date for each FMU is shown in Table 2.2.3 below.

Sub-Alternative 4f. Closure to end the last day of the month with the lowest landings based on monthly average landings through time, using 2012-2014 as the most recent three years of available landings data. A specific date for each FMU is shown in Table 2.2.3 below.

C. St. Croix, USVI (All sectors)

Sub-Alternative 4g. Closure to end the last day of the month that has the highest landings based on monthly average landings through time, using 2012-2014 as the most recent three years of available landings data. A specific date for each FMU is shown in Table 2.2.4 below.

Sub-Alternative 4h. Closure to end the last day of the month with the lowest landings based on monthly average landings through time, using 2012-2014 as the most recent three years of available landings data. A specific date for each FMU is shown in Table 2.2.4 below.

D. Caribbean-Wide (All sectors)

Sub-Alternative 4i. Closure to end the last day of the month that has the highest landings based on monthly average landings through time, using 2012-2014 as the

most recent three years of available landings data. A specific date for each FMU is shown in Table 2.2.5 below.

Sub-Alternative 4j. Closure to end the last day of the month with the lowest landings based on monthly average landings through time using 2012-2014 as the most recent three years of available landings data. A specific date for each FMU is shown in Table 2.2.5 below.

Table 2.2.1. Accountability measure-based closure dates resulting from **Sub-Alternatives 4a** and **4b** for Puerto Rico fishery management units in the commercial sector. **Sub-Alternative 4a** and **Sub-Alternative 4b** are based on monthly average landings through time using 2012-2014 average landings as the index from which months of highest and lowest landings are determined.

Puerto Rico Commercial FMUs

Alternative 4	**Sub-Alternative 4a** (highest landings)	**Sub-Alternative 4b** (lowest landings)
FMU		
Parrotfish	Mar 31	Aug 31
Snapper Unit 1 (silk, black, blackfin, vermilion, and wenchman)	Jan 31	Nov 30[1]
Snapper Unit 2 (queen and cardinal)	Jun 30	Dec 31
Snapper Unit 3 (mutton, lane, gray, dog, schoolmaster, and mahogany)	Mar 31	Aug 31
Snapper Unit 4 (yellowtail)	Mar 31	Dec 31
Groupers	Feb 28	Dec 31[2]
Angelfish	No Landings[3]	
Boxfish	Mar 31	Oct 31
Goatfish	Sep 30	Apr 30
Grunts	May 31	Sep 30
Wrasses	Aug 31	May 31
Jacks	Jul 31	May 31
Scups & Porgies	Mar 31	Nov 30
Squirrelfish	July 31	Sep 30
Surgeonfish	Dec 31	No Landings Jan-Oct
Triggerfish & Filefish	May 31	Aug 31
Spiny Lobster[4]	Sep 30	May 31

Note: If, for any FMU in any year, the number of available days running from the closure implementation date backward toward the beginning of the year is insufficient to achieve the required reduction in landings, the additional days needed would be captured by extending the closure forward toward the end of the year and continuing for the number of additional days needed to meet the required reduction. However, this table is only used to identify the end date and not the length of the closure because that is determined on an annual basis, based on the specific ACL overage.

[1]Harvest of silk, black, blackfin, and vermillion, part of Snapper Unit 1 (SU1) is prohibited in federal waters from October 1 through December 31. This closure does not apply to the wenchman. In Puerto Rico territorial waters, only the harvest of silk and blackfin snappers is prohibited during this period. Lowest landings for SU1 occur during the seasonal closure months (October 1 – December 31). Low landings during this month could be attributed to the seasonal closure for some of the species in the unit.

[2]The lowest landings for grouper occur in December, with the majority of landings dominated by misty grouper and red hind. Harvest and possession of red hind is prohibited from December 1 - February 28 in Puerto Rico state waters, and in federal waters west of 67º10'W from December 1 – last day of February, each year.

[3] No landings of angelfish were reported during 2012-2014.

[4] The spiny lobster commercial and recreational sectors for the Puerto Rico management area are managed under the same ACL, which is derived from commercial landings. An overage of this single ACL is the trigger to apply the AM to both the commercial and recreational sectors.

Table 2.2.2. Accountability measure-based closure dates resulting from **Sub-Alternatives 4c** and **4d** for Puerto Rico fishery management units in the recreational sector. Recreational landings data are reported in two-month waves. **Sub-Alternative 4c** and **Sub-Alternative 4d** are based on bi-monthly average landings through time using 2012-2014 average landings as the index from which months of highest and lowest landings are determined.

Puerto Rico Recreational FMUs

Alternative 4	**Sub-Alternative 4c** (highest landings – second month in wave)	**Sub-Alternative 4d** (lowest landings – second month in wave)
FMU		
Parrotfish	Jul/Aug (Aug 31)	March/Apr (April 30)
Snapper Unit 1	May/Jun (Jun 30)	No landings Nov-Dec[1]
Snapper Unit 2	Jan /Feb (Feb 28)	No landings for the rest of the year
Snapper Unit 3	May /Jun (Jun 30)	Sep/Oct (Oct 31)
Snapper Unit 4	May /Jun (Jun 30)	Sep/Oct (Oct 31)
Groupers	Jan/Feb (Feb 28)	Nov/Dec (Dec 31)
Angelfish	Jan/Feb (Feb 28)	No landings for rest of the year
Boxfish	Sep/Oct (Oct 31)	Jul/Aug (Aug 31)
Goatfishes	May/Jun (Jun 30)	No landings for the rest of the year
Grunts	May/Jun (June 30)	Nov/Dec (Dec 31)
Wrasses	Sep/Oct (Oct 31)	No landings Nov-Dec
Jacks	Jan/Feb (Feb 28)	Sep/Oct (Oct 30)
Porgies	Jul/Aug (Aug 31)	No landings Sep/Oct
Squirrelfish	May/Jun (Jun 30)	No landings Jul/Aug (Aug 31)
Surgeonfish	No Landings	
Triggerfish & Filefish	Sep/Oct (Oct 31)	No landings Nov-Dec

Note: If for any FMU in any year, the number of days left in the year is not enough to achieve the required reduction in landings, then those additional days would be captured in the opposite direction. However, this table is only used to identify the end date and not the length of the closure because that is determined on an annual basis, based on specific ACL overages.

[1] Harvest of silk, black, blackfin, and vermilion snappers in federal waters and only for silk and blackfin in Puerto Rico state waters is closed from October 1 through December 31 each year. Lowest landings for SU1 occur during the seasonal closure months of November and December (zero landings reported). Low landings during this month could be attributed to the seasonal closure for some of the species in the unit.

Table 2.2.3. Accountability measure-based closure dates resulting from **Sub-Alternatives 4e** and **4f** for St. Thomas/St. John fishery management units. **Sub-Alternative 4e** and **Sub-Alternative 4f** are based on monthly average landings through time using 2012-2014 average landings as the index from which months of highest and lowest landings are determined.

St. Thomas/St. John FMUs

Alternative 4	**Sub-Alternative 4e** (highest landings)	**Sub-Alternative 4f** (lowest landings)
FMU		
Parrotfish	Apr 30	Dec 31
Snapper	Apr 30	Dec 31[1]
Grouper	Jan 31	Dec 31
Angelfish	Jul 31	Dec 31
Boxfish	No reported landings	
Goatfish	No landings for 8 months of the year[2]	
Grunts	Jan 31	Nov 30
Wrasses	Sep 30	Nov 30
Jacks	Jun 30	Dec 31
Scups & Porgies	Jan 31	Dec 31
Squirrelfish	Aug 31	Nov 30
Surgeonfish	May 31	Dec 31
Triggerfish & Filefish	May 31	Nov 30
Spiny Lobster	Mar 31	Sep 30

Note: If for any FMU in any year, the number of days left in the year is not enough to achieve the required reduction in landings, then those additional days would be captured in the opposite direction. However, this table is only used to identify the end date and not the length of the closure because that is determined on an annual basis, based on specific ACL overages.

[1]Lowest landings for snappers occur during the silk, black, blackfin, and vermilion snapper seasonal closure months of December, November, and October in federal waters and St. Thomas/St. John waters.

[2]Landings of goatfish are very small and amount to less than 20 pounds on average annually for 2012-2014.

Table 2.2.4. Accountability measure-based closure dates resulting from **Sub-Alternatives 4g** and **4h** for St. Croix fishery management units. **Sub-Alternative 4g** and **Sub-Alternative 4h** are based on monthly average landings through time using 2012-2014 average landings as the index from which months of highest and lowest landings are determined.

St. Croix FMUs

Alternative 4	**Sub-Alternative 4g** (highest landings)	**Sub-Alternative 4h** (lowest landings)
FMU		
Parrotfish	Apr 30	Sep 30
Snappers	Jul 31	Dec 31
Groupers	Mar 31	Dec 31
Angelfish	May 31	Dec 31
Boxfish	No landings	
Goatfish[1]	Oct 31	Jan 31 or Mar 31
Grunts	Jul 31	Dec 31
Wrasses[1]	May 31	No landings for 9 months of the year
Jacks	Feb 28	Dec 31
Scups & Porgies[1]	May 31	Oct 31
Squirrelfish[1]	May 31	Dec 31
Surgeonfish	Jul 31	Dec 31
Triggerfish & Filefish	May 31	Dec 31
Spiny Lobster	Mar 31	Dec 31

Note: If for any FMU in any year, the number of days left in the year is not enough to achieve the required reduction in landings, then those additional days would be captured in the opposite direction. However, this table is only used to identify the end date and not the length of the closure because that is determined on an annual basis.

[1]Landings of goatfish, wrasses, scups & porgies, and squirrelfish FMUs are very small, amounting to less than 1,000 pounds on average annually for 2012-2014. Both January and March have the lowest average monthly goatfish landings for 2012-2014.

Table 2.2.5. Closure dates resulting from **Sub-Alternatives 4i** and **4j** for Caribbean-wide fishery management units: tilefish and aquarium trade species. **Sub-Alternative 4i** and **4j** are based on monthly average landings through time using 2012-2014 average landings as the index from which months of highest and lowest landings are determined.

Caribbean-wide FMUs

Alternative 4	**Sub-Alternative 4i** (highest landings)	**Sub-Alternative 4j** (lowest landings)
FMU		
Tilefish[1]	Jul 31	No landings Jan-April, Nov-Dec
Aquarium trade species[2]	Nov 30	No landings May-Aug

Note: If for any FMU in any year, the number of days left in the year is not enough to achieve the required reduction in landings, then those additional days would be captured in the opposite direction. However, this table is only used to identify the end date and not the length of the closure because that is determined on an annual basis, based on specific ACL overages.

[1]Average annual reported landings of Tilefish totaled less than 200 pounds in 2012-2014. From the months with reported landings, May had the lowest.

[2]Average annual reported landings of Aquarium trade species totaled approximately 1,000 pounds from 2012-2014. From the months with reported landings, September had the lowest.

Alternative 5: For FMUs that include species with seasonal closures in U.S. Caribbean federal waters (Table 2.2.6), AM-based closures resulting from an ACL overage for these FMUs would be timed to be continuous with the seasonal closure. The AM-based closure would extend either forward or backward from the seasonal closure into the year as specified in **Sub-Alternatives 5a** through **5n** for the number of days necessary to achieve the required reduction in landings. If, for any of these FMUs, in any year, the number of available days running from the date specified by the sub-alternative, is not enough to achieve the required reduction in landings, then the additional days needed would be captured by extending the closure in the opposite direction and continuing for the number of days needed to fulfill the required reduction.

I. Groupers

A. Puerto Rico

1. Commercial

Sub-Alternative 5a: For the commercial sector of the Puerto Rico management area, an AM-based closure for the grouper complex would begin on May 1st of the closure year and move forward toward the end of the year.

Sub-Alternative 5b: For the commercial sector of the Puerto Rico management area, an AM-based closure for the grouper complex would end on November 30th of the closure year and move backward toward the beginning of the year.

2. Recreational

Sub-Alternative 5c: For the recreational sector of the Puerto Rico management area, an AM-based closure for the grouper complex would begin on May 1st of the closure year and move forward toward the end of the year.

Sub-Alternative 5d: For the recreational sector of the Puerto Rico management area, an AM-based closure for the grouper complex would end on November 30th of the closure year and move backward toward the beginning of the year.

B. St. Thomas/St. John, USVI (All sectors)

Sub-Alternative 5e: For the St. Thomas/St. John management area, an AM-based closure for the grouper complex would begin on May 1st of the closure year and move forward toward the end of the year.

C. St. Croix, USVI (All sectors)

Sub-Alternative 5f: For the St. Croix management area, an AM-based closure for the grouper complex would begin on May 1st of the closure year and move forward toward the end of the year.

II. Snappers

A. Puerto Rico

1. Commercial

Sub-Alternative 5g: For the commercial sector of the Puerto Rico management area, an AM-based closure for all snapper species in Snapper Unit 3 (SU3) would start on July 1st of the closure year and move forward toward the end of the year.

Sub-Alternative 5h: For the commercial sector of the Puerto Rico management area, an AM-based closure for all snapper species in Snapper Unit 1 (SU1) would end on September 30th of the closure year and move backward toward the beginning of the year.

2. Recreational

Sub-Alternative 5i: For the recreational sector of the Puerto Rico management area, an AM-based closure for all snapper species in SU3 would start on July 1st of the closure year and move forward toward the end of the year.

Sub-Alternative 5j: For the recreational sector of the Puerto Rico management area, an AM-based closure for all snapper species in SU1 would end on September 30th of the closure year and move backward toward the beginning of the year.

B. St. Thomas/St. John, USVI (All sectors)

Sub-Alternative 5k: For the St. Thomas/St. John management area, an AM-based closure the snapper complex would start on July 1st of the closure year and move forward toward the end of the year.

Sub-Alternative 5l: For the St. Thomas/St. John management area, an AM-based closure for the snapper complex would end on September 30th of the closure year and move backward toward the beginning of the year.

C. <u>St. Croix, USVI (All sectors)</u>

Sub-Alternative 5m: For the St. Croix management area, an AM-based closure for the snapper complex would start on July 1st of the closure year and move forward into the year.

Sub-Alternative 5n: For the St. Croix management area, an AM-based closure for the snapper complex would end on September 30th of the closure year and move backward toward the beginning of the year.

Table 2.2.6. Species with seasonal closures in federal waters of Puerto Rico (PR), and in St. Thomas/St. John (STT/STJ) and St. Croix (STX) in the U.S. Virgin Islands; management unit to which they belong; and other species included in the management unit but that are not included in the seasonal closure.

Island Management Area	Species with seasonal closures and unit to which they belong	Seasonal Closure Dates in Federal Waters	Other species in the FMU that are not included in the seasonal closure	AM closures apply to:	AM closure date in Sub-Alts 5a through 5n, as applicable
Puerto Rico St. Thomas / St. John St. Croix	Grouper Unit (GU) 4: yellowfin, red, tiger, black; GU5: yellowedge	Feb 1 - Apr 30	GU5: misty	All groupers	<u>May 1st forward</u>: PR (Comm): 5a PR (Rec): 5c STT/STJ: 5e STX: 5f
Puerto Rico	GU3: red hind grouper in federal waters west of 67º10'W	[1]Dec 1 - Last day of Feb	GU3: coney, rock hind, graysby	All groupers	<u>Nov 30th backward</u>: PR (Comm.): 5b PR (Rec): 5d
Puerto Rico	SU3: mutton and lane	Apr 1 – Jun 30	SU3: gray, dog, schoolmaster, mahogany	SU3 in PR	<u>July 1st forward:</u> PR (Comm): 5g PR (Rec): 5i
St. Thomas/St. John; St. Croix				All Snappers[2] in USVI	<u>July 1st forward:</u> STT/STJ: 5k STX: 5m
Puerto Rico	SU1: silk, black, blackfin, vermilion	Oct 1 – Dec 31	SU1: wenchman	SU1 in PR	<u>Sep 30th backward:</u> PR (Comm): 5h PR (Rec): 5j
St. Thomas /St. John; St. Croix				All Snappers[2] in USVI	<u>Sep 30th backward:</u> STT/STJ: 5l STX: 5n

[1]Red hind seasonal closure applies to the west coast of Puerto Rico only.

[2] The ACLs and AMs established by the 2010 Caribbean ACL Amendment for St. Croix and St. Thomas/St. John apply to the whole snapper complex and not by individual units. The snapper complex is composed of silk, black, blackfin, vermillion, wenchman, queen, cardinal, mutton, lane, gray, dog, schoolmaster, mahogany, and yellowtail snappers.

Table 2.2.7. Summary of accountability measure (AM)-based closure dates resulting from **Alternatives 2**, **3**, and **5** for each of the fishery management units (FMUs) of the Puerto Rico (PR) commercial and recreational sectors, and for St. Thomas/St. John (STT/STJ), St. Croix (STX), and Caribbean-wide. **Alternative 5** below only applies to FMUs with seasonal closures; therefore, all other FMUs that do not have seasonal closures are identified in that column by N/A. For results of **Alternative 4**, please see Tables 2.2.1 through 2.2.5 above.

Island Management Area	Fishery Management Unit	Preferred Alternative 2	Alternative 3	Alternative 5 (Sub-Alts)
PR (all sectors), STT, STX	Parrotfish	Sep 30th backward	Jan 1st forward	N/A
PR Commercial	Snapper Unit 1	Sep 30th backward	Jan 1st forward	Sep 30th backward
PR Recreational			Jan 1st forward	Sep 30th backward
PR Commercial	Snapper Unit 2	Sep 30th backward	Jan 1st forward	N/A
PR Recreational				
PR Commercial	Snapper Unit 3	Sep 30th backward	Jan 1st forward	July 1st forward
PR Recreational				
PR Commercial	Snapper Unit 4	Sep 30th backward	Jan 1st forward	N/A
PR Recreational				
STT/STJ, STX	Snappers	Sep 30th backward	Jan 1st forward	July 1st forward or Sep 30th backward
PR Commercial	Groupers	Sep 30th backward	Jan 1st forward	May 1st forward or Nov 30th backward
PR Recreational				
STT/STJ, STX				May 1st forward
PR (All sectors), STT/STJ, STX	Angelfish	Sep 30th backward	Jan 1st forward	N/A
	Boxfish			
	Goatfish			
	Grunts			
	Wrasses			
	Jacks			
	Scups & Porgies			
	Squirrelfish			
	Surgeonfish			
	Triggerfish and Filefish			
	Spiny Lobster			
Caribbean-Wide	Tilefish	Sep 30th backward	Jan 1st forward	N/A
	Aquarium Trade			

2.2.1 Discussion of Alternatives in Action 1

The paragraphs below discuss each individual alternative proposed in Action 1 (**Alternatives 1-5**). These alternatives only affect the timing (date) of the AM-based closure; the reduction in landings for the affected species/species complex is expected to be the same regardless of whether it results in a shorter or a longer closure period.

Alternative 1 *– No Action. AM closure end date of December 31st extending backward into the year.*

The Council could choose to take no action through **Alternative 1**; AM-based closures would continue to be implemented ending on December 31st of the appropriate year and extend backward into the year for the number of days necessary to achieve the required reduction in landings. This timing has been identified by fishermen as having negative social and economic effects. For example, closing a season through December 31 results in the fishery being closed during the important Christmas holiday season, which fishers in the USVI have identified as a very important market, although the Christmas season market is of lesser importance to Puerto Rico fishers. Fishers have also expressed concern that an inability to provide a consistent supply of fish for the Christmas market in the USVI could result in buyers substituting locally caught fish with imported fish, which would result in revenue loss for local fishers. However, the closure of a number of different species complexes at the same time and in multiple consecutive years would likely be necessary for this to occur. **Alternative 1**, as well as **Preferred Alternative 2** and **Alternative 3**, propose a single AM-based closure date that would apply to all FMUs, except to those FMUs that include species with spawning seasonal closures if the Council also chooses to select **Alternative 5**. A single AM-based closure date for most species/species complexes (if **Alternative 5** also is chosen) or all (if **Alternative 5** is not also chosen) increases the potential of having multiple AM-based closures affecting an island management area at the same time. Effects would vary depending on the species/species complex with the AM closure and the degree to which fishers can compensate for the loss of fishing opportunities by fishing for other species. Effects of overlapping closures are discussed in Chapter 4. Section 1.5 discusses the instances where AMs had to be applied for FMUs in Puerto Rico, St. Croix, or St. Thomas/St. John since the implementation of AMs in 2012 (Table 2.2.1.1).

For many FMUs, December is a low landings month, so an AM closure ending on December 31st would generally be longer than a closure that occurs in a high landings month for a particular species/species complex. December is also a "high demand" month for seafood in the USVI, thus an AM closure in December could potentially affect certain markets negatively. Other high demand periods identified by fishers from all three islands include Lent (Holy Week, in particular), the dates of which vary from year to year (e.g., February – April), and the January to May tourist season. If a closure occurs during a high demand period, not only is short-term revenue lost but there is an additional long-term risk of losing market access. For example,

during an AM closure in December for a particular species with high demand in the USVI, traditional markets for fish may be lost if buyers of local fish switch to non-local sources.

***Alternative 2 (Preferred)** – AM closure end date of September 30th extending backward into the year.*

Preferred Alternative 2 would establish September 30th as the closure end date that would apply to all FMUs in Puerto Rico (commercial and recreational sectors), St. Thomas/St. John, St. Croix, and Caribbean-wide, except to those FMUs that include species with spawning seasonal closures if the Council also chooses to select **Alternative 5**. In **Preferred Alternative 2**, if it is determined that an FMU exceeded its ACL and AMs need to be applied, the closure would end on September 30th of the appropriate year and extend backward into the year for the number of days necessary to account for the overage and to constrain landings to the ACL. This closure start date would apply for any year AMs need to be implemented for those FMUs, unless and until the chosen closure date is revised as described in Action 2. This fixed start date for all applicable FMUs would be implemented through regulations. If for any FMU for which AMs will be applied in a particular year, the number of days left in the year is insufficient to achieve the required reduction in landings, then those additional days would be captured by extending the closure forward, beginning on October 1st.

As mentioned above, **Preferred Alternative 2** also allows the Council to exempt from the September 30th AM start date, those FMUs that include species with spawning seasonal closures in place in federal waters. For those FMUs, the Council could choose the applicable sub-alternative in **Alternative 5,** which provides an AM start date that would be timed to be immediately adjacent to the seasonal closure (see below for discussion of **Alternative 5**).

Preferred Alternative 2's September 30th AM-based closure date follows the recommendations of the Council District Advisory Panels (DAPs) from each island management area. The DAPs for each of Puerto Rico, St. Croix, and St. Thomas/St. John met during March 2015 and unanimously recommended this date as the preferred start date for AM-based closures for all FMUs. A September 30th end date for an AM-based closure would still ensure that landings are constrained to the ACL and also that any AM-based closure is unlikely to extend through the Christmas holiday season. This date has been identified in general as the end date of the slow fishing season and also purposely avoids the December holiday season, a period which has been identified by USVI fishers, as economically and culturally important.

September has been also identified by fishers from the four different regions in Puerto Rico (north, south, east, west) as a period of rough weather, for example in the north coast. The period ending in September has also been identified by fishers as a period of limited availability of certain important species due to seasonal variation of the species (varies by region), and a

period of a general decline in sale opportunities, which is evident in some regions more than others, as expressed by fishers at informational meetings.

Similar to **Alternative 1**, a single AM closure date applicable to all FMUs, as proposed in **Preferred Alternative 2**, increases the potential for overlapping AM closures. This potential AM closure overlap could be reduced by additionally selecting **Alternative 5** for those FMUs with existing seasonal closures.

Depending on the length of the AM-based closure needed, an AM closure under any of the alternatives proposed, including **Preferred Alternative 2,** may overlap or abut existing seasonal closures (see Table 1.4.2 and Table 2.2.6 for seasonal closure dates and species affected). Under **Preferred Alternative 2**, a September 30th AM closure end date would be immediately adjacent to the start of the spawning seasonal closure for silk, black, blackfin, and vermilion snappers (part of Snapper Unit (SU) 1) in federal waters of Puerto Rico and the USVI, running from October 1st through December 31st, each year (wenchman snapper, part of SU1, is not included in the spawning seasonal closure). If an AM-based closure were required for the SU1 in Puerto Rico or for the snapper complex in St. Thomas/St. John or St. Croix, this would result in a lengthy closure for the affected species, with potential socio-economic and biological effects of unknown magnitude. Those effects could be negative, for example by disrupting the fishery during a time of enhanced socio-economic value or positive, although indirect, benefiting the managed species, and the fishery that species supports, if reproductive activity occurs outside the established spawning closure dates. In this particular case, such a continuous closure would also have the advantage of only disrupting fishing activities for that specific fishery once instead of twice. This is, in fact, essentially what would be accomplished in proposed **Alternative 5**, an alternative specifically requested by the fishers and discussed later in this section. Similar effects could also be expected from all other alternatives proposed whenever the AM-based closure has the potential to overlap or abut with a seasonal closure for a particular species.

If the number of days left in the year to account for the ACL overage under a September 30th AM-based closure end date is insufficient to achieve the required reduction in landings, those additional days needed would be captured by extending the closure forward toward the end of the year for the number of days needed to fulfill the required reduction (i.e., October 1st through December 31st). This forward running closure is not expected to affect those species whose harvest is already closed through the seasonal closure, but would prohibit landings of other species in the unit (e.g., wenchman snapper of SU1 in Puerto Rico) or complex (e.g., snapper complex in the USVI; grouper complex in both Puerto Rico and the USVI) during this period, potentially disrupting the fishery during a time that may be of enhanced socio-economic value for those species. However, in general, the need for an additional 'forward' closure is considered to be unlikely based on the history of AM-based closures. Additionally, through **Alternative 5** the Council may separately address those FMUs that include species with seasonal closures. The

physical, biological, economic, social, and administrative effects of these choices are discussed in Chapter 4.

***Alternative 3** – AM-based closure start date of January 1st extending forward into the year.*

Alternative 3 would establish January 1st as the AM-based closure start date that would apply to all FMUs for each of Puerto Rico (commercial and recreational sectors), St. Thomas/St. John, St. Croix, and Caribbean-wide, except to those FMUs that include species with spawning seasonal closures if the Council also chooses to select **Alternative 5**. This closure start date would apply for any year AMs are triggered for that particular FMU, unless and until the chosen closure date is revised as described in Action 2. This fixed start date for all applicable FMUs would be implemented through regulations.

Alternative 3 contrasts with **Alternative 1** (no action) in that closures would start at the beginning of the year (January 1st) and move forward toward the end of the year, rather than ending at the end of the year (December 31st) and moving backward toward the beginning of the year. When compared to **Preferred Alternative 2**, choosing a January 1st start date provides an established start date for the AM closure, instead of an end date with variable start dates. Given that **Alternative 3** would apply to all FMUs in all island management areas and Puerto Rico sectors, unless the Council additionally chooses **Alternative 5**, overlapping AM-based closures could occur as in **Alternative 1** and **Preferred Alternative 2**, if AMs need to be applied to more than one species/species complex in a particular island management area in a given year (see examples in Table 1.5.1). Although, similar to **Preferred Alternative 2**, the possibilities of overlapping AM-based closures could be reduced by selecting a different AM closure date for FMUs that include species with seasonal closures in **Alternative 5**.

Depending on the length of the closure needed for the AM, and the FMU to which the AM would be applied, a January 1st going forward start date has a greater chance than **Preferred Alternative 2** for abutting or overlapping with spawning seasonal closures for groupers and snappers (see Table 1.4.2 and Table 2.2.6 for seasonal closure dates and species affected). The general effects of lengthier closures for the affected species discussed above for **Preferred Alternative 2** would also be applicable to **Alternative 3.**

***Alternative 4** – Unique AM-based closure end date for each FMU per island management area and/or Puerto Rico fishing sectors.*

Sub-Alternatives 4a-4j in **Alternative 4** propose unique but fixed AM-based closure end dates for each FMU or for a combination of FMUs for each of the island management areas, and in the case of Puerto Rico, fishing sectors. The choice of each end date would be based on landings patterns specific to each species or complex (this contrasts with **Alternatives 2** and **3**, where the AM-based closure date resulted from Council input). Either the AM-based closure would end

the last day of the month with the highest average monthly landings (**Sub-Alternatives 4a, 4c, 4e, 4g, 4i**) or the AM-based closure would end the last day of the month with the lowest average monthly landings (**Sub-Alternatives 4b, 4d, 4f, 4h, 4j**) and would move backward into the year for the number of days necessary to constrain landings to the ACL. The full reduction in landings must be achieved, regardless of the start day chosen. Sub-alternatives are based on monthly average landings through time using 2012-2014 average landings as the index from which months of highest and lowest landings are determined. As shown in Tables 2.2.1-2.2.5 above, the closure would end on the last day of the identified month because the landings data used for the analysis are based on monthly data or in the case of the Puerto Rico recreational sector, on bi-monthly data. If for any FMU in any year, the number of days left in the year is insufficient to achieve the required reduction in landings, then those additional days would be captured by extending the closure forward (from the "end" date) toward the end of the year. The closure date would apply for any year AMs need to be implemented for that particular FMU, unless and until the chosen closure dates are revised as described in Action 2. The selected fixed start date for each FMU (or group of FMUs) will be implemented through regulations.

When compared to **Alternatives 1**, **2 (Preferred)**, and **3**, choosing different dates for each FMU or for a group of FMUs in **Alternative 4** (all sub-alternatives) may decrease the likelihood of overlapping AM closures in the event that multiple AMs need to be implemented in a particular island management area. However, because **Sub-Alternatives 4a** through **4j** in **Alternative 4** would establish AM-based closures based on harvest rates without consideration of important demand periods, AM closures under all alternatives may be more likely to coincide with culturally or economically important periods. Similar to other alternatives proposed, if an AM-based closure under **Alternative 4** abuts or overlaps with seasonal closures, it may also result in lengthy closures for the affected species. The effects of extended closures discussed above for **Alternatives 1-3** would also apply to **Alternative 4** under such a scenario. Although, because **Alternative 4** allows for the Council to choose unique dates for different FMUs, effects could be minimized or avoided. The physical, biological, socio-economic, and administrative analyses discussed for all sub-alternatives in **Alternative 4** primarily include a qualitative discussion on the effects of selecting and establishing different dates for each FMU or for a group of FMUs. These sub-alternatives are discussed below.

<u>AM-based closure date based on month of highest average landings</u>

For an FMU requiring an AM-based closure, the closure would end on the last day of the month with highest average 2012-2014 landings and will move backward into the year for the number of days necessary to achieve the required reduction. Within **Alternative 4**, **Sub-Alternative 4a** (Puerto Rico commercial), **Sub-Alternative 4c (**Puerto Rico recreational), **Sub-Alternative 4e** (St. Thomas/St. John), **Sub-Alternative 4g** (St. Croix), and **Sub-Alternative 4i (**Caribbean-wide), address this alternative for each of the islands/sectors. Closing the fishery on that date typically would result in the shortest closure time. Reported high landings for a species/species complex may result from factors such as higher market demand (see Table 1.4.1), higher

abundance of a species in a certain area or during a specific time (availability), catchability (e.g., increased efficiency of fishing effort), and gear selectivity, among others.

Applying AM-based closures during a period of higher landings of a particular species/species complex, if that period also coincides with a period of high demand as identified by fishermen, may affect the socio-economic environment by interrupting supply to traditional markets and resulting in increased imports or other sources of protein. It is not possible to determine whether the socio-economic benefits would be positive or negative under sub-alternatives in **Alternative 4** since the effects depend on the particular FMU and the length of any required AM-based closure. If the closure occurs during a high demand period, as identified by fishermen, then this can be compared to the losses that would be experienced under **Alternative 1**. However, the cost and earnings data that would be required to quantify these economic impacts is unavailable.

As mentioned above, an AM-based closure during a period of high landings would result in a shorter closure. For example, based on 2012-2014 data, only the goatfish and spiny lobster FMUs in the Puerto Rico commercial sector experience the highest average landings during the month of September (Table 2.2.1), as does the wrasses FMU in St. Thomas/St. John (Table 2.2.3). Thus, **Sub-Alternative 4a** for Puerto Rico commercial goatfish and spiny lobster, and **Sub-Alternative 4e** for St. Thomas/St. John wrasses, propose to close these fisheries when average rate of landings are higher, resulting in a shorter AM-based closure for these FMUs. September is also the month for the AM-based closure date proposed for all FMUs (except for those with seasonal closures, if desired) across all island management areas in **Preferred Alternative 2** (i.e., September 30th going backward toward the beginning of the year), thus the same results and the effects associated to it (i.e., shorter AM closure) would be achieved for these FMUs if the Council selects instead **Preferred Alternative 2.** Any benefit accrued from a shorter AM-based closure during September for any of these three FMUs would depend on harvest patterns for these species during this period; and fishers from Puerto Rico and the USVI have noted on numerous occasions that September is in general a month with low fishing activity and low demand.

<u>AM-based closure based on lowest average landings</u>

For an FMU that exceeds its ACL and for which AMs need to be applied, **Sub-Alternative 4b** for Puerto Rico commercial; **Sub-Alternative 4d** for Puerto Rico recreational; **Sub-Alternative 4f** for St. Thomas/St. John, **Sub-Alternative 4h** for St. Croix, and **Sub-Alternative 4j** for Caribbean-wide FMUs propose to implement the AM-based closure on the last day of the month that, based on an analysis of landings data from 2012-2014, realizes the lowest landings, and move backward into the year for the number of days necessary to achieve the required reduction in landings. This would typically result in the longest closure period. For some species, this period may occur at a time during the year when fishing for that particular species/species complex may be relatively less important. As mentioned above, all of the alternatives proposed in Action 1 (**Alternatives 1-5**) only affect the timing of the closure and not the level of total

landings, which is bounded by the ACL. Reported low landings for a species/species complex may result from factors such as weather (e.g. hurricane season, fronts), low market demand (see Table 1.4.1), lower abundance of a species in a certain area or during a specific time (availability), reduced catchability (e.g., decreased efficiency of fishing effort), among others.

Effects from a longer closure could occur in **Sub-Alternatives 4b, 4d, 4f, 4h,** and **4j** as well as in those alternatives where the AM-based closure date falls on the lowest landings period for the affected species. Tables 2.2.1 through 2.2.5 show the dates with the lowest landings for FMUs in all island management areas, using average landings from 2012-2014 as an index. For example, the grunts and the squirrelfish FMUs in the Puerto Rico commercial sector (**Sub-Alternative 4b**) and the SU3, SU4, jacks, and porgies in the Puerto Rico recreational sector, exhibit low landings during the month of September (included in the bi-monthly wave Sep/Oct) (**Sub-Alternative 4d**) (see Tables 2.2.1 and 2.2.2). While the spiny lobster FMU in St, Thomas/St. John (**Sub-Alternative 4f**) and the parrotfish FMU in St. Croix (**Sub-Alternative 4h**) exhibit the lowest landings during September (see Tables 2.2.3 and 2.2.4). It would be expected that for those FMUs, choosing those sub-alternatives would result in a longer AM-based closure. This effect would also be expected if the Council choses instead **Preferred Alternative 2** for these particular FMUs. Although not necessarily evident from the data analyzed, fishers in Puerto Rico and the USVI have noted that September is in general a month with low fishing activity, justifying their preference for AM-based closures to occur during this particular time (see Table 1.2.1). This could be preferred because the risk of losing markets during the high tourist season (Jan-March), Lent (March and April) and Christmas (December) is higher than during September and the summer months.

However, several FMUs in **Sub-Alternatives 4b**, **4d**, **4f**, **4h**, and **4j** (see Tables 2.2.1-2.2.5) exhibit lower landings in December, based on the average landings from 2012-2014. Thus, a December AM-based closure, like the status quo (**Alternative 1**), could potentially be longer for those FMUs than a closure that occurs in a high landings month. In addition to the potential for a longer AM-based closure, which depends on the FMU affected by the AM and the ACL overage, on numerous occasions, fishers from the USVI have expressed that a closure during December may also have the negative economic effects associated to the risk of market loss.

Table 2.2.1.1 provides examples of the scenarios discussed for some FMUs. The general effects of longer vs shorter closures on the physical, biological/ecological, social, economic, and administrative environments resulting from the different alternatives are discussed in detail in Chapter 4.

***Alternative 5** – For FMUs that include species with seasonal spawning closures in federal waters, fixed AM-based closure date immediately adjacent to the seasonal spawning closure.*

Alternative 5 would allow the Council to select unique fixed closure dates for those FMUs that include species with spawning seasonal closures (see Table 2.2.6 above). In **Alternative 5**, the AM-based closure would be timed to be continuous with the seasonal closure, as specified by **Sub-Alternatives 5a** through **5n**. This alternative was developed from input received by participants at public hearings for this action held in Puerto Rico in November 2015 and as further discussed during the 154th Council Meeting held in December 2015. Fishers expressed that implementing an AM-based closure immediately adjacent to a seasonal spawning closure may be more beneficial than having two separate closures throughout the year. This is because the fishers would only experience a single (albeit lengthy) closure (seasonal adjacent to AM closure) rather than two closures (seasonal at one time of year and AM-based at another time of year). However, because **Alternative 5** would establish AM-based closures continuous with seasonal closures for those FMUs that include species with seasonal closures, but without consideration of important market days, AM closures could still overlap with culturally or economically important periods. During the 154th Council meeting held on December 2015, fishers and a Council member further stated that a particular fishery may benefit from an AM closure being continuous with the seasonal closure. Benefits could accrue because any reproductive activity occurring outside of the established seasonal closure could then be covered by the AM-based closure and because a continuous closure facilitates enforcement. Although, because some species included in a seasonal closure are not included in the AM-based closure (See Table 2.2.6), there may be confusion as to which species can be harvested during each phase of the combined seasonal/AM-based closure period. This could create complicated compliance and enforcement efforts.

In **Alternative 5**, the AM-based closure would extend either forward from the start date of the seasonal closure, or backward from the end date of the seasonal closure into the year as specified in **Sub-Alternatives 5a** through **5n** for the number of days necessary to achieve the required reduction in landings. Similar to the other alternatives, this closure start date would apply for any years AMs need to be implemented for an FMU, unless and until the chosen closure date is revised as described in Action 2. The fixed start date for the applicable FMUs would be implemented through regulations. If, for any of these FMUs, in any year, the number of available days running from the date specified by the sub-alternative is not enough to achieve the required reduction in landings, then the additional days needed would be captured by extending the closure in the opposite direction and continuing for the number of days needed to fulfill the required reduction.

As discussed earlier, an AM-based closure immediately adjacent to a seasonal closure may result in lengthy closures for the affected species/species complex with potential socio-economic and biological effects. Accountability measure-based closures immediately adjacent to a seasonal

closure may disrupt the fishery when the fishery may have more value (socio-economic). In general, fishing in the months immediately before or after a seasonal closure may result in harvest efficiencies. That is, fishing in the months adjacent to a seasonal closure may result in higher catches for less effort due to higher densities of fish during spawning; an interruption of that occurrence could result in short-term negative economic effects. However, these effects cannot be quantified due to the unavailability of detailed effort and cost and earnings data. Because switching between different fisheries has an economic cost associated with it, **Alternative 5** could decrease fishermen's economic costs associated with switching gear, fishing methods, and fishing location when transitioning from one fishery to another due to seasonal closures. **Alternative 5** could decrease the number of transitions that a fisherman potentially has to make during the fishing year. However, if the extended closure occurs during a period of high demand (e.g., tourist season, Lent, Christmas), then the economic effects could be negative. Because cost data for the affected fisheries is not available, it is not possible to determine whether the economic effects would be positive or negative in this situation. Socio-economic effects of these and other alternatives are discussed in Chapter 4.

Depending on the alternative chosen as preferred for other FMUs for which **Alternative 5** does not apply, the proposed sub-alternatives in **Alternative 5** may reduce the instances of having overlapping AM closures in the event that multiple AM-based closures are needed in a year.

The Council can choose any of the applicable sub-alternatives in **Alternative 5** (**Sub-Alternatives 5a – 5n**) as the preferred AM start date for the following FMUs that include species with seasonal closures: all groupers in St. Thomas/St. John, St. Croix, and/or Puerto Rico (commercial and/or recreational sectors), SU1 and SU3 in Puerto Rico commercial and/or recreational sectors, and all snappers on each of St. Thomas/St. John and St. Croix. Below is a description of the sub-alternatives applicable to each of these species groups.

<u>Groupers</u>

May 1st forward AM-based closure date[7]

Sub-Alternative 5a and **Sub-Alternative 5c** for the Puerto Rico commercial and recreational sectors, respectively, and **Sub-Alternative 5e** and **Sub-Alternative 5f** for St. Thomas/St. John and St. Croix, respectively, propose an AM-based closure start date of May 1st going forward toward the end of the year for the groupers complex on each of the island management areas and for each of the Puerto Rico fishing sectors. An AM-based closure starting on May 1st would begin immediately after the February 1-April 30 seasonal closure for black, yellowfin, red, tiger

[7] In **Alternative 5**, the AM-based closure dates proposed for groupers consider the amount of days available before and after the red, tiger, black, yellowfin, and yellowedge seasonal closure that could be used to account for an ACL overage. Although an AM-based closure date of January 31st going backward toward the beginning of the year could also be an option for a grouper AM closure, as it would be immediately adjacent to the start of the seasonal closure, it may not provide a reasonable number of days to account for a potential ACL overage. Therefore, an AM-based closure date immediately after the seasonal closure was proposed instead.

(Grouper Unit (GU) 4), and yellowedge (GU5) groupers in federal waters off the USVI and Puerto Rico. Although the seasonal closure only applies to the species mentioned above, the ACLs and AMs established by regulations implementing the 2010 Caribbean ACL Amendment (76 FR 8204), apply to the groupers complex as a whole on each island management area and for each Puerto Rico fishing sector, and not to the individual units. Therefore, if an AM-based closure needs to be applied to groupers in a particular island management area, the whole grouper fishery in that management area or Puerto Rico fishing sector would be closed during that time. Thus, although **Alternative 5** would result in a continuous closure, there will be differences between those species prohibited to be harvested during the seasonal closure and those species prohibited to be harvested during the AM-based closure, the latter being more inclusive. The extent to which this difference in the species included in the AM-based closure and the seasonal closure could create confusion in constituents and enforcers would depend on the fishing patterns on the particular island experiencing the AM.

If for an AM-based closure for groupers in a particular island management area or Puerto Rico sector, the number of available days running from May 1st forward toward the end of the year is not enough to achieve the required reduction in landings, then the additional days needed would be captured by extending the closure backward for the number of days needed to fulfill the required reduction (i.e., April 30th backward toward January 1st). This backward running closure is not expected to affect the red, black, tiger, yellowfin, and yellowedge groupers, which are already closed from February 1 through April 30th in federal waters of Puerto Rico and the USVI, but would prohibit landings of all other Council-managed grouper species from federal waters during this time. If the closure extends through February, the red hind grouper, whose seasonal closure runs through the end of February in federal waters off western Puerto Rico, would also not be expected to be affected. This period going backward from April through January has been identified as an important sales and demand period due to Lent.

November 30th going backward AM-based closure date

To account for the December 1 through last day of February red hind grouper seasonal closure that applies only to waters west of 67º10' W in Puerto Rico, this alternative includes two additional sub-alternatives. **Sub-Alternative 5b** and **Sub-Alternative 5d** propose November 30th going backward toward the beginning of the year as a potential AM end date for the Puerto Rico commercial and recreational grouper sectors, respectively. In **Sub-Alternative 5b** and **Sub-Alternative 5d**, an AM-based closure for the grouper complex in Puerto Rico of the appropriate sector ending on November 30th and moving backward toward the beginning of the year would occur immediately before the December 1 start of the red hind seasonal closure in federal waters off western Puerto Rico. The AM-based closure would also be continuous with the red hind seasonal closure in Puerto Rico state waters running from December 1st through February 28, each year. This would result in a lengthy closure for red hind grouper. Similar to **Sub-Alternatives 5a** and **5c**, the AM closure would apply to all Council-managed grouper species. Thus, if an AM-based closure needs to be applied to groupers in the Puerto Rico

commercial or recreational sector, the whole grouper fishery in that sector would be closed, and the discussion above regarding differences in the species allowed to be harvested during a seasonal closure vs an AM-based closure applies here as well.

Although unlikely, it is possible that the number of available days running from November 30th backward toward the beginning of the year would not be enough to achieve the required reduction in landings. In that case, the additional days needed could be captured by extending the closure from December 1st forward toward the end of the year for the number of days needed to fulfill the required reduction. This forward running closure would not be expected to further affect red hind, which are already closed from December 1 until the end of the year (and continuing through the last day of February the following year) in federal waters of western Puerto Rico and in all Puerto Rico state waters, and would continue to prohibit landings of all other grouper species from federal waters during that time. Any socio-economic effects of a lengthier closure for all groupers extending through the Christmas holiday season, for however many days are needed, would depend on how much fishers in Puerto Rico fish for these species during this time period, which may vary per region, but in general is expected to be low.

Snappers

July 1st going forward AM-based closure date

Sub-Alternative 5g and **Sub-Alternative 5i** propose an AM-based closure start date of July 1st going forward toward the end of the year for the SU3 FMU in the Puerto Rico commercial and recreational sectors, respectively. The SU3 FMU in federal waters is composed of mutton, lane, gray, dog, schoolmaster, and mahogany snappers. The July 1st start date for the AM-based closure would therefore begin immediately after the last day of the April 1 through June 30 seasonal closure for mutton and lane snappers in federal waters off Puerto Rico and the USVI. However, the AM-based closure would apply to all species in the SU3 FMU, not just to mutton and lane snappers. If fishing for lane or mutton snapper is important during the summer, right after the seasonal closure, then an AM closure immediately after the seasonal closure may affect fishers harvesting those resources.

Sub-Alternative 5k and **Sub-Alternative 5m** also propose an AM-based closure start date of July 1st going forward toward the end of the year but for the whole snapper complex in St. Thomas/St. John and St. Croix, respectively. In these two management areas, ACLs and AMs established by regulations implementing the 2010 Caribbean ACL Amendment (76 FR 8204), apply to the snappers complex[8] as a whole and not to the individual units. Similar to the Puerto Rico management area, the July 1st going forward AM-based closure start date is timed to be continuous with the April 1-June 30 seasonal closure for mutton and lane snappers in federal waters off the USVI and Puerto Rico.

[8] Managed snappers in the complex in the U.S. Caribbean federal waters include: silk, black, blackfin, vermillion, wenchman, queen, cardinal, mutton, lane, gray, dog, schoolmaster, mahogany, and yellowtail.

If for an AM closure for the snapper complex in the USVI or the SU3 in Puerto Rico, the number of available days running from July 1st forward toward the end of the year is not enough to achieve the required reduction in landings, then the additional days needed would be captured by extending the closure backward for the number of days needed to fulfill the required reduction (i.e., June 30th backward toward January 1st). This backward running closure is not expected to affect mutton and lane snappers, whose harvest is already closed from April 1st through June 30th in federal waters off Puerto Rico and the USVI, but would prohibit landings of all other SU3 species from federal waters off Puerto Rico, and of all Council-managed snapper species from USVI federal waters during this time.

September 30th going backward AM-based closure date

Sub-Alternative 5h and **Sub-Alternative 5j** propose an AM-based closure end date of September 30th going backward toward the beginning of the year for the SU1 FMU in the Puerto Rico commercial and recreational sectors, respectively. The SU1 FMU in federal waters is composed of silk, black, blackfin, vermillion, and wenchman snappers. Under these sub-alternatives, the AM-based closure would be continuous with the seasonal closure for silk, black, blackfin, and vermillion snappers (part of the SU1) in federal waters off Puerto Rico and the USVI, which runs from October 1st through December 31st, each year (wenchman snapper, part of SU1, is not included in the spawning seasonal closure). An AM-based closure in Puerto Rico applies to the specific FMU (i.e., SU1). If the number of days left in the year is not enough to achieve the required reduction in landings, then those additional days needed would be captured by extending the closure forward toward the end of the year for the number of days needed to fulfill the required reduction (i.e., October 1st through December 31st). This forward running closure is not expected to affect silk, black, blackfin, or vermilion snapper, whose harvest is already closed during that timeframe, but would prohibit landings of wenchman snapper from federal waters off Puerto Rico during this period.

Sub-Alternative 5l and **Sub-Alternative 5n** also propose an AM-based closure end date of September 30th going backward toward the beginning of the year for the snapper complex in St. Thomas/St. John and St. Croix, respectively. Similar to Puerto Rico, the AM-based closure would be continuous with the seasonal closure for silk, black, blackfin, and vermillion snappers (part of the SU1) in federal waters. As discussed earlier, this AM-based closure in the USVI applies to the whole snapper complex. If the number of days left in the year is not enough to achieve the required reduction in landings, then those additional days would be captured by extending the closure forward toward the end of the year (i.e., October 1st through December 31st). This forward running closure is not expected to affect silk, black, blackfin, and vermillion snappers, whose harvest is already closed during this timeframe, and would continue to prohibit landings of all other snapper species from federal waters off the USVI during this time. This may have additional negative effects because the extended closure would occur during the important Christmas holiday season.

Although the AM-based closure end date of September 30th going backward toward the beginning of the year proposed in **Sub-Alternatives 5h**, **5j**, **5l**, and **5n** is the same as the start date proposed for all FMUs in all island management areas in **Preferred Alternative 2,** these sub-alternatives were added to make sure suitable alternatives are available if the Council chooses an alternative other than **Alternative 2** for the rest of the FMUs in Puerto Rico, St. Thomas/St. John, St. Croix, and/or Caribbean-wide. Thus, for the specific species included, choosing **Sub-Alternatives 5h**, **5j**, **5l**, and **5n** for the applicable FMUs would have the same effects as choosing **Alternative 2**.

Table 2.2.1.1 below shows how the different alternatives would affect the length of an AM-based closure using as examples FMUs from Puerto Rico, St. Croix, and/or St. Thomas/St. John that had AMs applied in the 2013 and 2016 fishing years under the status quo (AM-based closures end date of December 31st going backward toward the beginning of the year). For example, the 2013 AM-based closure for the Puerto Rico commercial sector Snapper Unit 2 (SU2) under **Alternative 1** lasted 102 days. Using the same number of pounds of the ACL overage for that year, under **Preferred Alternative 2** (closure ending September 30th and moving backward toward the beginning of the year) the SU2 for the Puerto Rico commercial sector would be closed for 96 days, 172 days if the start date was January 1st (**Alternative 3**), 178 days under **Sub-Alternative 4b** (date with highest reported average landings - June 30th going backward); and 102 days under **Sub-Alternative 4b** (lowest reported monthly landings - December 31st going backward). Because the effects of the AM closures applied in 2013 have not been assessed, it is difficult to determine the impacts of these various closure lengths and dates.

The physical, biological, economic, social, and administrative effects of all alternatives are discussed in Chapter 4.

Table 2.2.1.1. Number of days a fishery would be closed under **Alternatives 1** through **5** using as examples species groups that had accountability measures applied in 2013 or that will have AMs applied in 2016 in federal waters of Puerto Rico (PR), St. Croix (STX), or St. Thomas/St. John (STT/STJ).

Fishery Management Unit	Annual Catch Limit (pounds [lbs])	ACL Overage in pounds[1] in a Fishing Year (FY)	Days Fishery would be Closed under each Alternative					
			Alt. 1 (Dec 31 backward)	Preferred Alt. 2 (Sep 30 backward)	Alt. 3 (Jan 1 forward)	Sub-Alts. 4: 4a, 4c, 4e, 4g, 4i (date varies by FMU)[1]	Sub-Alts. 4: 4b, 4d, 4f, 4h, 4j (date varies by FMU)[1]	Alt. 5 (if applicable)
Snapper Unit 2 (Commercial PR)	145,916	**2013 FY**	102 days	96 days	172 days	***Jun 30 back***	***Dec 31 back***	***NA***
		132,063				178 days	102 days	
		2016 FY	36 days	18 days	25 days	23 days	36 days	
		9,973						
Wrasses (Recreational PR)	5,050	**2013**	72 days	11 days	67 days	***Oct 31 back***	***Dec 31 back***	***N/A***
		489				11 days	72 days	
Wrasses (Commercial PR)	54,147	**2016**	46 days	22 days	36 days	***Aug 31 back***	***May 31 back***	***NA***
		5,047				*22 days*	*39 days*	
Triggerfish and Filefish (Commercial PR)	58,475	**2016**	77 days	57 days	69 days	***May 31 back***	***Aug 31 back***	***NA***
		12,451				61 days	63 days	
Spiny Lobster (Commercial and Recreational PR)	327,920	**2016**	22 days	17 days	20 days	***Sep 30 back***	***May 31 back***	***NA***
		18,077				*17 days*	*21 days*	
Parrotfish (Commercial PR)	52,737	**2016**	13 days	10 days	13 days	***Mar 31 back***	***Aug 31 back***	***NA***
		9,973				7 days	*11 days*	
Jacks (Recreational PR)	51,001	**2016**	58 days	96 days	42 days	***Feb 28 back***	***Oct 31 back***	***NA***
		11,536				*41 days*	*112 days*	
Triggerfish & Filefish (all sectors, STX)	24,980	**2013**	41 days	32 days	20 days	***May 31 back***	***Dec 31 back***	***N/A***
		1,473				18 days	41 days	
Spiny Lobster (all sectors, STX)	107,307	**2013**	13 days	13 days	5 days	***Mar 31 back***	***Dec 31 back***	*N/A*
		2,401				7 days	13 days	
Groupers (all sectors, STT/STJ)	51,849	**2013**	12 days	7 days	5 days	***Jan 31 back***	***Dec 31 back***	***May 1 forward***
		4,984				5 days	12 days	36 days

[1] For the 2013 FY, ACL overages were determined from analyses conducted in 2013 using 2011 reported landings for Wrasses (PR recreational sector), Triggerfish and Filefish (STX), and Spiny Lobster (STX). The average of landings from 2010 and 2011 was used for analyzing ACL overages for SU2 in PR and Groupers in STT/STJ. This same overage was used to estimate days of closures under **Alternatives 1** through **3** in this example for those species groups that had closures in FY 2013.

For the FY 2016, ACL overages were determined from analyses conducted using reported landings from 2012 -2014. This same overage was used to estimate closure days under **Alternatives 1** through **5** for species/species groups with AMs in FY 2016.

2.3 List of Alternatives for Action 2

Action 2: Specify a time period for revisiting the approach to establish AM-based closures selected in Action 1.

Alternative 1. No action. Do not specify how often the approach chosen should be revisited.

Alternative 2 (Preferred). Revisit the approach selected no longer than 2 years from implementation and every 2 years thereafter.

Alternative 3. Revisit the approach selected no longer than 5 years from implementation and every 5 years thereafter.

2.3.1 Discussion of Alternatives in Action 2

The purpose of Action 2 is to provide options to revisit and possibly revise the approach chosen in Action 1. Under any of the alternatives proposed, the Council has the option to review the approach at any time; however, **Preferred Alternative 2** and **Alternative 3** of Action 2 ensure that revisiting the approach selected to establish the timing for AM-based closures (Action 1) for a particular species is conducted within a specified timeframe. In both **Preferred Alternative 2** and **Alternative 3**, after the number of years specified, Council staff will present to the Council information about the specific closures, which may include available information on the biological, socio-economic, and administrative environment, discussion, and recommendations regarding the potential need of a more formal review of any aspect of the measures implemented in the amendment. The Council will then decide if such formal review is merited and proceed with next steps. If a formal review is merited, the next steps include potentially amending the FMPs and drafting regulations to modify, as appropriate, the process or the dates to implement AM-based closures on the applicable island-management area.

Alternative 1 is the no action alternative, and does not set a specific timeframe to re-evaluate the dates and/or approach chosen in Action 1. Under **Alternative 1**, the AM-based closure start date(s) selected for FMUs or the process chosen for selection of those dates would continue to be used unless and until the Council takes action to modify it. Any positive, negative, or neutral effects resulting from the chosen closure dates would continue until then. However, the chosen method can be revisited at any time to incorporate new information.

Under **Preferred Alternative 2** and **Alternative 3**, the Council would revisit the approach no longer than 2 years after implementation and every 2 years thereafter, or no longer than 5 years after implementation and every 5 years thereafter, respectively. The purpose of these two alternatives is to ensure that the dates and process selected are revisited within a specified time frame. When compared to **Alternative 1**, **Preferred Alternative 2**, and **Alternative 3** may require the Council to more frequently revisit the selected method. Similar to **Alternative 1**, any

positive, negative, or neutral effects resulting from the chosen closure dates would continue until then. However, the chosen method can be revisited at any time to incorporate new information. If the Council does not take action to revisit before the time limit set in **Preferred Alternative 2** and **Alternative 3**, then any effects from the chosen AM-based closure start date(s)/process would continue for a longer time period under **Alternative 3** than **Alternative 2 (Preferred)**. Under **Alternative 1** there is also the possibility of more time passing before a revision is conducted because there is no time limit, therefore any effects could be prolonged.

Chapter 3. Affected Environment

The actions considered in this amendment and associated environmental assessment would affect the U.S. Caribbean exclusive economic zone (EEZ) of Puerto Rico and the U.S. Virgin Islands (USVI) (Figure 3.1.1). Species affected by the actions in this amendment include all species included in the Reef Fish, Corals and Associated Plants and Invertebrates (Coral FMP), and Spiny Lobster Fishery Management Plans (FMPs) of Puerto Rico and the USVI.

The physical, biological, economic, social, and administrative environments have been described in detail in the 2010 and 2011 Caribbean Annual Catch Limit (ACL) Amendments (CFMC 2011a, b) and associated environmental impact statements (EIS), and in the most recent Caribbean actions affecting reef fish, queen conch, spiny lobster, and coral resources, the Comprehensive Amendment to the U.S. Caribbean FMPs: Application of Accountability Measures (AMs) (AM Application Amendment) (CFMC 2016). Information from these documents is incorporated herein by reference. Other descriptions can be found in Regulatory Amendment 4 to the Reef Fish FMP (CFMC 2013c), Regulatory Amendment 2 to the Queen Conch FMP (CFMC 2013b), and Amendment 4 to the Coral FMP (CFMC 2013a). These documents can be found on the National Marine Fisheries Service (NMFS) Sustainable Fisheries, Caribbean Branch website, http://sero.nmfs.noaa.gov/sustainable_fisheries/caribbean/index.html. Summaries of the affected environment can be found in Sections 3.1 through 3.5.

3.1 Physical/Habitat Environment

The physical (including geology and climate) and habitat environments of the U.S. Caribbean were described in detail in the Generic Essential Fish Habitat (EFH) Amendment to FMPs of the U.S. Caribbean, the EFH Final Environmental Impact Statement (EFH-FEIS) (CFMC 1998, 2004), the Five -Year review of EFH in the U.S. Caribbean, Vols.1 and 2 (CFMC 2011c), and Regulatory Amendment 2 to the Queen Conch FMP (CFMC 2013a). The most recent Council action, the AM Application Amendment also contains the most recent description of the physical environment (CFMC 2016). These documents are incorporated herein by reference and are summarized below.

The U.S. Caribbean is located in the eastern portion of the Caribbean archipelago, about 1,770 kilometers (km) (1,100 miles [mi]) east-southeast of Miami, Florida (Olcott 1999). It comprises the Commonwealth of Puerto Rico in the Greater Antilles and the Territory of the USVI in the Lesser Antilles island chains (Figure 3.1.1), both of which separate the Caribbean Sea from the western central Atlantic Ocean. The U.S. Caribbean EEZ covers an area of approximately 196,029 square kilometers (km^2) (75,687 square miles [mi^2]).

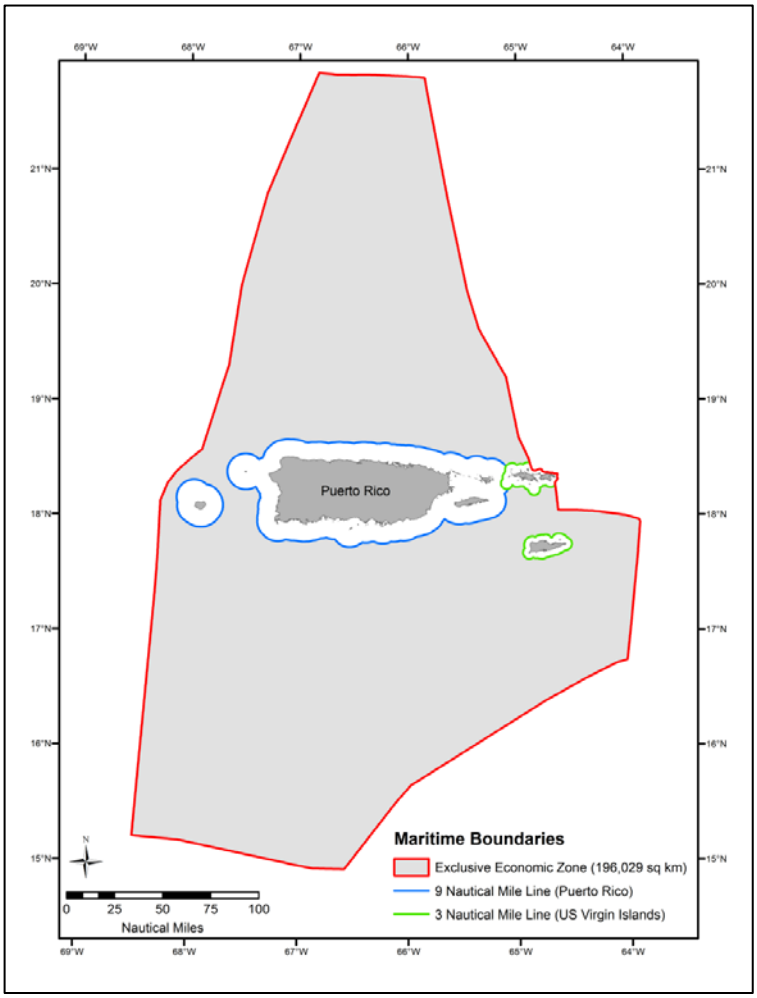

Figure 3.1.1. Boundaries of the U.S. Caribbean EEZ, Puerto Rico waters, and USVI waters.
(Source: NMFS 2014)

The USVI are part of the Virgin Islands chain, which lies in the northeastern Caribbean about 80 km (50 miles) east of Puerto Rico (mainland). The USVI consist of four major islands, St. Thomas, St. John, St. Croix, and Water Island, and about 50 cays (DPNR 2005). Together, the USVI constitutes approximately 347 km^2 (134 mi^2) of land area (Catanzaro et al. 2002).

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 shelf shared by the islands of St. Thomas and St. John has an area of approximately 1751 km^2 (510 nm^2) with most of the shelf more than 24.4 m (80 ft) deep (Kojis and Quinn 2012).

The island of 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 island of St. Croix lies on a different geological platform than the islands of St. Thomas and St. John, and is separated from those islands by a 4 km (2.5 mi) deep trench (CFMC 2004) (Figure 3.1.2). The St. Croix shelf is much narrower and shallower than that of the northern islands (Goenaga and Boulon 1991), extending only 4 km (2.2 nm) wide in the south, less than 0.2 km (0.1 nm) wide on the northwest, and up to several nautical miles wide in the northeast and on Lang Bank (CFMC 2004; CFMC 2011a). In total, the St. Croix shelf has an area of approximately 343 km^2 (99 nm^2) (references in Gordon 2010) with most of the shelf less than 24.4 m (80 ft) deep (Kojis and Quinn 2012).

The island of Puerto Rico is almost rectangular in shape, about 177 by 56 km (110 by 35 mi), and is the smallest and the most eastern island of the Greater Antilles (CFMC 1998, Morelock et al. 2001). Its coast measures approximately 1,227 km (700 mi) 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 isolated islands without permanent populations. Deep ocean waters fringe Puerto Rico. The Mona Passage, which separates the island from Hispaniola to the west, is about 120 km (75 mi) wide and more than 1,000 m (3,300 ft) deep. Off the northern coast is the 8,500 m (28,000 ft) 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.

Puerto Rico shares the same shelf platform as St. Thomas and St. John, and that shelf also extends east to include the British Virgin Islands. 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 3.1.2).

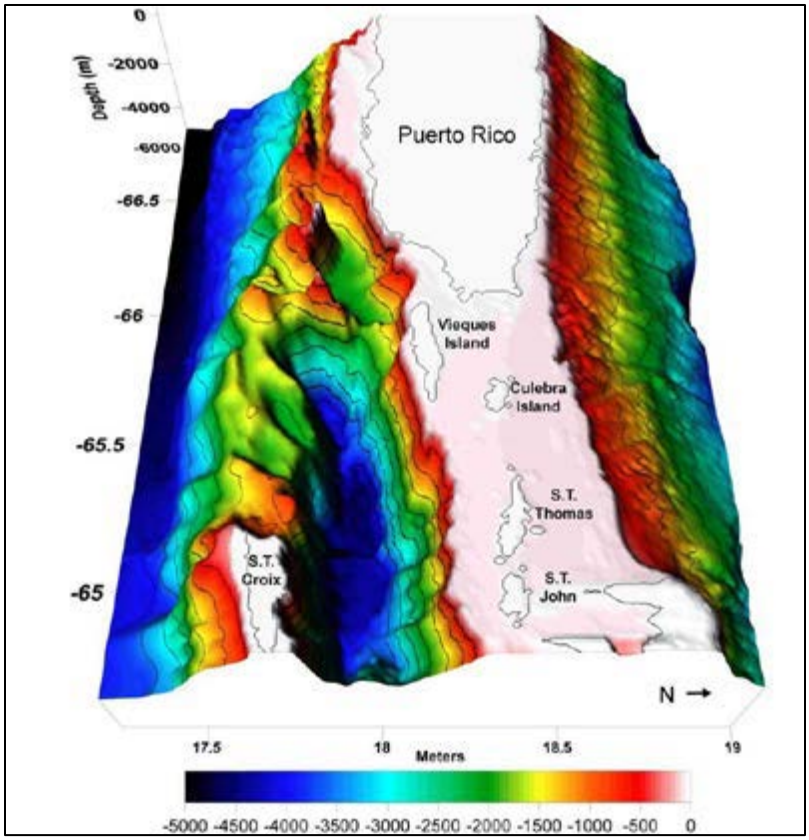

Figure 3.1.2. Shared platform between the east coast of Puerto Rico and St. Thomas/St. John. The deep trough between the Puerto Rico/St. Thomas/St. John platform and St. Croix is clearly seen in this graphic representation of depth (Source: García-Sais et al. 2005).

Habitat

A description of the major habitat types in the U.S. Caribbean EEZ, along with information on their ecological functions and condition, can be obtained in Section 3.2 of the EFH-FEIS (CFMC 2004) and in Section 5.1.3 of the Caribbean Sustainable Fisheries Act (SFA) Amendment (CFMC 2005), are incorporated herein by reference, and are summarized below. A description of the major habitat types of the USVI can be found in the USVI Marine Resources and Fisheries Strategic and Comprehensive Conservation Plan, prepared by the Department of Planning and Natural Resources (DPNR) of the USVI (DPNR 2005) and is incorporated herein by reference. For a description of the major habitat types of Puerto Rico, please see García-Sais et al. (2008). The coastal marine environments of the USVI and Puerto Rico are 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 in the U.S. Caribbean from the 5,494 km^2 (2,121 mi^2) of total bottom area mapped from aerial photographs. This total included 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, 73 km^2 (28 mi^2) of mangroves, and 756 km^2 (292 mi^2) of coral reef and colonized hard bottom were mapped (CFMC 2013).

Essential Fish Habitat (CFMC 2004; CFMC 2011c)

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. Essential fish habitat includes the spawning area in the water column above the adult habitat. EFH utilized by fish and invertebrate species in this region includes coral reefs, live/hard bottom, and submerged aquatic vegetation.

3.2 Biological and Ecological Environment

3.2.1 Description of the Species: Biology/Ecology

The biological environment of the U.S. Caribbean, including the species addressed in this amendment, is described in detail in the 2010 and 2011 Caribbean ACL Amendments (CFMC 2011a, b). Species affected by the action in this amendment include species in the Reef Fish, Coral, and Spiny Lobster FMPs. Species in these FMPs are managed as stocks or stock complexes. See Appendix C for a complete list of species managed by the Council.

3.2.2 Protected Species and Designated Critical Habitat

Within the U.S. Caribbean, some species and their habitats are protected under the Marine Mammal Protection Act (MMPA), the Endangered Species Act (ESA), or both. At least 17 species of whales and dolphins have been reported in or near U.S. waters in the northeastern Caribbean (Mignucci-Giannoni 1998). All 17 species are protected under the MMPA. Three of

these species (i.e., sperm, sei, and fin whales) are also listed as endangered under the ESA.[9] In addition to these three marine mammals, 13 other species that are known to occur in the U.S. Caribbean are also protected under the ESA, including sea turtles (i.e., green North Atlantic distinct population segment [DPS], green South Atlantic DPS, hawksbill, leatherback, and loggerhead Northwest Atlantic DPS), corals (i.e., elkhorn coral, staghorn coral [collectively "*Acropora*"], rough cactus coral, mountainous star coral, lobed star coral, boulder star coral, and pillar coral), and the Nassau grouper. Designated critical habitat for green (North Atlantic DPS) and leatherback (Northwest Atlantic DPS) sea turtles and for *Acropora* corals, also occurs within the U.S. Caribbean.

The potential impacts from the continued authorization of fishing under the Reef Fish, Coral, and Spiny Lobster FMPs of Puerto Rico and the USVI on all ESA-listed species have been considered in previous ESA Section 7 consultations. Summaries of those consultations and their determinations are in Appendix A. Both the Reef fish and Spiny Lobster FMPs have previously been consulted on formally, because of their known adversely affect listed sea turtles and corals; these fisheries may also affected the recently listed Nassau grouper. All consultations on the Coral FMP have been conducted informally as the fishery is not likely to adversely affect any listed species.

The most recent Council action, the Comprehensive Amendment to the U.S. Caribbean FMPs: Application of AMs (AM Application Amendment (CFMC 2016) provides background information about the sea turtles species *Chelonia midas* (green turtle), *Eretmochelys imbricata* (hawksbill), *Dermochelys coriacea* (leatherback), and the coral species *Acropora cervicornis* (staghorn coral), *A. palmata* (elkhorn coral), *Mycetophyllia ferox* (rough cactus coral), *Dendrogyra cylindrus* (pillar coral), *Orbicella annularis* (lobed star coral), *Orbicella faveolata* (mountainous star coral), and *Orbicella franksi* (boulder star coral) because these species were identified at the time as the ones that could be affected. Information is also provided about the *Acropora* critical habitat. The information provided in the AM Application Amendment includes a description of the life history, habitat, diet, growth patterns, or other species-specific information, and designated critical habitat. This information is also included below for reference, along with information on the newly listed Nassau grouper.

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 (7.9 to 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 toward herbivory occurs. They consume primarily

[9] Five DPSs of humpback whales are listed under the ESA; however, the West Indies DPS, which is the only DPS present in the U.S. Caribbean, is not listed as endangered or threatened (81 FR 62259).

seagrasses and algae, but are also know 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 stages. 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 time 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).

The hawksbill's pelagic stage lasts from the time they leave the nesting beach as hatchlings until they are approximately 22-25 cm (8.7-9.8 in) in straight carapace length (Meylan 1988; Meylan and Donnelly 1999). The pelagic stage is followed by residency in developmental habitats (foraging areas where juveniles reside and grow) in coastal waters. Little is known about the diet of pelagic stage hawksbills. Adult foraging typically occurs over coral reefs, although other hard-bottom communities and mangrove-fringed areas are occupied occasionally. Hawksbills show fidelity to their foraging areas over several years (van Dam and Diéz 1998). The hawksbill's diet is highly specialized and consists primarily of sponges (Meylan 1988). Gravid females have been noted ingesting coralline substrate (Meylan 1984) and calcareous algae (Anderes Alvarez and Uchida 1994), which are believed to be possible sources of calcium to aid in eggshell production. The maximum diving depths of these animals are not known, but the maximum length of dives is estimated at 73.5 minutes. More routinely, dives last about 56 minutes (Hughes 1974).

Leatherbacks are the most pelagic of all ESA-listed sea turtles and spend most of their time in the open ocean. Although, they will enter coastal waters and are seen over the continental shelf on a seasonal basis to feed in areas where jellyfish are concentrated. Leatherbacks feed primarily on cnidarians (medusae, siphonophores) and tunicates. Unlike other sea turtles, leatherbacks' diets do not shift during their life cycles. Because leatherbacks' ability to capture and eat jellyfish is not constrained by size or age, they continue to feed on these species regardless of life stage (Bjorndal 1997). Leatherbacks are the deepest diving of all sea turtles. It is estimated that these species can dive in excess of 1000 m (3,280 ft) (Eckert et al. 1989) but more frequently dive to depths of 50 m to 84 m (174 to 276 ft) (Eckert et al. 1986). Dive times range from a maximum of 37 minutes to more routines dives of 4 to 14.5 minutes (Standora et al. 1984; Eckert et al. 1986; Eckert et al. 1989; Keinath and Musick 1993). Leatherbacks may spend 74% to 91% of their time submerged (Standora et al. 1984).

Acropora cervicornis and *Acropora palmata*, the only two species of acroporids in the Caribbean, are two of the major reef-building corals in the wider Caribbean. Elkhorn colonies form flattened to near-round branches that typically radiate outward from a central trunk that is firmly attached to the sea floor. Staghorn colonies are stag antler-like, with cylindrical, straight, or slightly curved branches. The branching morphology of these species provides important habitat for other reef organisms. Historically, both acroporid species formed dense thickets at shallow (<5 m [16 ft]) and intermediate (10 to 15 m [33 to 49 ft]) depths in many reef systems, including locations

in the Florida Keys, western Caribbean (e.g., Jamaica, Cayman Islands, Caribbean Mexico, Belize), and eastern Caribbean. In the 1960s and 1970s in the USVI, elkhorn coral was the main reef-building coral at depths less than 10 m (33 ft) (Rogers et al. 2002). Elkhorn coral grew in nearly monospecific stands on the reef crest and in the upper and lower forereef zones of well-developed fringing and bank barrier reefs, as well as on isolated patch reefs (Rogers et al. 2002). The maximum range in depth reported for elkhorn coral is <1 to 30 m (<3.28 to 98 ft), but historic data for this coral in the USVI indicate that it was common at depths from 1 to 15 m (3.28 to 49 ft) (Bacle 2002; Rogers et al. 2008). The preferred habitat of elkhorn coral is the seaward face of a reef (turbulent shallow water), including the reef crest, and shallow spur-and-groove zone (Shinn 1963; Cairns 1982; Rogers et al. 1982). Historically, staghorn coral was reported from depths ranging from <1 to 60 m (<3.28 to 197 ft) (Goreau and Goreau 1973). It is suspected that 60 m (197 ft) is an extreme situation and that the coral is relatively rare below 20 m (66 ft) depth. The common depth range at which staghorn coral is currently observed is 5 to 17 m (16 to 56 ft). In the USVI, this species was abundant, but not often found in dense thickets or well-defined zones (Rogers et al. 2002); unlike in areas in the western Caribbean where this species was historically the primary constructor of mid-depth (10 to 15 m [33 to 49 ft]) reef terraces (Adey 1978).

Pillar coral (*Dendrogyra cylindrus*) forms cylindrical columns on top of encrusting bases. Colonies are generally grey-brown in color and may reach circa 10 ft (3 m) in height. Polyp tentacles remain extended during the day, giving columns a furry appearance. Pillar coral inhabits most reef environments in water depths ranging from ~3-75 ft (1-25 m), but it is most common between ~15-45 ft (5-15 m) depths (Acosta and Acevedo 2006; Cairns 1982; Goreau and Wells 1967). Pillar coral is a gonochoric (separate sexes) broadcast spawning species with relatively low annual egg production for its size. Sexual recruitment of this species is low, and reported juvenile colonies in the Caribbean are lacking. Pillar coral can reproduce by fragmentation following storms or other physical disturbance. Average growth rates of 0.7-0.8 in (1.8-2.0 cm) per year in linear extension have been reported in the Florida Keys compared to 0.8 cm per year in Colombia and Curaçao. Feeding rates (removal of suspended particles in seawater) are low relative to most other Caribbean corals, indicating it is primarily a tentacle feeder rather than a suspension feeder. However, pillar coral has a relatively high photosynthetic rate, and it receives substantial amounts of energy from its symbiotic algae. Pillar coral is uncommon but conspicuous with scattered, isolated colonies. In monitoring studies, cover is generally less than 1%. At permanent monitoring stations in the USVI, pillar coral has been observed in low abundance at 10 of 33 sites and, where present, ranged in cover from less than 0.05-0.22% (Smith 2013). It is rarely found in aggregations.

Rough cactus coral (*Mycetophyllia ferox*) forms a thin, encrusting plate that is weakly attached. Maximum colony size is ~20 inches (50 cm) in diameter. It has been reported in reef environments in water depths of ~15 to 300 ft (5 to 90 m), including shallow and mesophotic habitats. Rough cactus coral is a hermaphroditic (simultaneously both sexes) brooding

(fertilization occurs within the parent colony and grows for a period of time before release) species. Colony size at first reproduction is greater than 15 in^2 (100 cm^2). Recruitment of rough cactus coral appears to be very low, even in studies from the 1970s. Rough cactus coral has a lower fecundity compared to other species in its genus (Morales Tirado 2006). Over a 10 year period, no colonies of rough cactus coral were observed to recruit to an anchor-damaged site in the U.S. Virgin Islands although adults were observed on the adjacent reef (Rogers and Garrison 2001). Rough cactus coral is usually uncommon or rare, constituting less than 0.1% of all coral species at generally less than 1% of the benthic cover. Benthic cover of rough cactus coral in the Red Hind Marine Conservation District off St. Thomas, USVI, which includes mesophotic coral reefs, was 0.003 ± 0.004% in 2007, accounting for 0.02% of coral cover, and ranking 20th highest in cover out of 21 coral species (Nemeth et al. 2008; Smith et al. 2010). In the USVI between 2001 and 2012, cover of rough cactus coral appeared in 12 of 33 survey sites and accounted for 0.01% of the bottom, and 0.07% of the coral cover, ranking as 13th most common (Smith 2013).

Boulder star coral (*Orbicella franksi*) is one of the three species [mountainous star coral (*Orbicella faveolata*) and lobed star coral (*Orbicella annularis*) are the others] in the *Orbicella annularis* complex. These three species were formerly in the genus *Montastraea*; however, recent work has reclassified the three species in the *annularis* complex to the genus *Orbicella* (Budd et al. 2012). Boulder star coral is distinguished by large, unevenly arrayed polyps that give the colony its characteristic irregular surface. Colony form is variable, and the skeleton is dense with poorly developed annual bands. Colony diameter can reach up to 16 ft (5 m) with a height of up to 6.5 ft (2 m). Boulder star coral tends to have a deeper distribution than the other two species in the *Orbicella* species complex. It occupies most reef environments and has been reported from water depths ranging from ~16-165 ft (5 to 50 m), with the species complex reported to 250 ft (90 m). *Orbicella* species are a common, often dominant, component of Caribbean mesophotic reefs, suggesting the potential for deep refugia for boulder star coral. Boulder star coral is hermaphroditic (simultaneously having both sexes) broadcast spawners, with spawning concentrated on 6 to 8 nights following the full moon in late August, September, or early October. Boulder star coral spawning is reported to be about one to two hours earlier than lobed star coral and mountainous star coral. Fertilization success measured in the field was generally below 15% for all three species being closely linked to the number of colonies concurrently spawning. In Puerto Rico, minimum size at reproduction for the star coral species complex was 13 in^2 (83 cm^2). Boulder star coral is reported as common. In the USVI, boulder star coral is the second most abundant species by percent cover at permanent monitoring stations. However, because the species complex, which is the most abundant by cover, was included as a category when individual *Orbicella* species could not be identified with certainty, it is likely that boulder star coral is the most abundant. Population estimates of boulder star coral in the ~19 square mile (49 km^2) Red Hind Marine Conservation District are at least 34 million colonies (Smith 2013). Abundance was stable between 1998-2008 at 9 sites off Mona and Desecheo Islands, Puerto Rico. In 1998, 4% of all corals at six sites surveyed off Mona Island were

boulder star coral colonies in 1998 and approximately 5% in 2008; at Desecheo Island, about 2% of all coral colonies were boulder star coral in both 2000 and 2008 (Bruckner and Hill 2009).

Lobed star coral (*Orbicella annularis*) is one of the three species within the *Orbicella* complex. Lobed star coral colonies grow in columns that exhibit rapid and regular upward growth. Unlike the other two star coral species, margins on the sides of columns are typically dead. Live colony surfaces usually lack ridges or bumps. Lobed star coral is reported from most reef environments in depths of ~1.5-66 ft (0.5-20 m). The star coral species complex is a common, often dominant component of Caribbean mesophotic (deeper than ~100 ft) reefs, suggesting the potential for deep refuge across a broader depth range, but lobed star coral is generally described with a shallower distribution. Asexual fission and partial mortality can lead to multiple clones of the same colony. The percentage of unique genotypes is variable by location and is reported to range between 18% and 86% (14-82% are clones). Colonies in areas with higher disturbance from hurricanes tend to have more clonality. Although lobed star coral is still abundant, it may exhibit high clonality in some locations. Like the other species in the complex, lobed star coral is a hermaphroditic broadcast spawners, with spawning concentrated on 6-8 nights following the full moon in late August, September, or early October. Lobed star coral is reported to have slightly smaller egg size and potentially smaller size/age at first reproduction that the other two species of the *Orbicella* genus. In Puerto Rico, minimum size at reproduction for the star coral species complex was 12 in^2 (83 cm^2). Lobed star coral has been described as common overall. Demographic data collected in Puerto Rico over nine years straddling the 2005 bleaching event showed that population growth rates were stable in the pre-bleaching period (2001–2005) but declined one year after the bleaching event. Population growth rates declined even further two years after the bleaching event, but they returned to stasis the following year. Lobed star coral is the third most abundant coral by percent cover in permanent monitoring stations in the USVI. A decline of 60% was observed between 2001 and 2012 primarily due to bleaching in 2005. However, most of the mortality was partial mortality, and colony density in monitoring stations did not change (Smith 2013). At nine sites off Mona and Desecheo Islands, Puerto Rico, no species extirpations were noted at any site over 10 years of monitoring between 1995 and 2008. In 1998, 8% of all corals at six sites surveyed off Mona Island were lobed star coral colonies, dipping to approximately 6% in 2008. At Desecheo Island, 14% of all coral colonies were lobed star coral in 2000 while 13% were in 2008 (Bruckner and Hill 2009).

Mountainous star coral (*Orbicella faveolata*) is one of the three species within the *Orbicella* complex. Mountainous star coral grows in heads or sheets, the surface of which may be smooth or have keels or bumps. The skeleton is much less dense than in the other two star coral species. Colony diameter can reach up to 33 ft (10 m) with heights of 13-16 ft (4-5 m). Mountainous star coral has been reported in most reef habitats and is often the most abundant coral between 33-66 ft (10-20 m) in fore-reef environments. The depth range of mountainous star coral has been reported as ~1.5-132 ft (0.5-40 m), though the species complex has been reported to depths of 295 ft (90 m), indicating mountainous star coral's depth distribution is likely deeper than 132 ft

(40 m). Like the other species in the complex mountainous star coral is a hermaphroditic broadcast spawner with spawning concentrated on 6 to 8 nights following the full moon in late August, September, or early October. Fertilization success measured in the field was generally below 15% for all three species being closely linked to the number of colonies concurrently spawning. In Puerto Rico, minimum size at reproduction for the star coral species complex was 12 in^2 (83 cm^2). In many life history characteristics, including growth rates, tissue regeneration, and egg size, mountainous star coral is considered intermediate between lobed star coral and boulder star coral. Reported growth rates of mountainous star coral range between 0.12 and 0.64 in (0.3-1.6 cm) per year (Cruz-Piñón et al. 2003; Tomascik 1990; Villinski 2003; Waddell 2005). Szmant and Miller (2005) reported low post-settlement survivorship for mountainous star coral transplanted to the field with only 3-15% remaining alive after 30 days. Mountainous star coral is the sixth most abundant species by percent cover in permanent monitoring stations in the USVI. Population estimates in the 19-square-mile (49 kilometers squared) Red Hind Marine Conservation District are at least 16 million colonies (Smith 2013). At nine sites off Mona and Desecheo Islands, Puerto Rico, no species extirpations were noted at any site over 10 years of monitoring between 1998 and 2008 (Bruckner and Hill 2009). Both mountainous star coral and lobed star coral sustained large losses during the period. The number of colonies of mountainous star coral decreased by 36% and 48% at Mona and Desecheo Islands, respectively (Bruckner and Hill 2009). In 1998, 27% of all corals at six sites surveyed off Mona Island were mountainous star coral colonies, but decreased to approximately 11% in 2008 (Bruckner and Hill 2009). At Desecheo Island, 12% of all coral colonies were mountainous star coral in 2000 compared to 7% in 2008.

On November 26, 2008, a final rule designating *Acropora* critical habitat was published in the *Federal Register* and defined the physical or biological features essential to the conservation of the species (also known as essential feature). The essential features to the conservation of *Acropora* species is substrate of suitable quality and availability, in water depths from the mean high water line to 30 m (98 ft), to support successful larval settlement, recruitment, and reattachment of fragments. Substrate of suitable quality and availability means consolidated hardbottom or dead coral skeletons free from fleshy macroalgae or turf algae and sediment cover. Areas containing these features have been identified in the U.S. Caribbean include Puerto Rico, St. Thomas/St. John, and St. Croix (Figures 3.2.2.1 - 3.2.2.3).

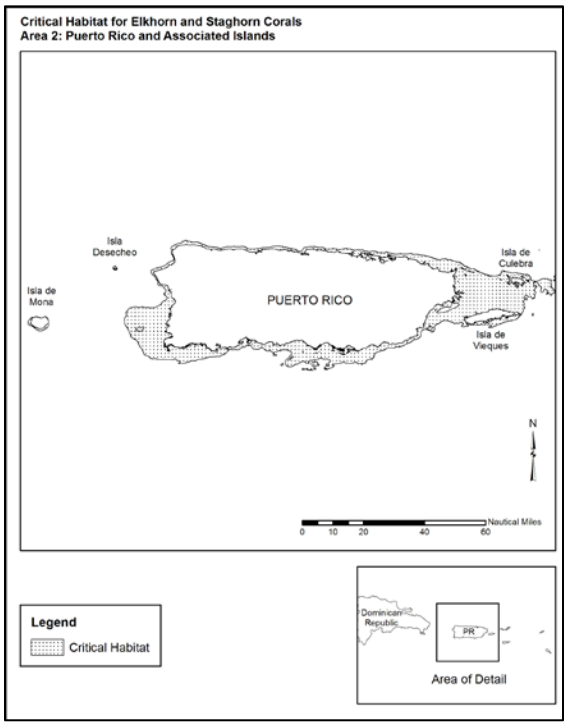

Figure 3.2.2.1. Designated Critical Habitat Area 2 for Elkhorn and Staghorn Corals in Puerto Rico.

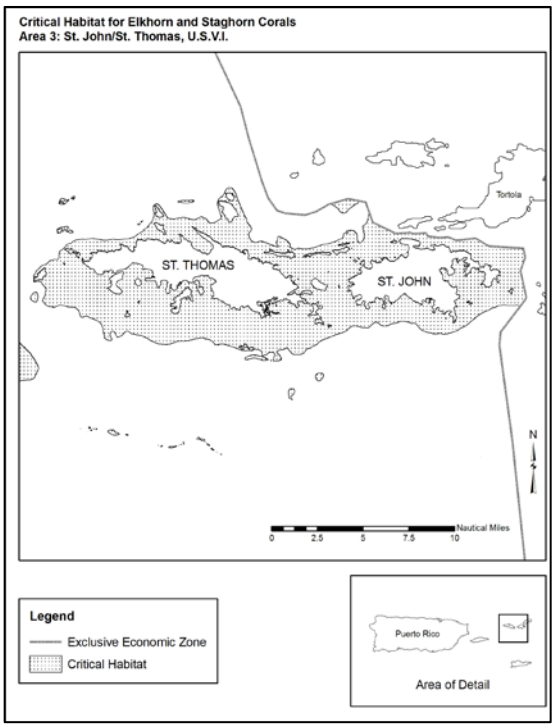

Figure 3.2.2.2. Designated Critical Habitat Area 3 for Elkhorn and Staghorn Corals in St. Thomas/St. John.

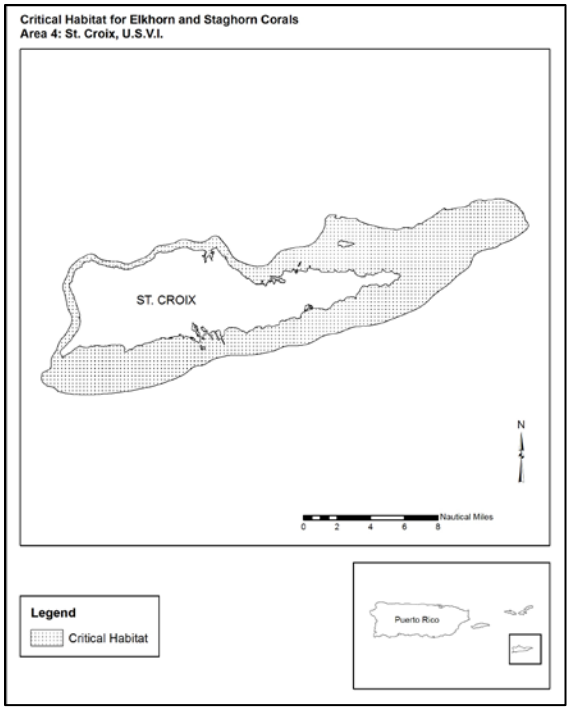

Figure 3.2.2.3. Designated Critical Habitat Area 4 for Elkhorn and Staghorn Corals in St. Croix.

The Nassau grouper is primarily a shallow-water, insular species that has long been valued as a major fishery resource throughout the wider Caribbean, South Florida, Bermuda, and the Bahamas (Carter et al. 1994). The Nassau grouper is slow-growing and long-lived; estimates range up to 29 years (Bush et al. 1996). As larvae, Nassau grouper are planktonic. After an average of 35-40 days and at an average size of 32 mm total length (TL), larvae recruit from an oceanic environment into demersal habitats (Colin 1992; Eggleston 1995). Juvenile Nassau grouper (12-15 cm TL) are relatively solitary and remain in specific areas (associated with macroalgae, and both natural and artificial reef structure) for months (Bardach 1958). As juveniles grow, they move progressively to deeper areas and offshore reefs (Tucker et al. 1993; Colin et al. 1997). Smaller juveniles occur in shallower inshore waters (3.7-16.5 m) and larger juveniles are more common near deeper (18.3-54.9 m) offshore banks (Bardach et al. 1958; Cervigón 1966; Silva Lee 1974; Radakov et al. 1975; Thompson and Munro 1978). Adult Nassau grouper also tend to be relatively sedentary and are commonly associated with high-relief coral reefs or rocky substrate in clear waters to depths of 130 m. Generally, adults are most common at depths less than 100 m (Hill and Sadovy de Mitcheson 2013) except when at spawning aggregations where they are known to descend to depths of 255 m (Starr et al. 2007).

Nassau grouper form spawning aggregations at predictable locations around the winter full moons, or between full and new moons (Smith 1971; Colin 1992; Tucker et al. 1993; Aguilar-Pereira 1994; Carter et al. 1994; Tucker and Woodward 1994). Recent evidence suggests that

spawning is occurring at what may be reconstituted or novel spawning sites in both Puerto Rico and the USVI (Hill and Sadovy de Mitcheson 2013). Nassau grouper harvest is prohibited in the U.S. Caribbean in both federal and territorial waters. There are at least two known Nassau grouper spawning aggregations in the U.S. Caribbean. The Nassau grouper spawning aggregations identified in Bajo de Sico in western Puerto Rico and in the Grammanik Bank, south of St. Thomas, USVI are the only documented spawning aggregation sites for the Nassau grouper under U.S. jurisdiction (Schärer et al. 2016). Research conducted during the 2013-2014 Nassau grouper spawning seasons at these two sites estimated fish abundance at 200 individuals in Grammanik Bank and 100 individuals in Bajo de Sico (Schärer et al. 2016). Abundance of Nassau in Grammanik Bank during the 2015-2016 spawning season was estimated at a maximum of 261 individuals and 107 individuals at Bajo de Sico during the peak months of the spawning aggregation from February to April of 2016 (Schärer pers. comm.)

3.3 Description of the Fisheries

Comprehensive descriptions of the commercial and recreational reef fish, spiny lobster, and coral fisheries of the U.S. Caribbean are contained in the 2010 and 2011 Caribbean ACL Amendments (CFMC 2011a, b), and in the AM Application Amendment (CFMC 2016) and are incorporated herein by reference. A fishery not included in this amendment (queen conch) is also included in the referenced narrative to provide context regarding Council-managed species. A summary is provided below.

The fisheries of Puerto Rico and the USVI provide food, livelihoods, and income to Puerto Ricans and U.S. Virgin Islanders. The fisheries in the U.S. Caribbean (federal and state) waters can be divided into commercial, recreational, and subsistence sectors. The commercial fishers of both Puerto Rico and the USVI pursue multiple species, commonly using multiple gear types. These fishers have been characterized as "artisanal"[10] because their commercial fishing vessels tend to be less than (and commonly much less than) 45 feet (13.7 m) long, have small crews, yield small revenues, and their seafood processors are small-scale producers.

Fishing vessel permits are not required to commercially harvest any Council-managed species in federal waters of the U.S. Caribbean (CFMC 2013c). Also there are no federal licenses or permits required for the recreational harvest of reef fish, queen conch, spiny lobster, or aquarium trade species in the EEZ of the U.S. Caribbean. However, a federal permit may be issued to take or possess Caribbean prohibited coral only as a scientific research activity, exempted fishing, or exempted education activity. Efforts are underway to evaluate the development of a federal permit system in federal waters. Since 2010, all anglers fishing recreationally in U.S. Caribbean federal waters are required to be registered through the National Angler Registry

[10] The NOAA Fisheries Glossary Revise Edition June 2006 defines artisanal fishery as a fishery based on traditional or small-scale gear and boats.

(https://www.countmyfish.noaa.gov/register/). In addition, there are Highly Migratory Species (HMS) permit requirements that apply to the commercial and the recreational sectors fishing in the U.S. Caribbean EEZ. For more information on the HMS permit requirements please visit http://www.nmfs.noaa.gov/sfa/hms/compliance/permits_reporting/. For more information about the permit requirements in federal and state waters, see Section 3.5 of this document.

A detailed description of the fishing gear and methods used in the U.S. Caribbean reef fish, spiny lobster, and coral fisheries is provided in the 2010 and 2011 Caribbean ACL Amendments (CFMC 2011a, b). Gear and methods used in the commercial fishery include hook-and-line, bottom lines, troll lines, rod and reel, longlines, SCUBA and skin diving, traps and pots, and nets (Matos-Caraballo and Agar 2008). Two of the most common gear used in the U.S. Caribbean recreational sector are hook-and-line and SCUBA diving equipment (Griffith et al. 2007).

For more information regarding U.S. Caribbean Fisheries see Section 3.4.2 of this document and the Description of the Social and Cultural Environment in the recently implemented AM Application Amendment (CFMC 2016).

3.4 Economic and Social Environment

3.4.1 Description of the Economic Environment of the Puerto Rico Commercial and Recreational Fishing Industries

3.4 .1.1 Commercial Fisheries

For a comprehensive description of the Caribbean commercial and recreational fishing industries, please see the Environmental Assessment for the Development of Island-Based FMPs in the U.S. Caribbean (CFMC 2014), as well as the 2010 Caribbean ACL Amendment (CFMC 2011a) and the 2011 Caribbean ACL Amendment (CFMC 2011b). The economic description information contained in these amendments is incorporated herein by reference.

These tables provide background information about the mix of species caught by fishermen in Puerto Rico and the economic benefits derived from those landings. The tables in this section (Table 3.4.1.1 to Table 3.4.1.23) show updated annual and monthly trips, landings, prices and ex-vessel revenues (2014 dollars using CPI deflator) by ACL unit and gear group for Puerto Rico, St. Thomas/St. John, and St. Croix for 2012-2014.

Data caveats: The data presented come from individual trip reports. All reported landings are in pounds whole weight (lbs ww). Puerto Rico historical landings are expanded pounds (see the "Puerto Rico" section below) and ex-vessel revenues for those expanded pounds estimates. Landings come from state and federal waters. When the data show that less than three vessels

landed poundage for a particular category, the data is confidential and this is indicated in the table and explained in the notes at the bottom of the table.

Puerto Rico

The number of active fishermen in Puerto Rico is estimated from a fishermen census periodically conducted by the Southeast Fisheries Science Center. The most recent census was conducted in 2008. Current estimates place the number of active fishermen at between 1,000 and 1,200. The Description of the Social and Cultural Environment (Section 3.4.2) below contains a thorough discussion of estimates of the number of fishermen in Puerto Rico and the reader is directed to this section for more information.

Table 3.4.1.1 shows the number of commercial trips, expanded landings (lbs), and estimated associated ex-vessel revenue over the period 2012-2014. Expanded landings (adjusted pounds) are an expansion of reported pounds that accounts for non-reporting or inaccurate reporting by commercial fishermen. These expanded pounds were used to establish the ACLs. The estimates of ex-vessel revenue are based on the expanded pounds and reported ex-vessel prices. The number of trips has not been expanded because there is no agreed upon methodology for doing this. Thus, the combination of the estimated landings and revenues with the number of trips to generate average performance measures per trip will not accurately reflect actual performance. Nevertheless, the reported number of trips is included to show possible trends in number of trips taken.

Table 3.4.1.1. Annual number of reported commercial trips, expanded landings (lbs ww) and estimated ex-vessel revenue (2014 dollars) for Puerto Rico, 2012-2014.

Year	Number of Reported Trips	Expanded Landings	Estimated Ex-Vessel Revenue
2012	60,304	2,740,378	$10,050,808
2013	65,257	1,893,571	$7,087,878
2014	70,372	2,330,036	$8,959,710
Average	65,311	2,321,328	$8,699,465

Source: Southeast Fisheries Science Center, Feb 2016.

Trips

Table 3.4.1.2 shows the number of reported commercial trips by month for 2012-2014. In general, there does not seem to be a consistent pattern indicating a change in the number of trips occurring at any particular time of year. The number of trips is possibly influenced by weather, demand for fish and seasonal labor markets, and this could vary by regions.

Table 3.4.1.2. Number and percentage of reported commercial trips per month for Puerto Rico, 2012-2014.

Month	2012	2013	2014	Average	Average (%)
January	5,212	5,209	5,899	5,440	8.3%
February	5,759	5,537	5,743	5,680	8.7%
March	5,765	5,692	6,684	6,047	9.3%
April	4,963	5,801	6,133	5,632	8.6%
May	5,890	5,769	6,492	6,050	9.3%
June	4,659	5,571	6,287	5,506	8.4%
July	4,777	6,042	6,545	5,788	8.9%
August	5,080	5,741	5,994	5,605	8.6%
September	5,204	5,720	5,673	5,532	8.5%
October	4,159	5,007	4,907	4,691	7.2%
November	4,762	4,903	5,080	4,915	7.5%
December	4,074	4,265	4,935	4,425	6.8%
Total	**60,304**	**65,257**	**70,372**	**65,311**	**100%**

Source: Southeast Fisheries Science Center, Feb 2016.

Table 3.4.1.3 shows the number of reported commercial trips that landed a specific species or species group. A fishing trip will typically have landings of multiple species or species groups, for example, spiny lobster and snapper are often landed on the same trip. As a result, this table counts individual trips for each species or species group harvested on the trip. Consequently, the totals by species and species group shown in Table 3.4.1.3 should not be summed since that would result in an overestimation of the number of actual trips taken by fishermen.

Table 3.4.1.3. Number of reported commercial trips by species group/complex for Puerto Rico, 2012-2014.

Species Group/Complex	2012	2013	2014
AQUARIUM TRADE	1	0	0
BOXFISHES	2,535	2,560	2,813
GOATFISHES	509	434	564
GROUPERS	2,757	2,769	2,947
GRUNTS	1,125	1,144	1,189
JACKS	1,378	1,506	1,739
PARROTFISH UNIT	1,762	2,150	2,081
PORGIES	1,167	1,215	1,265
QUEEN CONCH	6,869	7,575	6,954
SNAPPER UNIT 1	3,421	3,598	4,751
SNAPPER UNIT 2	1,768	1,567	2,440
SNAPPER UNIT 3	5,724	6,302	6,460
SNAPPER UNIT 4	3,205	3,574	4,258
SPINY LOBSTER	10,511	11,190	11,908
SQUIRRELFISHES	488	582	623
SURGEONFISH	0	0	6
TILEFISHES	0	0	0
TRIGGERFISHES AND FILEFISHES	2,889	3,595	3,808
WRASSES	3,334	3,479	3,355
Non-federally managed species	8,905	10,005	11,148

Source: Southeast Fisheries Science Center, Feb 2016.

Table 3.4.1.3 shows that spiny lobster, queen conch, species within the snapper unit, and non-federally managed species are caught on the most trips.

Landings, Prices, and Revenue

Table 3.4.1.4 shows expanded annual landings (lbs ww) by ACL unit and Table 3.4.1.5 shows average annual reported ex-vessel prices (2014 dollars) by ACL unit for Puerto Rico for 2012-2014. The highest landings occur for spiny lobster and queen conch. These are also the highest values species at an average of $6.37/pound and $4.95/pound.

Table 3.4.1.4. Expanded annual commercial landings (lbs ww) by species group/complex for Puerto Rico, 2012-2014.

Species Group/Complex	2012	2013	2014	Average
BOXFISHES	48,632	35,616	38,722	40,990
GOATFISHES	11,532	5,957	7,390	8,293
GROUPERS	67,048	51,047	63,180	60,425

Species Group/Complex	2012	2013	2014	Average
GRUNTS	33,723	23,248	25,162	27,377
JACKS	50,568	32,696	41,041	41,435
PARROTFISH UNIT	60,156	48,606	53,910	54,224
PORGIES	32,928	18,372	18,044	23,115
QUEEN CONCH	374,711	313,991	296,574	328,425
SNAPPER UNIT 1	204,098	138,466	215,583	186,049
SNAPPER UNIT 2	184,621	108,570	174,478	155,889
SNAPPER UNIT 3	217,486	145,548	167,460	176,831
SNAPPER UNIT 4	208,473	131,369	193,086	177,642
SPINY LOBSTER	385,776	275,448	376,766	345,997
SQUIRRELFISHES, TILEFISHES, AQUARIUM TRADE	8,783	5,825	6,219	6,942
SURGEONFISH	0	0	65	65
TRIGGERFISHES AND FILEFISHES	76,826	64,125	71,827	70,926
WRASSES	68,592	48,945	60,045	59,194
Non-federally managed species	656,491	412,803	480,382	516,559
Total	**2,740,378**	**1,893,572**	**2,330,036**	

Source: Southeast Fisheries Science Center, Feb 2016.
Note: Tilefishes FMU and Aquarium Trade Species FMU were combined with the Squirrelfish FMU to avoid confidentiality issues.

Table 3.4.1.5. Average annual reported commercial ex-vessel prices (2014 dollars) by species group/complex for Puerto Rico, 2012-2014.

Species Group/Complex	2012	2013	2014	Average
BOXFISHES	$2.21	$2.24	$2.30	$2.25
GOATFISHES	$2.54	$2.54	$2.55	$2.54
GROUPERS	$2.53	$2.64	$2.72	$2.63
GRUNTS	$1.81	$1.77	$1.89	$1.82
JACKS	$1.87	$1.90	$1.88	$1.88
PARROTFISH UNIT	$1.84	$1.93	$2.04	$1.93
PORGIES	$1.91	$1.91	$1.96	$1.93
QUEEN CONCH	$4.86	$4.93	$5.04	$4.95
SNAPPER UNIT 1	$4.07	$4.39	$4.68	$4.38
SNAPPER UNIT 2	$4.56	$4.90	$5.21	$4.89
SNAPPER UNIT 3	$2.59	$2.73	$2.76	$2.70
SNAPPER UNIT 4	$2.73	$2.87	$2.94	$2.85
SPINY LOBSTER	$6.41	$6.41	$6.30	$6.37

Species Group/Complex	2012	2013	2014	Average
SQUIRRELFISHES, TILEFISHES, AQUARIUM TRADE	$1.67	$1.70	$1.76	$1.71
SURGEONFISH	$0.00	$0.00	$1.30	$0.43
TRIGGERFISHES AND FILEFISHES	$1.58	$1.60	$1.68	$1.62
WRASSES	$3.05	$3.27	$3.39	$3.24
Non-federally managed species	$2.59	$2.80	$2.76	$2.72

Source: Southeast Fisheries Science Center, Feb 2016.
Note: Tilefishes FMU and Aquarium Trade Species FMU were combined with the Squirrelfish FMU to avoid confidentiality issues.

Table 3.4.1.6 shows average monthly prices for all Puerto Rico fishery management units using the years 2012-2014. There is no indication, in general, that there is a higher price during one time of the year than another. Table 3.4.1.7 shows annual commercial ex-vessel revenue (2014 dollars) by ACL unit for 2012-2014. Spiny lobster and queen conch are the highest grossing species groups in Puerto Rico bringing in an average of $2.2 million and $1.6 million from 2012-2014.

Table 3.4.1.6. Average monthly prices for all Puerto Rico fishery management units, 2012-2014 (2014 dollars).

Month	2012	2013	2014	Average
Jan	$3.53	$3.66	$3.69	$3.63
Feb	$3.57	$3.70	$3.75	$3.67
Mar	$3.50	$3.72	$3.67	$3.63
Apr	$3.57	$3.89	$3.68	$3.71
May	$3.62	$3.81	$3.72	$3.72
Jun	$3.53	$3.73	$3.68	$3.65
Jul	$3.69	$3.60	$3.75	$3.68
Aug	$3.41	$3.38	$3.48	$3.42
Sep	$3.32	$3.40	$3.54	$3.42
Oct	$3.38	$3.45	$3.51	$3.45
Nov	$3.77	$3.62	$3.82	$3.74
Dec	$3.68	$3.60	$3.84	$3.71

Source: Southeast Fisheries Science Center, Feb 2016.

Table 3.4.1.7. Estimated annual commercial ex-vessel revenue (2014 dollars) by species group/complex for Puerto Rico, 2012-2014.

Species Group/Complex	2012	2013	2014	Average
BOXFISHES	$107,601	$79,780	$89,146	$92,176
GOATFISHES	$29,265	$15,141	$18,850	$21,085
GROUPERS	$169,684	$134,672	$171,969	$158,775
GRUNTS	$60,956	$41,227	$47,513	$49,899
JACKS	$94,368	$62,213	$77,068	$77,883
PARROTFISH UNIT	$110,491	$93,642	$109,957	$104,697
PORGIES	$63,022	$35,116	$35,329	$44,489
QUEEN CONCH	$1,821,398	$1,548,677	$1,495,435	$1,621,836
SNAPPER UNIT 1	$831,351	$608,433	$1,008,679	$816,154
SNAPPER UNIT 2	$842,039	$532,020	$908,346	$760,802
SNAPPER UNIT 3	$563,756	$398,012	$462,627	$474,798
SNAPPER UNIT 4	$569,685	$377,522	$567,590	$504,932
SPINY LOBSTER	$2,473,889	$1,765,825	$2,374,083	$2,204,599
SQUIRRELFISHES, TILEFISHES, AQUARIUM TRADE	$14,654	$9,905	$10,943	$11,834
SURGEONFISH	$0	$0	$84	$28
TRIGGERFISHES AND FILEFISHES	$121,487	$102,418	$120,514	$114,806
WRASSES	$209,290	$159,879	$203,624	$190,931
Non-federally managed species	$1,703,046	$1,154,901	$1,325,891	$1,394,613

Source: Southeast Fisheries Science Center, Feb 2016.
Note: Tilefishes Unit and Aquarium Trade Unit were combined with the Squirrelfish Unit to avoid confidentiality issues.

Gear Usage

Tables 3.4.1.8 and 3.4.1.9 show expanded landings and estimated ex-vessel revenue (2014 dollars), respectively, by gear type for 2012-2014. Handline, spearfishing, and pots and traps have historically been used to bring in the most landings and ex-vessel revenue.

Table 3.4.1.8. Expanded annual commercial landings (lbs ww) by gear type for Puerto Rico, 2012-2014.

Gear Type	2012	2013	2014	Average
Seine Nets	26,146	35,023	50,800	37,323
Pots and Traps	451,581	261,638	359,541	357,587
Gill Nets	194,182	129,057	123,267	148,835
Trammel Nets	30,997	39,481	59,094	43,190
Hand Line	839,056	524,820	708,327	690,734
Rod and Reel	0	52,662	107,028	79,845
Troll	265,044	108,077	136,791	169,971

Gear Type	2012	2013	2014	Average
Longline	28,972	21,666	23,633	24,757
Cast Net	69,326	32,430	32,768	44,841
Spearfishing	708,353	542,146	463,317	571,272
Snare	123,722	145,068	262,654	177,148
By Hand	28,972	21,666	23,633	24,757

Source: Southeast Fisheries Science Center, Feb 2016.

Table 3.4.1.9. Estimated annual commercial ex-vessel revenue (2014 dollars) by gear type for Puerto Rico, 2012-2014.

Gear Type	2012	2013	2014	Average
Seine Nets	$63,646	$89,672	$103,494	$85,604
Pots and Traps	$1,690,872	$1,000,151	$1,300,607	$1,330,544
Gill Nets	$437,620	$273,074	$255,914	$322,202
Trammel Nets	$107,488	$135,288	$217,446	$153,407
Hand Line	$2,570,114	$1,706,380	$2,528,712	$2,268,402
Rod and Reel	$0	$127,546	$272,879	$133,475
Troll	$607,392	$224,967	$287,670	$373,343
Longline	$92,461	$66,920	$75,666	$78,349
Cast Net	$106,083	$51,327	$55,343	$70,918
Spearfishing	$3,097,365	$2,292,661	$1,853,543	$2,414,523
Snare	$770,226	$910,433	$1,556,147	$1,078,935
By Hand	$16,090	$5,549	$10,977	$10,872

Source: Southeast Fisheries Science Center, Feb 2016.

St. Thomas/St. John

The number of active fishermen on St. Thomas and St. John in 2014 was estimated at about 70. The Description of the Social and Cultural Environment below (Section 3.4.2) contains more detail regarding numbers of fishermen.

Table 3.4.1.10. Annual number of reported commercial trips, reported landings (lbs ww), and estimated ex-vessel revenue (2014 dollars) for St. Thomas/St. John, 2012-2014.

Year	Number of Reported Trips	Reported Landings	Average Lbs per Trip	Estimated Ex-Vessel Revenue
2012	15,742	392,581	25	$2,148,079
2013	13,222	347,948	26	$1,876,170
2014	12,626	414,364	33	$2,194,808
Average	13,863	384,964	28	$2,073,019

Source: Southeast Fisheries Science Center, Feb 2016.

As Table 3.4.1.10 shows, the number of reported trips has declined over the three years 2012 to 2014 while landings and ex-vessel revenues have increased overall. The number of reported trips by months shows no consistent pattern of a greater number of trips in some months over others. Table 3.4.1.11 shows the number of reported commercial trips per month from 2012-2014 while Tables 3.4.1.12 and 3.4.1.13 show annual landings and ex-vessel revenues (2014 dollars) by ACL unit. Annual reported commercial landings are highest for triggerfishes and filefishes, snappers and groupers. These same species provide the greatest ex-vessel revenue in addition to jacks.

Trips

Table 3.4.1.11. Number of reported commercial trips per month for St. Thomas/St. John, 2012-2014.

Month	2012	2013	2014	Average	Average (%)
January	1,432	1,396	1,002	1,277	9.2%
February	1,490	1,074	994	1,186	8.6%
March	1,364	1,160	1,224	1,249	9.0%
April	1,224	990	1,102	1,105	8.0%
May	1,478	1,184	1,054	1,239	8.9%
June	1,326	909	897	1,044	7.5%
July	1,244	1,232	1,236	1,237	8.9%
August	1,387	1,219	1,157	1,254	9.0%
September	1,295	1,224	895	1,138	8.2%
October	1,264	1,273	1,143	1,227	8.8%
November	1,202	783	837	941	6.8%
December	1,036	778	1,085	966	7.0%
Total	**15,742**	**13,222**	**12,626**	**13,863**	**100.0%**

Source: Southeast Fisheries Science Center, Feb 2016.

Landings, Prices and Revenue

Table 3.4.1.12. Annual reported commercial landings (lbs ww) by species group/complex for St. Thomas/St. John, 2012-2014.

Species Group/Complex	2012	2013	2014	Average
Angelfishes	16,077	16,202	21,106	17,795
Boxfishes	12,303	10,975	11,333	11,537
Groupers	41,412	38,675	38,076	39,388
Grunts	16,113	11,562	11,701	13,125
Jacks	45,551	25,430	43,956	38,312
Parrotfish	17,224	17,653	16,283	17,053

Species Group/Complex	2012	2013	2014	Average
Aquarium Trade, Goatfishes & Porgies	145	132	298	191
Queen Conch	592	88	459	380
Snappers	53,965	36,462	51,191	47,206
Spiny lobster	83,157	84,233	92,261	86,550
Squirrelfishes	9,817	9,502	9,258	9,525
Surgeonfishes	15,093	12,575	13,184	13,617
Triggerfishes and Filefishes	46,047	45,039	51,537	47,541
Wrasses	1,823	1,903	2,639	2,121

Source: Southeast Fisheries Science Center, Feb 2016.

Note: Aquarium Trade, Goatfishes, and Porgies units have been combined to avoid confidentiality issues.

Table 3.4.1.13. Estimated annual commercial ex-vessel revenue (2014 dollars) by species group/complex for St. Thomas/St. John, 2012-2014.

Species Group/Complex	2012	2013	2014	Average
Angelfishes	$49,748	$49,405	$63,325	$54,159
Boxfishes	$53,254	$46,826	$47,528	$49,202
Groupers	$256,027	$235,814	$228,435	$240,092
Grunts	$96,386	$68,154	$67,858	$77,466
Jacks	$234,847	$129,213	$219,780	$194,613
Parrotfish	$88,802	$89,699	$81,415	$86,638
Aquarium Trade, Goatfishes & Porgies	$869	$573	$124	$522
Queen Conch	$4,273	$626	$3,213	$2,704
Snappers	$333,877	$222,344	$307,148	$287,790
Spiny Lobster	$685,948	$684,791	$738,084	$702,941
Squirrelfishes	$40,175	$38,334	$36,760	$38,423
Surgeonfishes	$77,811	$63,897	$65,920	$69,209
Triggerfishes and Filefishes	$237,402	$228,846	$257,682	$241,310
Wrasses	$11,277	$11,600	$15,834	$12,904

Source: Southeast Fisheries Science Center, Feb 2016.

Note: Aquarium Trade, Goatfishes, and Porgies units have been combined to avoid confidentiality issues.

Table 3.4.1.14. Average monthly prices for all St. Thomas/St. John fishery management units, 2012-2014.

Month	2012	2013	2014	Average
Jan	$5.47	$5.43	$5.35	$5.41
Feb	$5.47	$5.42	$5.32	$5.40
Mar	$5.49	$5.39	$5.37	$5.42
Apr	$5.48	$5.46	$5.27	$5.40

Month	2012	2013	2014	Average
May	$5.47	$5.38	$5.26	$5.37
Jun	$5.41	$5.38	$5.30	$5.36
Jul	$5.44	$5.37	$5.26	$5.36
Aug	$5.46	$5.35	$5.27	$5.36
Sep	$5.52	$5.33	$5.30	$5.38
Oct	$5.46	$5.36	$5.27	$5.36
Nov	$5.51	$5.48	$5.33	$5.44
Dec	$5.49	$5.41	$5.29	$5.40

Source: Southeast Fisheries Science Center, Feb 2016.

Table 3.4.1.14 shows average monthly prices for all St. Thomas/St. John fishery management units from 2012-2014. The table indicates a decline in prices during the summer months with a peak in prices in December, a period of high demand as people celebrate Christmas. January through March are high tourism months while March and April are months with high demand due to Lent.

Gear Usage

Tables 3.4.1.15 and 3.4.1.16 show annual commercial landings and ex-vessel revenue (2014 dollars) from 2012-2014 by gear group. Traps and line fishing gear provide the greatest amount of landings and ex-vessel revenues.

Table 3.4.1.15. Annual reported commercial landings (lbs ww) by gear type for St. Thomas/St. John, 2012-2014.

Gear Type	2012	2013	2014	Average
Line Fishing	59,084	50,789	60,263	56,712
Traps	285,855	270,464	299,804	285,375
By Hand	944	2,011	6,606	3,187
Seine Net	33,689	14,286	41,247	29,741
SCUBA	2,716	923	941	1,527
Nets	9,167	8,430	4,158	7,252
Castnet	536	955	1,345	945
Longline	240	90	0	110
Gillnet	350	0	0	117

Source: Southeast Fisheries Science Center, Feb 2016.

Table 3.4.1.16. Estimated annual commercial ex-vessel revenue (2014 dollars) by gear type for St. Thomas/St. John, 2012-2014.

Gear Type	2012	2013	2014	Average
Line Fishing	$356,150	$307,941	$366,965	$343,685
Traps	$1,714,483	$1,595,545	$1,731,111	$1,680,380
By Hand	$5,226	$10,448	$33,156	$16,277
Seine Net	$185,645	$78,805	$224,303	$162,918
SCUBA	$15,828	$5,381	$5,314	$8,841
Nets	$49,847	$46,034	$22,246	$39,376
Castnet	$2,825	$4,973	$6,725	$4,841
Longline	$1,402	$503	$0	$635
Gillnet	$1,804	$0	$0	$601

Source: Southeast Fisheries Science Center, Feb 2016.

St. Croix

As with Puerto Rico, the number of active commercial fishermen in St. Croix is somewhat elusive, but recent estimates place the number of active fishermen in the range of 200-250. Section 3.4.2 contains more detail regarding numbers of fishermen.

Table 3.4.1.17 shows the annual number of trips, landings and ex-vessel revenue (2014 dollars from 2012-2014. The reported number of commercial fishing trips in St. Croix declined from 2012-2014, as did landings and ex-vessel revenue.

Table 3.4.1.17. Annual number of reported commercial trips, reported landings (lbs ww), average pounds per trip, and estimated ex-vessel revenue (2014 dollars) for St. Croix, 2012-2014.

Year	Number of Reported Trips	Reported Landings (Whole Pounds)	Average Lbs per Trip	Estimated Ex-Vessel Revenue (2014 Dollars)
2012	24,237	511,165	21.1	$2,925,659
2013	20,387	469,896	23.1	$2,668,020
2014	13,663	398,538	29.2	$2,249,086
Average	**19,429**	**511,658**	**24.4**	**$2,614,255**

Table 3.4.1.18 shows the number of commercial trips each month from 2012-2014. There does not appear to be any pattern to indicate that a greater number of trips occur in any one month or range of months than another. However, there is a slight increase in the number of trips during tourism season and the months that include Lent. The decision of whether to take a trip or not is likely largely determined by the weather.

Trips

Table 3.4.1.18. Number of reported commercial trips per month for St. Croix, 2012-2014.

Month	2012	2013	2014	Average	Average (%)
January	1,850	2,011	1,526	1,796	9.2%
February	1,856	1,696	1,568	1,707	8.8%
March	2,126	1,894	1,540	1,853	9.5%
April	2,082	1,875	1,480	1,812	9.3%
May	2,256	1,798	1,429	1,828	9.4%
June	2,019	1,439	1,551	1,670	8.6%
July	2,053	1,837	1,114	1,668	8.6%
August	2,323	1,769	751	1,614	8.3%
September	1,881	1,433	753	1,356	7.0%
October	1,990	1,841	642	1,491	7.7%
November	2,062	1,650	705	1,472	7.6%
December	1,739	1,144	604	1,162	6.0%
Total	**24,237**	**20,387**	**13,663**	**19,429**	**100.0%**

Source: Southeast Fisheries Science Center, Feb 2016.

Reported Landings and Prices and Estimated Revenue

Tables 3.4.1.19 and 3.4.1.20 show annual landings and ex-vessel revenues (2014 dollars) by ACL unit from 2012-2014. Parrotfish, snapper, and spiny lobster catches dominate landings and ex-vessel revenues.

Table 3.4.1.19. Annual reported commercial landings (lbs ww) by species group/complex for St. Croix, 2012-2014.

Species Group/Complex	2012	2013	2014	Average
Angelfishes	14,268	8,890	5,386	9,515
Boxfishes	1,822	1,755	1,047	1,541
Groupers	29,866	22,977	14,182	22,342
Grunts	16,113	11,562	11,701	13,125
Jacks	8,360	14,563	4,286	9,070
Parrotfish	118,867	107,437	75,338	100,547
Queen Conch	36,896	21,431	23,373	27,233
Snapper	67,522	65,370	44,353	59,082
Spiny Lobster	86,997	59,398	39,684	62,026
Surgeonfishes	21,245	12,641	9,624	14,503
Triggerfishes and Filefishes	22,658	13,950	8,831	15,146
Aquarium Trade, Goatfishes, Porgies, Squirrelfishes, and Wrasses	1,432	1,174	680	1,095

Source: Southeast Fisheries Science Center, Feb 2016. Notes: Aquarium Trade, Goatfishes, Porgies, Squirrelfishes, and Wrasses units have been combined to avoid confidentiality issues.

Table 3.4.1.20. Estimated annual commercial ex-vessel revenue (2014 dollars) by species group/complex for St. Croix, 2012-2014.

Species Group/Complex	2012	2013	2014	Average
Angelfishes	$44,136	$27,103	$16,158	$29,132
Boxfishes	$7,858	$7,481	$4,365	$6,568
Groupers	$184,451	$140,100	$85,092	$136,548
Grunts	$96,407	$68,156	$67,851	$77,471
Jacks	$43,106	$73,996	$21,430	$46,177
Parrotfish	$612,820	$545,897	$376,690	$511,802
Queen Conch	$266,304	$152,452	$163,611	$194,123
Snapper	$417,756	$398,631	$266,116	$360,834
Spiny Lobster	$717,628	$482,892	$317,472	$505,997
Surgeonfishes	$109,529	$64,230	$48,120	$73,960
Triggerfishes and Filefishes	$116,813	$70,881	$44,154	$77,283
Aquarium Trade, Goatfishes, Porgies, Squirrelfishes, and Wrasses	$6,986	$5,665	$3,020	$5,224

Source: Southeast Fisheries Science Center, Feb 2016.
Notes: Aquarium Trade, Goatfishes, Porgies, Squirrelfishes, and Wrasses units have been combined to avoid confidentiality issues.

Table 3.4.1.21 shows St. Croix average monthly prices for all fishery management units for 2012-2014. The data indicates a slight increase in prices in March - May, possibly due to increased demand for Lent, and an increase in November and December, likely due to increased demand for the holidays.

Table 3.4.1.21. Average monthly prices for all St. Croix fishery management units, 2012-2014.

Month	2012	2013	2014	Average
1	$5.76	$5.77	$5.68	$5.74
2	$5.73	$5.73	$5.68	$5.71
3	$5.79	$5.75	$5.61	$5.72
4	$5.77	$5.72	$5.68	$5.72
5	$5.79	$5.71	$5.69	$5.73
6	$5.67	$5.64	$5.59	$5.64
7	$5.71	$5.57	$5.51	$5.60
8	$5.62	$5.56	$5.58	$5.59
9	$5.65	$5.61	$5.72	$5.66
10	$5.62	$5.61	$5.51	$5.58
11	$5.78	$5.72	$5.75	$5.75
12	$5.78	$5.73	$5.72	$5.74

Source: Southeast Fisheries Science Center, Feb 2016.

Gear Usage

Tables 3.4.1.22 and 3.4.1.23 show annual commercial landings and ex-vessel revenues (2014 dollars) by gear type for 2012-2014. SCUBA, line fishing, and traps are the gear being used to land the greatest number of pounds and bring in the highest ex-vessel revenues.

Table 3.4.1.22. Annual reported commercial landings (lbs ww) by gear type for St. Croix, 2012-2014.

Gear Type	2012	2013	2014	Average
Line Fishing	77,762	119,296	151,328	116,129
Traps	77,715	66,490	45,546	63,250
By Hand	27,870	21,273	43,177	30,773
Seine Net	2,612	1,465	13,595	5,891
SCUBA	298,469	231,226	121,633	217,109
Nets	0	49	705	251
Castnet	3,363	5,046	14,714	7,708
Gillnet	8,871	17,828	2,465	9,721
Longline	11,718	520	0	4,079
Other	217	35	260	171

Source: Southeast Fisheries Science Center, Feb 2016.

Table 3.4.1.23. Annual commercial ex-vessel revenue (2014 dollars) by gear type for St. Croix, 2012-2014.

Gear Type	2012	2013	2014	Average
Line Fishing	$476,178	$741,597	$944,342	$720,706
Traps	$427,041	$364,659	$242,182	$344,628
By Hand	$167,297	$126,998	$247,717	$180,670
Seine Net	$13,466	$7,444	$68,532	$29,814
SCUBA	$1,708,578	$1,311,676	$689,280	$1,236,511
Nets	$0	$249	$3,528	$1,259
Castnet	$17,339	$25,637	$73,570	$38,849
Gillnet	$45,711	$90,588	$12,325	$49,541
Longline	$74,838	$3,234	$0	$26,024
Other	$1,320	$216	$1,560	$1,032

Source: Southeast Fisheries Science Center, Feb 2016.

3.4.1.2 Recreational Fishery

This section presents information from the Marine Recreational Information Program (MRIP) from the NOAA Office of Science and Technology website found at http://www.st.nmfs.noaa.gov/recreational-fisheries/access-data/run-a-data-query/index in May 2015. Data from MRIP does not exist for the USVI because the program is not conducted there, nor is data from any other systematic recreational data collection program available. As a result, the following discussion only addresses recreational fishing activity in Puerto Rico.

Puerto Rico

Based on analyses of the MRIP data there has been a steady increase from 2010-2014 in estimates of number of fish caught and released with a large increase in numbers of fish caught last year. Estimates of the total number of angler trips and recreational fishing participation (coastal residents only) show a decrease in 2011 and 2012 followed by a steady increase over the past two years to 2010 levels. The recent increase in effort could result from the decrease in gas prices, making fishing excursions less expensive.

Catch and Harvest

Table 3.4.1.24 shows the number of fish caught and released through recreational fishing.

Table 3.4.1.24. Total recreationally caught and released numbers of fish in Puerto Rico, 2010-2014.

Year	Caught	Released
2010	392,623	156,115
2011	387,306	58,980
2012	477,723	48,664
2013	497,202	101,692
2014	1,164,740	173,376

Source: MRIP (http://www.st.nmfs.noaa.gov/recreational-fisheries/access-data/run-a-data-query/index)

Effort (Angler Trips)

Table 3.4.1.25 shows the total number of angler (recreational fishing) trips in Puerto Rico while Table 3.4.1.26 breaks down the number of angler trips by mode (shore, charter boat, and private/rental boat).

Table 3.4.1.25. Total angler trips in Puerto Rico, 2010-2014.

Year	Angler Trips
2010	536,183
2011	424,587
2012	350,568
2013	510,262
2014	534,500

Source: MRIP, May 2015 (http://www.st.nmfs.noaa.gov/recreational-fisheries/access-data/run-a-data-query/index)

Table 3.4.1.26. Total angler trips by mode in Puerto Rico, 2010-2014.

Year	Shore	For-Hire Boat	Private/Rental Boat
2010	219,651	4,113	312,419
2011	232,917	4,730	186,939
2012	140,266	1,839	208,462
2013	275,132	6,470	228,661
2014	275,636	Unavailable	258,864

Source: MRIP, May 2015 (http://www.st.nmfs.noaa.gov/recreational-fisheries/access-data/run-a-data-query/index)

Participation

Table 3.4.1.27 shows individual participation in recreational fishing in Puerto Rico.

Table 3.4.1.27. Recreational fishing participation by region (individuals) in Puerto Rico, 2009-2013.

Year	Coastal Resident of PR	Non-Puerto Rico
2009	110,236	22,352
2010	92,191	11,096
2011	98,662	13,795
2012	83,837	10,003
2013	122,002	5,515

Source: Marine Recreational Information Program (MRIP), May 2015 (http://www.st.nmfs.noaa.gov/recreational-fisheries/access-data/run-a-data-query/index)

Economic Value, Expenditures, and Business Activity

There is no information at this time regarding the total economic value, expenditures, or business activity associated with recreational fishing in the U.S. Caribbean for Council-managed species.

3.4.2 Description of the Social and Cultural Environment

Descriptions of the social environment of reef fish, spiny lobster, and coral fisheries are included in CFMC (2011a) and CMFC (2011b) and are incorporated by reference. In addition, a detailed description of the social environment for the reef fish fisheries is included in a recent amendment CFMC (2013a) (Reef Fish FMP) and is incorporated herein by reference. Detailed descriptions of USVI and Puerto Rican fishing communities are included in Stoffle et al. (2009; 2011), Impact Assessment Inc. (IAI) (2007), and Griffith et al. (2007) and are incorporated herein by reference. Additional narratives on the impacted fisheries, which can be used to supplement this section, are included in Section 3.3 (Description of the Fisheries) and Section 3.4.1 (Description of Economic Environment) of this document.

This amendment proposes changes to the timing of AM-based closures for the reef fish, coral, and spiny lobster FMPs (including snappers, groupers, spiny lobster, boxfish, goatfish, grunts, wrasses, jacks, scups and porgies, squirrelfish, triggerfish and filefish, tilefish, angelfish, surgeonfish, parrotfish, and aquarium trade species). A description of the social environment including fishermen and fishing communities in Puerto Rico and the USVI in relation to their involvement in the included fisheries was provided in the AM Application Amendment (CFMC 2016) and is incorporated herein by reference. A fishery not included in this amendment (queen conch) and additional fisheries not managed by the Caribbean Council (such as highly migratory species) are also included in the referenced narrative to provide context on the dependence on Council-managed species. A summary of this referenced description is provided below. The referenced description details fishing involvement in the fishing communities of Puerto Rico, St. Croix, and St. Thomas and St. John.

<u>Puerto Rico:</u> The importance and cultural significance of Puerto Rican fishing traditions (i.e. celebration of Virgen del Carmen, Festival Del Pescao in Cabo Rojo during Lent, importance of fish to Catholics during Lent, and fish as food to tourists as well as local working people) is described. Descriptions of the three types of fishing (commercial, recreational, and subsistence) in Puerto Rico are provided as well as a discussion of fishing communities.

Commercial: The commercial sector is responsible for the majority of landings, and is referred to as “artisanal,” and most commercial fishing operations are multi-gear and multi-species with nearly two-thirds utilizing at least three gear types. Determining the number of active commercial fishermen has proven difficult and counts or estimates of fishers which have been provided over the years have ranged from 868 active fishermen to 2500 fishermen. In 2011-2012, the number of licensed fishermen greatly increased due to two possible factors: relaxation of tax form requirement and extension of beginner fishing license (see CFMC 2016 for a discussion about these factors). Reef fish are the most important category of targeted commercial fish, followed by deep water snappers and spiny lobster, but, target species vary by

coastal region. Top target species are described by region. Descriptions also include the top ten municipalities by commercial landings (Cabo Rojo, Lajas, Vieques, Aguadilla, Guánica, Fajardo, Naguabo, Rincón, Juana Díaz, and Ponce) and top species by municipality. A variety of species are important to each municipality and rarely did more than one or two species account for more than 10% of landings in a specific municipality.

Recreational: The recreational fishing sector in Puerto Rico is described with an estimated total of 127,517 participants that embarked on 510,262 fishing trips in 2013. The majority of recreational fishing occurs from the shore and private or rental boat and the majority of participants are coastal residents of Puerto Rico.

Subsistence: Subsistence fishing includes people who primarily fish for foods for their households. It is primarily a working class activity in Puerto Rico, and subsistence fishermen may often be retired or unemployed. Subsistence fishermen target snapper-grouper species, pelagic species, king mackerel, but nearly no shellfish.

Fishing communities: In Puerto Rico, fishing communities are place-based (provide key features such as fishing infrastructure and social interactions), and network-based and over 38 place-based fishing communities have been identified.

St. Croix: The importance of fishing to the Cruzan population as a core value and important identity is discussed. Descriptions of commercial and recreational fishing in St. Croix are provided as well as a discussion of fishing communities.

Commercial: The commercial sector is described as "artisanal" and most fishermen construct and repair their gear and boats and market their fish. Determining the number of active fishermen is difficult in St. Croix, but somewhat recent counts or estimates have ranged from 177 registered fishermen up to 200-250 active fishermen. The demographics of commercial fishermen are described (most identify as Hispanic and the most frequent racial designation is Black). Many fishers hold other occupations in addition to fishing, although it's difficult to find other paid work. Fishers with other occupations intend to continue fishing for as long as possible. The dominant gear type is hook and line first, diving second, and trap third. Many fishermen fish with several gear types during the year. Commercial vessels are usually small and hauled on trailers and transported around the island. Licensed fishermen land at many landing locations, with the top three important landing sites being Altona Lagoon in Christiansted, the Molasses Pier, and the Frederiksted Fish Market. Fishermen commonly keep part of their catch to be consumed by their families and also commonly give away part of their catch to friends. Commercial fishermen commonly target more than one category of fish. Reef fish is the top category in terms of importance based on the number of fishermen identifying it as their target, spiny lobster is second, deep pelagic is third, and queen conch is fourth. The location of types of fishing is described with most deepwater snapper fished off the eastern and southeastern side of

island, trap grounds are off the southwestern part of island, and dive fishing is along the southern shore.

Recreational: There has been limited research on the recreational fishing, but several categories of recreational fishing in the USVI have been identified (for-hire-charter boat, private boat, and shore and pier). Tuna, dolphin, and wahoo have been identified as the primary target species in one survey of fishing clubs. The recreational line fishery in the USVI targets offshore and inshore reef fish as well as invertebrates. About 11% of St. Croix residents participate in recreational fishing. Sport fishing tournaments are increasingly important. The St. Croix offshore sport fishing fleet is more modest than the fleets in St. Thomas and St. John.

Fishing communities: It is difficult to identify particular communities as fishing communities because of the geographical dispersion of fishermen and fishing activities throughout the island. Most St. Croix fishers do not typically live in areas close to the coast, and this pattern of residence is based on historical factors or the choice to move to a newly developed area or preferred location. Other factors are detailed which might influence residence patterns, including the ability to trailer vessels and move locations.

St. Thomas and St. John: The importance of fishing to the island economies is discussed. Descriptions of commercial, recreational, and subsistence fishing in St. Thomas and St. John are provided as well as a discussion of fishing communities.

Commercial: Two areas of commercial concentration are located on St. Thomas, on the north side and the south side of the island. The top reported commercial landing sites in St. Thomas (Frenchtown, Hull Bay, and Water Bay) and St. John (Coral Bay and Cruz Bay) are described. The top ports for boat storage in St. Thomas (Frenchtown, Hull Bay, and Walter Bay) and St. John (Coral Bay) are described, but a sizable portion of fishermen keep their boats at home (6.9%). Commercial fishing is described as “artisanal” and most fishermen constructs and repair their gears and boasts, as well as market their fish. The most recent census places the number of active fishermen at around 102 on both islands combined. The demographics of commercial fishermen are described (most classify themselves as French descent and the most frequent racial designation is White). About one-third of fishermen are full-time, one third work 15-36 hours per week, and one-third work less than 15 hours per week. The dominant gear is hook and line, traps are second, and dive fishing is third. Many fishermen fish several gear types. Vessels are small and hauled on trailers to different parts of the island, but some are moored or docked. Fishing locations are described (lobster and finfish are fished in the area to the south and north of islands, handline area is to the south and there is also a small area north of St. Thomas, and net fishing is fished on the north side of St. Thomas). Fishermen primarily target reef fish first, coastal pelagic second, and spiny lobster third, in order of importance.

Recreational: Recreational fishing is more important on St. Thomas than elsewhere in the USVI. Recreational infrastructure on the island includes eight marinas (Crown Bay Marina, Frenchtown Marina, Yacht Haven Marina, American Yacht Harbor Marina, Sapphire Beach Marina, Saga Haven Marina, Pirate's Cove Marina, and Boater's Haven) and twelve anchorage sites (Benner Bay, Charlotte Amalie Harbor, Red Hook, Cowpet Bay, Water Bay, Hull Bay, Jersey Bay, Long Bay, Vessup Bay, Bolongo Bay, Elephant Bay, and Secret Harbor). Recreational fishermen are more likely to target pelagic fish which explains the highly dispersed fishing area for charter fishermen which extends well beyond the north sides of both islands and the far south of St. Thomas.

Subsistence: There's little description of subsistence fishing in St. Thomas or St. John, but it does exist and is likely an important source of food, although we don't have sufficient information to provide a complete description.

Fishing communities: It has been suggested that the whole island should be designated a fishing community because there is a geographical dispersion of fishermen and their activities throughout the island, although some parts of St. Thomas have been identified as having substantial fishing activity and could be considered a place-based fishing community. Fishing (commercial, recreational, or subsistence) is important to the culture and livelihood of many individuals on the islands.

Since the referenced description was finalized, NMFS has provided estimates of the number of active commercial fishers for the year 2014, the most recent year for which data are available. In 2014, the number of active fishers was estimated at 61 fishermen in St. Croix, 70 fishermen in St. Thomas/St. John, and 858 fishermen in Puerto Rico (NMFS, SERO Caribbean Landings Dataset, April 2016). These estimates of active fishers only include licensed fishermen that reported landings during the year 2014.

3.4.3 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 in the U.S. and its territories. This executive order is generally referred to as environmental justice (EJ).

Minority populations: The Hispanic origin group which is considered a minority in the continental U.S. is the majority ethnic group in Puerto Rico. In the year 2010, 16.3% of the population of the continental U.S. was comprised of residents that identified itself as Hispanic or Latino; however, for the same year, 99% of the population of Puerto Rico identified as Hispanic or Latino (U.S. Census Bureau, 2010 Census). In the USVI the majority of the population is

Black or African American (72% including those of two or more races) according to the year 2000 Census, whereas the percentage of the population comprised of Black or African American residents of the continental U.S. was 12.9% for the same year. The minority (minority is commonly interpreted for the U.S. as White, non-Hispanic) rates for all of Puerto Rico and the USVI are substantially higher than that of the continental United States.

Low-income populations: Low-income populations in the U.S. Caribbean make up a much greater percentage of the general population than in the continental United States. The percentage of people below poverty included 45.2% of the population in Puerto Rico for the year 2010, significantly higher than that of the continental U.S. which included 15.3% of the population below poverty (U.S. Census Bureau, 2010 Census). For the year 2010 the poverty rate for the USVI was 22.2%, also significantly higher than the rate for the continental U.S. (U.S. Census Bureau, 2010 Census). These overall higher poverty rates indicate that the U.S. Caribbean includes more individuals that are likely to be more vulnerable and experience higher levels of effects when changes in fisheries management are conducted.

Because this proposed action is expected to impact fishermen in the U.S. Caribbean, and information is not available in most cases to link these fishermen to the communities in which they reside, all communities in Puerto Rico and the USVI have been examined using census data to see if they have poverty rates that exceed EJ thresholds.

The threshold for comparison that was used was 1.2 times the average of the USVI or Puerto Rico such that, if the value for the community was greater than or equal to 1.2 times the average of the greater area, then the community was considered an area of potential EJ concern (EPA 1999).

As mentioned above, the poverty rate for Puerto Rico for the year 2010 was 45.2%. This value translates into an EJ poverty threshold of approximately 54.2%. The communities listed in table 3.4.3.1 exceeded this poverty threshold and are the most likely to be vulnerable to EJ concerns.

Table 3.4.3.1. Puerto Rico communities which exceeded poverty threshold for year 2010. Source: U.S. Census Bureau 2010.

Community	Percent of Population Below Poverty Level
Adjuntas	57.2
Aguada	56.5
Barranquitas	54.7
Ciales	59.3
Coamo	55.8

Community	Percent of Population Below Poverty Level
Comerío	58.4
Corozal	58.4
Guánica	58.2
Guayanilla	56.5
Isabela	57.1
Lajas	55.7
Lares	58.1
Las Marías	58.2
Maricao	65.7
Maunabo	55.6
Moca	57.0
Morovis	62.0
Naranjito	55.3
Orocovis	62.6
Patillas	57.0
Peñuelas	57.7
Quebradillas	60.6
Salinas	58.5
San Sebastián	58.5
Utuado	57.6
Villalba	57.1
Yauco	56.8

As mentioned above, the poverty rate for the USVI in 2010 was 22.2%. This value translates into an EJ poverty threshold of approximately 26.6%. The communities listed in Table 3.4.3.2 exceeded this poverty threshold and are likely the most vulnerable to EJ concerns.

Table 3.4.3.2. U.S. Virgin Islands communities which exceeded poverty threshold for year 2010. Source: U.S. Census Bureau 2010.

Community	Poverty Rate
Charlotte Amalie	27.3
Charlotte Amalie East	30.7
Christiansted	41.1
Frederiksted	45.9
Frederiksted Southeast	38.9

Based on the information provided above, Puerto Rico and the USVI have minority or economic profiles that include higher rates than that of the continental United States. Environmental Justice issues could arise if FMUs or species experience long closures (because fishermen would not have access to the fish for a greater amount of time) as a result of AM required closures. Food insecurity is a large issue in the U.S. Caribbean and these vulnerable low-income populations could be impacted to a greater extent because of their dependence on the fish they receive through fishing efforts and utilize as food to supplement their income. However, AM required closures are the result of previous amendments and rulemaking and not this proposed amendment. The alternatives in this proposed amendment are intended to reduce the adverse economic and social effects of AM-induced closures by increasing the flexibility of their timing, allowing the closures to occur when least disruptive of economic, social, or cultural needs. As a result, because the expected effects of this proposed amendment would be positive, no EJ issues are expected to arise.

The general participatory process used in the development of fishery management measures (e.g., public hearings and open Caribbean Council meetings) is expected to provide 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. In addition, the proposed actions section of this amendment will be translated into Spanish to provide local populations with access to the information and the ability to participate in the development of this amendment.

3.5 Administrative Environment

3.5.1 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. Caribbean EEZ.

In the 2005 Caribbean SFA Amendment (CFMC 2005), fishable habitat was defined as those waters less than or equal to 100 fathoms (fms) (600 ft; 183 m). The majority of fishing activity for Council-managed species occurs in that area, except for fishing for deep-water snappers, which occurs primarily in the EEZ at depths greater than 100 fms (600 ft; 183 m) (CFMC 2005). The total area of fishable habitat (less or equal to 100 fms) in the U.S. Caribbean is estimated to be approximately 2,214.1 square nautical miles (nm^2) (7,594 km^2). The fishable habitat within

the EEZ is 304.7 nm2 (1,045 km2) or 13.7% of the U.S. Caribbean total, with 119.5 nm2 (410 km2) occurring in the EEZ off Puerto Rico and 185 nm2 (635 km2) occurring in the EEZ 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.

Table 3.5.1. Estimates of fishable habitat areas in the U.S. Caribbean. (Source: NMFS-SERO 2015)

Region	**Total Fishable Habitat Area**		**EEZ Waters**		**Territorial Waters**		**Percent of the total fishable area in EEZ waters**	**Percent of the total fishable area in territorial waters**
U.S. Caribbean (EEZ and Territorial Waters combined)	Km^2	Nm^2	Km^2	Nm^2	Km^2	Nm^2	13.7	86
	7594	2214.1	1045	304.7	6549	1909.4		
Puerto Rico	5823	1697.7	410	119.5	5413	1578.2	5.4	71
St. Croix	375	109.3	68	19.8	307	89.5		
St. Thomas/St. John	1396	407	567	165	829	241.7		
USVI (total)	1771	516	635	185	1136	331	8.4	14.9

Responsibility for federal fishery management decision-making in the U.S. is divided between the Secretary of Commerce 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 Fishery Management Council (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. The 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 USVI.

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 FMPs are enforced through actions of NOAA's Office of Law Enforcement, the U.S. Coast Guard, and various Puerto Rico commonwealth and USVI territory authorities. To better coordinate enforcement activities, federal and commonwealth 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. In 2012, Amendment 4 to the Consolidated Atlantic HMS FMP: Caribbean Fishery Management Measures re-evaluated the management measures for commercial and recreational HMS fisheries operating in the U.S. Caribbean. The rule implementing this amendment became effective on January 2, 2013. This rule had the purpose of improving permitting of and data collection from vessels operating in the U.S. Caribbean to better manage the traditional small-scale commercial HMS fishing fleet in the U.S. Caribbean Region, enhance fishing opportunities, and improve profits for the fleet, and to provide improved capability to monitor and sustainably manage those fisheries. For additional information regarding the HMS management process and authority in the Caribbean, please refer to the FMP for Atlantic Tunas, Swordfish, and Sharks (HMS FMP, http://www.nmfs.noaa.gov/sfa/hms/) and Amendment 4 to the 2006 Consolidated HMS FMP (http://www.nmfs.noaa.gov/sfa/hms/documents/fmp/am4/index.html).

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

3.5.2 Territory and Commonwealth Fishery Management

The governments of the Territory of the USVI and the Commonwealth of Puerto Rico have the authority to manage their respective state fisheries. The USVI is an organized, unincorporated

territory of the United States[11] with a locally-elected government. Residents born in the USVI are citizens of the United States and they elect a Governor, unicameral (15-member) Legislature, and Delegate to Congress (DOI 1999). 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 Department of Planning and Natural Resources (DPNR) is the USVI's agency responsible for the administration and enforcement of all laws pertaining to the preservation and conservation of fish and wildlife, trees and vegetation, coastal zones, cultural and historical resources, water resources, and air, water and oil pollution, among other responsibilities (http://dpnr.vi.gov/). Commercial and recreational fishing activities are regulated with the advice of the DPNR's Division of Fish and Wildlife and the St. Thomas/St. John and St. Croix Fisheries Advisory Committees (Uwate 2002 in DPNR 2005). The DPNR/Division of Environmental Enforcement is responsible for enforcing regulations within USVI waters (Uwate 2002 in DPNR 2005).

The Estado Libre Asociado de Puerto Rico (i.e., Commonwealth of Puerto Rico) is a self-governing commonwealth in association with the United States. Residents born in Puerto Rico are citizens of the United States and they elect a Governor, two legislative chambers: the House of Representatives (51 seats) and the Senate (27 seats), and a Resident Commissioner, a non-voting member of the United States House of Representatives. 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 (DNER). 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.

Each of the USVI and Puerto Rico fishery management agencies has a designated seat on the 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 the 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 has license categories for full-time, part-time, beginner, and non-resident commercial fishers, ornamental fisheries, and owners of rental boats, including charter

[11] "The USVI is an organized territory because Federal legislation - an organic act - has established the institutions of local government. It is an unincorporated territory because not all the provisions of the U.S. Constitution apply to the Virgin Islands. The territorial court system has jurisdiction for all local legal issues." (DOI 1999)

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., cetí) 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 enforced.

In the USVI, all commercial fishers, any person who uses a pot, trap, set-net, or haul seine, even for personal consumption, and any person who sells, trades, or barters any part of their catch, including charter boat operators who sell or trade their catch, must obtain a commercial license (DPNR 2016). USVI commercial fishermen are required to report their catch (all species) and effort for every trip (CFMC 2010). Commercial Cath Report (CCR) forms must be submitted to the DPNR on a monthly basis, within two weeks after every fishing trip or within two weeks after the close of the month if no fishing took place (DPNR 2016). The level of non-reporting, under-reporting, and delayed reporting is not well known. However, the DPNR has been working with the fishermen to improve accuracy of reports and the reporting rate. The USVI DPNR implemented a moratorium on issuance of new commercial fishing licenses on August 24, 2001, and license renewals are only issued to fishers who have held a commercial fishing license for at least one year within three years of June 2001 and have complied with catch reporting requirements (DPNR 2016).

In the USVI, permits are not required for recreational fishing. Recreational fishers are not allowed to sell, barter, or trade their catch or to use certain fishing gears to catch fish (i.e., traps, pots, haul seines and set-nets). Fishing permits are required to fish in some areas in the USVI. A recreational shrimp permit is needed to fish in Altona Lagoon and in Great Pond, St. Croix (commercial fishing not allowed). Permits are also required for fishing activities in the Great St. James Marine Reserve and Cas Cay/Mangrove Lagoon Marine Reserves in St. Thomas (DPNR 2016).

Additional information regarding fishery management in territorial or federal waters can be found in Section 2.1 of the 2005 Caribbean SFA Amendment (CFMC 2005), and in the 2010 Caribbean ACL Amendment (CFMC 2011a). Additional information about commercial and recreational fisheries in the USVI and Puerto Rico can be found in Sections 3.3 and 3.4.2.

Chapter 4. Environmental Effects

Chapter 4 describes the effects to the physical, biological and ecological, economic, social, and administrative environments from the alternatives in the proposed actions**.** In the following sections, the terms fishery management unit (FMU) and species/species complex may be used interchangeably.

4.1 Environmental Effects of Action 1: Modifying the timing of Accountability Measure (AM)-based closures

Action 1: Select an approach to modify the timing for the implementation of AM-based closures in the U.S. Caribbean exclusive economic zone.

Summary of Management Alternatives

Alternative 1: No Action. AM-based closure end date: **December 31st** extending backward into the year.

Alternative 2 (Preferred): AM–based closure end date: **September 30th** extending backward into the year for all FMUs on each of Puerto Rico commercial and recreational sectors, St. Thomas/St. John, St. Croix, and Caribbean-wide, except for those FMUs that include species with seasonal closures in federal waters, if selected by the Council in **Alternative 5**.

Alternative 3: AM–based closure start date: **January 1st** extending backward into the year for all FMUs on each of Puerto Rico commercial and recreational sectors, St. Thomas/St. John, St. Croix, and Caribbean-wide, except for those FMUs that include species with seasonal closures in federal waters, if selected by the Council in **Alternative 5**.

Alternative 4 (Sub-Alts. 4a – 4j): AM–based closure end dates: fixed for each FMU: Puerto Rico (I. Commercial, II. Recreational), B. St. Thomas/St. John, C. St. Croix, and D. Caribbean-wide), based on the highest or lowest average monthly landings of the most recent three years of available data (2012, 2013, 2014).

Alternative 5 (Sub-Alts. 5a – 5n): AM–based closure start/end dates: For FMUs with species with seasonal closures in Caribbean federal waters, closures timed to be continuous with the seasonal closure. The AM-based closure will extend either forward or backward from the seasonal closure into the year as specified in **Sub-Alts 5a - 5n** for the number of days necessary to achieve the required reduction in landings.

4.1.1 Direct and Indirect Effects on the Physical Environment

Proposed Action 1 would not have any direct physical effects. However, indirect effects on the physical environment are expected depending on the alternative, as described below. These effects depend on the degree to which the proposed action results in changes to the fishing effort for a particular species/species complex. Modifying the start date for AM closures as proposed in **Alternatives 2-4** would not change the allowable landings, or the amount of any reduction in landings required; it would redistribute those landings throughout the year relative to the no action alternative.

Management actions that affect the physical environment mostly relate to the interactions of fishing gear with the sea floor. The degree or magnitude of the effects will depend on whether an action increases or decreases fishing gear interactions with the bottom habitat. It also depends on the vulnerability of a particular habitat to disturbance and the rate at which the habitat can recover from such disturbances (Barnette 2001). The primary gear types used in the reef fish, spiny lobster, and coral fisheries are described in Section 3.3. These include vertical line gear, traps, spear fishing, and hand harvest. Vertical line gear has the potential to snag and entangle bottom structures, which can result in breakage and abrasions (Barnette 2001). Traps can break and damage vulnerable corals, including Endangered Species Act (ESA) listed species, which offer significant benthic structure and essential fish habitat (EFH) in the U.S. Caribbean (Barnette 2001). Hand harvest while free diving or SCUBA diving, used to some extent in the spiny lobster fishery, and spear fishing, are expected to have little to no adverse direct effects on the physical environment in general. The proposed action would not change the primary gears or how they are currently used in the reef fish, spiny lobster, and coral fisheries.

The cumulative effects of repeated anchoring by fishermen using any harvest method, including spear guns and hand harvest, as well as the use of fishing traps, can also damage (e.g., reduce vertical relief) hard bottom areas where fishing occurs (Barnette 2001 in CFMC 2011a). The cumulative effects of anchoring and trap fishing will depend on how much the proposed action causes an increase or decrease in the quantity and time spent in fishing activities (fishing effort). Increases in fishing effort increase the interaction of fishing gear with the bottom. However, traps in the U.S. Caribbean are not usually removed from the water during a closure, thus the interactions between traps and the bottom are not expected to change under any of the alternatives proposed.

Indirect physical effects resulting from the application of AMs in general are expected from **Alternative 1** and all other alternatives proposed (**Alternatives 2 (Preferred)**, **3, 4**, and **5**). These indirect effects from the general application of AMs were evaluated in the 2010 and 2011 Caribbean ACL Amendments (CFMC 2011 a, b), which established ACLs and AMs for Council-managed species. Effects were discussed in those amendments and are incorporated herein by

reference and summarized as follows. Indirect physical effects from the application of AMs reflect the reduction in fishing effort resulting from reducing the length of the fishing season for a particular species/species complex when AMs are applied. Reducing fishing effort reduces the opportunity for interactions from non-trap fishing gear and anchors with the sea bottom, benefiting the physical environment.

With respect to the length of AM-based closures, in general, under any of the alternatives proposed, when compared to a shorter AM closure, a longer AM closure (shorter fishing season) could potentially result in additional minor indirect positive effects on the physical environment by reducing anchoring activities from fishing for that particular species experiencing the AM. However, these benefits on the physical environment would not be attained if fishers frequent the same areas and continue to anchor to fish for other species. Benefits may also be limited if fishers, while trying to harvest the entire ACL during the open season, increase the intensity of fishing, thus continuing or increasing fishing gear interactions with the bottom.

Alternative 1 is the no action alternative and would continue the status quo. The starting date for the implementation of AMs in U.S. Caribbean federal waters would continue to be December 31st going backward toward the beginning of the year. **Alternative 1** would not have direct physical effects because it would not change current fishing activities. In **Alternative 1**, no changes in fishing effort from the baseline are expected and interactions between fishing gear and habitat would remain unchanged.

As discussed in Section 2.2.1, for the time period analyzed in this amendment, several FMUs in Puerto Rico, St. Thomas/St. John, St. Croix, and Caribbean-wide exhibit lower landings during the month of December. If lower landings are indicative of decreased fishing effort, then in general, benefits on the physical environment from the application of AMs during December (**Alternative 1**) for those FMUs should be neutral because effort is expected to be lower during a low fishing month when compared to the rest of the year. For those FMUs that have either higher landings or more demand during December, the opposite is true because

Similar to **Alternative 1**, **Preferred Alternative 2** would not have any direct physical effects because it would not be expected to directly modify current fishing activities. Also similar to **Alternative 1**, indirect effects from the implementation of AMs would apply to **Preferred Alternative 2**. Although not clearly shown from the data analyzed in this amendment, anecdotal information from fishers in Puerto Rico and the U.S. Virgin Islands (USVI) indicates that September is in general a month with low fishing/sales activity, justifying their preference for AM-based closures to occur during this particular time (see Table 1.2.1). If September is in fact a month with low fishing activity in Puerto Rico and the USVI in general, any additional indirect benefits on the physical environment from the implementation of AMs during this period should be minimal because effort is expected to be lower during a low fishing month when compared to the rest of the year. If the AM-based closures extend through the low fishing months into a

period of traditionally high fishing activity for the affected species, then the reduction in fishing effort during that period would reduce anchoring from fishing activities for that species benefiting the physical environment. Thus, based on the discussion above for **Alternative 1** and **Preferred Alternative 2**, when compared to **Alternative 1**, changing the AM closure end date from December 31st going backward to September 30th going backward into the year is generally not expected to substantially change how fishing effort is distributed throughout the year. A September 30th going backward date may make the AM closure longer or shorter depending on the landing patterns for the affected species. If an AM closure under **Preferred Alternative 2** for a particular FMU results in a longer closure than under the status quo (**Alternative 1**, December 31st), it may result in additional indirect minor positive effects on the physical environment as discussed above, by reducing anchoring activities from fishing for that particular species or reduced interactions with non-trap gears used for that particular species and the sea bottom. If on the contrary, the AM closure results in a shorter closure than under **Alternative 1**, the benefits would be less because the fishing season for that species/species group would be open longer, increasing the potential for these interactions with the physical environment.

Alternative 3 would implement AMs starting on January 1st and move forward into the year, which would apply to all FMUs in an island management area, except to FMUs that include species with seasonal closures, if selected by the Council in **Alternative 5**. Indirect effects on the physical environment would depend on if this start date occurring at the beginning of the year results in changes to the distribution of fishing effort throughout the year. The indirect effects on the physical environment discussed above for **Alternative 1** and **Preferred Alternative 2** related to longer versus shorter AM closures would also apply to an AM closure start date under **Alternative 3,** if an AM closure for a particular FMU results in a shorter or longer closure than **Alternative 1** or **Preferred Alternative 2**.

The dates for AM closures proposed under each of **Alternative 1**, **Preferred Alternative 2**, and **Alternative 3** would apply to all FMUs in an island management area and Puerto Rico fishing sector, thus several FMUs could potentially have AM closures applied at the same time in a given year. Multiple overlapping AM-based closures would theoretically provide some minor benefit to the physical environment by simultaneously reducing fishing activities for the affected species. The physical environment may benefit from the potential reduction in anchoring or from the reduced potential for interaction between the sea bottom and gears used to fish for the affected species. Although these potential benefits would not be expected from species harvested with trap gear because traps in the U.S. Caribbean are usually left in the water during a closure, thus they continue to interact with the bottom.

Alternative 4, Sub-Alternatives 4a through **4j** would establish different AM-based closure dates for individual FMUs on each island management area. Compared to **Alternatives 1**, **2 (Preferred)**, and **3**, different AM-based closure start dates could result in less potential for overlapping AM-based closures if these are spaced out throughout the year. Thus, in the event of

multiple AM-based closures in a year, any potential benefits to the physical environment from reduced fishing for those species with different AM closures dates (e.g., reduction in anchoring, fishing gear interactions) would be less than if those AM closures overlapped as discussed above for **Alternatives 1-3**.

As discussed in Section 2.2.1, **Alternative 4**, **Sub-Alternatives 4a** through **Sub-Alternative 4j** propose AM closure start dates that occur during the month with highest or lowest reported landings. The effects discussed above for **Alternatives 1-3** regarding the effects of longer versus shorter closures (i.e., reduction/increase in anchoring, fishing gear interactions with the bottom) also apply to **Sub-Alternatives 4a** through **4j**, and the effects would vary depending on the FMU and island management area and the closure date selected for each one.

Sub-Alternatives 5a-5n in **Alternative 5** propose a unique closure date for those FMUs that include species with spawning seasonal closures in federal waters. The AM-based closure date would start immediately before or after the seasonal closure as specified by the sub-alternative. **Alternative 5** may provide a slight additional beneficial effect to the physical environment by extending protection from fishing activities to the habitat supporting the spawning aggregation during the period immediately before or after the established spawning closure. Also, periods before or after a spawning season, depending on the date and the species, may also be periods of higher fishing effort, thus additional indirect minor positive effects on the physical environment would be expected from the reduction on anchoring activities during this higher effort period, or reduced interactions with non-trap gears used for that particular species and the sea bottom.

4.1.2 Direct and Indirect Effects on the Biological and Ecological Environment

Although this action would affect all Council-managed fisheries conducted in the U.S. Caribbean EEZ, it is not expected to have direct biological or ecological effects or substantially modify fishing activities in federal waters. The reduction in landings resulting from an AM-based closure for the affected species/species complex would be the same regardless of whether it results in a shorter or a longer closure period. Thus the indirect biological/ecological effects of a shorter versus a longer closure on the species/species complex experiencing the AM are not expected to be different. The biological/ecological environment of a species/species complex to which an AM is applied would in general benefit positively from the AM by constraining landings to the ACL and preventing an overage in future years. The proportion of this expected benefit is equivalent across all the alternatives proposed in this action (**Alternatives 1, 2 (Preferred)**, **3**, **4** (**Sub-Alternatives 4a-4j**), and **5 (Sub-Alternatives 5a-5n)**. Any indirect effects on the biological and ecological environment would depend then on how much the proposed alternative results in an increase or decrease in the quantity and time spent in fishing activities (fishing effort).

Indirect effects on the biological/ecological environment expected from **Alternative 1** are those indirect effects evaluated in the 2010 and 2011 Caribbean ACL Amendments (CFMC 2012 a, b), which established AMs for Caribbean Council-managed species. Those are incorporated herein by reference and summarized as follows. In the 2010 Caribbean ACL Amendment, the implementation of AMs was expected to result in positive indirect biological and ecological effects by reducing fishing effort on species that were at the time undergoing overfishing. The general effects anticipated as a result were a more natural size distribution of individuals and an increase in the abundance of individuals in the population. However, the rate and extent of those changes could not be determined at that time. An additional positive indirect effect expected from a shortened fishing season due to AMs for all Council-managed species was a reduction in the incidental catch of other co-occurring species. Another expected indirect effect, although negative, was the potential increase in regulatory discards resulting from bycatch of species caught during the closure while fishers continue harvest of legally available species.

Both **Preferred Alternative 2** and **Alternative 3** are also not expected to have any direct biological/ecological effects because none would directly modify current fishing activities. **Preferred Alternative 2** and **Alternative 3** should have the same indirect effects on the biological and ecological environment discussed above for **Alternative 1** from the shortening of the fishing season from AMs.

Alternative 4 would establish different closure dates for FMUs on each of the island management areas (**Sub-Alternatives 4a -4j**). Direct effects on the biological/ecological environment are not expected, and indirect effects would be similar to those baseline indirect effects expected under **Alternatives 1-3**. As discussed at the beginning of this section, there is not expected to be any difference between the biological/ecological effects expected from a shorter closure (**Sub-Alternatives 4a**, **4c**, **4e**, **4g**, and **4i**, highest landings) versus a longer closure (**Sub-Alternatives 4b, 4d, 4f, 4h,** and **4j**, lowest landings) on the species/species complex experiencing the AM, because the reduction in landings for the affected species/species complex is the same. The rate of bycatch expected from a longer vs a shorter closure is also expected to be similarly affected.

As discussed in Section 2.2.1, under any of **Alternatives 1** through **5** (including all sub-alternatives), depending on the length of the closure needed for the AM and on the FMU to which the AM would be applied, if an AM closure for a species/species complex needs to extend through the seasonal closure months of a species or if the AM-based closure ends or starts close to the species seasonal closure start/end date (such as in **Alternative 5**, which specifically proposes AM-based closure start or end dates that would be immediately adjacent to an existing seasonal closure), this may result in a prolonged closure for the affected species/species complex. Potentially minor beneficial biological effects could be realized by potential spawners because they would be left undisturbed for a longer period of time, if an AM-based closure is in

place. Also, any reproductive activity that extends beyond the date of the species' seasonal closure in federal waters could be protected if there is an adjacent AM closure. Transient aggregation-forming species, including many snappers and groupers, aggregate to spawn according to a suite of temporal cues such as seasonal, lunar, and diel cycles (Heyman et al. 2013). Nemeth et al (2007) found that the timing of migration and arrival of red hinds to spawning aggregation sites in the USVI was synchronized with lunar and solar cycles and with seasonal declines in seawater temperature and current speed. Throughout most of its range, red hind typically spawn the week around the full moons of January and February (Beets and Friedlander 1992, Colin et al. 1987, Cushion et al. 2008, Sadovy et al. 1994, Shapiro et al. 1993b, and Whiteman et al. 2005 in Rowell et al. 2010). Nemeth et al. (2007) discuss that, in the USVI, red hind spawning aggregations occur between the winter solstice (i.e., after December 20) and about February 20 of any year and show a distinctive peak 20–40 days after the winter solstice. Aggregations disperse days after the January or February full moon, but they can persist for several days after the full moon (Nemeth et al. 2007). The extended duration of aggregations has also been described for red hind aggregations on the west coast of Puerto Rico (Schärer-Umpierre, M., letter to the Caribbean Fishery Management Council, February 24, 2016). Thus, for red hind in both Puerto Rico and the USVI, if the timing of the full moon in February occurs near the end of the month, the aggregation may extend past the end date of the species' seasonal closure (last day of February, where applicable). As a result, aggregating red hinds in those areas could benefit from the additional protection from fishing mortality that an adjacent AM closure period would provide. Positive minor effects from the protection from fishing mortality could similarly be obtained under any of the sub-alternatives in **Alternative 5** for other species with seasonal closures in Puerto Rico, St. Thomas/St. John, and St. Croix.

In summary, the difference between all the alternatives proposed is the length of an AM closure for a particular species/species complex. As outlined above, there is no significant difference between the biological/ecological effects expected from a shorter versus a longer closure on the species/species complex experiencing the AM because the reduction in landings for the affected species/species complex is the same. Thus, the effects of all alternatives are expected to be substantially the same. With respect to bycatch, the 2012-2014 average landings for Puerto Rico, St, Croix, and St. Thomas/St. John varies between 23% and 40% annually, as discussed in Section 4.1.3, indicating minimal variation in catch patterns among the various alternatives. For AM-based closures in general, a shortened fishing season of a particular species due to AMs would reduce bycatch of co-occurring species, although regulatory discards could increase. This is not expected to change regardless of the alternative chosen. **Alternative 5** may provide a slight additional beneficial effect by extending protection from fishing activities to the period immediately before or after the established spawning closure, as discussed above. This may also occur under **Alternatives 1** through **4** for specific FMUs, as discussed in the paragraph above. However, how much of the spawning activity occurs outside of the established seasonal closure is unknown and variable. Spawning activity is species-specific and depends on many factors such as lunar cycles, density dependence, predation, and others. Therefore, an AM closure that

occurs before or after a seasonal closure may or may not provide extended protection to spawners, thus any potential effects will be very species- and time-specific.

4.1.3 Direct and Indirect Effects on the Economic Environment

Current regulations stipulate that when an ACL overage is determined to have occurred, an AM-based closure is implemented the year following that determination. The extent to which fishing seasons are shortened to account for any overages equals the number of days necessary to constrain landings to the ACL. Accountability measure-based closures are currently designed to end on December 31st of the closure year and extend backward into the year for the number of days necessary to ensure the ACL is not again exceeded. In calculating the length of the closure, NMFS assumes future fishing effort will resemble the most recent years of fishing effort, on a monthly basis, and shortening the fishing season will decrease fishing effort and, therefore, landings. The actual closure length will vary depending on estimated rate of monthly landings and the overage amount. Because there are potential economic drawbacks to a closure during December for some areas (see below), the Council has developed alternative AM closure dates for consideration.

Proposed **Alternatives 2-5** would not affect the quantity of harvest being reduced. **Alternatives 2-5** would only affect the timing of the closure. The harvest reduction (equal to the overage) would be expected to occur regardless of when the closure occurs. The expected economic effects for **Alternatives 2-5** will vary depending on the actual closure start date, the closure length, and the ex-vessel prices associated with the pounds that would have been landed had the closure instead occurred from December 31st going backward (**Alternative 1**). Theoretically, ex-vessel prices increase during periods of high demand and decrease during periods of low demand. Table 1.4.1 shows the high market demand times for seafood for each of the three island management areas over the course of a calendar year. Lent, and Holy Week in particular, is a high demand period for all three island management areas and the timing varies among years. In the USVI, both Christmas and tourist season (January-May) are high demand periods. These are referred to as "high demand" periods because they have been identified by fishermen as such. The data needed to quantitatively determine when demand is highest/lowest is not available.

<u>Method of Analysis</u>: An analysis to estimate the direct short-term economic effects of **Alternatives 2-5** compared to **Alternative 1** (No Action) would typically involve estimating the ex-vessel revenue that has historically accrued during a closure using an end date of September 30th going backward toward the beginning of the year (**Preferred Alternative 2**), January 1st going forward toward the end of the year (**Alternative 3**), various start dates depending on the FMU (**Alternative 4, sub-alternatives**), and various start dates depending on seasonal closures already in place for several FMUs (**Alternative 5, sub-alternatives**) compared to the economic

effects of a closure using a start date of December 31st going backward toward the beginning of the year (**Alternative 1**). However, because the amount of future overages and the FMU that would be closed are unknown, this analysis focuses instead on expected future variability in monthly landings and expected ex-vessel prices across a typical year to give an indication of how **Alternatives 2-5** compare to **Alternative 1**. If the ex-vessel prices are invariant across the months of a typical year, there would be no expected difference in short-term economic effects under the various alternatives. The following graphs (Figures 4.1.3.1 - 4.1.3.5) show the variation in average monthly landings and ex-vessel revenue (nominal dollars) for each island management area in order to enable a discussion of periods of high landings and ex-vessel price variability.

Historical landings and nominal ex-vessel revenue variability by island management area: Figure 4.1.3.1 shows average monthly landings and average monthly ex-vessel revenue (nominal dollars) for all species for Puerto Rico 2012-2014.

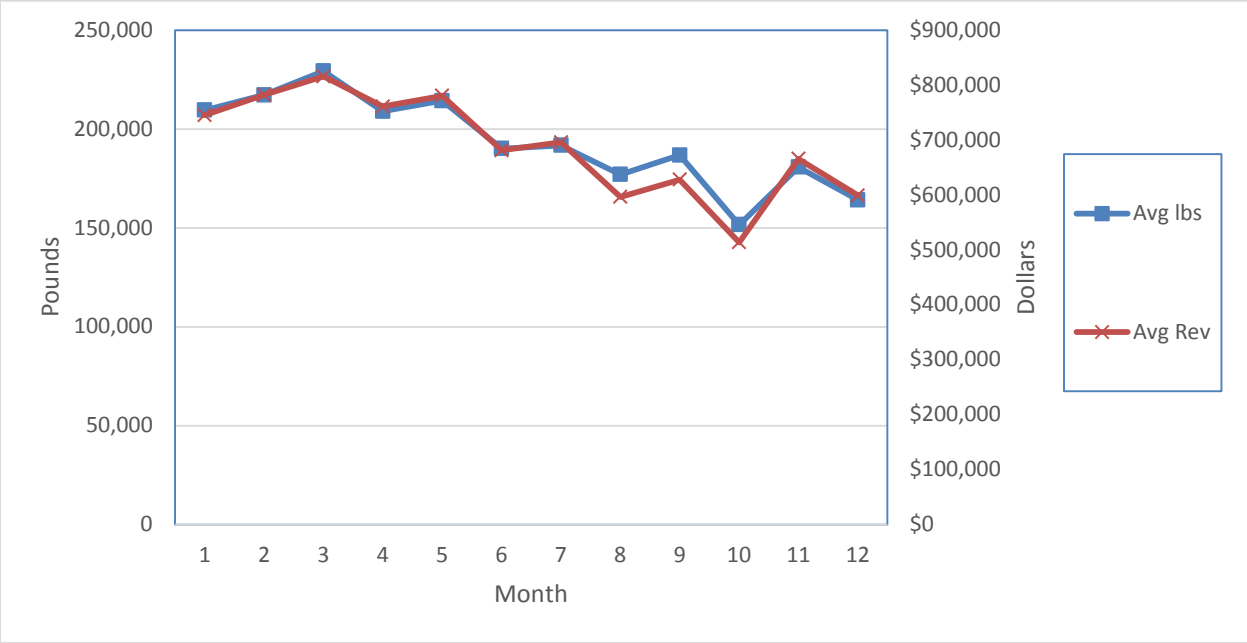

Figure 4.1.3.1. Puerto Rico average monthly landings and average monthly ex-vessel revenue (nominal dollars) all species, 2012-2014. (Source: SERO, Feb 2016)

The data indicate some variations in aggregate landings and nominal ex-vessel revenue from month to month. In Puerto Rico, aggregate historical landings and revenue are highest during the first five months of the year with fluctuations of about 60,000 pounds (32% of total average monthly landings) between the highest and lowest landings months. Nominal ex-vessel revenues fluctuate $302,000 (44% of average monthly ex-vessel revenue) between the highest and lowest landings months of the year. The higher landings during the first five months of the year are

likely due to increased sales during Lent and Holy Week. Lower landings during December could be influenced by substitution of pork for fish. In Puerto Rico, unlike the USVI, pork is often the preferred protein served during the holiday period of Christmas through "Three Kings Day" or "Feast of the Epiphany" which occurs January 6th. Average monthly ex-vessel prices vary little, between $3.42 in July and August to $3.74 in November, or about 9% of average monthly ex-vessel prices (see Table 3.4.1.6).

Because there is a relatively large amount of landings in Puerto Rico compared to the USVI, select species were separated out for greater detail. Figure 4.1.3.2 and Figure 4.1.3.3 show average monthly landings and average monthly ex-vessel revenue of all species for Puerto Rico from 2012-2014. The three species/species complexes with the greatest amount of landings are separated out into their own category and the remaining species are grouped together under "Others." Figure 4.1.3.2 shows a significant decline in landings of snappers from October to December. Landings for the other species/groups over the course of the year, with the exception of queen conch, are relatively stable. For queen conch, harvest is prohibited in federal waters, but allowed in state waters from August through October. The decline in snapper landings from October to December is likely due to closures for particular snapper species from October 1 – December 31 of each year (i.e, snappers in Snapper Unit 1). Figure 4.1.3.3 shows similar fluctuations.

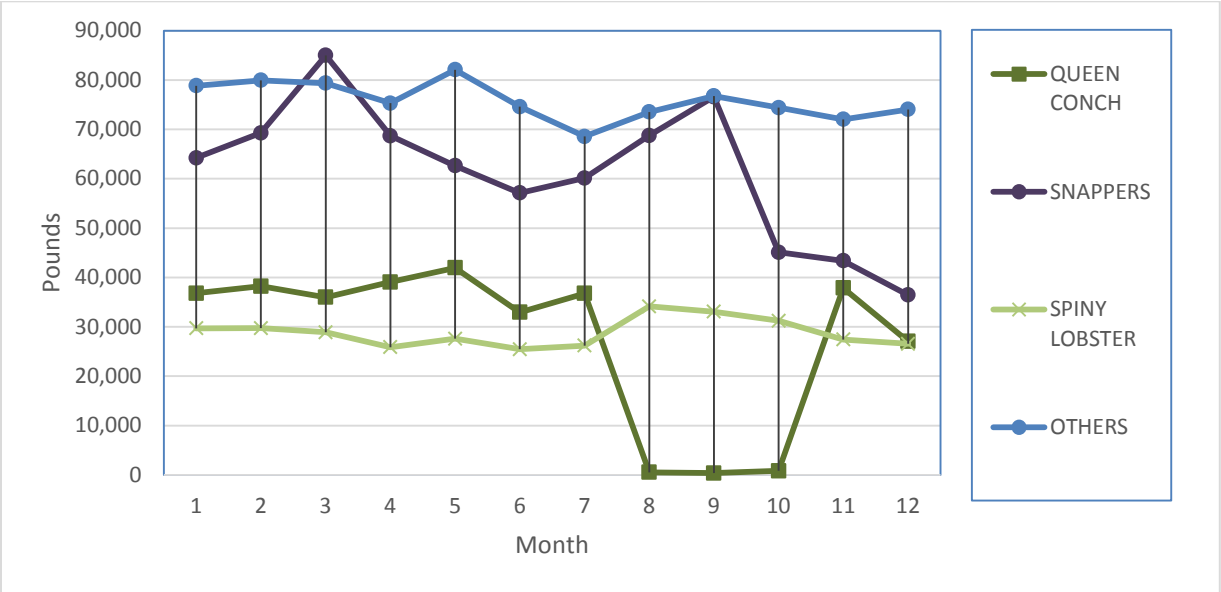

Figure 4.1.3.2. Puerto Rico average monthly landings for species complexes with highest landings, 2012-2014. (Source: SERO, Feb 2016)

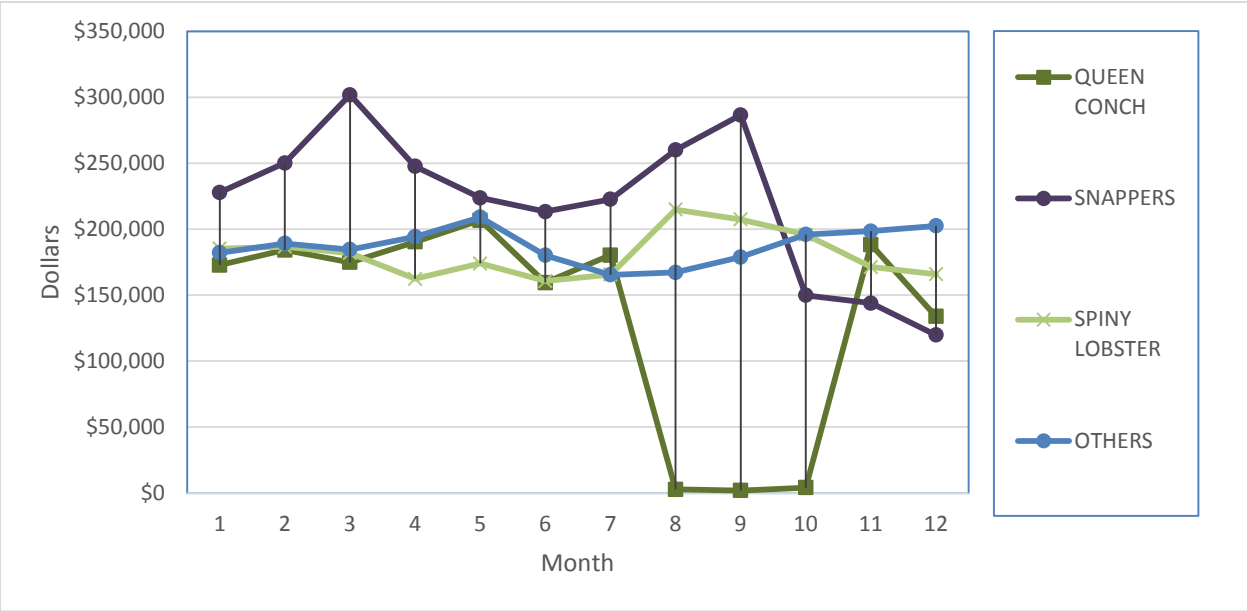

Figure 4.1.3.3. Puerto Rico average monthly ex-vessel revenue (nominal dollars) for species complexes with highest landings, 2012-2014. (Source: SERO, Feb 2016)

Figures 4.1.3.4 and 4.1.3.5 show average monthly landings and revenue of all species for St. Thomas/St. John and St. Croix, respectively. St. Thomas/St. John landings vary by about 7,400 pounds (23% of average monthly landings) and about $2,900 in ex-vessel revenues (almost 2% of average monthly ex-vessel revenues). St. Croix landings vary by about 15,000 pounds (40% of average monthly landings) and $7,334 in ex-vessel revenues (3% of average monthly ex-vessel revenues). The figures both indicate significant variation in landings and much smaller variation in ex-vessel revenue from month to month. In St. Thomas/St. John, landings decrease in November and December while revenues rebound during that time indicating high demand. During the summer months, landings remain relatively stable (other than a decrease in June) but ex-vessel revenue declines, indicating low demand during the summer months. In St. Croix, landings and revenues decline during the summer months and only partially recover in November and December during the holidays. The deviations between landings and ex-vessel revenue indicate variation in ex-vessel prices. Overall, average monthly prices on St. Thomas/St. John vary by $0.08 (1.5% of average monthly price) and $0.16 (2.8% of average monthly price) on St. Croix. While price fluctuations occur among different fishermen (Kojis 2014), fish prices are largely stable throughout the year (fluctuations are considered relatively small), though are slightly lower in July through November on St. Thomas. The Kojis study surmises that sale prices were discounted during July to November due to a tourism low season, residents leaving the island for vacation elsewhere, and residents saving their money in July and August to pay for school expenses.

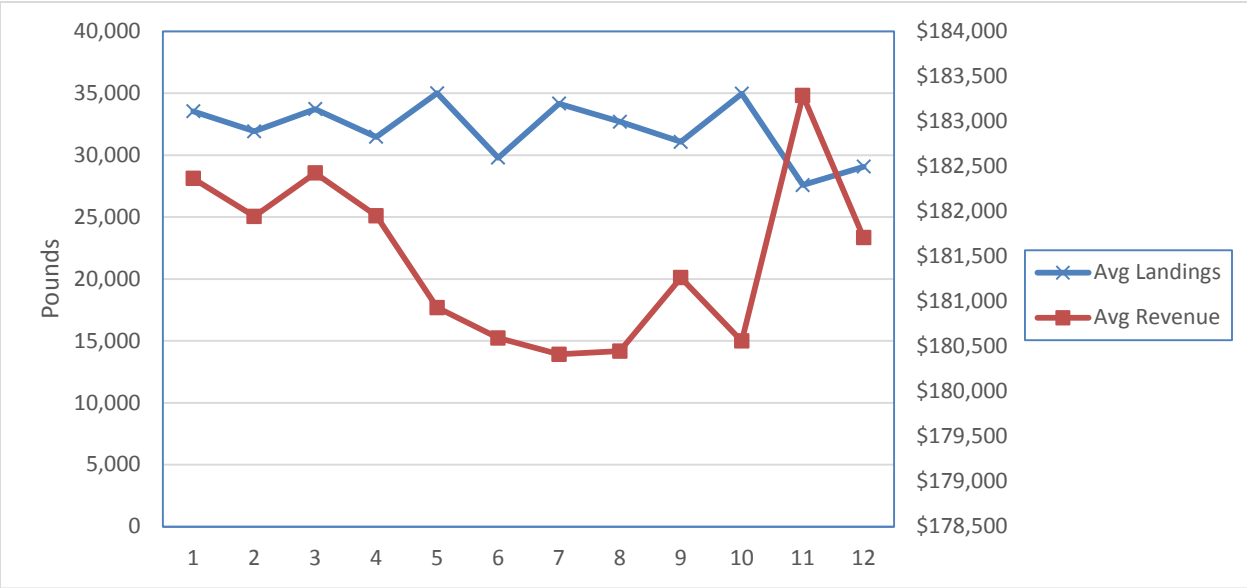

Figure 4.1.3.4. St. Thomas/St. John average monthly landings and nominal ex-vessel revenue (nominal dollars), 2012-2014**.** (Source: SERO, Feb 2016)

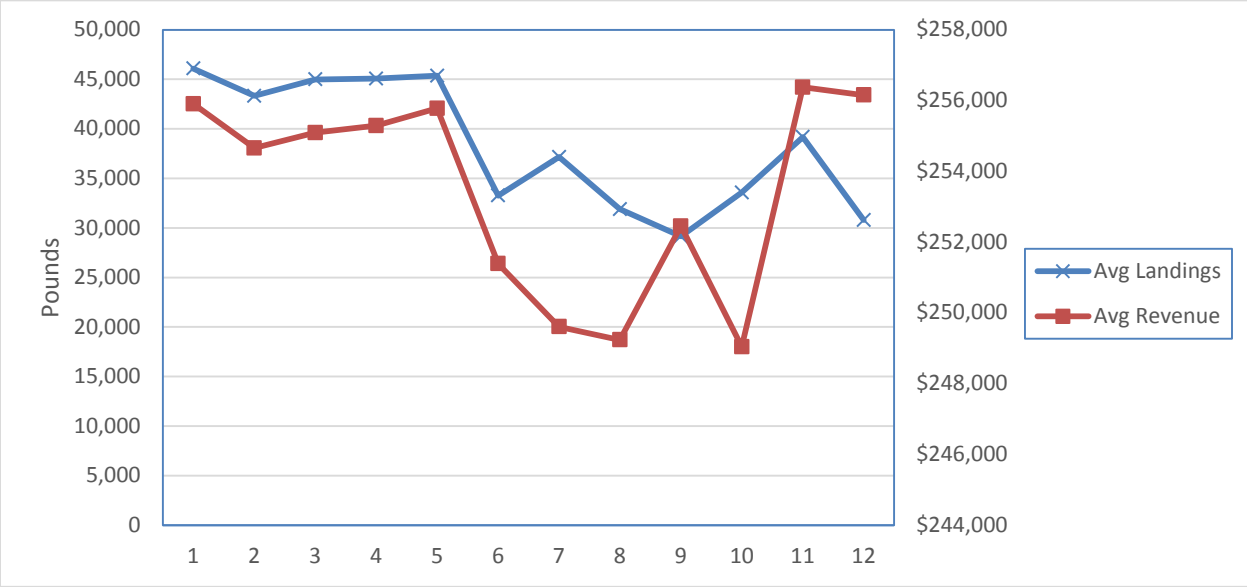

Figure 4.1.3.5. St. Croix average monthly landings and nominal ex-vessel revenue (nominal dollars), 2012-2014**.** (Source: SERO, Feb 2016)

In general, closures occurring during high demand times are more likely to have a greater negative economic effect than closures occurring during low demand times due to potentially higher ex-vessel revenue prices offered during high demand periods and the risk associated with losing seafood markets during high demand periods. Theoretically, closures during historically

high landings periods are also expected to be shorter than closures during historically low landings periods because of the higher daily harvest rates during high landings periods. As discussed above, the poundage removed from the fishery under an AM-based closure is expected to be the same regardless of when the start date occurs under each of the **Alternatives 2-5**. There may also be differences among the alternatives with regard to the potential for species substitution. Closures during a certain time of the year may result in greater fishing effort on another FMU than might otherwise occur under the **Alternative 1**. Unfortunately, at this time, there is not enough information known about the behavioral reactions of fishermen to closures during different times of the year with regard to species substitution. Another economic effect that could occur is an increase in the cost of labor if fishing patterns are forced to change as a result of AM-based closures. That is, currently, it is assumed that fishermen fish the various FMUs when it is most cost effective to do so. Imposing a closure at a different time than under the No Action alternative could result in an increase in labor costs as fishermen move from one fishery to another (one that has a lower catch rate for the time spent fishing and therefore more costly). Ultimately, future estimated economic effects in this analysis will vary depending on: 1) the variations in ex-vessel price associated with historical landings during the closure under consideration compared to the December 31st start date moving backward and, 2) the risk associated with losing seafood markets due to closures during single, alternating, or consecutive years (although this is less likely) for the same FMU. Other factors that would likely influence the economic effects of the action proposed here include the changes in cost associated with fishing, species substitution, and opportunities for alternative employment if fishermen can't go fishing.

<u>Economic effects of alternatives:</u> In the following discussion, the initial paragraphs will describe how all the proposed alternatives will structurally operate, followed by descriptions of the expected economic effects of each alternative. Under **Alternative 1** (No Action), an AM closure will always result in a closure going backward from December 31st toward the beginning of the year. The length of the closure varies depending on the historic monthly rate of harvest and amount of the overage for the FMU experiencing the AM. A closure ending in December 31st and going backward toward the beginning of the year results in direct economic effects that are likely negative, as noted by fishermen. Commercial fishermen from St. Thomas/St. John and St. Croix have reported/stated that the month of December is an important time for fish sales due to the Christmas holiday demand for seafood on those islands. Similar sentiments regarding the potential for closures in December have not been voiced by Puerto Rico fishermen because pork is the traditional and preferred protein for the Christmas holiday. However, in the USVI, loss or interruptions of seafood supply to the markets during the month of December from AM-based closures may result in direct negative *short-term* economic effects to fishermen and local communities in the form of lost ex-vessel revenues. Interruptions in seafood supply are harmful to Puerto Rico as well. Direct negative *long-term* economic effects are also possible if market supply is consistently interrupted year after year and consumers substitute with other protein sources, purchase imported fish, or purchase fish from sources outside the region. However, the

closures should not be persistent since, if a closure is effective, then there would be no closure the year following. But, even inconsistent closures could result in market loss due to species substitution or purchase of imports.

Preferred Alternative 2 proposes an AM closure end date of September 30th extending backward toward the beginning of the year. The September 30th closure end date would be used *for any FMU* with an ACL overage, except for those species/species complexes with spawning seasonal closures, if selected by the Council in **Alternative 5**. **Alternative 3** specifies an AM closure start date of January 1st moving forward toward the end of the year. Similar to **Preferred Alternative 2**, **Alternative 3** would also be used *for any FMU* with an ACL overage, except for species with seasonal closures if selected by the Council in **Alternative 5**. Unlike **Alternatives 2** and **3**, **Alternative 4, Sub-Alternatives 4a-4j** propose a *different closure end date for each FMU or for a combination of FMUs.* The implementation date under **Sub-Alternatives 4a, 4c, 4e, 4g,** and **4i** would be calculated based on the reported highest landings month on average over the past three years. A closure during a period of high landings would yield a shorter closure but that closure could occur at a time during the year when demand for that particular species/species group is higher or when supply is more plentiful. The implementation date under **Sub-Alternatives 4b, 4d, 4f, 4h,** and **4j** would be calculated based on the reported lowest landings month on average over the past three years. A closure during a period of lower landings would result in a longer closure but that closure could occur at a time when demand is lower than other times during the year.

Under **Preferred Alternative 2** and **Sub-Alternatives 4a-4j**, AM closures would move backward toward the beginning of the year. If, for any FMU in any year, the number of days left in the year going backward toward the beginning of the year (under **Preferred Alternative 2** and **Sub-Alternatives 4a-4j**) is not enough to achieve the required reduction in landings, then those additional days would be captured in the opposite direction. Table 2.2.1.1 shows what would be the closure lengths under each of the alternatives using the FMUs from different island management areas that had AMs applied in the past or that will have AMs applied in the 2016 fishing year.

Under **Alternative 5**, for FMUs that include species with seasonal closures in Caribbean federal waters (Table 2.2.6), AM-based closures resulting from an ACL overage for these FMUs would be timed to be continuous with the seasonal closure. The AM-based closure will extend either forward or backward from the seasonal closure into the year as specified in **Sub-Alternatives 5a** through **5n** for the number of days necessary to achieve the required reduction in landings. If, for any of these FMUs, in any year, the number of available days running from the date specified by the sub-alternative, is not enough to achieve the required reduction in landings, then the additional days needed would be captured by extending the closure in the opposite direction and continuing for the number of days needed to fulfill the required reduction. **Alternative 5** and its sub-alternatives create the unusual situation whereby a spawning closure that includes a handful

of species, would then transform, within 24 hours, into an AM based closure that includes all of the species within a complex (See the discussion of the alternatives in Section 2.1).

Assuming the 2012-2014 landings and ex-vessel revenue data, shown in the five graphs above, are representative of typical fluctuations across the fishing year, in general, **Preferred Alternative 2** (September 30th end date going backward toward the beginning of the year) would be expected to result in a longer closure than **Alternative 3** (January 1st start date going toward the end of the year) because June to September are typically lower landing months than January to May. For all of the FMUs in Puerto Rico, in general, **Alternative 1** (December 31st end date going backward) would likely result in a longer closure period than **Alternative 3** (January 1 start date going forward) but an equally long or longer closure period than **Preferred Alternative 2** (September 30th going backward). However, a longer closure period does not necessarily indicate greater negative short-term economic effects because the reduction in landings will be the same as a shorter closure. Major fluctuations in ex-vessel prices across months, however, could result in differences in short-term economic effects between the alternatives but, as Figure 4.1.3.1 shows, landings and ex-vessel revenues follow quite closely to each other, implying relatively small overall differences in prices across the year. Relatively small changes in prices indicate potentially small short-term economic gains or losses of each of the **Alternatives 2-5** compared to **Alternative 1**.

In Puerto Rico, while the short-term economic effects of the proposed alternative would likely be relatively small, negative long-term economic effects are possible and could be the result of lost markets due to supply shortages. If closures occur for several consecutive years for desired species during Lent (and during Holy Week, in particular), noting the comment above that, in general, AM-based closures should not be persistent, consumers may substitute imported or non-local seafood for local seafood and regional long-term negative economic effects would ensue. A closure during March and/or April would likely have the greatest risk of short-term and long-term (if repeated in consecutive or multiple years for desired species) negative economic effects to the Puerto Rico seafood market. A closure that continues through or includes March and/or April could occur under any of the proposed alternatives but is most likely to occur under **Alternative 3** (January 1 start date going forward), depending on the length of the closure, or **Alternative 4** (in any of the sub-alternatives) for select FMUs (if the closure includes the months of March and/or April) and least likely to occur under **Alternative 1** (December 31st closure going backward).

With regard to **Alternative 4**, in general, closures during high demand periods, regardless of which sector and/or island is examined, would be expected to result in a shorter closure than if applied to the period of low landings. Sub-alternatives that propose closures during high demand periods include sub-alternatives 4a, 4c, 4e, 4g, and 4i while sub-alternatives that propose closures during low demand periods include **Sub-alternatives 4b**, **4d**, **4f**, **4h**, and **4j**. The sub-alternatives that propose closures for the commercial sector in Puerto Rico and the combined

commercial and recreational sectors on the other islands during high demand periods (**4a**, **4e**, **4g**, **4i**) could result in higher expected revenue losses (due to higher expected prices during high demand periods) and potential market losses for the commercial sector because the closure would occur during high demand periods when customers may switch to purchasing imports than the sub-alternatives proposing closures during low demand times (**4b, 4f, 4h,** and **4j**). The lack of commercial cost and earnings data make it impossible to quantify compare the effects of one sub-alternative over another.

Sub-alternatives 4c and **4d** are specific to the Puerto Rico recreational fishery. The lack of for-hire vessel cost and earnings data, and recreational angler demand data make it impossible to quantify and compare the effects of one sub-alternative over another.

The following paragraphs break out economic effects by specific sub-alternative. It is unknown whether **Sub-Alternative 4a** for the Puerto Rico commercial sector would provide an overall positive or negative economic effect compared to **Alternative 1** (No Action). This determination depends on when the closure would occur, for the particular FMU. The closure could occur at the same time as the closure under **Alternative 1** (No Action) or at another time. Table 2.2.1 shows the implementation date of a Puerto Rico commercial closure for **Sub-Alternatives 4a** (closures when landings are higher) and **4b** (closure when landings are lower) based on historical data. While a closure may be shorter under **Sub-Alternative 4a,** it would also have potentially negative economic effects (in terms of lost revenue) because of the expected higher prices that can occur during high demand periods. Under **Sub-Alternative 4b**, the closure will likely be longer but could have potentially less negative economic effects because of expected lower prices during low demand periods. While these tradeoffs exist, we cannot know which one provides larger economic benefits without identifying a specific FMU and the amount of the overage. In addition, if a closure occurs during a high demand period, as defined by fishermen, this indicates likely negative economic effects due to the risk of market loss. However, whether the loss in revenue is greater than or less than a closure starting December 31 (**Alternative 1**) is unknown without being able to make quantitative comparisons which would require cost and earning data that are not available.

Similarly, it is unknown whether **Sub-Alternative 4c** (closure when landings are higher) for the Puerto Rico recreational sector would provide a positive or negative economic effect in aggregate compared to **Alternative 1** (No Action) for the reasons stated in the previous paragraph. Likewise, it is unknown whether **Sub-Alternative 4d** (closures when landings are lower) would provide a positive or negative economic effect in aggregate compared to **Alternative 1** (No Action). The outcome depends on the particular FMU experiencing the AM. Table 2.2.2 shows the implementation date of a Puerto Rico recreational closure for **Sub-Alternatives 4c** and **4d** based on historical data. In general, it is expected that **Sub-Alternative 4c** would provide a shorter closure than a closure that would occur under **Sub-Alternative 4d** due to the higher historical landings used to determine an implementation date under **Sub-**

Alternative 4c. There is no recreational angler demand information and there is also no cost and earnings data for the recreational for-hire sector. Therefore, it is not possible to do a quantitative analysis that would show more specific economic effects for the recreational fishery under each of these sub-alternatives.

Under **Alternative 4**, **Sub-Alternatives 4e** (closure when landings are higher) and **4f** (closure when landings are lower) propose methodologies for determining closure implementation dates for St. Thomas/St. John. Similar to the above discussion for Puerto Rico, it is not known whether **Sub-Alternative 4e** or **4f** would result in a positive or negative economic effect compared to **Alternative 1** (No Action) because it depends on the specific FMU and due to the lack of economic cost and earnings data.

Under **Alternative 4**, **Sub-Alternatives 4g** and **4h** propose methodologies for determining closure implementation dates for St. Croix. Similar to the above discussion for Puerto Rico, it is not known whether **Sub-Alternative 4g** or **4h** would result in a positive or negative economic effect compared to **Alternative 1** (No Action). **Alternative 4**, **Sub-Alternatives 4i** and **4j** propose methodologies for determining closure implementation dates for two Caribbean-wide species groups. Again, it is not possible to determine whether **Sub-Alternatives 4i** and **4j** will have a positive or negative economic effect compared to **Alternative 1** (No Action) due to the lack of cost and earnings data necessary to make that determination.

Where applicable, **Alternative 5** theoretically provides an economic benefit to fishermen by eliminating the need to switch, more than once, from one fishery to another in the event that an AM needs to be implemented for a species that also has a seasonal closure. **Alternative 5** could reduce the economic cost associated with switching gear and making other modifications to the boat, crew, fishing schedule, and adjustments (if any) in marketing of fish because fishermen would not have to switch fisheries more than once compared to the possibility of switching fisheries more than once under the other alternatives. However, if fishermen currently are able to fish following a spawning season closure, this is possibly resulting in harvest efficiencies. Interruption of that occurrence would result in short-term negative economic effects. Other negative economic effects may occur if an AM based closure occurs during a high demand period, as defined by fishermen. In this case, there is still the risk of losing revenue, in the short-term, and markets, in the long-term. Loss of markets would occur if there was a consistent occurrence of closures during high demand periods in multiple consecutive years. However, this is unlikely as long as AMs work as intended and correct for an overage, thus eliminating triggering an overage in the following year. Under **Alternative 5**, **Sub-Alternatives 5a-5n** identify specific dates for a closure to begin for FMUs that include species with spawning seasonal closures. Therefore, these can be compared to closure start dates under **Alternatives 1-3** and potential closure start dates under sub-alternatives in **Alternative 4**.

For Puerto Rico, **Alternative 5, Sub-Alternatives 5a and 5c** propose an AM date for grouper starting on May 1st and moving forward toward the end of the year. May 1st is the beginning of the summer season, which has been identified by fishermen as a higher demand season in Puerto Rico. Despite this, it is likely a more economically beneficial closure start date when compared to **Alternative 3** (January 1 going forward) and compared to any of the sub-alternatives in **Alternative 4** that might result in a closure during Lent or Holy Week in Puerto Rico. However, **Alternative 5, Sub-Alternatives 5a** and **5c** are not more beneficial than the closures proposed in **Alternatives 1** or **2**. **Alternative 5, Sub-Alternatives 5b** and **5d** propose a November 30th end date going backward for groupers. This end date may or may not be more beneficial than **Alternative 1** (December 31 going backward) given its close proximity to the Lent holiday. While landings can sometimes increase right before or after a seasonal closure, the economic effects are going to likely be dominated by the high market demand periods, as identified by fishermen. It is believed that ultimately, the market will dictate landings.

The Puerto Rico snapper closure start dates of July 1st going forward under **Sub-Alternatives 5g and 5i** and September 30th going backward under **Sub-Alternatives 5h and 5j** focus the closures on the summer months which may be more beneficial than any closure that occurs during Lent and Holy Week which is more likely to occur under **Alternative 3** (January 1 going forward). However, **Alternatives 1 and 2** could be of more benefit in that they both reduce the likelihood that a closure would occur during Lent and the higher demand summer months.

Under **Sub-Alternatives 5e** and **5f** in **Alternative 5**, the grouper complex in either St. Thomas/St. John or St. Croix would have a May 1st start date going forward into the year. This date may be preferred to **Alternative 1,** which would occur during the high demand Christmas holiday in the USVI, **Alternative 3**, which would occur during the high tourism season in the USVI, and any of the sub-alternatives in **Alternative 4** that would implement a closure during Lent and Holy Week. However, **Preferred Alternative 2** (September 30th going backward) would likely be more beneficial than a May 1st start date (**Sub-Alternatives 5e** and **5f**) because early summer is considered tourism season in the USVI. Back to back closures of the grouper complex, in particular, could have negative economic effects if both the tourism and Lent seasons are affected by the closures. Negative economic effects could also occur if multiple high value species are closed within the same year at the same time.

Similar to the effect described above for groupers in the USVI, the snapper closure start date of July 1st going forward proposed under **Sub-Alternative 5k** and **5m** for St. Thomas/St. John and St. Croix, respectively, would likely be more beneficial than **Alternatives 1**, **3,** and sub-alternatives in **Alternative 4**, which implement a closure during Christmas, Lent, and Holy Week. **Sub-Alternatives 5l** and **5n** would have the same expected effects as **Preferred Alternative 2** since they both have a closure end date of September 30th going backward toward the beginning of the year. That is, they would be more beneficial than **Alternative 1** because the closure would not occur during a period of high demand, as identified by the fishermen.

Comparisons *between* island management areas are not logical because each island management area has independent AM closures. However, there are some general effects that make sense to acknowledge. In Puerto Rico, as stated previously, unlike the USVI, pork is often the preferred protein served during the holiday period of Christmas through "Three Kings Day" or "Feast of the Epiphany" which occurs January 6th. Therefore, there would be a less pronounced negative economic effect resulting from **Alternative 1** (No Action) in Puerto Rico compared to the effects in the USVI.

Although there would be short-term economic differences between **Alternatives 1-5**, these are expected to be small. Again, because the future overage amounts and the FMU to which AMs would be applied to are both unknown, no further meaningful quantitative analysis of short-term economic effects can be provided; any example of possible effects using a prior overage would be speculative, incapable of capturing the range of potential behavioral and market changes that may occur, and any overage would not be expected to be persistent if the AM-based closure is effective in eliminating any overage.

However, it is worthwhile to discuss potential long-term economic effects. For the USVI, in general, **Preferred Alternative 2** (September 30th end date going backward toward the beginning of the year) is expected to result in a longer closure than **Alternative 3** (January 1st start date going forward toward the end of the year) because June to September are lower landing months than January to May. January to May are higher landing months in the USVI because this is when the islands experience high demand periods such as peak tourism, Lent, and Carnival. Christmas is also an important high demand time for seafood in the USVI, particularly St. Croix (Kojis 2014). Therefore, **Alternative 1** (No Action), **Alternative 3,** and the sub-alternatives within **Alternative 4** and **Alternative 5** that include closures in January to April or December are expected to result in greater risk of long-term negative economic effects than **Preferred Alternative 2**. The negative long-term economic effects are expected in the form of increased risk of loss of seafood markets if consumers switch to purchasing seafood imports and/or substitution for more readily available sources of protein during Lent and Christmas.

<u>Summary</u>

In summary, there will likely be relatively small short-term differences in the economic effects between the alternatives as measured by differences in ex-vessel revenues. Because ex-vessel prices in Puerto Rico increase slightly in April (Lent) through July compared to other months, the short-term economic benefits are expected to be greatest under **Preferred Alternative 2** followed by **Alternative 1** (No Action), and those sub-alternatives of **Alternative 4** and **Alternative 5** that have closures that reduce the likelihood of restricting fishing in March and April, and lastly, **Alternative 3**. The sub-alternatives in **Alternative 5** may provide some benefit for fishermen over the other alternatives if there is a significant economic cost associated with switching from one fishery to another due to spawning season closures for species that also

experience an AM closure during the same year. However, this must be weighed against the risk of market loss depending on the time of the year that the closure occurs and any interruption in harvest efficiencies are currently occurring when fishermen are able to fish immediately before or after a spawning season closure under **Alternative 1**.

Because ex-vessel prices in the USVI increase slightly in the beginning of the year and November and December (Christmas market), compared to other months, short-term economic benefits are expected to result from any alternative that avoids Lent and November and December. Economic benefits are expected to result from **Preferred Alternative 2**, sub-alternatives of **Alternative 4** that propose closures that avoid closing fishing in November and December, sub-alternatives of **Alternative 5**, and **Alternative 3**.

There will likely be long-term economic benefits from **Preferred Alternative 2**, any of the sub-alternatives of **Alternative 4**, and sub-alternatives of **Alternative 5** that reduce the likelihood of a closure during tourism season (January to March), Lent (March and April), and Christmas (December) in the USVI, and Lent (March and April) in Puerto Rico. **Alternative 3** is expected to have a greater risk of long-term negative economic effects for the USVI (but not Puerto Rico) because it stipulates for a closure to begin in January, a peak tourism month in the USVI, and could extend to Lent (March and April). Long-term benefits would result from a decrease in the risk of losing a market as a result of consecutive closures during high market demand times.

4.1.4 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 4.1.3 (Economic Effects), alternatives predicting positive or negative economic effects are expected to have correlating positive or negative social effects.

Future AM-based closures of the Caribbean FMUs will not be the result of this proposed amendment, but will be a result of the 2010 and 2011 Caribbean ACL Amendments (CFMC 2011a, b), which established AMs. Therefore, the general or baseline effects of a closure will not be attributable to this proposed amendment. Instead, this proposed amendment is expected to lessen the potential adverse social effects of the status quo (**Alternative 1**) closures that would result from the application of the AMs.

General social effects are expected for any AM-based closure. The severity of the effects will likely be dependent on the length of the closure necessary to achieve the required reduction in landings, whether the closure overlaps with important market dates (based on economic, social, and cultural factors), whether the closure occurs during a time period of traditionally high landings or low landings, the cumulative effects of interacting with other closures for that FMU (such as a spawning closure), and whether multiple FMUs experience AM-based closures at the same time.

The need for and extent of future closures is unknown. However, examples of potential closure scenarios under each of the alternatives for FMUs which had AMs applied in 2013 and/or in 2016 in Puerto Rico, St. Croix, and St. Thomas/St. John (SU2 (commercial Puerto Rico), Wrasses (commercial and recreational Puerto Rico), Triggerfish and Filefish (commercial and recreational St. Croix), Spiny Lobster (commercial and recreational St. Croix), Parrotfish (commercial Puerto Rico), Jacks (recreational Puerto Rico), and Groupers (commercial and recreational St. Thomas/St. John)) are shown in Table 2.2.1.1 in Section 2.2.1. Included in the table are estimates of the number of days that were closed (under **Alternative 1**) or would have been closed had the closures occurred under the provisions of **Alternatives 2-5**.

Alternative 1 (No action) would retain the current timing for the implementation of AM-based closures in the U.S. Caribbean EEZ. AM-based closures resulting from an ACL overage for all FMUs would continue to end on December 31st of the closure year and would extend backward into the year for the number of days necessary to achieve the required reduction in landings. **Preferred Alternative 2** would establish September 30th as the closure end date for all FMUs (except for those FMUs that include species with spawning seasonal closures, if selected in **Alternative 5**) within each island management area and would extend backward into the year for the number of days necessary to prevent another overage. If the number of days available in the year is not enough to achieve the required landings reduction, then additional days would be closed in the opposite direction. **Alternative 3** would establish January 1st as the closure start date for all FMUs (except for those FMUs that include species with spawning seasonal closures, if selected in **Alternative 5**) within each island management area and would extend forward into the year for the number of days necessary to prevent another overage. **Alternative 4** would establish a fixed closure date for each FMU or group of FMUs by island management area. The closure would extend backward toward the beginning of the year and if the number of days left in the year is not enough to receive the required landings reduction, then additional days would be closed in the opposite direction. Under **Alternative 4**, a different start date could be selected for each FMU, or any combination of FMUs, on each island management area (Tables 2.2.1-2.2.5). **Sub-Alternatives 4a**, **4c**, **4e**, **4g**, and **4i** would establish a closure end date on the last day of the month that has the highest landings; whereas **Sub-Alternatives 4b**, **4d**, **4f**, **4h**, and **4j** would establish a closure end date on the last day of the month with the lowest landings. Finally, **Alternative 5** would establish an AM-based closure date that is continuous with the seasonal closure for FMUs that include species with seasonal closures in Caribbean federal waters (Table

2.2.6). The closure would extend either forward or backward from the seasonal closure as specified in **Sub-Alternatives 5a** through **5n** and if the number of days left in the year is not enough to achieve the required landings reduction, then additional days would be closed in the opposite direction.

Important market dates identified by the fishing communities: direct negative impacts could be experienced by fishermen if important market dates fall within the AM closure. As explained in section 4.1.3, examples of important market dates include high demand periods, such as Lent for all three islands/island groups and Christmas for the USVI, as well as other times such as the tourism season (see Table 1.4.1). If a particular fishery is closed during important market dates for that FMU, commercial fishermen could lose money from the inability to fish for and sell those species during these important times. If the dates are important for recreational fishermen, individual anglers targeting those species could lose access to fishing, and recreational guides could lose the ability to make money from fishing trips for that particular species during this time. This could negatively impact fishing communities associated with these fishermen and guides. Also, these dates identified by the fishing communities are important socially and culturally to individuals and communities in the U.S. Caribbean and the availability of fish to customers during this time is important. If particular species of fish are important during these times and these fish are not available because of an AM-based closure, then customers would be negatively impacted by the inability to harvest or consume these fish.

Any AM-based closure that would occur under the status quo (**Alternative 1**) would end on December 31st and extend backward. This would continue the problem of AM closures overlapping with the Christmas holiday season and tourism season in the USVI (Table 1.4.1). These dates have been identified as being important to fishermen and are dates of higher demand, at least for fishers in the USVI. However, these dates of higher demand don't necessarily correspond with times of high landings. Accountability measure-based closures implemented so far in the USVI have lasted from 12 to 41 days and have overlapped with much, if not all, of the Christmas holiday (Table 2.2.1.1). Fishermen and fishing communities in the USVI might be impacted the most negatively by maintaining the status quo closure start date of December 31st for AM-based closures because of the likelihood that the closure of any species would overlap with these identified important market dates of higher demand.

Important market dates are not as likely to fall within an AM closure for Puerto Rico FMUs in the status quo (**Alternative 1**) because the first important market period of higher demand when extending backward from December 31st has been identified as summer vacation. Summer vacation runs from approximately May 1st through July 31st (Table 1.4.1). In order to impact the summer season, an AM-based closure in Puerto Rico under **Alternative 1** would have to be longer than 153 days (December through August) and, based on historic harvest patterns (the nine Puerto Rican FMUs AM closures which have occurred (or will occur in fishing year 2016) so far range from 13 days to 102 days (Table 1.5.1 and Table 2.2.1.1)), it is unlikely, although

not impossible, that an AM closure would last that long. Thus, **Alternative 1** would likely continue to cause fewer negative impacts to Puerto Rican fishermen and fishing communities than in the USVI.

The negative effects of an AM closure would be expected to be reduced under **Preferred Alternative 2** compared to **Alternative 1** (No Action) because the **Preferred Alternative 2** closure start end of September 30th purposely avoids conflict with times of greater demand, cultural importance, and social importance. The proposed closure start date of September 30th was identified by the District Advisory Panels for Puerto Rico, St. Croix, and St. Thomas/St. John as the preferred start date for all FMUs. The September 30th date, and preceding days, were identified as a time of slow fishing and lower demand, particularly in the USVI (Table 1.4.1). Therefore, there is a higher likelihood that important market dates would not be included in an AM-based closure under **Preferred Alternative 2**. As shown in Table 2.2.1.1, had **Preferred Alternative 2** been previously in effect, only one FMU closure in 2013 and one FMU closure in 2016 would have overlapped with important market dates (e.g., summer vacation) (Puerto Rico Commercial SU2 and Puerto Rico Recreational Jacks, respectively). However, if AM closures for a particular unit extend past July 31st for Puerto Rico, April 30th for St. Thomas/St. John, and April 30th for St. Croix, additional important dates of higher demand or cultural importance (such as Lent) could be included in the closure (Table 1.4.1). Thus, if harvest overages are high enough, even though **Preferred Alternative 2** would eliminate the adverse social effects of a closure overlapping with the culturally and economically important Christmas season, the likelihood of affecting significant periods during summer and spring would increase. However, the endorsement of **Preferred Alternative 2** by the DAPs suggests that the benefits associated with open fisheries in December will exceed those that may be lost if overlap with these other important periods occurs.

Under **Alternative 3**, some identified important market days of higher demand are expected to overlap with a January 1st going forward start date and fishermen could be negatively impacted**.** Under **Alternative 3**, it is certain that an AM closure would overlap with several important times in the USVI. For example, in St. Thomas/St. John there is a higher demand for lobster and yellowtail snapper from January 1 through June 30 due to tourism. In St. Croix there is a higher demand for all species from January 1 through May 31 also due to tourism (Table 1.4.1). In Puerto Rico, the earliest identified example of higher demand begins March 1st (March 1- April 30) for Lent (Table 1.4.1), which would be affected if a closure lasts for more than 59 or 60 (in a leap year) days. Some species in particular, such as queen snapper, have been identified as having the highest demand and being very important during particular times such as during Lent in northern communities in Puerto Rico (this was mentioned during recent Puerto Rico coastline visits). If these species were not available because of an AM closure under **Alternative 3**, then customers might be negatively impacted by the inability to acquire these fish. If **Alternative 3** had been in effect in 2013 and 2016, SU2 commercial (2013), Wrasses recreational (2013), and

Triggerfish and Filefish commercial (2016) closures in Puerto Rico FMUs would have overlapped with Lent (Table 2.2.1.1).

Because **Sub-Alternatives 4a** through **4j** in **Alternative 4** would establish AM-based closures on harvest rates without consideration of important demand periods, AM closures under all alternatives could overlap these culturally or economically important periods. As an example of one FMU for which AM-based closures have occurred, Puerto Rico commercial SU2 would have been closed on June 30th under **Sub-Alternative 4a** (higher landings) and December 31st under **Sub-Alternative 4b** (lowest landings) had any of these alternatives been in effect in 2013 and 2016 (Table 2.2.1.1). In this example, Puerto Rico commercial SU2 would have been closed for 178 days (2013 closure) or alternatively for 23 days (2016 closure) under **Sub-Alternative 4a,** which would overlap with summer vacation for 61 days during the 2013 closure and 23 days during the 2016 closure and would overlap with all of Lent during the 2013 closure (Table 1.4.1). Whereas, Puerto Rico commercial SU2 would be closed for 102 days (2013 closure) or 36 days (2016 closure) under **Sub-Alternative 4b** (which would not overlap with any identified important demand period during either closure (Table 1.4.1)). Because the closure for Puerto Rico commercial SU2 under **Sub-Alternative 4b** begins on December 31st and extends back, the effects would be the same for the unit as under **Alternative 1** (No action). This is also the case for a numerous other FMUs with a closure date beginning on December 31st under **Sub-Alternatives 4a**, **4b**, **4d**, **4f**, and **4h** (Table 2.2.1-2.2.4); however how these FMUs overlap with important demand periods is not provided here.

Because **Alternative 5** would establish AM-based closures continuous with seasonal closures for those FMUs that include species with seasonal closures, but without consideration of important market days, AM closures could overlap with culturally or economically important periods. The May 1st going forward date under **Sub-Alternatives 5a**, **5c**, **5e**, and **5f** would overlap with the summer vacation in Puerto Rico (**Sub-Alternatives 5a** and **5c**) and the tourism season in St. Croix (**Sub-Alternative 5f**), but would not overlap with important market times in St. Thomas/St. John unless the closure was particularly long (extending into fall, **Sub-Alternative 5e**, Table 1.4.1). The only FMU included in **Alternative 5** and for which an AM-based closure has occurred is St. Thomas/St. John groupers. It would have been closed starting on May 1st and moving forward for 36 days under **Sub-Alternative 5e** had this alternative been in effect in 2013 (Table 2.2.1.1). The AM closure would not overlap with any important demand period for groupers in St. Thomas/St. John (Table 1.4.1). The November 30th going backward start date in **Sub-Alternatives 5b** and **5d** would not overlap with important market dates in Puerto Rico unless the closure was long (extending into summer, Table 1.4.1). The July 1st going forward start date in **Sub-Alternatives 5g**, **5i**, **5k**, and **5m** would overlap with the end of summer vacation in Puerto Rico (**Sub-Alternatives 5g** and **5i**), but would not overlap with important market dates in St. Thomas/St. John and St. Croix unless the closure was long (extending into fall, in **Sub-Alternatives 5k** and **5m**, Table 1.4.1). The September 30th going backward start date in **Sub-Alternatives 5h**, **5j**, **5l**, and **5n** is the same date identified by the DAPs to create

Preferred Alternative 2 and which is intended to avoid conflict with times of greater demand, cultural importance, and social importance. **Sub-Alternatives 5h**, **5j**, **5l**, and **5n** would not overlap with any identified important market times for Puerto Rico or the USVI unless the closure was long and extended into the summer (summer vacation in Puerto Rico and tourism season in the USVI) and spring (Lent in all areas, Table 1.4.1).

High landings: direct negative social impacts could be experienced by fishermen if the closure falls within a time period where landings for the particular species/species group are traditionally high. A period of high landings could correspond to a period of high demand or a period in which the species are more available or easily caught; and fishermen could be negatively impacted by the loss of income and associated social effects if access to those fish during these periods is reduced. The particular type of fish might be seasonally more abundant and commercial fishermen might not have to exert as much effort or use as many resources (such as fuel) to catch the same amount of fish as they would during a time where the species were less available. This could negatively impact the income earned by fishermen and result in negative social consequences. In addition, recreational fishermen could be negatively impacted in that they might not be able to encounter their preferred species at the same rate as they would during the closure period of traditionally high landings. This could result in reduced satisfaction with their fishing experience. Fishing guides could also be negatively impacted by an inability to retain fish during periods of high catch rates if forced to shift effort to periods of lower catch rate and they have to use more resources to search for these species to satisfy their customers. Conversely, it is likely that a closure occurring during periods of high landings would be shorter in duration than a closure occurring during a period with low landings, which could possibly result in fewer negative impacts. A shorter closure could benefit both commercial and recreational fishermen in that they would lose fewer days on the water fishing for the affected species.

Under **Alternative 1**, fishermen targeting those species in FMUs with the highest landings occurring in December when extending the closure backward would continue to experience these possible negative or positive impacts to the greatest extent. These impacts could continue to occur because of the greater likelihood that the closure will extend through the months with higher landings for that species/species group; however December appears to be a low landings month in general and only one FMU, the Puerto Rico commercial surgeonfish, has its highest month of landings in December (see Tables 2.2.1-2.2.5 for the month of highest landings by FMU). Only a few FMUs include periods of high landings in November or October and fishermen targeting these FMUs would be the most likely to experience effects in the status quo (**Alternative 1**).

Under **Preferred Alternative 2**, the September 30th going backward date has been identified as a slow fishing period by fishers, although based on recent landings (2012-2014), it does not appear to be a period of low landings, in general. However, a few FMUs include periods of high

landings in months close to or in September (Tables 2.2.1-2.2.5) and fishermen targeting species in these FMUs would be more likely to experience impacts resulting from a closure under **Preferred Alternative 2**.

Under **Alternative 3,** fishermen targeting FMUs with months of highest landings closest to January 1st and extending forward into the year could experience the greatest effects related to high landings, and several FMUs include periods of high landings during January and February (Tables 2.2.1-2.2.5). Because **Sub-Alternatives 4a, 4c**, **4e**, **4g**, and **4i** would establish a closure start date on the last day of the month that has the highest landings, fishermen would be expected to experience the most substantial social effects related to high landings under this alternative. Alternatively, because **Sub-Alternatives 4b**, **4d**, **4f**, **4h**, and **4j** would establish a closure start date on the last day of the month with the lowest landings, fishermen would be expected to experience the fewest social effects related to high landings.

Under **Sub-Alternatives 5a**, **5c**, **5e**, and **5e** (i.e., May 1st forward AM start date), no grouper FMUs have their highest month of landings in or near May and therefore it is unlikely that grouper fishermen would be impacted by effects related to high landings from a May 1st closure which extends forward (Tables 2.2.1-2.2.4). Under **Sub-Alternatives 5b** and **5d** (November 30th), fishermen engaged in Puerto Rico grouper fishing are unlikely to be impacted by the effects related to high landings because the closest months (to a November 30th and extending backward start date) of high landings are in January and February (Tables 2.2.1-2.2.2). Under **Sub-Alternatives 5g**, **5f**, **5k**, and **5m**, fishermen engaged in fishing for all snapper in St. Thomas/St. John and St. Croix with the highest landings in the months closest to July and extending forward could be impacted because the closure would begin on July 1st and St. Thomas/St. John and St. Croix snapper have their highest landings in July; however commercial and recreational SU3 fishermen in Puerto Rico would not be impacted unless the closure extended through May and June (Tables 2.2.1-2.2.4). For **Sub-Alternatives 5h**, **5j**, **5l**, and **5n**, the closest month of highest landings to a September 30th start date and extending backward by any affected FMU is in July (St. Croix snappers, Tables 2.2.1-2.2.4).

<u>Low landings</u>: a closure that occurs during a time of traditionally low landings could have fewer direct negative impacts on fishermen (than if the closure occurred during times of traditionally high landings). A period of lower landings could correspond to a period of lower demand; however a period of lower landings could also correspond to a period of higher demand, as is the case in the USVI during the month of December. A period of lower landings could also correspond to a period of time during which fishing effort is low for other reasons, such as during bad weather. An AM closure that occurs during a time of low landings for a particular species would last longer. A lengthy closure could negatively impact commercial fishermen that fish for that species to a greater degree during the closure time period because they would lose the ability to fish and earn income from the fishery for a greater amount of time. This extended period of income loss could result in social consequences, but fishermen could also switch to

other fisheries. A lengthy closure period could particularly negatively impact fishermen who depend on a portion of their catch for personal and family consumption; however this is only relevant if the fishermen are particularly dependent on keeping those species affected by an AM closure and lack the ability to substitute other species. Recreational guides that target a particular species might also be particularly negatively impacted by a lengthy AM closure for that species because of the longer duration of a loss of access to the species for their customers. Customers may be willing to pay for a trip as long as there is hope of catching and retaining a certain species, but if retention is not allowed (closure) fishing demand may decline. Private recreational anglers would also likely be negatively impacted by a lengthy closure because of the lengthier loss of access to that particular fishery.

Low landing periods occur under each alternative and whenever the start date falls into a low landing period for that particular species, effects related to low landings (such as a lengthy closure) could occur. Under **Alternative 1**, fishermen targeting those species in FMUs with the lowest landings occurring in the month or months closest to December 31st would continue to experience these negative or positive impacts to the greatest extent, including the possibility of a lengthy closure, and a large number of FMUs have their lowest landings during December, especially in St. Croix and St. Thomas/St. John (see Tables 2.2.1-2.2.5). Under **Preferred Alternative 2**, fishermen engaged in fishing for those FMUs with the lowest landings in the months closest to September and extending backward could be impacted by a lengthy closure and some FMUs, such as many Puerto Rican recreational FMUs that have their lowest landings in September (Tables 2.2.1-2.2.5). Under **Alternative 3**, establishing the January 1st closure start date and extending forward could impact fishermen engaged in fishing for those FMUs with the lowest landings reported in the months closest to January because an AM closure would be longer than if landings for those species were higher during that time; however only a few FMUs have their lowest landings during January or in the months following January (Tables 2.2.1-2.2.5). Because **Sub-Alternatives 4a, 4c**, **4e**, **4g**, and **4i** would establish a closure start date on the last day of the month that has the highest landings, it is unlikely that fishermen would be expected to experience the effects associated with lowest landings periods, such as a lengthy closure. The low landings effects would, however, be greater under **Sub-Alternatives 4b**, **4d**, **4f**, **4h**, and **4j** because they would establish a closure start date on the last day of the month with the lowest landings. The effects related to low landings under **Alternative 5**, such as lengthy closures, would apply if grouper or snapper FMUs experience times of low landings during the start of the closure established in each sub-alternative (see Tables 2.2.1-2.2.4). However, some fishers mentioned that they would prefer to have one lengthy closure as opposed to multiple interruptions to fishing during the year which could require adjustments to their planning, gear, crew, and marketing strategy.

<u>Seasonal closures:</u> FMUs with additional same species-specific closures which already occur during the time period of the AM-based closure could experience longer closures, such as if an AM-based closure overlaps with a spawning closure for that same species. In these cases, the

AM-based closure would extend past the species-specific closure, making that continuous closure lengthier. As previously stated, lengthening a closure would be expected to increase the negative social impacts to fishermen and their associated fishing communities because of greater loss of access to, income from, and food provided by the respective species. However, if an AM-based closure is designed to form a continuous closure by occurring immediately adjacent to a seasonal spawning closure, fishermen might find this arrangement beneficial because fishing would be interrupted once during the year rather than twice, which could cut down on the need to switch fishing gear, change crew, or change their fishing schedule. Although, because the species included in a seasonal closure are not always the same as those included in the AM-unit, fishing participants could be confused about what they are allowed to harvest and when. Examples of non-AM-based closures are provided in Table 1.4.2.

Unless the AM-based closure was particularly long (extending into the summer and spring months), **Preferred Alternative 2** would not overlap with the seasonal closures for nearly any species. Therefore, it is likely that the cumulative effects of a lengthier continuous closure resulting from overlapping with other same species or FMU closures would be avoided for the majority of the areas in the U.S. Caribbean under **Preferred Alternative 2**. The species with the earliest seasonal closure, when moving backward from September 30th, are mutton and lane snappers which are closed to fishing in federal waters off Puerto Rico and the USVI from April 1st through June 30th. If the number of days left in the year when going backward from September 30th is not enough to include the necessary number of days needed for the closure, then additional days would be captured by moving forward into the year and these days could overlap with some spawning seasonal closures and the negative cumulative social effects increased. Under **Preferred Alternative 2**, a back to back or lengthy closure could be created for these species if an AM-based closure were required for Snapper Unit 3 (includes mutton and lane snappers) and was extended for enough days to reach or come close to a seasonal closure. But this FMU has not experienced an AM-based closure and in this scenario under **Preferred Alternative 2**, the AM-based closure would need to last for over 92 days in order to run continuous to the seasonal closure (however this would not be true if **Alternative 5** is selected for this FMU). Under **Alternative 3**, several seasonal closures overlap with the AM-based closure start date of January 1st and extending forward in the year (Table 1.4.2). Thus, the adverse social effects associated with overlapping same species/FMU closures would be expected to be higher under **Alternative 3** compared to **Alternative 1** and **Preferred Alternative 2** (however this would not be true if **Alternative 5** is selected for these FMUs). For **Sub-Alternative 4a** through **4j,** the overlap of highest and lowest harvest months with the periods of seasonal closure can be determined by comparison of Table 1.4.2 (seasonal closures) with Tables 2.2.1-2.2.5 (highest and lowest harvest months). The combinations of closures with highest/lowest harvest months for all the FMUs are too numerous to detail; in some instances overlaps would definitely or be likely to occur, whereas in others overlap may be unlikely at all or less likely to be encountered, and increased social losses would be expected where overlap occurs. However, to the extent that most of the seasonal closures occur more during the early

parts of the year (before June) than later, whereas most of the FMUs have their lowest landings later in the year (June or later), an AM-based closure occurring in **Sub-Alternatives 4b, 4d**, **4f**, **4h**, and **4j** would appear to be better suited to avoid an extension through the seasonal closure or occur immediately adjacent to a seasonal closure. As a result, **Sub-Alternatives 4b**, **4d**, **4f**, **4h**, and **4j** may result in less adverse social effects than **Sub-Alternatives 4a, 4c**, **4e**, **4g**, and **4i** and **Alternative 3**. **Alternative 5** was developed to create AM-based closures that are continuous with the seasonal closures for species of groupers and snappers (Table 1.4.2). As a result, under **Sub-Alternatives 5a-5n** fishermen would be expected to experience the positive (i.e., fewer interruptions, less frequent gear switching) and negative effects (i.e. greater loss of access to, income from, and food provided by the respective species and confusion about harvest rules) of a continuous closure.

Concurrent closures: If multiple FMUs experience concurrent closures, the effects could be more severe for fishermen and fishing communities because fishing would be allowed for fewer species during the AM closures. This would allow for fewer available species in which to switch effort during the multiple species closure period and would include the loss of income (and resulting social effects) from more species during the closure period. Under **Alternatives 1-3**, multiple FMUs would continue to and/or could experience AM-based closures at the same time because all AM closures would start on the same date under each alternative (except for those species selected in **Alternative 5**, and this could be minimized by selecting **Alternative 5** for those FMUs that include species with seasonal closures, if those dates are not the same as the dates selected for the rest of the FMUs under any of **Alternatives 1-3**). Under **Alternative 4**, however, a different start date could be selected for each FMU, or any combination of FMUs, on each island management area (Table 2.2.1-2.2.5), reducing the likelihood of overlap, thus it could be possible to avoid having multiple fisheries closed at the same time, which could greatly benefit fishermen, though fishers have expressed that they don't want different or multiple AM closure dates. Under **Alternative 5**, different closure start date options are provided for snappers and groupers and different dates could be selected for each group, island management area, and sector (only Puerto Rico), minimizing to some degree overlaps.

4.1.5 Direct and Indirect Effects on the Administrative Environment

Alternative 1 (no action) would not require additional rulemaking; therefore it would not have additional effects on the administrative environment.

Alternatives 2 (Preferred), **3**, **4**, and **5** would all have direct administrative effects because they all require rulemaking to modify the start date for AMs that would apply to all FMUs on each of Puerto Rico, St. Croix, St. Thomas/St. John, and Caribbean-wide. These effects are expected to be minor, although the effects of **Alternative 4**, which would establish individual AM closure dates for each FMU per island management area, would be larger than the other alternatives

proposed. **Alternative 4** (all sub-alternatives) and **Alternative 5** (all sub-alternatives), for applicable FMUs, would also add the administrative burden of monitoring different dates in the event various FMUs have AMs applied during a particular year, and this administrative effect is expected to be minor to moderate. There would be an additional moderate administrative burden for NMFS law enforcement under any of **Sub-Alternatives 4a** through **4i** if different closure start dates are implemented because they will have to keep track of all of the different closure dates and provide training to their officers. This effect will also be apparent under any of the sub-alternatives in **Alternative 5**. However, under **Alternative 5**, there is also an additional burden for monitoring different species included in adjacent closures, because the species in the seasonal closure are not always the same species that would be closed to harvest during an AM closure for the species complex. On the other hand, **Alternative 5** may provide a minor benefit to enforcement because adjacent closures may be easier to enforce than intermittent closures. In those alternatives that would allow for variable dates and conditions, there would be an increased administrative burden and complexity for announcing these AM-based closures through multiple Federal Register notices. This contrasts with the current situation under **Alternative 1**, were a single AM notification is used to announce all AM-based closures that would be implemented in a year. Because under all alternatives proposed, the length of the AM-based closure(s) would still need to be estimated, this minor negative effect on the administrative environment would be similar for all alternatives.

In summary, **Preferred Alternative 2, Alternative 3, Sub-Alternatives 4a** through **4i** in **Alternative 4**, and **Sub-Alternatives 5a** through **5n** in **Alternative 5** would all have direct minor to moderate (i.e., all sub-alternatives of **Alternative 4** and **Alternative 5**) negative effects on the administrative environment because they would add an administrative burden to the Council and NMFS to modify the start dates for AMs in the U.S. Caribbean EEZ through rulemaking. Because **Preferred Alternative 2** and **Alternative 3** propose a single AM closure start date that applies to all FMUs (with the exception of some FMUs that include species with spawning seasonal closures if selected by the Council in **Alternative 5**), these effects are expected to be similar across these alternatives. However, and as discussed above, the overall negative administrative effects of **Alternative 4**, which are equal across **Sub-Alternatives 4a** through **4i**, may be larger than the other alternatives because of the establishment of individual dates for each FMU on each island management area and Puerto Rico fishing sectors, which requires additional monitoring, enforcement, and temporary rulemaking to implement different AMs if needed.

4.2 Environmental Effects of Action 2: Revisiting the approach to set AM-based Closures

Action 2: Specify how often the approach to set the timing of AM-based closures selected in Action 1 should be revisited.

Summary of Management Alternatives

Alternative 1

No Action. Do not specify how often the approach chosen should be revisited

Alternative 2 (Preferred)

Review the chosen approach no longer than 2 years from implementation, and every 2 years thereafter.

Alternative 3

Review the chosen approach no longer than 5 years from implementation, and every 5 years thereafter.

4.2.1 Direct and Indirect Effects on the Physical Environment

The purpose of Action 2 is to provide options to review the approach/dates chosen for FMUs in Action 1. Action 2 is not expected to have any direct effects on the physical environment. Indirect effects expected for Action 2 could be that any positive, negative, or neutral effects that the chosen AM closure start date in Action 1 has on the physical environment would continue for an undetermined (**Alternative 1**), shorter (**Preferred Alternative 2**, no longer than two years), or longer (**Alternative 3**, no longer than five years) period of time until the Council revisits the decision.

4.2.2 Direct and Indirect Effects on the Biological and Ecological Environment

Action 2 is not expected to have any direct effects on the biological/ecological environment. Indirect effects that could result from Action 2 could be that any positive, negative, or neutral effects that the chosen AM closure start date in Action 1 has on the biological/ecological environment would be continued for an undetermined (**Alternative 1**), shorter (**Preferred**

Alternative 2, no longer than two years), or longer (**Alternative 3**, no longer than five years) period of time until the Council revisits the decision.

4.2.3 Direct and Indirect Effects on the Economic Environment

Action 2 provides alternatives regarding if and how often the Council would review the approach taken under Action 1. **Alternative 1** (No Action) proposes that the Council not specify how often the approach chosen under Action 1 be revisited. **Preferred Alternative 2** proposes that the chosen approach be reviewed no longer than two years from implementation and every two years thereafter, while **Alternative 3** proposes to review the chosen approach no longer than five years from implementation and every five years thereafter.

Although the Council can make a change to the approach adopted in Action 1 at any time, **Preferred Alternative 2** and **Alternative 3** ensure that there is a maximum time limit on how often the approach adopted will be revisited, a process which costs time and money, the amount of which could vary depending on the depth of analysis undertaken and the changes made. This analysis assumes that any change, whether developed and adopted under **Alternative 1**, **Preferred Alternative 2,** or **Alternative 3,** would result in the same increased economic benefits because the alternatives only vary in the potential timing of review and are invariant in the time allowable to identify and implement the beneficial change. The actual timing of review could, in practice, be coincident because the adoption of maximum review periods would not preclude earlier review. It would, further, be illogical to expect that any subsequent change in the AM timing approach would result in reduced benefits and, absent a prescribed maximum period for completing the review and implementing the change (e.g., any review and change may take no more than 15 months), the benefits would be expected to be invariant to the required frequency of review. The logic behind these statements is that the need for change would not be expected to require mandatory review to be identified; review and change can be initiated as early as necessary/appropriate regardless of any mandatory review cycle; and the process can take as long as necessary to identify, develop, and implement the best change/outcome. Thus, the three alternatives would not be expected to result in different economic benefits.

The three alternatives vary, however, in the imposition of mandatory process costs. As stated above, any management review has attendant time and money costs. These costs increase with the frequency and depth of review. Mandatory review under a specified schedule will increase these costs the more frequent a review is required. Although, as stated above, actual review may occur more frequently than specified, the shorter the mandatory period, the more frequent reviews would be expected to be occur and the greater the associated total costs. Thus, **Preferred Alternative 2** would be expected to result in more frequent review, and associated costs, than **Alternative 3** and **Alternative 1**, and **Alternative 3** would be expected to result in more frequent review than **Alternative 1**. Although these costs would be justified if change is

needed (the benefits of review and change would be expected to exceed the costs, and a net gain in economic benefits would be expected to result), if a change is not needed, mandatory review would simply impose costs with no accompanying benefits. Thus, from this perspective and examining net benefits (benefits minus costs), **Preferred Alternative 2** could result in lower net economic benefits compared to **Alternative 3** and **Alternative 1**, and **Alternative 3** lower net economic benefits than **Alternative 1**. The differences may be minimal, however, depending on the required depth of review. If simple discussion at a council meeting is sufficient to determine that the current AM approach does not need to be changed, then only trivial routine council process costs would be incurred. If, however, the review involves extensive data review and analysis, multiple public meetings and other forms of outreach and information exchange, spread over many months, as the resultant process, the associated cost, on a recurring basis, could become substantial. Mandatory review may engender greater confidence in responsible management and, if so, more frequent review would be expected to result in greater confidence compared with less frequent review; however, confidence is not an economic benefit or metric.

4.2.4 Direct and Indirect Effects on the Social Environment

Alternative 1 would continue not to specify how often the approach used to select an AM-based closure date would be revisited. Under **Alternative 1**, whatever the AM closure date and approach selected in Action 1 would continue to be used unless some future action is taken by the Council. This could result in the continuation of any social effects from the chosen method, including unintended consequences that may not have been considered. However, the Council has the discretion to revisit the chosen method at any time. Under **Alternative 1**, fishermen could change their behavior based on the perception that the current approach used to select a closure date will continue and thus resulting social effects will continue to be experienced.

Preferred Alternative 2 would require the Council to review the chosen approach for selecting an AM-based closure start date no longer than two years from implementation and every two years thereafter. This could result in the continuation of social effects from the chosen method for up to two years and then could allow for the ability to change that method to incorporate new information (such as how fishermen are actually impacted by the selected method rather than presenting the expected impacts). Under **Preferred Alternative 2**, fishermen could change their behavior based on the perception that the current approach used to select a closure date will continue for up to two years and thus resulting social effects will continue to be experienced during that time**. Preferred Alternative 2** would include a presentation of information to the Council about the specific closure. The presentation might include available information on the biological, social, economic, and administrative effects as well as a discussion and recommendations regarding the need for a more formal review. This consideration by the Council may result in greater confidence in responsible management. If so, a more frequent

consideration would be expected to result in greater confidence compared with less frequent review and thus **Preferred Alternative 2** could result in greater confidence than **Alternative 3** and **Alternative 1** (which does not include a required review).

Alternative 3 would review the chosen approach for selecting an AM-based closure start date no longer than five years from implementation and every five years thereafter. This could result in the continuation of social effects from the chosen method for up to five years and then could allow for the ability to change that method to incorporate new information. Because the required period of review occurs later under **Alternative 3** than in **Preferred Alternative 2**, social effects experienced from the AM-based closure start date selection method could continue for a longer time period under **Alternative 3**, including any possible unintended negative consequences. Under **Alternative 3**, fishermen could change their behavior based on the perception that the current approach used to select a closure date will continue for up to five years. **Alternative 3** would include a presentation of information to the Council about the specific closure. The presentation might include available information on the biological, social, economic, and administrative effects as well as a discussion and recommendations regarding the need for a more formal review. This consideration by the Council may result in greater confidence in responsible management than under **Alternative 1** which does not include a required review. However, the review period is less frequent under **Alternative 3** than under **Preferred Alternative 2** and thus could result in less confidence than under **Preferred Alternative 2.**

Regardless of whether **Alternative 1-3** is selected, fishermen and managers would have the opportunity to comment or initiate efforts to change the closure start date or dates whenever it is called for and not under some specified time frame. Under **Alternatives 1-3** it is expected that the regulatory process would take at least a year for changes to go into effect after action is initiated.

4.2.5 Direct and Indirect Effects on the Administrative Environment

Because **Alternative 1** does not specify how often the approach used to select an AM-based closure date should be revisited, the administrative effects of this alternative would be unknown; however, the Council can choose to revisit the approach at any time. If the Council revisits the action and implements changes to the dates or to the approach for implementing AMs, then this will add the minor administrative burden of amending the appropriate FMP and creating the applicable regulations.

Preferred Alternative 2 and **Alternative 3** specify how often the approach used to select an AM-based closure should be revisited (i.e., no longer than two years after implementation and every two years thereafter in **Preferred Alternative 2**, and no longer than five years from

implementation and every five years thereafter in **Alternative 3**). In both **Preferred Alternative 2** and **Alternative 3**, after the number of years specified by each alternative, Council staff will present to the Council information about the specific closure, which may include available information on the biological, socio-economic, and administrative environment, and discussion and recommendations regarding the potential need of a more formal review of any aspect of the measures implemented in this amendment (e.g., timing of AM-based closures). The Council will then decide if such formal review is merited and proceed with next steps. If a formal review is merited, the next steps include potentially amending the FMPs and drafting regulations to modify, as appropriate, the process or the dates to implement AM-based closures on the applicable island-management area. Thus, in general, there are negative minor administrative effects similar to those expected from **Alternative 1** if the outcome is to amend the applicable FMPs and creating the regulations. However, **Preferred Alternative 2** (and **Alternative 3**) also add the administrative burden of conducting the required formal review, if merited. The magnitude of the effects expected from a formal review leading to a regulatory process will depend on the particular case being evaluated; and that information is not available at this time. In any case, any administrative effects are expected to be larger in **Preferred Alternative 2** than in **Alternative 3** because of the frequency that the Council would have to review the approach chosen in Action 1.

In **Alternative 3** revising the approach selected in Action 1 no longer than five years from implementation and every five years thereafter would also have minor negative effects on the administrative environment similar to those expected for both **Alternative 1** and **Preferred Alternative 2** and would involve amending the FMPs and creating new rulemaking if changes are to be made at the time. The additional administrative effects from a formal review requirement, if merited, would be the same as discussed above for **Preferred Alternative 2.** Although, as mentioned above, any effects are expected to be less frequent than in **Preferred Alternative 2**.

In summary, in all three alternatives the Council maintains the discretion to revisit their decision at any time; and the effects would be unknown and not really different among alternatives. In this case, under any of the alternatives, if the Council revisits the approach and determines that changes are not necessary, then no additional negative administrative effects would be expected. However, if after revisiting the approach, the Council determines that a re-evaluation of the AM closures approach/date is granted (i.e., formal review), then the administrative effects would be larger because it could involve extensive data review and analysis, multiple public meetings and other forms of outreach and information exchange, as well as potentially amending the FMPs and creating new rulemaking, if necessary. This could be expected to occur under any of the alternatives proposed. At this time it is not possible to determine the magnitude of those administrative effects because that will depend on the particular situation being evaluated and the extent of the review and regulatory action required. In general, given that both **Preferred**

Alternative 2 and **Alternative 3** add a non-specified review requirement every 2 or 5 years, respectively, minor negative effects are expected when compared to **Alternative 1**, which does not have a review requirement.

4.3 Cumulative Effects Assessment

The immediate affected area is the federal waters off Puerto Rico and the USVI as well as the fishing communities of Puerto Rico and the USVI dependent on fishing for reef fish, spiny lobster, and coral resources and the ecosystem services they provide. Federal waters in the U.S. Caribbean extend from the three-nautical mile seaward boundary of the Territory of the USVI, and the nine-nautical mile seaward boundary of the Commonwealth of Puerto Rico, out to 200 nautical miles offshore. This is also the Caribbean Fishery Management Council area of jurisdiction.

Past, Present, and Reasonably Foreseeable Actions Impacting the Affected Area

The Cumulative Effects Assessment (CEA) included in the Environmental Impact Statement (EIS) of the 2010 Caribbean ACL Amendment (CFMC 2011a) analyzed cumulative effects to the reef fish; and the CEA included in the EIS for the 2011 Caribbean ACL Amendment (CFMC 2011b) analyzed cumulative effects to the reef fish, spiny lobster, and coral reef resources, in the U.S. Caribbean EEZ. Although not addressed in this amendment, both CEAs also analyzed cumulative effects to the queen conch resources in the U.S. Caribbean EEZ. Both of these CEAs also described baseline economic and social conditions for fishing communities in Puerto Rico and the USVI. These CEAs described the effects of the implementation of ACLs, AMs, and the redefinition of management reference points for reef fish, spiny lobster, corals and reef associated plants and invertebrates, as well as queen conch in U.S. Caribbean federal waters and how those actions would serve to restore and stabilize natural trophic and competitive relationships, rebuild species abundances, re-establish natural sex ratios, contribute to the long-term health of the ecosystem, and reinvigorate sustainable fisheries while minimizing to the extent practicable negative socioeconomic impacts. The analyses of cumulative effects listed in each of the 2010 and 2011 Caribbean ACL Amendments EIS are still considered to be accurate and useful at the present time and are incorporated herein by reference. Both CEAs discussed that although ACLs and AMs are intended to prevent or greatly reduce the risk of overfishing and are expected to have positive biological benefits, they may also impose more restrictive catch levels on fisheries resulting in negative social and economic impacts over the short-term. However, to the extent that ACLs and AMs can prevent overfishing and assist in rebuilding overfished stocks, they should have positive long-term benefits to both the biological and socio-economic environments.

The CEAs in the 2010 and 2011 Caribbean ACL Amendments/EIS determined that the ability of U.S. Caribbean fishers and their communities to withstand any potential adverse impacts caused by the actions in those amendments was greatly dependent on their reliance on fishing in federal waters. Both CEAs discussed that with more fishable habitat in their territorial waters, Puerto Rican fishers are most able to mitigate for any losses of landings due to a shortened federal fishing season by shifting into territorial waters, assuming the territorial season remains open. With the least amount of fishable habitat in territorial waters off St. Thomas/St. John, it was expected that St. Thomas/St. John fishers would be least able to mitigate for lost landings due to a shortened federal fishing season because of a Caribbean-wide ACL.

The CEAs for both EISs listed the stresses affecting fishing communities, such as additional regulatory restrictions, competition from foreign seafood imports, coastal development, loss of infrastructure, and rising fuel prices, and discussed how all of these stresses have placed a greater burden on fishermen and fishing communities that threaten their short- and long-term sustainability. The CEAs discussed that although the intent of the actions on those amendments was to improve the targets and thresholds of reef fish, spiny lobster, queen conch, and coral resources, they may cause additional stresses (e.g., lower landings). The process of protecting Council-managed species through the specification of management targets, thresholds, and AMs, and regulations that implement those AMs was expected to have a short-term adverse impact on the social and economic environment, and to create a burden on the administrative environment. However, the process was also expected to provide larger benefits to those environments in the long-run than would be expected with the no action alternative. The effects on the human environments were discussed in detail in those EISs. No alternatives were considered that would completely avoid those negative effects because they were considered a necessary cost associated with establishing ACLs and AMs in the U.S. Caribbean. The CEAs concluded that for that reason, it was difficult to mitigate these measures and managers must balance the costs and benefits when choosing management alternatives for these fisheries.

NMFS recently implemented the Comprehensive Amendment to the U.S. Caribbean FMPs: Application of AMs (AM Application Amendment) (CFMC 2016) (81 FR 29166). This amendment modified AM- applicability language in the four Council FMPs to correct an inconsistency with the implementing regulations. Although this action directly affected AMs, the action did not result in regulatory changes and did not change the way AMs are currently implemented in the EEZ. The action in the AM Application amendment is not expected to contribute to the effects expected from the actions considered in this amendment, and vice-versa. The CEA included in the AM Application Amendment analyzed cumulative effects to the spiny lobster, queen conch, reef fish, and coral resources in the U.S. Caribbean EEZ and revealed no significant, cumulative adverse effects on the human environment. The CEA in the AM Application Amendment also considered the analyses of cumulative effects listed in each of the

2010 and 2011 Caribbean ACL Amendments/EISs, mentioned above. These analyses are still considered to be accurate and useful at the present time and are incorporated herein by reference.

Additional past actions affecting Caribbean Council-managed species are summarized in the management history section of this document (Section 1.6). The Council is considering one present and reasonably foreseeable future action that would directly affect Council-managed species and that is the development of island-based FMPs for the U.S. Caribbean. These will replace the current Reef Fish, Spiny Lobster, Queen Conch, and Coral FMPs. This action could affect the way the queen conch, reef fish, spiny lobster, and coral resources fisheries are managed in the U.S. Caribbean, as management could be tailored to each island or island group. It is likely that through these FMPs, management reference points, ACLs, and/or AMs will be revisited and possibly revised. How the actions proposed in this amendment would be affected by the development of Island-based FMPs is currently unknown.

The actions proposed in this amendment would modify the timing for the application of AMs for council-managed species in the Reef Fish, Spiny Lobster, and Coral FMPs and how often a review of the chosen approach to establish the timing for AMs should be conducted. Modifying the start date for AM closures as proposed in **Alternatives 2-5** in Action 1 would not change the allowable landings; it would redistribute those landings throughout the year relative to the no action alternative. These actions are not expected to have significant beneficial or adverse cumulative effects on the physical or biological/ecological environments as they would minimally affect fishing practices (Action 1) (see Sections 4.1.1 and 4.1.2) or have no effect at all on fishing practices (administrative action) (Action 2). As discussed in the summary of the CEAs for the 2010 and 2011 Caribbean ACL Amendments provided above, in general, the biological/ecological environment of a species/species complex to which an AM is applied is expected to benefit positively from the AM by constraining landings to the ACL and preventing an overage in future years.

The socio-economic environment is expected to experience short-term adverse effects from the application of AMs in general, as discussed earlier in this CEA. However, in the long term, the social and economic effects are expected to be positive through healthier fish stocks. These are expected general effects from this amendment. Other effects associated to the actions in this amendment depend on the alternative chosen and the FMU to which the AM-based closure applies to. Section 3.4 describes baseline economic and social conditions for fishing communities in Puerto Rico and the USVI. This proposed amendment is expected to lessen the potential adverse socio-economic effects of the status quo (**Alternative 1**) closures that would result from the application of the AMs. As discussed in Sections 4.1.3 and 4.1.4 (Economic Effects and Social Effects, respectively), the current timing for the application of AMs, which is December 31st going backward toward the beginning of the year (**Alternative 1**, No Action), has been identified by fishers as potentially having direct economic effects that would likely be

negative. These effects were analyzed in the 2010 and 2011 Caribbean ACL Amendments, which established AMs. Commercial fishermen from St. Thomas/St. John and St. Croix have reported/stated that the month of December is an important time for fish sales due to the Christmas holiday demand for seafood on those islands. Similar sentiments regarding the potential for closures in December have not been voiced by Puerto Rico fishermen because pork is the traditional and preferred protein for the Christmas holiday. Thus, it is expected that there would be a less pronounced negative economic effect resulting from the no action alternative in Puerto Rico compared to the effects in the USVI. However, in the USVI, loss or interruptions of seafood supply to the markets during the month of December from AM-based closures may result in direct negative short-term economic effects to fishermen and local communities in the form of lost ex-vessel revenues. Direct negative long-term economic effects are also possible if market supply is consistently interrupted year after year and consumers substitute with other protein sources, purchase imported fish, or purchase fish from sources outside the region.

In general, the social and economic environments are expected to benefit from this amendment because a change to the current date on which AM-based closures are applied is expected to decrease the negative socio-economic effects that AM-based closures occurring close to the end of the calendar year inevitably have on fishers. Effects may vary depending on the species/species complex with the AM closure and how much fishers can compensate for the loss of fishing opportunities by fishing for other species, for example. Any positive or negative effects will likely be dependent on the length of the closure necessary to achieve the required reduction in landings, whether the closure overlaps with important market dates (based on economic, social, and cultural factors), whether the closure occurs during a time period of traditionally high landings or low landings, the cumulative effects of interacting with other closures for that FMU (such as a spawning closure), and whether multiple FMUs experience AM-based closures at the same time. The Council has selected **Alternative 2**, an AM-based closure end date of September 30th going backward toward the beginning of the year, as the preferred alternative in Action 1 applicable to all FMUs across all island management areas. This AM end date has been identified by fishers as desirable because, to the extent possible, it avoids high demand market periods for fish so that they do not risk losing markets, and thus is expected to minimize any cumulative effects from past actions.

Consideration of Climate Change and Other Non-Fishery Related Issues

Stresses affecting fishery resources and protected resources as well as the human communities that depend on those resources include but are not limited to natural events, habitat quality, human population growth, and anthropogenic threats (e.g., habitat loss and degradation, sedimentation, pollution, water quality, overharvest, climate change). Some managed species may be more sensitive to the quality of their environment than others. For example, any changes in benthic conditions resulting from land based increases in sedimentation or turbidity will

adversely affect the available productive habitat for queen conch (Appeldoorn et al. 2011) and corals.

Other factors directly affecting human communities include high fuel costs, increased seafood imports, restricted access to traditional fishing grounds, and regional economies. Increased seafood imports are significant as it relates to market competition, where a glut of fish products can flood the market and lower ex-vessel prices. Once market channels are lost to imported seafood products it may be hard for fishery participants to regain those channels (WPFMC 2009). Effects on the regional economy, for example the closure of the Hovensa Petroleum Refinery Plant of St. Croix in 2012, which left more than 1,200 people without work, may increase the community dependence on local fisheries as their main source of income and food.

Environmental changes (e.g., potential threats from climate change, ocean acidification) can also affect fishery populations, protected resources, and the people and communities that depend on those resources. New and recent information about climate change has begun to shed light on how global climate change will affect, and is already affecting, reef fish, spiny lobster, queen conch, and coral resources. Climate change can affect marine ecosystems through ocean warming by increased thermal stratification, changes to upwelling patterns, sea level rise, increases in wave height and frequency, loss of sea ice, and increased risk of diseases in marine biota, among other things. Potential vulnerabilities for coastal zones include increased shoreline erosion leading to alteration of the coastline, loss of coastal wetlands, and changes in the profiles of fish and other marine life populations (Lorde et al. 2013). Changes in ocean temperatures have been linked to shifting fish stock distributions and abundances in many marine ecosystems, and these impacts are expected to increase in the future (NMFS 2014). Any of these could affect the local or regional seafood output and thus the local economy (Carter et al. 2014). In the U.S. Caribbean region and throughout the southeastern U.S., the major climate induced ecosystem concerns are: 1) Threats to coral reef ecosystems - coral bleaching, disease, and ocean acidification; 2) Threats to habitat from sea level rise – loss of essential fish habitat; and 3) Climate induced changes to species phenology and distribution (Osgood 2008).

Climate variability is also a factor that needs to be considered when addressing climate effects, and in the reasonable foreseeable future it may be far more influential than unidirectional climate change (B. Arnold, personal communication). For example, inter-annual or El Niño scale changes in the ocean environment may result in changes in the distribution patterns of migratory fishes and can affect reproduction and recruitment in other species (NOAA PFL Climate Variability and Marine Fisheries, http://www.pfeg.noaa.gov/research/climatemarine/cmffish/cmffishery.html, accessed May 2015). Additionally, cyclical water temperature patterns may result in relatively short-term (i.e., decadal) decreases in water temperature despite the evident long-term pattern of temperature increase. Such decadal-scale events may be far more influential with respect to fishery

management regulations such as those included in this amendment than are long-term climate change events, because these decadal-scale events operate on the time frame of the fishery management action.

Extreme weather events in the Caribbean, such as hurricanes and storms, in combination with poor land-use planning and deficient ecosystem management and restoration, can be a source of additional pressure to marine ecosystems and to species affected by the proposed action. Moreover, climate change impacts appear to be more substantial or at least more noticeable so far, as one moves away from the equator. Thus, impacts of climate change may be less measurable in the Caribbean than in the higher latitudes (B. Arnold, personal communication), although impacts could be greater in the tropics due to organisms being less well adapted to temperature fluctuations. Nevertheless, when the potential effects of the proposed actions in this amendment are considered within the context of climate change, the interactive effects are considered to be insignificant relative to other impacts of the proposed action.

Excess carbon dioxide (CO_2) dissolves into the ocean and is converted to corrosive carbonic acid, resulting in the phenomenon known as "ocean acidification" (Madin 2010). At the same time, the CO_2 also supplies carbon that combines with calcium already dissolved in seawater to provide the main ingredient for shells, calcium carbonate ($CaCO_3$) (Madin 2010). The net responses of organisms to rising CO_2 concentration will vary depending on often opposing sensitivities to decreased seawater pH, carbonate concentration, and carbonate saturation state, and to elevated oceanic total inorganic carbon and gaseous CO_2 (Cooley and Doney 2009). Increased ocean acidity caused by elevated CO_2 could directly damage organisms by partially dissolving their shells (Madin 2010) or by decreasing growth rates. Other species with more protective coverings on their shells and skeletons, such as crustaceans, temperate urchins, mussels, and coralline red algae may be less vulnerable to decreasing seawater pH (Madin 2010). However, the specifics of how ocean acidification affects these species are not well understood.

In general, specific levels of impacts resulting from climate change, climate variation, and ocean acidification cannot be quantified at this time, nor is the exact timeframe known in which these impacts will occur. However, projections based on the Intergovernmental Panel on Climate Change's (IPCC) Special Report on Emissions Scenarios (SRES) give a reduction in average global surface ocean pH of between 0.14 and 0.35 units during the 21st century (Climate Change 2007).

None of the actions proposed in this amendment are expected to increase or decrease the potential impacts of climate change and ocean acidification on fishery resources and other protected resources. Other anthropogenic impacts to reef fish, spiny lobster, and coral resources in the affected area may be more pressing than climate change or even decadal-scale climate variability. Continued monitoring of the effects of climate change, climate variability, and ocean

acidification should be a priority of national and local programs. For more information about climate impacts in U.S. marine living resources concerning NMFS, see Osgood (2008). For additional information about climate change in the Caribbean and Southeast region, please see Chapter 17 of the Third National Climate Assessment: *Climate Change Impacts in the United States*; http://nca2014.globalchange.gov/report/regions/southeast, (Carter et al. 2014).

Monitoring and Mitigation

The effects of the proposed actions are, and will be continue to be monitored through collection of fisheries-dependent and fisheries-independent data by NMFS and the Puerto Rico and USVI governments. In the USVI, commercial landings data are collected by the Department of Planning and Natural Resources. Recreational landings data for managed species are not currently collected in the USVI. In Puerto Rico, commercial and recreational landings data are collected by the Department of Natural and Environmental Resources. Additional information of the effects of these actions will be obtained through stock assessments and stock assessment updates, life history studies, economic and social analyses, and other scientific observations, as applicable, and by direct communication with affected constituents.

Chapter 5. Regulatory Impact Review

5.1 Introduction

The National Marine Fisheries Service (NMFS) requires a Regulatory Impact Review (RIR) for all regulatory actions that are of public interest. The RIR does three things: (1) provides a comprehensive review of the level and incidence of impacts associated with a regulatory action; (2) provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives which 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 also serves as the basis for determining whether any proposed regulations are a "significant regulatory action" under certain criteria provided in Executive Order 12866 (E.O. 12866) and whether the approved regulations will have a "significant economic impact on a substantial number of small business entities" in compliance with the Regulatory Flexibility Act of 1980.

5.2 Problems and Objectives

The purpose and need, issues, problems, and objectives of these actions are presented in Section 1.4.

5.3 Description of the Fishery

A description of the fishery is contained in Chapter 3 and incorporated here by reference.

5.4 Effects of Management Measures

Because of the lack of sufficient data and the inability to reasonably forecast future ACL overages and associated next-year closures, it is not feasible to provide quantitative estimates of the potential expected economic effects of the proposed actions. As a result, the following discussion is a qualitative assessment of the expected economic effects these actions.

Action 1

Action 1 would modify the timing for the implementation of AM-based fishing closure start or end dates in the U.S. Caribbean EEZ. **Preferred Alternative 2** would result in a closure end date of September 30th, which reduces the likelihood of an AM-based closure during the high demand season in December in the U.S. Virgin Islands and implements a closure during a typically slow fishing period for certain areas of Puerto Rico. Therefore, **Preferred Alternative 2** would be expected to result in increased revenues and profits due to more stable product supply and increased ex-vessel prices. Although it is not feasible to quantitatively estimate the economic benefits of the preferred action due to a lack of cost and earning data and the unknown amount of an overage that might occur that the closure length would be based on, extensive qualitative information from fishermen indicate positive economic benefits from moving the closure end date from December 31st to September 30th.

Action 2

Action 2 concerns specification of a time period to revisit the approach to establish AM-based closures selected in Action 1. **Preferred Alternative 2** would require revisiting the timing of the AM-based closure no longer than two years from implementation and every two years thereafter. This is an administrative procedural action that would not have any direct economic effects on fishery participants. However, periodic mandatory reevaluation of the AM-based closure end date would result in recurring unknown management costs. Any subsequent change in the start date, however, would only be expected to occur if positive economic effects were expected to accrue.

5.5 Public and Private Costs of Regulation

The preparation, implementation, enforcement, and monitoring of this or any Federal action involves the expenditure of public and private resources, which can be expressed as costs associated with the regulations. Costs associated with this action include, but are not limited to the Caribbean Fishery Management Council costs of documentation preparation, meeting, and other costs; NMFS administration costs of document preparation, meetings, and review, and annual law enforcement costs. The estimated public and private costs of this proposed regulation is $100,000 to $150,000. This estimate does not include potential changes in annual law enforcement costs for which estimates are not available.

5.6 Determination of Significant Regulatory Action

Pursuant to E.O. 12866, a regulation is considered a "significant regulatory action" if it is expected to: 1) result in an annual effect of $100 million or more or adversely effect 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, and the fact that the combined average annual revenue for the affected entities is less than $15 million, this 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 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 or amendment (including framework management measures and other regulatory actions) and to ensure the agency considers alternatives that minimize the expected impacts while meeting the goals and objectives of the FMP and applicable statutes.

The RFA requires agencies to conduct a Regulatory Flexibility Act Analysis (RFAA) for each proposed rule. The RFAA 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. An RFAA is conducted to primarily determine whether the proposed action would have a "significant economic impact on a substantial number of small entities." The RFAA provides: 1) A description 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 practicable, of all relevant federal rules, which may duplicate, overlap, or conflict with the proposed rule; 6) a description and estimate of the expected economic impacts on small entities; and 7) an explanation of the criteria used to evaluate whether the rule would impose "significant economic impacts".

6.2 Statement of the need for, objective of, and legal basis for the proposed action

The need for and objective of this proposed action are provided in Chapter 1. In summary, accountability measure (AM)-based closures need to be better timed so that they successfully achieve their conservation objective and, to the extent practicable, minimize adverse economic

impacts to fishers and fishing communities. The purpose of this proposed action is to change the start date from which AM-based closures are calculated so that harvest does not exceed the annual catch limit and adverse socio-economic effects are reduced to the extent practicable. The Magnuson-Stevens Fishery Conservation and Management Act provides the statutory basis for this proposed action.

6.3 Description and estimate of the number of small entities to which the proposed action would apply

This proposed action would directly affect all entities that commercially harvest federally managed species in the U.S. Caribbean Exclusive Economic Zone. This proposed action would be expected to directly affect approximately 1,000-1,200 commercial fishermen in Puerto Rico, 200-250 commercial fishermen in St. Croix, and 70 commercial fishermen in St. Thomas and St. John, or a total of 1,270-1,520 fishermen. The average annual revenue from commercial fishing is estimated to be approximately $7,250-$8,700 for Puerto Rico fishermen, $10,500-$13,100 for St. Croix fishermen, and $29,600 for St. Thomas and St. John fishermen (2014 dollars). Total (across all fishermen) average annual revenue (2014 dollars) for 2012-2014 was approximately $8.7 million for Puerto Rico, $2.6 million for St. Croix, and $2.1 million for St. Thomas and St. John. More recent information is not available.

NMFS has not identified any other small entities that might be directly affected by this proposed action.

For RFA purposes only, NMFS has established a small business size standard for businesses, including their affiliates, whose primary industry is commercial fishing (see 50 CFR § 200.2). A business primarily engaged in commercial fishing (NAICS code 11411) is classified as a small business if it is independently owned and operated, is not dominant in its field of operation (including its affiliates), and has combined annual receipts not in excess of $11 million for all its affiliated operations worldwide. All of the commercial vessels directly regulated by this proposed rule are believed to be small entities.

6.4 Description of the projected reporting, record-keeping and other compliance requirements of the proposed action, 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.

6.5 Identification of all relevant federal rules, which may duplicate, overlap or conflict with the proposed action

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

6.6 Significance of economic impacts on a substantial number of small entities

Substantial number criterion

This proposed action would be expected to directly affect an estimated 1,270-1,520 commercial fishing businesses. All of these businesses are believed to be small business entities. As a result, this proposed action, if implemented, would be expected to affect a substantial number of small entities.

Significant economic impacts

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

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

All entities expected to be directly affected by the measures in this proposed action are believed to be small business entities, so the issue of disproportionality does not arise in the present case.

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

This proposed amendment contains two actions. The first action would specify the start date for any AM-based closure, when necessary, and the second action would establish the timing of when the council must reconsider this start date. Specifying the start date for any AM-based closure would be expected to result in unquantifiable economic benefits to the directly affected commercial fishing businesses. An AM-based closure is required in the subsequent fishing year if the allowable catch limit (ACL) is exceeded. The fishing year for Caribbean fisheries is the calendar year and the current end date for AM-based closures is December 31. If an AM-based

closure is required, the closure period begins on December 31 and extends backwards into the year until a sufficient number of days are closed to constrain harvest to the ACL and prevent another overage. However, fishermen have reported that closures beginning on December 31 and extending back into the year conflict with periods of high consumer demand driven by tourist seasons, holidays, and elections. Closure during these periods results in reduced revenue and profits to affected fishermen. This proposed action would change the date of any necessary closure to start on and extend backward from September 30 in order to better situate the closure to reduce or avoid conflict with these important events and time periods. Although the amount of harvest reduction during the closure would be unaffected by changing the start date (the intent of the closure would be to allow the ACL to be harvested, but not exceeded, regardless of when the closure begins or how long it lasts), avoidance of these periods of increased demand would be expected to enable fishermen to better meet market demand, maintain product flow, and receive higher prices and associated profits for their harvest. Available data from the Caribbean fisheries are insufficient to document seasonal price variability and demonstrate the benefits of supplying fish during these high demand periods. Thus, quantitative documentation of demand-driven price increases during the end-of-year and special seasons is not available. Additionally, because future ACL overages and associated next-year required closures cannot be reasonably forecast, it is not feasible to provide quantitative estimates of the potential expected economic benefits of improving the timing of these closures. Nevertheless, the proposed action was selected based on extensive input from commercial fisherman and, although unquantifiable, would be expected to result in increased revenue and associated profits.

Specifying when the starting date for any AM-based closure must be reconsidered is an administrative action because it would simply establish a procedural requirement of the management process and not implement or mandate any specific changes in how fishermen are managed or allowed to operate their business. As a result, this action would not be expected to have any direct economic effects on any small entities. Although management change subsequent to reconsideration of the AM-based closure start date may have direct economic effects on fishing businesses, these would be indirect effects of establishing the timing of deliberation. Indirect economic effects are outside the scope of the RFA.

6.7 Description of the significant alternatives to the proposed action and discussion of how the alternatives attempt to minimize economic impacts on small entities

The actions in this proposed amendment, if implemented, would not be expected to have a significant adverse economic impact 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 Co-Lead / Fishery Biologist
Bill Arnold	NMFS/SF	Caribbean Branch Chief / Fishery Biologist
Graciela García-Moliner	CFMC	Fishery Biologist
Kate Quigley	CFMC	IPT Co-Lead / Economist
Christina Package-Ward	NMFS/SF	Anthropologist
Stephen Holiman	NMFS/SF	Economist
Andrew Herndon	NMFS/PR	Fishery Biologist
Jennifer Lee	NMFS/PR	Fishery Biologist
Michael Larkin	NMFS/SF	Data Analyst
Meaghan Bryan	NMFS/SEFSC	Fishery Biologist
Shepherd Grimes	NOAA/GC	Attorney
Iris Lowery	NOAA/GC	Attorney
Scott Sandorf	NMFS/SF	Technical Writer
Noah Silverman	NMFS/SER	Regional NEPA Coordinator
Scott Crosson	NMFS/SEFSC	Economist
Lynn Rios	NOAA/OLE	Enforcement Officer

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

Chapter 8. List of Agencies, Organizations and Persons Consulted

Responsible Agencies

Caribbean Fishery Management Council
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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 Southeast Division
United States Coast Guard
United States Department of the Interior
U.S. Virgin Islands Department of Planning and Natural Resources
Puerto Rico Department of Natural and Environmental Resources
Puerto Rico Junta de Calidad Ambiental (Puerto Rico Environmental Quality Board)

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Appendices

Appendix A. 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 (APA)
All federal rulemaking is governed under the provisions of the 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 (CZMA)
The 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. 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.

Endangered Species Act (ESA)

The ESA of 1973 (16 U.S.C. Section 1531 et seq.) requires federal agencies to ensure actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered species or the habitat designated as critical to their survival and recovery. The ESA requires federal agencies to consult with the appropriate administrative agency (NMFS for most marine species, and the U.S. Fish and Wildlife Service for all remaining species) when proposing an action that may jeopardize the continued existence of threatened or endangered species or destroy or adversely modify critical habitat. Consultations are necessary to determine the potential impacts of the proposed action. They are concluded informally when proposed actions may affect but are “not likely to adversely affect” threatened or endangered 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” threatened or endangered species or designated critical habitat.

NMFS has completed formal and informal ESA Section 7 consultations on the continued authorization of the Spiny Lobster and Reef Fish fisheries under their respective FMPs. Consultations on the Corals and Reef Associated Plants and Invertebrates (Coral) have all been concluded informally. A summary of recent completed consultations of these FMPs can be found below.

In 2011, NMFS completed separate biological opinions evaluating the impacts of the continuing authorization of the reef fish (NMFS 2011d) and spiny lobster fisheries (NMFS 2011e) on ESA-listed species. In the reef fish biological opinion, NMFS determined that the reef fish fishery would adversely affect green, hawksbill, and leatherback sea turtles and *Acropora* corals but is not likely to jeopardize their continued existence. NMFS also determined that the reef fish fishery would adversely affect *Acropora* critical habitat but would not destroy or adversely modify it. An incidental take statement was issued for green, hawksbill, and leatherback sea turtles, as well as *Acropora* corals. Reasonable and prudent measures to minimize the impact of these incidental takes were specified, along with terms and conditions to implement them. Other listed species and designated critical habitat in the U.S. Caribbean were determined to be unaffected or not likely to be adversely affected by the fishery.

The spiny lobster biological opinion concluded that the spiny lobster fishery would adversely affect green, hawksbill, and leatherback sea turtles and staghorn coral but was not likely to jeopardize their continued existence. The opinion also stated the spiny lobster fishery would adversely affect *Acropora* critical habitat but would not destroy or adversely modify it. An incidental take statement was issued for green, hawksbill, and leatherback sea turtles, as well as staghorn coral. Reasonable and prudent measures to minimize the impact of these incidental takes were specified, along with terms and conditions to implement them. Other listed species and designated critical habitat in the U.S. Caribbean were determined to be unaffected or not likely to be adversely affected by the continued authorization of the fishery.

NMFS met the ESA Section 7 consultation requirements to evaluate the potential impacts to listed species from the continued authorization of the coral reef resources fishery via informal consultations. In a consultation memorandum dated February 8, 2013, NMFS concurred with the determination that the continued authorization of the fishery was not likely to adversely affect any listed species or critical habitat. That determination was based primarily on the fact that the vast majority of the fishery does not operate in federal waters and because the fishery is highly selective and fishers can easily avoid listed species. In that memorandum NMFS also concurred with the determination that the essential feature of *Acropora* critical habitat (i.e., consolidated hardbottom or dead coral skeleton that is free from fleshy macroalgae cover and sediment cover, occurring in water depths from the mean high water line to 30 meters (98 feet)), was not likely to be adversely affected by the continued authorization of fishery. NMFS agreed with the determination that coral reef resources fishers would not cause consolidated hardbottom to become unconsolidated and would not cause the growth of macroalgae or sedimentation; therefore, any adverse effects were unlikely to occur and are discountable.

On September 10, 2014, NMFS published a final rule (79 FR 53852) listing 20 new coral species under the ESA. Five of those new species (*Mycetophyllia ferox*, *Dendrogyra cylindrus*,

Orbicella annularis, *Orbicella faveolata*, and *Orbicella franksi*) occur in the Caribbean and are listed as threatened. The two previously listed *Acropora* coral species (*Acropora palmata* and *Acropora cervicornis*) remained protected as threatened. In a September 26, 2014, memorandum, NMFS determined the continued authorization of the Reef Fish and Spiny Lobster fisheries may adversely affect these species and requested re-initiation of ESA Section 7 consultation to evaluate these fisheries' potential impacts. In a January 19, 2016, memorandum, NMFS determined allowing the continued authorization of fishing managed by the Reef Fish and the Spiny Lobster FMPs during the re-initiation period will not violate ESA Section 7(a)(2) or 7(d).

On April 6, 2016, NMFS and the U.S. Fish and Wildlife Service published a final rule (81 FR 20057) removing the range-wide and breeding population listings of the green sea turtle under the ESA, and in their place, listing eight Distinct Population Segments (DPSs) as threatened and three DPSs as endangered, effective May 6, 2016. Two of the green sea turtle DPSs, the North Atlantic DPS and the South Atlantic DPS, occur in the Caribbean and are listed as threatened and may be affected by the reef fish and spiny lobster fisheries. In addition, on June 29, 2016, NMFS published in the *Federal Register* a final rule (81 FR 42268) to list Nassau grouper as threatened, effective July 29, 2016. Nassau grouper are also found in the Caribbean and may be affected by the subject fishery. NMFS has expanded the scope of the consultation already underway to evaluate potential effects of the spiny lobster and reef fish fisheries on these species and expects to complete separate biological opinions on both fisheries by the end of March 2017. NMFS is currently evaluating the effects of allowing the continued authorization of fishing managed by the Reef Fish and Spiny Lobster FMPs during the extended reinitiation on the two new DPSs of green sea turtles, the Nassau grouper, and the newly listed corals.

Marine Mammal Protection Act (MMPA)

The 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.

NMFS has determined that fishing activities conducted under this amendment will have no adverse impact on marine mammals. In the 2016 List of Fisheries published by NMFS, all gear (dive, hand/mechanical collection fisheries) used in the reef fish, queen conch, spiny lobster, and coral resources fisheries are considered Category III (81 FR 20550). This classification indicates the annual mortality and serious injury of a marine mammal stock resulting from any fishery is less than or equal to one percent of the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock, while allowing that stock to reach or maintain its optimum sustainable population.

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 does not contain a collection-of-information requirement for purposes of the PRA.

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 (EFH) Provisions

The Magnuson-Stevens Act includes 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 areas affected by the proposed action have been identified as EFH for queen conch, spiny lobster, corals, and reef fish. As specified in the Magnuson-Stevens Act, EFH consultation is required for federal actions which may adversely affect EFH.

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 Chapter 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 [FRFA]) 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 the 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.

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 Takings Implication Assessment is necessary for this amendment.

E.O. 12866: Regulatory Planning and Review

Executive Order 12866, 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.

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 3.4.3 for Environmental Justice considerations as they relate to this regulatory amendment.

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 in this amendment will have no direct impacts on coral reefs. Regulations are already in place to limit or reduce impacts to coral reef habitat in the U.S. Caribbean EEZ. In addition, NMFS approved and implemented the 2011 Annual Catch Limit (ACL) Amendment, which established ACLs and accountability measures for species within the Corals and Reef Associated

Plants and Invertebrates FMP. These actions aim to 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, when 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 international, State, Tribal, and local entities. No Federalism issues have been identified relative to the action proposed in this regulatory amendment. Therefore, consultation with state officials under Executive Order 13132 is not necessary.

E.O. 13112: Invasive Species

This Executive Order requires agencies to use their authority 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 (MPAs)

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 MPA in federal waters of the U.S. Caribbean.

Appendix B. Considered but Rejected Alternatives

This section describes a sub-alternative proposed for Action 1 that the Caribbean Fishery Management Council (Council) considered in developing this document, but decided not to pursue.

During the 153rd Regular Meeting held on August 19-20, 2015 in Mayaguez, Puerto Rico, the Council reviewed the alternatives and sub-alternatives proposed for both Action 1 and Action 2. The Council decided to not pursue **Sub-Alternative 4c** of **Alternative 4** in Action 1: Modify the timing for the implementation of AM-based closures in the U.S. Caribbean exclusive economic zone (EEZ). **Sub-Alternative 4c** proposed to establish a fixed start date to apply an accountability measure-based closure for each fishery management unit (FMU) on each of Puerto Rico, St. Croix, St. Thomas/St. John, and Caribbean-wide management areas:

A. Puerto Rico, B. St. Thomas/St. John, C. St. Croix, and D. Caribbean-Wide:

> **Sub-Alternative 4c**. Closure to start the last day of the month with the least negative economic, social, and cultural effects.

Sub-Alternative 4c was eliminated following a discussion by the Council where it was recognized that determining the optimal time of the year for a closure for each FMU within each of the management areas that would have the least negative socio-economic and cultural effects would likely not be feasible.

Appendix C. Species included in the Reef Fish, Corals and Reef Associated Plants and Invertebrates, and Spiny Lobster FMPs

Fishery Management Unit	
Reef Fish FMP	
Grouper Unit 1 Nassau grouper, *Epinephelus striatus*	**Goatfish FMU** Spotted goatfish, *Pseudupeneus maculatus;* Yellow goatfish, *Mulloidichthys martinicus*
Grouper Unit 2 Goliath grouper, *Epinephelus itajara*	**Tilefishes FMU** Blackline tilefish, *Caulolatilus cyanops* Sand tilefish, *Malacanthus plumieri*
Grouper Unit 3 Red hind, *Epinephelus guttatus*, coney *Cephalopholis fulvus*, rock hind, *Epinephelus adscensionis*, Graysby, *Cephalopolis cruentata*	**Scups and Porgies FMU** Jolthead porgy, *Calamus bajonado*, Sea bream, *Archosargus rhomboidalis*, Sheepshead porgy, *Calamus penna;* Pluma, *Calamus pennatula*
Grouper Unit 4 Black grouper *Mycteroperca bonaci*; Red grouper, *Epinephelus morio*, Tiger grouper, *Mycteroperca tigris*, Yellowfin grouper, *Mycteroperca venenosa*	**Squirrelfish FMU** Blackbar soldierfish, *Myripristis jacobus*, Bigeye, *Priacanthus arenatus*, Longspine squirrelfish, *Holocentrus rufus; S*quirrelfish, *Holocentrus adscensionis*
Grouper Unit 5 Misty grouper, *Epinephelus mystacinus*, Yellowedge grouper , *Epinephelus flavolimbatus*	**Surgeonfish FMU** Blue tang, *Acanthurus coeruleus*, Ocean surgeonfish, *Acanthurus bahianus;* Doctorfish, *Acanthurus chirurgus*
Snapper Unit 1 Black snapper, *Apsilus dentatus*; blackfin snapper, *Lutjanus buccanella*; Silk snapper , *Lutjanus vivanus*, Vermilion snapper *Rhomboplites aurorubens*, Wenchman, *Pristipomoides aquilonaris*	**Grunts FMU** White grunt, *Haemulon plumierii;* Margate, *Haemulon albu;* Tomtate, *Haemulon aurolineatum;* Bluestriped grunt, *Haemulon sciurus;* French grunt, *Haemulon flavolineatum;* Porkfish, *Anisotremus virginicus*
Snapper Unit 2 Cardinal snapper, *Pristipomoides macrophthalmus*, Queen snapper , *Etelis oculatus*	**Wrasses FMU** Hogfish, *Lachnolaimus maximus;* Puddingwife, *Halichoeres radiates;* Spanish hogfish, *Bodianus rufus*
Snapper Unit 3 Gray snapper, *Lutjanus griseus*, Lane snapper, *Lutjanus synagris*, Mutton snapper, *Lutjanus analis*, Dog snapper *Lutjanus jocu*, Schoolmaster , *Lutjanus apodus*, Mahogany snapper, *Lutjanus mahogoni*	**Jacks FMU** Blue runner, *Caranx crysos;* Horse-eye jack, *Caranx latus*; Black jack, *Caranx lugubris*; Almaco jack, *Seriola rivoliana*; Bar jack, *Caranx ruber*; Greater amberjack, *Seriola dumerili*; Yellow jack, *Caranx bartholomaei*
Snapper Unit 4 Yellowtail snapper, *Ocyurus chrysurus*	**Angelfish FMU** Queen angelfish, *Holacanthus ciliaris;* Gray angelfish, *Pomacanthus arcuatus;* French angelfish, *Pomacanthus paru*

Fishery Management Unit	
Parrotfish Unit Blue parrotfish , *Scarus coeruleus*, Midnight parrotfish, *Scarus coelestinus*, Princess parrotfish , *Scarus taeniopterus*, Queen parrotfish , *Scarus vetula*, Rainbow parrotfish, *Scarus guacamaia*, Redfin parrotfish, *Sparisoma rubripinne*, Redtail parrotfish, *Sparisoma chrysopterum*, Stoplight parrotfish, *Sparisoma viride*, Redband parrotfish , *Sparisoma aurofrenatum*, Striped parrotfish, *Scarus iseri* (formerly *Scarus croicencis*)	**Boxfish FMU** Honeycomb cowfish, *Acanthostracion polygonius* (formerly Lactophrys polygonia); Scrawled cowfish, *Acanthostracion quadricornis* (formerly *Lactophrys quadricornis*); Trunkfish, *Lactophrys trigonus;* Spotted trunkfish, *Lactophrys bicaudalis;* Smooth trunkfish, *Lactophrys triqueter*
Aquarium Trade Species[1]	**Triggerfish and Filefish FMU** Ocean triggerfish, *Canthidermis sufflamen;* Queen triggerfish, *Balistes vetula;* Sargassum triggerfish, *Xanthichthys ringens;* Black durgon, *Melichthys niger;* Scrawled filefish, *Aluterus scriptus;* Whitespotted filefish, *Cantherhines macrocerus*
Spiny Lobster FMP Spiny lobster, *Panulirus argus*	
Corals and Associated Plants and Invertebrates Prohibited corals and invertebrates[1] Aquarium Trade Species[1]	

[1]A comprehensive list of the species included in these FMUs can be found in 50 CFR Part 622, Appendix A to Part 622–-Species Tables.

Appendix D. Summary of Regulations in Federal, U.S. Virgin Islands, and Puerto Rico Waters

Revised 9.27.2016 – NMFS/Sustainable Fisheries/Caribbean Branch. This is a summary of current regulations for informational purposes only.

QUEEN CONCH	Closed	Open
Federal (only applies to Lang Bank, STX. Season closes when STX territorial limit is reached)	Jun 1 – Oct 31	Nov 1 – May 31
Puerto Rico	Aug 1 – Oct 31	Nov 1 – Jul 31
USVI (50,000 lbs STX & 50,000 lbs STT/STJ) Season closes when limit is reached	Jun 1 – Oct 31	Nov 1 – May 31

SNAPPERS

Snapper Unit 1: (1) silk, (2) black, (3) blackfin, (4) vermillion, (5) wenchman*

	Closed	Open
Federal	Oct 1 – Dec 31	Jan 1 – Sept 30
Puerto Rico (only applies to silk and blackfin)	Oct 1 – Dec 31	Jan 1 – Sept 30
USVI (only applies to STT/STJ)	Oct 1 – Dec 31	Jan 1 – Sept 30

*Wenchman was transferred from Snapper Unit 2 to Snapper Unit 1 (Effective January 30, 2012. Seasonal closure does not apply to wenchman).

Snapper Unit 2: (1) queen , (2) cardinal *new

Federal	No restrictions
Puerto Rico	
USVI	

*Cardinal was added to Snapper Unit 2 (Effective January 30, 2012)

Snapper Unit 3: (1) mutton, (2) lane, (3) gray, (4) dog, (5) schoolmaster, (6) mahogany

	Closed	Open
Federal (only applies to mutton and lane)	Apr 1 – Jun 30	July 1 – Mar 31
Puerto Rico (only applies to mutton)	Apr 1 – May 31	June 1 – Mar 31
USVI (only applies to mutton and lane)	Apr 1 – Jun 30	July 1 – Mar 31

Snapper Unit 4: (1) yellowtail snapper

No seasonal closures. Size limits apply year-round

Federal	12 inches (in) Total Length (TL)
Puerto Rico	10.5 in Fork Length (FL)
USVI	No size limit

PARROTFISH

Federal	• No harvest of midnight, blue, and rainbow parrotfish. • 8 in (FL) min. size for redband parrotfish <u>only applies to STX</u> • 9 in (FL) min. size all other parrotfish (princess, queen, striped, redtail, stoplight, redfin) <u>only applies to STX</u>
Puerto Rico	No restrictions
USVI	No restrictions

GROUPERS

Grouper Unit 1: (1) Nassau grouper

Federal	**PROHIBITED SPECIES**
Puerto Rico	
USVI	

Grouper Unit 2: (1) goliath grouper

Federal	**PROHIBITED SPECIES**
Puerto Rico	
USVI	

Grouper Unit 3: (1) red hind, (2) coney, (3) rock hind, (4) graysby

	Closed	Open
Federal (only applies to red hind fishing and possession west of 67°10' W. longitude)	Dec 1 – Last day Feb	Mar 1 – Nov 30
Puerto Rico (only applies to red hind)	Dec 1 – Feb 28	Mar 1 – Nov 30
USVI	------	--------

*Creole fish was removed from Grouper Unit 3 and from federal management (Effective January 30, 2012).

Grouper Unit 4*: (1) yellowfin, (2) red, (3) tiger, (4) black

	Closed	Open
Federal	Feb 1 – Apr 30	May 1 – Jan 31
Puerto Rico (only applies to yellowfin)	Feb 1 – Apr 30	May 1 – Jan 31
USVI	Feb 1 – Apr 30	May 1 – Jan 31

*Yellowedge and misty groupers were transferred from Grouper Unit 4 to Grouper Unit 5. Black grouper was added into Grouper Unit 4 (Effective January 30, 2012).

Grouper Unit 5*: (1) yellowedge, (2) misty

	Closed	Open
Federal (only applies to yellowedge)	Feb 1 – Apr 30	May 1 – Jan 31
Puerto Rico	No restrictions	
USVI (only applies to yellowedge)	Feb 1 – Apr 30	May 1 – Jan 31

*New unit (Effective January 30, 2012)

CORALS

Federal	No harvest of corals allowed (stony corals, octocorals, and live rock), except by permit for scientific, educational purposes.
Puerto Rico	
USVI	

SPINY LOBSTER

Federal	<u>No seasonal closures</u>. Must be landed whole. Size limit (> 3.5 in (8.9 cm) carapace length) and gear restrictions apply. No harvest of egg bearing females.
Puerto Rico	
USVI	

AQUARIUM TRADE SPECIES

Federal	List of allowed species
Puerto Rico	List of allowed species; state permit required
USVI	Territorial permit required

FEDERAL RECREATIONAL BAG LIMITS

Aggregate bag limit for:	**Allowed quantity:**
snapper grouper parrotfish	5 fish per person/day, or if 3 or more persons are aboard, 15 fish from aggregate per vessel/day; but not to exceed: 2 parrotfish per person/day or 6 parrotfish per vessel/day.
Angelfish, boxfish, goatfish, grunts, wrasses, jacks, scups and porgies, squirrelfish, triggerfish and filefish, tilefish	5 fish per person/day or, if 3 or more persons are aboard, 15 fish from aggregate per vessel/day, but not to exceed: 1 surgeonfish per person/day or 4 surgeonfish per vessel/day.
Spiny lobster	3 spiny lobsters per fisher/day, no more than 10 spiny lobsters per vessel/day.

QUEEN CONCH RECREATIONAL AND COMMERCIAL LIMITS

RECREATIONAL BAG LIMIT

Federal	3 conch per person/day, or if > than 4 persons aboard, 12 conchs per vessel
Puerto Rico	3 conch per person/day, 12 per vessel/day
USVI	6 conch per fisher/day, no more than 24 per vessel/day

COMMERCIAL LIMIT

Federal	200 conch per vessel per day
Puerto Rico	150 conch person/day, 450 per vessel/day
USVI	200 conch per vessel/day

OTHER SPECIES RESTRICTIONS

		Min. Size (FL)
Puerto Rico	White grunt (*Haemulon plumieri*)	8 in (203 mm)
	Honeycomb cowfish (*Acanthostracion polygonia*)	7 in (78 mm)
	Scrawled cowfish (*A. quadricornis*)	7 in (78 mm)
	Cero (*Scomberomorus regalis*)	16 in (406 mm)
	King mackerel (*S. cavalla*)	20 in (508 mm)
	Snook (*Centropomus undecimalis*)	22 in (559 mm)

SEASONAL AREA CLOSURES

Grammanik Bank, STT – NO fishing any fish from **Feb 1 - Apr 30**, except for HMS
Hind Bank, STT - Closed year-round to all fishing and anchoring
Mutton Snapper Spawning Aggregation, STX – NO fishing any fish from **Mar 1 - Jun 30**
Bajo de Sico , PR – NO fishing of Council managed reef fish species from **Oct 1 - Mar 31**
NO anchoring year-round
Tourmaline Bank and Abrir la Sierra Bank, PR – NO fishing any fish from **Dec 1 - Feb 28**
*Fishing with pots, traps, bottom longlines, gillnets or trammel nets is prohibited year-round in these areas.