Generic Framework Amendment 1 to the Fishery Management Plans for Puerto Rico, St. Thomas and St. John, and St. Croix: Modification of Spiny Lobster Management Reference Points Based on SEDAR 57 Stock Assessments

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

September 2022

Environmental Assessment Cover Sheet

Name of Action

Environmental Assessment for the Generic Framework Amendment 1 to the Fishery Management Plans for Puerto Rico, St. Thomas and St. John, and St. Croix: Modification of Spiny Lobster Management Reference Points Based on SEDAR 57 Stock Assessments.

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This Environmental Assessment (EA) is being prepared using the 2020 CEQ NEPA Regulations. The effective date of the 2020 Council on Environmental Quality National Environmental Policy Act Regulations was September 14, 2020, and reviews begun after this date are required to apply the 2020 regulations unless there is a clear and fundamental conflict with an applicable statute. 85 *Federal Register* at 43372-73 (§§ 1506.13, 1507.3(a)). This EA began on December 8, 2020, and accordingly proceeds under the 2020 regulations.

Abbreviations and Acronyms Used in this Document

ABC	acceptable biological catch
ACL	annual catch limit
AM	accountability measure
CEA	cumulative effects analysis
CFMC	(Council); Caribbean Fishery Management Council
DNER	Department of Natural and Environmental Resources (Puerto Rico)
DPNR	Department of Planning and Natural Resources (United States Virgin Islands)
DPS	distinct population segment
EA	environmental assessment
EBFM	ecosystem-based fishery management
EEZ	exclusive economic zone
EIS	environmental impact statement
FMP	fishery management plan
F_{MSY}	fishing mortality rate yielding maximum sustainable yield
MFMT	maximum fishing mortality threshold
MSA	(Magnuson-Stevens Act); Magnuson-Stevens Fishery Conservation and Management Act
MSST	minimum stock size threshold
MSY	maximum sustainable yield
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
OFL	overfishing limit
OY	optimum yield
SDC	status determination criteria
SEDAR	Southeast Data, Assessment, and Review (stock assessment)
SEFSC	Southeast Fisheries Science Center
SSC	Scientific and Statistical Committee
SYL	sustainable yield level
USVI	United States Virgin Islands

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Chapter 1. Introduction

The Caribbean Fishery Management Council (Council) is one of eight regional fishery management councils established by the Magnuson-Stevens Fishery Conservation and Management Act of 1976 (Magnuson-Stevens Act). The Council prepares fishery management plans (FMP) and amendments to those FMPs that are designed to manage fishery resources within the federal waters of the U.S. Caribbean, which includes waters off Puerto Rico and the U.S. Virgin Islands (USVI).

The National Marine Fisheries Service (NMFS) is responsible for the stewardship of the nation's ocean resources and their habitat. Specifically, NMFS is responsible for the collection of data and for conducting stock assessments in support of science-based fishery management to prevent overfishing and rebuild overfished fish stocks. The Council develops a framework amendment and sends it to NMFS, which implements the measures in the amendment on behalf of the Secretary of Commerce through the development of regulations. NMFS's Southeast Regional Office is responsible for implementing and enforcing management measures based on the U.S. Caribbean FMPs and amendments.

1.1 What Action is Proposed?

The Generic Framework Amendment 1 to the Comprehensive FMP for the Puerto Rico Exclusive Economic Zone (EEZ) (Puerto Rico FMP), the Comprehensive FMP for the St. Thomas and St. John EEZ (St. Thomas and St. John FMP), and the Comprehensive FMP for the St. Croix EEZ (St. Croix FMP) (Framework Amendment) includes an action to update the status determination criteria (SDC) and other management reference points for spiny lobster under each FMP based on the Southeast Data, Assessment, and Review 57 (SEDAR 57) stock assessments. The Puerto Rico FMP, St. Thomas and St. John FMP, and St. Croix FMP are collectively referred to as the island-based FMPs throughout this Framework Amendment.

Status Determination Criteria and Definitions

Maximum Fishing Mortality Threshold (MFMT) – The level of fishing mortality (F), on an annual basis, above which overfishing is occurring. The MFMT or reasonable proxy may be expressed either as a single number (a fishing mortality rate or F value), or as a function of spawning biomass or other measure of reproductive potential.

Minimum Stock Size Threshold (MSST) – The biomass level below which the capacity of the stock to produce MSY on a continuing basis has been jeopardized. A stock or stock complex is considered overfished when its biomass has declined below MSST.

Overfishing Limit (OFL) – The annual amount of catch that corresponds to the estimate of MFMT applied to a stock or stock complex's abundance and is expressed in terms of numbers or weight of fish.

Overfishing occurs whenever a stock or stock complex is subjected to a level of fishing mortality or total catch that jeopardizes the capacity of a stock or stock complex to produce MSY on a continuing basis.

Overfished. A stock or stock complex is considered "overfished" when its biomass has declined below the MSST.

Status determination criteria are the measurable and objective factors, maximum fishing mortality threshold (MFMT), minimum stock size threshold (MSST), and overfishing limit (OFL), or their proxies, that are used to determine if overfishing has occurred, or if the stock or stock complex is overfished. 50 C.F.R. 600.310(e)(2)(i)(A). Under the National Standard 1 guidelines, SDC, maximum sustainable yield (MSY), optimum yield (OY), acceptable biological catch (ABC), and annual catch limit (ACL) are collectively referred to as "reference points," 50 C.F.R. 600.310(b)(2)(iv). The SDC and other reference points are collectively referred to as management reference points throughout this Framework Amendment.

Other Management Reference Points

Maximum Sustainable Yield (MSY) – The largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological, environmental conditions and fishing technology characteristics (e.g., gear characteristics) and the distribution of catch among fleets.

Acceptable Biological Catch (ABC) – The catch level recommended by the SSC and set at or below OFL to account for scientific uncertainty.

Annual Catch Limit (ACL) – The limit of total annual catch for a stock or stock complex that serves as the basis for invoking accountability measures. The ACL cannot exceed the ABC.

Optimum Yield (OY) – The amount of fish that provides the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems.

The SDC to be updated for spiny lobster under this Framework Amendment to the island-based FMPs include the MFMT, the MSST, and the OFL. Other spiny lobster management reference points to be updated include the MSY, or MSY proxy, ABC, OY, and ACL.

The Framework Amendment includes a second action that would revise the accountability measure (AM) trigger for spiny lobster in each island/island group from the AM trigger described in the island-based FMPs.

1.2 Why is the Council Considering Action?

The Council is considering action to update management reference points to incorporate information from the Southeast Data, Assessment, and Review (SEDAR) 57 U.S. Caribbean Spiny Lobster stock assessments, which are considered best scientific information available for the U.S. Caribbean spiny lobster stocks. Following the SEDAR assessments, the spiny lobster stock in each island-based FMP would change from Tier 4a (data limited, no accepted assessment available) to Tier 3 (data limited, accepted assessment available) in the Council's ABC Control Rule, which is included in each island-based FMP. The Council is also considering revising the AM trigger for spiny lobster to (1) respond to landings information available since the AM trigger was developed under the island-based FMPs and (2) anticipate changes to the spiny lobster ACLs moving forward, following the spiny lobster stock assessments.

1.2.1 Spiny Lobster Stock Assessments

In 2019, SEDAR completed three stock assessments for spiny lobster, one for the Puerto Rico spiny lobster stock, one for the St. Thomas and St. John spiny lobster stock, and one for the St. Croix spiny lobster stock (SEDAR 57 2019; http://sedarweb.org/sedar-57). Due to the lack of an estimable spawner-recruit relationship, MSY could not be reliably estimated for the three spiny lobster stocks. Therefore, the stock status, OFL, and projected landings were presented relative to a provisional MSY proxy of $F_{SPR30\%}$.[1] SEDAR 57 used management threshold definitions of $F_{SPR30\%}$ for the MFMT and 75% of $S_{SPR30\%}$ for the MSST. The assessments estimated that the fishing mortality was below MFMT and the spawning output was above MSST. Thus, each spiny lobster stock was determined to be not undergoing overfishing and not overfished.

The Council's Scientific and Statistical Committee (SSC) reviewed results from SEDAR 57 and determined that the stock assessments are suitable for management advice. Specifically, the SSC (1) supported the three island-based spiny lobster stock assessments (statistical catch at age models) as providing the best scientific information available relative to the SDC of overfishing status and overfished status; (2) accepted the $F_{SPR30\%}$ as an MSY proxy; (3) supported the outcome of the SEDAR 57 that overfishing is not occurring relative to the recommended MFMT and that the populations are not overfished relative to the recommended MSST; and (4) supported and recommended the use of the assessments to update the values for management reference points and SDC in each of the island-based FMPs, using the Council's ABC Control Rule included in each the island-based FMPs as described below.

The Council requested that the SSC coordinate with the Southeast Fisheries Science Center (SEFSC) to provide OFLs and ABCs for spiny lobster for each island/island group, based on SEDAR 57, for 2021 to 2023. Council intent would be to request the SEFSC provide an interim assessment[2] by 2023 to update OFL projections and set catch levels for 2024 and later years.

1.2.2 Acceptable Biological Catch Control Rule

The ABC is a level of annual catch recommended by the Council's SSC, which accounts for the scientific uncertainty in the estimate of the OFL, any other scientific uncertainty, and the Council's risk policy (50 CFR 600.310(f)(1)(ii)). The Council's risk policy could be based on an acceptable probability (at least 50%) that catch equal to the stock's ABC will not result in overfishing. The Council's choice of a risk policy cannot result in an ABC that exceeds the OFL (50 CFR 600.310(f)(2)(i)). Councils and their SSC should develop a process by which the SSC

[1] The F_{MSY} proxy of $F_{SPR30\%}$ is calculated from spawning-stock-biomass-per-recruit (SPR) analyses. Under conditions of no fishing mortality, 100% of a stock's spawning potential is obtained. A fishing mortality rate, denoted by $F_{SPR30\%}$ would allow the stock to attain 30% of the maximum spawning potential, which would have been obtained under conditions of no fishing mortality.

[2] An interim assessment would update the model projections used in the SEDAR 57 stock assessments with more recent commercial landings and length-composition data, as available, for each island/island group.

can access the best scientific information available when implementing the ABC Control Rule (i.e., specifying the ABC) (50 CFR 600.310(f)(3). The SSC must recommend the ABC to the Council.

Each of the Puerto Rico, St. Thomas and St. John, and St. Croix FMPs adopt and apply a newly devised, four-tiered ABC Control Rule to specify SDC (i.e., MFMT, MSST, and OFL or OFL proxy) and other management reference points (i.e., MSY or MSY proxy and ABC), depending on differing levels of data availability (see Appendix A). In each FMP, spiny lobster was considered a Tier 4a stock (data limited with no accepted assessment, with relatively low vulnerability to fishing pressure).[3] In the FMPs, the MSY proxy, MFMT, and MSST for Tier 4a stocks were defined (see Appendix A), but due to data limitations, were not quantified. Similarly, under Tier 4a, the OFL could not be quantified. Thus, a new reference point, the sustainable yield level (SYL), which is a level of landings that can be sustained over the long-term, was quantified and used as the OFL proxy and an additional MSY proxy.[4] Under the island-based FMPs, the SSC recommended ABCs, which were derived from the spiny lobster SYLs, and the Council set each spiny lobster ACL at 95% of the respective island's ABC (Table 1.1).

Table 1.1. Spiny lobster SYL, ABC, and ACL specified for federal waters under the Puerto Rico FMP, St. Thomas and St. John FMP, and St. Croix FMP. Values are in pounds whole weight.

Fishery Management Plan	Spiny Lobster SYL*	Spiny Lobster ABC	Spiny Lobster ACL
Puerto Rico	924,968	554,981	527,232
St. Thomas and St. John	367,035	220,221	209,210
St. Croix	346,541	207,925	197,528

* Under Tier 4 of the ABC Control Rule included in each FMP, the SYL was quantified and used as the OFL proxy.

Based on the uncertainty in the data used in the SEDAR 57 stock assessment models, the SSC in consultation with the SEFSC recommended that spiny lobster be classified as a Tier 3 stock (data limited, accepted assessment available) under the ABC Control Rule for each FMP. Under Tier 3 of the ABC Control Rule, if the biomass of the stock falls below MSST, which would be set equal to 75% of the long-term spawning stock biomass at MFMT (SSB_{MFMT}), the stock would be determined to be overfished (i.e., if B/MSST <1) and the Council would then need to develop a rebuilding plan capable of returning the stock to a level that allows the stock to achieve MSY on

[3] Spiny lobster was considered to be a Tier 4a stock in each FMP due in part to recruitment (the species is found throughout the Caribbean and the duration of the larval stage is several months) and sizes of spiny lobsters that are harvested compared to the minimum size limit in place (average carapace lengths observed were greater than the minimum size limit of 3.5 inches carapace length).

[4] The SYL is intended to be used when the information or resources needed to produce a quantitative stock assessment are not available to determine the MSY or corresponding reference point such as the OFL, and therefore it is specific to Tier 4.

a continuing basis. Additionally, under Tier 3, in years when there is a stock assessment, if fishing mortality (F) exceeds the MFMT, the stock is considered to be undergoing overfishing (i.e., if F/MFMT >1), because this level of fishing mortality, if continued, would reduce the stock biomass to an overfished condition. In years in which there is no assessment, overfishing would occur if landings exceed the OFL.[5]

Under Tier 3 of the ABC Control Rule, the ABC is derived from the OFL, reduced by the SSC's scientific uncertainty[6] buffer (sigma; for spiny lobster stocks sigma = 1.0) and reflecting the acceptable probability of overfishing determined by the Council (P*; for spiny lobster stocks P* = 0.45).[7] The ACL would then be derived from the ABC, reduced by the Council's management uncertainty[8] buffer (Action 1).

1.2.3 Statement of Purpose and Need

The purpose of this framework amendment is to update management reference points for spiny lobster under the Puerto Rico, St. Thomas and St. John, and St. Croix FMPs to account for the SEDAR 57 spiny lobster stock assessments and application of the Council's ABC Control Rule and to revise the AM trigger for spiny lobster stocks.

The need for this framework amendment is to update management measures for spiny lobster stocks based on best scientific information available to prevent overfishing and achieve OY, consistent with the requirements of the Magnuson-Stevens Act.

[5] Under Tier 3 of the ABC Control Rule, overfishing would be determined to be occurring if one year of landings exceeds the annual OFL for the stock.
[6] Scientific uncertainty takes into account the deficiencies in and vagaries of reporting, which includes potential biases (over reporting, underreporting, trends), changes in reporting forms, changes in fishermen behavior, the contribution of unspecified landings, expansion factors and validation capacity, availability of recreational data (quantity and quality), availability of ancillary data, and life history parameters, focusing on how these deficiencies affected data quality.
[7] The SSC set a sigma value of 1.0 at their May 2020 meeting and the Council set a P* value of 0.45 at their June 2020 meeting.
[8] Management uncertainty refers to uncertainty in the ability of managers to constrain catch so the ACL is not exceeded, and the uncertainty in quantifying the true catch amounts (i.e., estimation errors).

1.3 Where Will the Action Have an Effect?

Under the Puerto Rico FMP (CFMC 2019a), St. Thomas and St. John FMP (CFMC 2019b), and the St. Croix FMP (CFMC 2019c), the Council is responsible for managing fishery resources, including spiny lobster, in federal waters in the U.S. Caribbean region (Figure 1.1).

The EEZ around each island/island group was discussed in detail in the respective FMP, and is incorporated herein by reference. The EEZ around Puerto Rico (Puerto Rico EEZ) ranges from 9-200 nautical miles (17-370 kilometers) from the shore of the Commonwealth of Puerto Rico to the outer boundary of the EEZ. The EEZ around St. Thomas and St. John (St. Thomas and St. John EEZ) and around St. Croix (St. Croix EEZ) ranges 3-200 nautical miles (6-370 kilometers) from the shore of the respective USVI island/island group to the outer boundary of the EEZ.

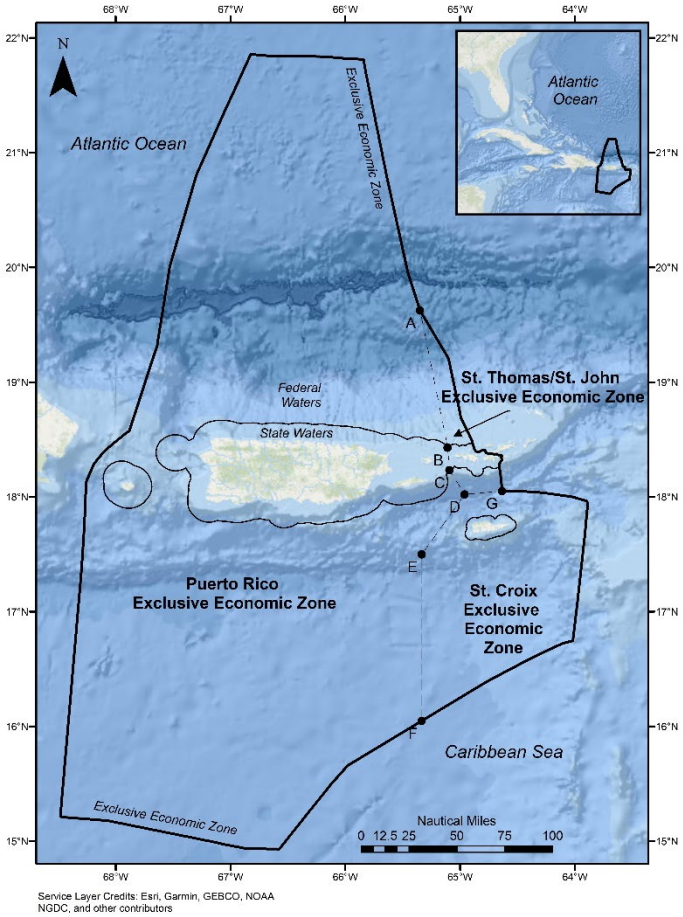

Figure 1.1. U.S. Caribbean region with boundaries between the Puerto Rico, St. Thomas and St. John, and St. Croix management areas.

1.4 History of Federal Fisheries Management

The island-based FMPs established management measures for the EEZ around each respective island. The island-based FMPs updated the list of species included for federal management and how those species would be grouped into stocks or stock complexes; specified management reference points for managed stocks and stock complexes; updated accountability measures; described essential fish habitat for managed species; and updated the FMP framework procedures. The island-based FMPs retained other management measures established under the U.S. Caribbean-wide FMPs that apply to the respective island management area (e.g., seasonal and area closures, minimum size limits, recreational bag limits). The Secretary of Commerce approved the island-based FMPs on September 22, 2020.

Prior to the development of the island-based FMPs, spiny lobster was managed throughout the U.S. Caribbean EEZ under the Spiny Lobster FMP of Puerto Rico and the USVI (CFMC 1981), as amended. The history of management actions under the Spiny Lobster FMP are summarized in Appendix C of each island-based FMP.

Below is an annotated list of fishery management actions implemented under the island-based FMPs and the Spiny Lobster FMP and its amendments that are specifically related management reference points and AMs for spiny lobster.

Puerto Rico FMP (CFMC 2019a), St. Thomas and St. John FMP (CFMC 2019b), and St. Croix FMP (CFMC 2019c)
The FMPs included a new four-tiered ABC Control Rule to define management reference points for spiny lobster. Each FMP updated the AM trigger for spiny lobster.

Spiny Lobster FMP (49 FR 50049 December 26, 1984)
The Spiny Lobster FMP defined MSY and OY for spiny lobster. Under the FMP, MSY was estimated for the three island areas (Puerto Rico, St. Thomas and St. John, St. Croix) and then summed to provide an estimate for the entire management area (U.S. Caribbean EEZ).

Amendment 1 (56 FR 19098 April 25, 1991)
Amendment 1 implemented definitions for overfished and overfishing and outlined framework actions that could be taken by the Council should overfishing occur.

Amendment 2 (70 FR 62073 October 28, 2005)
Amendment 2, part of the Caribbean Sustainable Fisheries Act Amendment, redefined MSY and OY and defined the MSST and MFMT for spiny lobster.

Amendment 5 (76 FR 82414 December 30, 2011)
Amendment 5, part of the 2011 Caribbean ACL Amendment, revised the management reference points and status determination criteria established in Amendment 2 and established ACLs (specified for each of Puerto Rico, St. Thomas and St. John, and St. Croix) and AMs for spiny lobster.

Amendment 6 (81 FR 29166 May 11, 2016)
Amendment 6 revised the language within the FMP 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.

Chapter 2. Proposed Actions and Alternatives

Framework procedures included in the Puerto Rico Fishery Management Plan (FMP), the St. Thomas and St. John FMP, and the St. Croix FMP allow the Caribbean Fishery Management Council (Council) to modify management measures in certain situations, including when a new stock assessment indicates changes should be made to management reference points and status determination criteria (SDC), and to revise accountability measures (AM) (e.g., change AM trigger) (See Table 5.12.1 in each FMP).

Based on Southeast Data, Assessment, and Review (SEDAR) 57, this Framework Amendment to the island-based FMPs would update values for the following management reference points for the spiny lobster stock in each FMP: maximum sustainable yield (MSY) or MSY proxy, maximum fishing mortality threshold (MFMT), and minimum stock size threshold (MSST) using definitions specified in the Acceptable Biological Catch (ABC) Control Rule included in the island-based FMPs. Under this Framework Amendment, the MSY proxy, MFMT, and MSST for spiny lobster in each island/island group would be as specified in Table 2.1.

Table 2.1. Management reference points from SEDAR 57 spiny lobster stock assessments for each island/island group.

Management Reference Point	Puerto Rico	St. Thomas/St. John	St. Croix
MSY proxy*	432,501	133,601	127,742
MFMT (F_{SPR30})	0.197	0.244	0.203
MSST ($0.75*SSB_{MFMT}$) (1,000 eggs)	8.48 E+07	2.13 E+07	2.30 E+07

* Values are in pounds whole weight.

Additionally, the Council would take action to update the overfishing limit (OFL), ABC, and annual catch limit (ACL) for spiny lobster in each FMP (Action 1) and to revise the AM trigger for spiny lobster (Action 2).

2.1 Action 1: Spiny Lobster OFLs, ABCs, and ACLs

The Council's Scientific and Statistical Committee (SSC) recommended both a variable-catch approach and a constant-catch approach for updating spiny lobster OFLs and ABCs for the period of 2021-2023 under each FMP. Both approaches use the island-specific OFLs projected from the stock assessment model and the ABC estimates determined by applying Tier 3 of the Council's ABC Control Rule.

For the variable-catch approach, the SSC recommended spiny lobster OFLs and ABCs for 2021 to 2023 for each island/island group that would change each year (Table 2.2). For the constant-catch approach, the SSC recommended a constant-catch ABC derived from a constant-catch

OFL that was set equal to the average of the 2021-2023 OFLs (Table 2.3). For both the variable-catch and constant-catch approaches, the SSC recommended the spiny lobster OFLs/ABCs for 2024 and subsequent years be set equal to the OFL and ABC values specified for 2023 under the variable-catch approach, until modified by a subsequent amendment.

Through Action 1, the Council would select the process for determining the ACL(s) from the ABC(s) recommended by the SSC for spiny lobster in each island/island group based on the Council's preferred approach for determining OFLs and ABCs (i.e., variable-catch or constant-catch approach). The Council would also select the level of management uncertainty to derive the ACLs from the ABCs. The ACL would be set equal to OY for the stock. The Council could select a different alternative and sub-alternative for each island or island group.

Table 2.2. Variable-catch OFLs and ABCs for spiny lobster for each island/island group, based on SEDAR 57 stock assessments and Tier 3 of the ABC Control Rule included in each island-based FMP. All values are in pounds whole weight.

Year	Puerto Rico OFL	Puerto Rico ABC	St. Thomas/ St. John OFL	St. Thomas/ St. John ABC	St. Croix OFL	St. Croix ABC
2021	444,020	391,587	195,223	172,170	200,020	176,400
2022	440,387	388,383	165,021	145,534	159,452	140,623
2023	438,001	386,279	150,497	132,725	144,219	127,189
2024+[1]	438,001	386,279	150,497	132,725	144,219	127,189

[1] If subsequent assessments are not completed and an amendment is not implemented by 2024, the OFLs and ABCs would be equal to the values specified for 2023.

Table 2.3. Constant-catch OFLs and ABCs for spiny lobster for each island/island group, based on SEDAR 57 stock assessments and Tier 3 of the ABC Control Rule included in each island-based FMP. All values are in pounds whole weight.

Year	Puerto Rico OFL	Puerto Rico ABC	St. Thomas/ St. John OFL	St. Thomas/ St. John ABC	St. Croix OFL	St. Croix ABC
2021-2023	440,803	388,750	170,247	150,143	167,897	148,071
2024+[1]	438,001	386,279	150,497	132,725	144,219	127,189

[1] If subsequent assessments are not completed and an amendment is not implemented by 2024, the OFLs and ABCs under the constant-catch approach would be set equal to the values specified for 2023 under the variable-catch approach (Table 2.2).

2.1.1 Proposed Alternatives for Action 1

Alternative 1. No Action. The OFL proxy, ABC, and ACL (which equals OY) for spiny lobster would remain as specified under the Puerto Rico FMP, St. Thomas and St. John FMP, and St. Croix FMP (Table 1.1).

Alternative 2. Select the variable-catch approach for specifying OFLs and ABCs for spiny lobster (Table 2.2), and use the variable-catch ABCs to derive the spiny lobster variable-catch ACLs (which equals OY) (Table 2.4), under one of the sub-alternatives listed below.

Sub-alternative 2a. OY = ACL = ABC

Sub-alternative 2b. OY = ACL = ABC x 0.95

Sub-alternative 2c. OY = ACL = ABC x 0.90

Preferred Alternative 3. Select the constant-catch approach for specifying the OFL and ABC for spiny lobster (Table 2.3), and use the constant-catch ABC to derive the spiny lobster constant-catch ACL (which equals OY) (Table 2.5), under one of the sub-alternatives listed below.

Sub-alternative 3a. OY = ACL = ABC

Preferred Sub-alternative 3b. OY = ACL = ABC x 0.95

Sub-alternative 3c. OY = ACL = ABC x 0.90

Table 2.4. Variable-catch ACLs for spiny lobster for each island/island group based on the variable-catch ABCs recommended by the SSC as reduced by the Council's management uncertainty buffer (Alternative 2, Sub-alternatives 2a-2c).

Island/Island Group	Year	Sub-alternative 2a (ACL = ABC)	Sub-alternative 2b (ACL = ABC * 0.95)	Sub-alternative 2c (ACL = ABC * 0.90)
Puerto Rico	2021	391,587	372,008	352,428
	2022	388,383	368,964	349,545
	2023+[1]	386,279	366,965	347,651
St. Thomas/ St. John	2021	172,170	163,562	154,953
	2022	145,534	138,257	130,981
	2023+[1]	132,725	126,089	119,453
St. Croix	2021	176,400	167,580	158,760
	2022	140,623	133,592	126,561
	2023+[1]	127,189	120,830	114,470

[1] If subsequent assessments are not completed and an amendment is not implemented by 2024, the ACLs would be equal to the values specified for 2023.

Table 2.5. Constant-catch ACLs for spiny lobster for each island/island group based on the constant-catch ABC recommended by the SSC as reduced by the Council's management uncertainty buffer (Alternative 3, Sub-alternatives 3a-3c).

Island/Island Group	Year	Sub-alternative 3a (ACL = ABC)	Preferred Sub-alternative 3b (ACL = ABC * 0.95)	Sub-alternative 3c (ACL = ABC * 0.90)
Puerto Rico	2021-2023	388,750	369,313	349,875
	2024+[1]	386,279	366,965	347,651
St. Thomas/ St. John	2021-2023	150,143	142,636	135,129
	2024+[1]	132,725	126,089	119,453
St. Croix	2021-2023	148,071	140,667	133,264
	2024+[1]	127,189	120,830	114,470

[1] If subsequent assessments are not completed and an amendment is not implemented by 2024, the ACLs under the constant-catch approach would be set equal to the values specified for 2023 under the variable-catch approach (Table 2.4).

2.1.2 Discussion of Action 1 Alternatives

As stated above, the Council could select a different alternative for specifying OFLs, ABCs, and ACLs for spiny lobster under each of the Puerto Rico, St. Thomas and St. John, or St. Croix FMPs.

Alternative 1 would not update spiny lobster OFLs, ABCs, and ACLs following the SSC accepted SEDAR 57 stock assessments, and thus would not be based on the best scientific information available, even if it was the best scientific information available at the time the island-based FMPs were developed. The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) states "conservation and management measures shall be based upon the best scientific information available." 50 C.F.R. 600.315(a). Under **Alternative 1**, the ACLs specified for Puerto Rico, St. Thomas and St. John, and St. Croix would exceed the variable-catch and constant-catch ABCs recommended by the SSC (as based on the SEDAR 57 stock assessments and application of Tier 3 of the ABC Control Rule). The Magnuson-Stevens Act specifies that ACLs cannot exceed the ABC recommended by the Council's SSC. MSA § 302(h)(6); 50 C.F.R. 600.310(f)(1)(iii). **Alternative 1** would be inconsistent with the requirements of the Magnuson-Stevens Act and National Standard 2 Guidelines.

Contrary to **Alternative 1**, **Alternative 2** and **Preferred Alternative 3**, discussed below, would set the OFLs, ABCs, and ACLs for spiny lobster in each island/island group using the best scientific information available (i.e., SEDAR 57, Tier 3 of the ABC Control Rule, and SSC recommendations). Applying the best scientific information available would ensure that federally managed stocks are harvested sustainably while protecting reproductive capacity and maintaining effective ecological contributions. Under **Alternative 2** and **Preferred Alternative**

3, if an interim assessment is not completed and an amendment is not implemented by 2024, under both the variable-catch and constant-catch approaches the OFLs, ABCs, and ACLs for 2024 and later would be set equal to the values specified for 2023 under the variable-catch approach (Tables 2.2 and 2.4).

Alternative 2, the variable-catch approach, would specify OFLs, ABCs, and ACLs for spiny lobster for 2021-2023, and the values would change each year (Tables 2.2 and 2.4). Under **Alternative 2**, the OFLs for all three islands/island groups would be set at a level above the MSY proxy and would decrease each year from 2021 to 2023, converging down towards the respective MSY proxy (Table 2.1). For each spiny lobster stock, SEDAR 57 stated that the current spawning stock biomass is above the level that produces MSY. So long as a stock's biomass remains above the level that produces MSY, fishing at the estimated harvest rate that produces the longer term MSY can result in catch levels that are higher than the stock's MSY. Thus, the stock assessment model initially allows for a higher level of catch that in time decreases towards the MSY proxy and so no negative effects to each stock's ability to produce its MSY would be expected from the 2021-2023 OFLs being above the MSY proxy. The ABCs, derived from the OFLs, and the ACLs, derived from the ABCs, would also decrease each year from 2021 to 2023. The variable OFLs, ABCs, and ACLs specified for 2021-2023 under **Alternative 2** would be less than the values specified under **Alternative 1**. However, under **Alternative 2** the updated management reference points would be expected to better protect against overfishing in relation to those included in the island-based FMPs, thus ensuring, to the best extent practicable, continued access to the resource in future years.

Under **Sub-alternatives 2a-2c**, the Council would apply a reduction buffer to the ABC to account for their level of management uncertainty for spiny lobster in each island-specific fishery. **Sub-alternative 2a** (no reduction) would set the ACL equal to the ABC, resulting in the greatest harvest allowed of the sub-alternatives (Table 2.4). **Sub-alternative 2b** (5% reduction buffer) and **Sub-alternative 2c** (10% reduction buffer) would result in more conservative ACLs for spiny lobster when compared to **Sub-alternative 2a**, with **Sub-alternative 2c** allowing for the least amount of harvest of the sub-alternatives.

As under **Alternative 2**, **Preferred Alternative 3** would update OFLs, ABCs, and ACLs for spiny lobster in each island/island group. For each island/island group the total harvest allowed under **Preferred Alternative 3** would be equal to the total harvest allowed under **Alternative 2**, but **Preferred Alternative 3** would specify a constant-value OFL, ABC, and ACL for spiny lobster for each island/island group for 2021-2023 (Tables 2.3 and 2.5) based on the OFL and ABC recommendations from the Council's SSC. Under **Preferred Alternative 3**, the OFL for each island/island group would be greater than the MSY proxy, but would not converge towards the respective MSY proxy (Table 2.1). As mentioned above for **Alternative 2**, for each island/island group, the current spiny lobster spawning stock biomass is above the level that

produces MSY and no negative effects to each stock's ability to produce its MSY would be expected from the 2021-2023 OFLs being above the MSY proxy. For years 2024 and later, the OFLs, ABCs, and ACLs under **Preferred Alternative 3** would be equal to the OFLs, ABCs, and ACLs set for year 2023 and later under **Alternative 2.** Under both alternatives, those values would remain in place until amended. The sub-alternatives under **Preferred Alternative 3** would set the ACL from the ABC using the same management uncertainty reduction buffers specified in the sub-alternatives under **Alternative 2,** described above. The Council selected **Sub-alternative 3b** as their preferred sub-alternative. **Preferred Sub-alternative 3b** has a 5% reduction buffer from the ABC to ACL to account for management uncertainty.

Summary

Managing based on best scientific information available better ensures the spiny lobster stocks are harvested sustainably. For all three island management areas, **Alternative 2** and **Preferred Alternative 3** have a smaller buffer between the OFL and the ABC[9] when compared to the buffer between the OFL proxy (SYL) and ABC under **Alternative 1**.[10] In general, a smaller buffer would increase the likelihood that OFL could be exceeded if catch rates or effort is higher than expected. If the OFL is exceeded, this would indicate that the stock is experiencing overfishing and would require immediate action to end overfishing. However, the overfishing SDC under **Alternative 1** do not reflect the best scientific information available for spiny lobster and the higher ACLs under **Alternative 1** could lead to overfishing as defined under SEDAR 57.

The ACLs for spiny lobster under **Alternative 2** and **Preferred Alternative 3** are less than the ACLs under **Alternative 1**. However, under all alternatives, exceeding the ACL could require AM-based closures in subsequent fishing years to prevent repeated ACL overages and protect against overfishing. In Puerto Rico, the most recent and complete (i.e., landings adjusted using coast-specific expansion factors) post-hurricane landings for spiny lobster (years 2018 and 2019) were at a level above the proposed OFLs and ACLs under **Alternative 2** and **Preferred Alternative 3**, but under the OFL proxy (SYL) and ACL specified under **Alternative 1**. If future spiny lobster landings in Puerto Rico are at the 2018 or 2019 levels, then the AM could be triggered and management actions, including reductions to the fishing season, would be required under **Alternative 2** and **Preferred Alternative 3** but not under **Alternative 1**. Landings of spiny lobster in both St. Thomas and St. John and St. Croix in 2018 and 2019 have been below the proposed OFLs and ACLs under all alternatives, and thus would not be expected to trigger AMs and any management actions such as fishing season reductions if landings remain at that level.

[9] The ABC for spiny lobster under Alternative 2 and Preferred Alternative 3 is 88% of the OFL for each island/island group, providing a 12% buffer between the two reference points.

[10] The ABC for spiny lobster under Alternative 1 is 60% of the OFL proxy (i.e., the SYL) for each island/island group, providing a 40% buffer between the two reference points.

2.2 Action 2: Spiny Lobster Accountability Measure Trigger

Through Action 2, the Council would revise the AM trigger for the spiny lobster stock under each FMP. The AM trigger is the process NMFS would use to evaluate whether to apply the AM. For spiny lobster, the AM is a fishing season reduction to prevent the ACL from being exceeded. If triggered, NMFS would estimate the length of the fishing season reduction and apply the reduction in the same manner described in the island-based FMPs. Any fishing season reduction would be applied from September 30 and moving earlier toward the beginning of the fishing year (i.e., January 1). If the required length of the fishing season reduction exceeds the time period of January 1 through September 30, any additional fishing season reduction would be applied from October 1 and moving later toward the end of the fishing year (i.e., December 31).

The Council could select a different alternative for each island or island group.

2.2.1 Proposed Alternatives for Action 2

Alternative 1. No Action. Use the AM trigger described for spiny lobster in the Puerto Rico FMP, St. Thomas and St. John FMP, or St. Croix FMP, as follows:

> An AM would be triggered if spiny lobster landings exceed the spiny lobster ACL, unless NMFS' Southeast Fisheries Science Center determines the overage occurred because data collection or monitoring improved rather than because landings increased. Landings from the following years, in order, would be used to evaluate an exceedance of the spiny lobster ACL.
>
> (1) Landings from 2018
> (2) Landings from 2019
> (3) Two-year average of landings from 2019 and 2020
> (4) Three-year average of landings from 2019, 2020, and 2021
> (5) Thereafter, a progressive running three-year average (2020-2022, 2021-2023, etc.).
>
> The NMFS Southeast Regional Administrator in consultation with the Council may deviate from the specific time sequences used to determine if the ACL was exceeded based on data availability.[11]

Preferred Alternative 2. Use the average of the most recent three years of spiny lobster landings to evaluate whether an AM is triggered. An AM is triggered if average landings exceeded average ACLs in place during those years. The years of landings used to trigger an AM can be adjusted to account for the best scientific information available.

[11] The RA may update the years specified for triggering an AM for spiny lobster, beginning with landings from the most recent year available. If the island-based FMPs take effect in 2022, the most recent year of available landings likely would be 2020.

Alternative 3. Use the most recent single year of spiny lobster landings to evaluate whether an AM is triggered. An AM is triggered if landings exceeded the ACL in place during that year. The years of landings used to trigger an AM can be adjusted to account for the best scientific information available.

2.2.2 Discussion of Action 2 Alternatives

The National Standard Guidelines describe two general types of AMs, in-season AMs and AMs for when the ACL is exceeded (50 CFR 600.310(g)). Caribbean stocks are managed using the latter, AMs for when the ACL is exceeded. The guidelines state that "as soon as possible after the fishing year," on an annual basis, the AMs will evaluate whether an ACL was exceeded and take action to correct the issue that caused the ACL overage and remedy any biological consequences, once known. Landings for Puerto Rico and the U.S. Virgin Islands (USVI) are generally available one to two years after the fishing year, thus, all AMs are applied post-season.

In general, using a multi-year average of landings to trigger an AM would be expected to account for any biological (e.g., year-class variability) and economic (e.g., market demand) variability in the landings, thereby reducing the probability that an AM would be triggered. However, if landings in a particular year are very high, when using a multi-year average as the AM trigger, that year of high landings could be used in the AM trigger analysis up to three times, potentially triggering AMs in three consecutive years. Spiny lobster continues to be a highly targeted species in Puerto Rico, St. Thomas and St. John, and St. Croix, though spiny lobster landings have fluctuated from island to island following the disastrous 2017 hurricane season. Although landings for 2020 are not available at this time, it is expected that these landings would be less than the previous years' landings due to the reduced fishing effort in 2020 during the COVID-19 pandemic.

Alternative 1 (No Action) would continue to use the stepwise comparison of landings (i.e., single year, subsequent single year, two-year average, three-year average) specified in the island-based FMPs as the AM trigger for spiny lobster. **Alternative 1** would not use a multi-year average as the AM trigger until the third year after the amendment was implemented, and would not use a three-year average until the fourth year (Table 2.6). Under **Alternative 1**, AMs for spiny lobster could be triggered more frequently in the initial two years, which compare a single year of landings to the ACL, when compared to years 3 and 4, which compare a multi-year average of landings to the spiny lobster ACL(s) in place during those years. Using a multi-year average could dampen the variability of a high landings year and avoid an AM being triggered. Using a single year would only use that one year of high landings when evaluating the AM trigger. Under **Alternative 1**, the years of landings used to evaluate whether an AM is triggered may be adjusted "based on data availability." If an AM is triggered (i.e., if NMFS estimates that

landings have exceeded the ACL[12] and the exceedance is not due to improved data collection or monitoring), the AA would file a notification in the Federal Register to reduce the length of the spiny lobster fishing season within that fishing year by the amount necessary to prevent landings from exceeding the ACL applicable in that fishing year.

Preferred Alternative 2 would compare the average of the most recent three years of spiny lobster landings, as estimated by NMFS and based on best scientific information available, to the average of the ACLs for those years to determine if an AM is triggered. **Preferred Alternative 2** states that the years of landings used to evaluate whether an AM is triggered may be adjusted based on the "best scientific information available," which better defines when NMFS in consultation with the Council may deviate from the specific years of landings used as the AM trigger under **Alternative 1**. The language in **Preferred Alternative 2** makes it clearer that if landings for a given year are available, but there are concerns with the reliability (e.g., concerns with quality of data and expansion factors in Puerto Rico) of that data, then NMFS may use different data to evaluate the AM trigger. As under **Alternative 1**, if NMFS determines the ACL exceedance was due to improved data collection or monitoring rather than from increased landings, NMFS would not reduce the length of the fishing season. If an AM is triggered (i.e., if NMFS estimates that average landings have exceeded the average ACLs and the exceedance is not due to improved data collection or monitoring), the AA would file a notification with the Federal Register to reduce the length of the fishing season for spiny lobster within that fishing year by the amount necessary to prevent landings in that year from exceeding the ACL applicable in that fishing year.

Both **Alternative 1** and **Preferred Alternative 2** use a multi-year average of landings as the AM trigger, thus accounting for any variability in the landings. However, **Alternative 1** uses a prescribed process to build up to a three year average, starting with a single year of landings, then another single year, then a two-year average, then a three-year average. Because **Preferred Alternative 2** immediately uses a three-year average as the AM trigger, and three-year averages can dampen variability, **Preferred Alternative 2** would potentially trigger AMs less frequently in the initial years following amendment implementation than **Alternative 1**. With regard to triggering an AM, the effects of **Alternative 1** and **Preferred Alternative 2** would be the same beginning in the fourth year, when they both use three-year averages.

Unlike **Alternative 1** and **Preferred Alternative 2**, which use an average of landings to trigger an AM, **Alternative 3** would compare the most recent single year of spiny lobster landings, based on best scientific information available, to the ACL for that year to determine if an AM is triggered. **Alternative 3** would be the most straightforward approach to ACL monitoring in that

[12] As explained in the proposed rule to implement the island-based FMPs, landings data may not be available at the end of a fishing year, sometimes lagging by two years. During this period of the data lag, NMFS would compare whether the landings would exceed the ACL applicable in the year the AM would be applied.

a single year of landings would be compared to the ACL in place during that year (i.e., an additional step to determine average landings and average ACLs would not be needed). If the level of spiny lobster harvest was much greater than the ACL in a given year, and triggered an AM, that year of high landings would only be used once in the ACL monitoring process. This contrasts with the multi-year approach in **Alternative 1** and **Preferred Alternative 2**, where a year with extremely high landings could be incorporated into the average landings for comparison to the ACL up to three times, potentially resulting in an AM triggered each time. For example, under **Preferred Alternative 2**, if the 2022 landings of spiny lobster were abnormally high, then that year of landings would be used in the 2020-2022 average, the 2021-2023 average, and the 2022-2024 average, potentially exceeding the average ACLs and triggering an AM each time. As a result, a fishing season reduction could be triggered over multiple fishing seasons given a single year of high landings. But, as explained above, using a three-year average of landings as in **Alternative 1** and **Preferred Alternative 2** could dampen (i.e., reduce) any variability in landings that may occur.

As in **Preferred Alternative 2**, **Alternative 3** would also use the best scientific information available when comparing landings to the ACL in place. Under **Alternative 3**, if the most recent year of data (e.g., 2022) were determined to be incomplete, then NMFS could use the previous year of landings (e.g., 2021) that were considered to be the best scientific information available for comparison to the ACL in place during that year (e.g., 2021). As under **Alternative 1** and **Preferred Alternative 2**, if NMFS determines the ACL exceedance was due to improved data collection or monitoring rather than from increased landings, NMFS would not reduce the length of the fishing season. If an AM is triggered under **Alternative 3** (i.e., if NMFS estimates that the single year of landings exceeded the ACL effective during that year and the exceedance is not due to improved data collection or monitoring), the AA would file a notification with the Federal Register to reduce the length of the fishing season for spiny lobster within that fishing year by the amount necessary to prevent landings from exceeding the ACL applicable in that fishing year.

Table 2.6. Years of spiny lobster landings that would be used to trigger an AM under the Action 2 alternatives, assuming that the island-based FMPs and the Spiny Lobster Framework Amendment are both implemented in 2022.

Year Amendment Implemented	Fishing Year	Most Recent Landings Available*	AM Trigger under Alternative 1**	AM Trigger under Preferred Alternative 2	AM Trigger under Alternative 3
1	2022	2020	Single year (2020)	Three-year average (2018-2020)	Single year (2020)
2	2023	2021	Single year (2021)	Three-year average (2019-2021)	Single year (2021)
3	2024	2022	Two-year average (2021-2022)	Three-year average (2020-2022)	Single year (2022)

Year Amendment Implemented	Fishing Year	Most Recent Landings Available*	AM Trigger under Alternative 1**	AM Trigger under Preferred Alternative 2	AM Trigger under Alternative 3
4	2025	2023	Three-year average (2021-2023)	Three-year average (2021-2023)	Single year (2023)
5	2026	2024	Three-year average (2022-2024)	Three-year average (2022-2024)	Single year (2024)

* For the U.S. Caribbean region, landings are generally available two years after when the fishing occurred (i.e., the fishing year). Data availability may be additionally delayed by rare events such as hurricanes.
** Alternative 1 (No Action) identifies a different sequence of years for triggering the spiny lobster AM than the years included in the island-based FMPs. The dates in Table 2.6 reflect the expectation that the Regional Administrator would deviate from that specific time sequence to account for more recent, available data (i.e., start with 2020 as the first, single year of landings assuming amendment implementation date in 2022), as authorized in the FMP.

Summary

The choice of alternatives under Action 2 could influence the frequency with which an AM is triggered, and thus could affect the frequency with which an AM-based fishing season reduction is applied for spiny lobster. The frequency of AMs triggered and applied under Action 2 would depend on the magnitude of future landings, which are difficult to predict. For example spiny lobster landings in Puerto Rico in 2018 and 2019 were above the MSY proxy specified in SEDAR 57 (432,501 pounds [lbs]), but preliminary landings reported[13] for 2020 are much lower (~150,000 lbs). If future spiny lobster landings in Puerto Rico recover to the 2018 and 2019 levels, then AMs would likely be triggered every year, regardless of the alternative selected. Similarly, the spiny lobster landings in St. Thomas, St. John, and St. Croix have been substantially less than the landings before the 2017 hurricane season, and well below the ACLs proposed under the Action 1 alternatives, and would thus likely not trigger an AM under any of the Action 2 alternatives. Under the Action 2 alternatives, if an AM was triggered NMFS might determine that corrective action is not needed to prevent a future ACL exceedance given differences in the observed fishing effort in the year(s) the landings occurred (the year[s] of landings used to trigger an AM) and the year in which the AM application would occur.

[13] Puerto Rico landings are adjusted each year using an expansion factor determined by DNER staff at the Fisheries Research Laboratory, which is based on intercept sampling of commercial fishermen. Expansion factors for 2020 are not available at this time.

Chapter 3. Affected Environment

This section describes the environment and resources included within federal waters off Puerto Rico, St. Thomas and St. John, and St. Croix that would be affected by the proposed actions. Additional information on the physical, biological/ecological, economic, social, and administrative environments of Puerto Rico and the U.S. Virgin Islands (USVI) have been described in detail in the Puerto Rico Fishery Management Plan (FMP) (CFMC 2019a), the St. Thomas and St. John FMP (CFMC 2019b), and the St. Croix FMP (CFMC 2019c). These are incorporated herein by reference and summarized below.

3.1 Description of the Physical 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 the FMPs of the U.S. Caribbean, the EFH Final Environmental Impact Statement (EFH-FEIS), and the Five-year Review of EFH in the U.S. Caribbean, Vols.1 and 2 (CFMC 1998, CFMC 2004, CFMC 2011c). The most recent descriptions of the physical environment can be found in the island-based FMPs (CFMC 2019a, CFMC 2019b, CFMC 2019c). 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 1,100 miles (mi) (1,770 kilometers [km]) east-southeast of Miami, Florida (Olcott 1999). The region is composed of the Commonwealth of Puerto Rico in the Greater Antilles and the USVI in the Lesser Antilles island chains, both of which separate the Caribbean Sea from the western central Atlantic Ocean. The USVI are part of the Virgin Islands chain, which lies in the northeastern Caribbean about 50 mi (80 km) east of Puerto Rico's main island, and consists of four major islands: St. Thomas, St. John, St. Croix, and Water Island (DPNR 2005). The Exclusive Economic Zone (EEZ) in the U.S. Caribbean covers an area of approximately 75,687 mi^2 (196,029 km^2), which, for management purposes, is divided into the Puerto Rico, St. Thomas/St. John, and St. Croix management areas (see Figure 1.1).

The coastal marine environments of Puerto Rico and the USVI are characterized by a wide variety of habitat types, with 21 distinct benthic habitats types delineated (Kendall et al. 2001). The EFH-FEIS (CFMC 2004) summarized the percent distribution for all habitats in the U.S. Caribbean from the 2,121 mi^2 (5,494 km^2) of total bottom area mapped from aerial photographs. This total included both Puerto Rico (1,934 mi^2 [5,009 km^2]) and the USVI (187 mi^2 [485 km^2]), and covered from the shoreline to about 66 feet (ft) (20 meters [m]) depth.

3.1.1 Puerto Rico

The Puerto Rico EEZ is located 9 - 200 nautical miles (17 - 370 km) from the shoreline and covers approximately 65,368 mi^2 (169,303 km^2). Puerto Rico approximately 110 by 35 mi (177 by 56 km), and is the smallest and the most eastern island of the Greater Antilles (CFMC 1998). Puerto Rico includes the adjacent inhabited islands of Vieques and Culebra as well as various other isolated islands without permanent populations including Mona, Monito, and Desecheo. Puerto Rico is surrounded on three sides by deep ocean waters: the Mona Passage to the west (> 3,300 ft [1,000 m] deep); the Puerto Rico Trench to the north (~28,000 ft [8,500 m] deep); and the Venezuelan Basin of the Caribbean Sea to the south (~16,400 ft [5,000 m] deep). To the east, Puerto Rico shares the shallow-water shelf platform with St. Thomas and St. John, USVI.

For Puerto Rico, the following areas have been designated as Habitat Areas of Particular Concern (HAPC) by the Council for coral and reef fish species, which are managed with seasonal closures that are also applicable to spiny lobster:

- Tourmaline Bank - closed December 1 through the last day of February, each year, to all fishing, including spiny lobster; and
- Abrir la Sierra Bank - closed December 1 through the last day of February, each year, to all fishing, including spiny lobster.

3.1.2 St. Thomas and St. John

The St. Thomas and St. John EEZ is located 3 - 200 nautical miles (6 – 370 km) from the shoreline and covers approximately 1,103 mi^2 (2,856 km^2). The islands of St. Thomas and St. John are bordered by the Atlantic Ocean to the north and the Caribbean Sea to the south. The island of St. Thomas is bordered to the west by the Puerto Rico islands of Vieques and Culebra, and to the east by St. John, which is bordered on the east by the British Virgin Islands. The shelf shared by the islands of St. Thomas and St. John is about 8 mi (12.9 km) wide on the south and 20 mi (32.2 km) wide on the north (Goenaga and Boulon 1992) with an area of approximately 510 nm^2 (1751 km2). Most of the shelf area is greater than 80 ft (24.4 m) deep (Kojis and Quinn 2011).

For St. Thomas and St. John, the following areas are managed with year-round or seasonal closures that are applicable to spiny lobster:

- Hind Bank Marine Conservation District - closed year-round to all fishing, including spiny lobster; and
- Grammanik Bank - closed February 1 through April 30, each year, to all fishing, including spiny lobster.

3.1.3 St. Croix

The St. Croix EEZ is located 3 - 200 nautical miles (6 – 370 km) from the shoreline and covers approximately 9,216 mi^2 (23,870 km^2). The island of St. Croix is surrounded by the Caribbean Sea. St. Croix is located about 46 mi (74 km) south of St. Thomas and St. John and lies on a different geological platform than Puerto Rico, St. Thomas, and St. John. St. Croix is separated from those islands by a 2.5 mi (4 km) deep trench (CFMC 2004). The St. Croix shelf is much narrower and shallower than that of the northern islands (Goenaga and Boulon 1992), and has a total area of approximately 99 nm^2 (343 km^2) (Gordon 2010). Most of the shelf area is less than 80 ft (24.4 m) deep (Kojis and Quinn 2011).

For St. Croix, the following areas have been designated as HAPC by the Council for coral and/ reef fish species, which are managed with seasonal closures that are also applicable to spiny lobster:

- Red Hind Spawning Aggregation Area (Lang Bank) - closed December 1 through the last day of February, each year, to all fishing, including spiny lobster; and
- Mutton Snapper Spawning Aggregation Area - closed March 1 through June 30, each year, to all fishing, including spiny lobster.

3.1.4 Essential Fish Habitat (EFH)

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)). EFH for life stages of species that were managed under the U.S. Caribbean-wide FMPs and would continue to be managed under the island-based FMPs was identified in the Caribbean Sustainable Fisheries Act (SFA) Amendment (CFMC 2005) and mapped in the EFH-FEIS (CFMC 2004). EFH for life stages of species new to management was identified in the island-based FMPs (CFMC 2019a, CFMC 2019b, CFMC 2019c).

The habitats described for the species new to management overlap with and occur within the same geographic extent as the habitats previously described for species managed under the Reef Fish, Spiny Lobster, Queen Conch, and Coral FMPs.

Specific EFH identified for all species in the island-based FMPs include both estuarine/inshore (e.g., estuarine emergent and mangrove wetlands, submerged aquatic vegetation, intertidal flats, palustrine emergent and forested systems, and estuarine water column) and marine/offshore (e.g., live/hard bottom habitats, coral and coral reefs, seagrass and algal plains, sand and shell substrate, and the marine water column) areas. Essential fish habitat includes the spawning area in the water column above the adult habitat and the highest degree of overlap occurs in the

pelagic environment (i.e., the water column), because most of the managed use this habitat as eggs, larvae, juveniles, or adults.

In Puerto Rico, St. Thomas and St. John, and St. Croix, EFH for spiny lobster consists of all waters from mean high water to the outer boundary of the U.S. Caribbean EEZ (habitats used by phyllosome larvae) and seagrass, benthic algae, mangrove, coral, and live/hard bottom substrates from mean high water to 100 fathoms depth (habitats used by other life stages).

3.2 Description of the Biological and Ecological Environments

The Puerto Rico FMP (CFMC 2019a), St. Thomas and St. John FMP (CFMC 2019b), and St. Croix FMP (CFMC 2019c) include a description of the biological and ecological environments for the species managed in federal waters in the respective island/island group, including spiny lobster, which is incorporated herein by reference and summarized below.

3.2.1 Description of the Species

The species directly affected by actions proposed in this framework amendment is spiny lobster.

3.2.1.1 Life History

The Caribbean spiny lobster, *Panulirus argus* (hereafter referred to as spiny lobster), occurs in the Western Central and South Atlantic Ocean, including the Caribbean Sea and the Gulf of Mexico, ranging from North Carolina in the north to Brazil in the south. The spiny lobster occurs from the extreme shallows of the littoral fringe to depths exceeding 328 ft (100 m) (Kanciruk 1980; Munro 1974). The distribution of spiny lobster extends to the edge of the shelf, which is described as the 100-fathom contour (183 m) (CFMC 1981).

Shallow-water areas with mangroves and seagrass (*Thalassia testudinum*) beds serve as nursery areas (Munro 1974), with the spiny lobsters generally moving offshore when they reach reproductive size (Phillips et al. 1980). Adult spiny lobsters are found on shelf areas that offer adequate shelter in the form of reefs, wrecks or other forms of cover (Munro 1974). Spiny lobsters are primarily carnivores, feeding upon smaller crustaceans, molluscs, and annelids (Cobb and Wang 1985). This species shelters communally by day and emerge to feed at night (Munro 1974).

3.2.1.2 Status of the Stock

Previous stock assessments for spiny lobster in the U.S. Caribbean have attempted to quantify stock status using both traditional as well as data-limited stock assessment procedures (SEDAR 57 2019). SEDAR 8 (2016) was the most recent data-limited assessment (e.g. mean-length, indicator-based control rules) prior to the SEDAR 57 stock assessments. Prior to the current

assessment (SEDAR 57), nearly all evaluations have resulted in unsatisfactory determination of stock status.

The SEDAR 57 assessment applied an integrated statistical catch-at-age (Stock Synthesis version 3.30) model using data through 2016. Stocks in both St. Croix and St. Thomas and St. John approached the levels corresponding to $F_{SPR30\%}$ and $S_{SPR30\%}$ during the mid to late 2000s. Since that time, a reduction in fishing mortality has allowed the stock spawning output to increase. In Puerto Rico, the stocks were already exploited when the time series began (1983). Fishing mortality was initially above $F_{SPR30\%}$, but declined and remained below that threshold after 1986, with exceptions, particularly during the period 1999-2005. Spawning output remained below $S_{SPR30\%}$ from the initial year through 1992, but has since remained above $S_{SPR30\%}$, except between 2000 and 2007. Based on the management thresholds (i.e., minimum stock size threshold and maximum fishing mortality threshold) from in SEDAR 57, the spiny lobster stocks in Puerto Rico, St. Thomas and St. John, and St. Croix were not considered overfished and were not undergoing overfishing.

3.2.1.3 Responses to Climate Change

There is a lack of research and long-term data on the impacts of climate change on Caribbean marine ecosystems and fishery resources (Oxenford 2017). The majority of the research to date has been outside of the Caribbean. Those research efforts mainly examined the effects of one or two stressors over short-term laboratory experiments, which is unlikely to accurately reflect the real complexity of long-term climate change effects on U.S. Caribbean reef ecosystems. Additionally, climate change research and data efforts need to consider cumulative effects of stressors on individual species and on ecosystems as a whole, while also considering other anthropogenic stressors that chronically occur in the region.

Climate change can affect spiny lobster populations as the coral reef ecosystems in which they reside shift due to increases in water temperatures and extreme weather events (e.g., hurricanes). These climate change-related shifts can also affect the food chain that the spiny lobsters rely on. Additionally, the extended larval phase of spiny lobsters makes them particularly vulnerable to climate variability, specifically the warming of surface temperatures.[14] Ross and Behringer (2019) found that in addition to affecting the survival and size at metamorphosis of spiny lobsters, especially post-larval and juvenile lobsters, changes in temperature and salinity also altered the spiny lobsters ability to identify chemosensory cues, such as selecting suitable shelters, which may result in decreased survivorship due to impaired behaviors.

[14] http://www.fao.org/fi/static-media/MeetingDocuments/WECAFC/WECAFC2019/17/Ref.35e.pdf

3.2.2 Bycatch

Each of the Puerto Rico, St. Thomas and St. John, and St. Croix FMPs include a bycatch practicability analysis for the species managed under each FMP, which is incorporated herein by reference, and pertinent portions are summarized below.

Fisheries that are noted for producing large amounts of bycatch (e.g., trawling) are essentially absent from the U.S. Caribbean. Thus, bycatch is not as significant an issue in Puerto Rico, St. Thomas and St. John, and St. Croix, compared to other regions. What little bycatch that does occur is generally confined to regulatory discards. Under the island-based management approach, regulatory discards specific to spiny lobster include:

- Sublegal lobsters: federal laws prohibit the harvest of spiny lobster under 3.5 inches (8.9 cm) in carapace length; and
- Egg-bearing female spiny lobsters (i.e., berried).

In Puerto Rico, St. Thomas and St. John, and St. Croix, spiny lobster are harvested commercially in federal waters using trap gear (both fish trap and spiny lobster trap) and by hand or snare collection while diving. Recreational harvest of spiny lobster in federal waters is thought to mostly be conducted while diving, though recreational data are not available at this time. All legal spiny lobsters caught by commercial fishermen in the Puerto Rico, St. Thomas and St. John, and St. Croix fisheries are assumed to be retained and assumed discards include sublegal and berried spiny lobsters (SEDAR 57 2019). Consensus opinion during the SEDAR 57 data workshop was that discard mortality of spiny lobsters was negligible.

The actions in this framework amendment are not expected to significantly increase or decrease the magnitude of bycatch or bycatch mortality in the Puerto Rico, St. Thomas and St. John, and St. Croix fisheries that target spiny lobster. Additionally, since fishermen in the U.S. Caribbean region traditionally utilize most resources harvested, and the amount of bycatch from the fisheries targeting spiny lobster are minimal and are not expected to change under this amendment, little to no affect to mammals or birds would be expected.

3.2.3 Protected Species

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), including waters around Puerto Rico. 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.[15] In addition to these three marine mammals, five species or distinct population segments (DPS) of sea turtles (green - North Atlantic DPS and the South Atlantic DPS; hawksbill; leatherback; loggerhead - Northwest Atlantic DPS); four species or DPSs of fish (Nassau grouper; scalloped hammerhead shark - Central and Southwest Atlantic DPS; oceanic whitetip shark; giant manta ray); and seven species of coral (elkhorn coral, staghorn coral, rough cactus coral, pillar coral, lobed star coral, mountainous star coral, and boulder coral) occur in the U.S. Caribbean and are also protected under the ESA. ESA designated critical habitat for the green sea turtle, hawksbill sea turtle, leatherback sea turtle, and *Acropora* corals also occur within the Council's jurisdiction. Critical habitat for green and hawksbill sea turtles occurs entirely within Puerto Rico state waters, and over 99% of the critical habitat for leatherback sea turtles around St. Croix occurs within USVI state waters. Designated critical habitat of *Acropora* corals in Puerto Rico and the USVI extended from the mean low water line seaward to the 98 foot (30 meter) depth contour (73 FR 72209), the majority of which occur in state waters.

The National Marine Fisheries Service (NMFS) completed a biological opinion on September 21, 2020, evaluating the impacts of the Puerto Rico, St. Thomas and St. John, and St. Croix fisheries on Endangered Species Act (ESA)-listed species that occur in the U.S. Caribbean region (NMFS 2020b). In the biological opinion, NMFS determined that the authorization of the fisheries conducted under each of the island-based FMPs is not likely to adversely affect sperm, sei, and fin whales; the Northwest Atlantic DPS of loggerhead sea turtle; giant manta rays; or critical habitat of green, hawksbill, or leatherback sea turtles. The biological opinion also determined that the authorization of the island-based fisheries is not likely to jeopardize the continued existence of the North Atlantic DPS of green sea turtle, South Atlantic DPS of green sea turtle, hawksbill sea turtle, Nassau grouper, oceanic whitetip shark, Central and Southwest Atlantic DPS of scalloped hammerhead shark, elkhorn coral, staghorn coral, rough cactus coral, pillar coral, lobed star coral, mountainous star coral, or boulder star coral, or result in the destruction or adverse modification of designated *Acropora* critical habitat.

An incidental take statement for select ESA species was included in the biological opinion, and reasonable and prudent measures to minimize the impact of the incidental takes were specified, along with terms and conditions to implement them.

The actions contained in this Framework Amendment are not anticipated to modify the operation of the Puerto Rico, St. Thomas and St. John, or St. Croix fisheries in a manner that would cause effects to ESA-listed species or critical habitat that were not considered in the 2020 biological opinion.

[15] 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).

3.3 Description of the Spiny Lobster Fisheries

The fisheries of the U.S. Caribbean region provide food, livelihoods, and income to residents and visitors alike. The region's fisheries (federal and state[16]) can be divided into commercial, recreational, and subsistence sectors. Commercial fishermen pursue multiple species using multiple gear types and are characterized as "artisanal" because their fishing vessels tend to be less than 45 ft (13.7 m) long, have small crews, yield small revenues (when compared to revenues from commercial fishing in the continental U.S.), and their seafood processors are small-scale producers.

In the Caribbean SFA Amendment (CFMC 2005), fishable habitat was defined as those waters less than or equal to 100 fathoms (183 m). The majority of fishing activity for Council-managed species occurs in that area. The total area of fishable habitat (less or equal to 100 fathoms) in the U.S. Caribbean is estimated to be approximately 2,932 mi^2 (7,594 km^2), of which only 13.7% (403 mi^2 [1,045 km^2]) is in the EEZ in the U.S. Caribbean.

Spiny lobster, managed in U.S. Caribbean federal waters since 1985, are targeted by commercial and recreational fishermen in the Puerto Rico, St. Thomas and St. John, and St. Croix, although recreational data (i.e., pounds landed) are not available for spiny lobster. Spiny lobster accounted for 29% of the total dollar amount of commercial landings reported in 2018 for both Puerto Rico and the USVI (NMFS 2020a).

Annual catch limits (ACL) for spiny lobster were established for each island/island group in 2011, based on commercial landings, and revised under the island-based FMPs. For each island/island group, in the event that spiny lobster commercial landings exceed the ACL set for the stock, an accountability measure (AM) would be triggered and would apply to both fishing sectors (i.e., commercial and recreational fishing sectors). Additionally, recreational fishermen are limited to a daily bag limit of three spiny lobster per person per day, with no more than 10 spiny lobster per vessel per day. The minimum size limit for spiny lobster in the U.S. Caribbean region is 3.5 inches (8.9 centimeters) carapace length.

In 2017, Hurricanes Irma and Maria devastated the islands of the U.S. Caribbean as well as their fisheries. Many fishermen who fished for spiny lobster switched over to targeting other species providing food fish for local residents rather than high-valued spiny lobster for tourists. Reported landings of spiny lobster since that time have been greatly reduced for the USVI fisheries, which are still recovering. In Puerto Rico, spiny lobster landings decreased in 2017, but have since recovered to pre-hurricane levels. In 2020, the fisheries were impacted by the

[16] State means each of the several states, the District of Columbia, the Commonwealth of Puerto Rico, American Samoa, the Virgin Islands, Guam, the Northern Mariana Islands, and any other Commonwealth, territory, or possession of the United States (50 CFR 600.10).

COVID-19 pandemic, which severely reduced fishing effort. Ninety-four percent of Puerto Rico commercial fishermen and 81% of USVI fishermen stopped fishing for some period in the first half of 2020 (NMFS 2021a).

3.3.1 Puerto Rico

Landings of spiny lobster are available from self-reported commercial fishermen logbooks since 1983, and include information on fishing gear type and location where the catch was landed. Commercial fishermen target multiple species using multiple gear types during the same fishing trip, with 63.2% of fishermen using at three gear types during a fishing trip (Griffith et al. 2007). Approximately half of the commercial fishermen target spiny lobster (Matos-Caraballo and Agar 2011). In 2019,[17] 373 of the 801 commercial fishermen in Puerto Rico that reported their catch reported landings of spiny lobster.

Commercial divers selectively target a diverse group of highly valued species including spiny lobster (Agar and Shivlani 2016) and fishermen using trap gear target reef fish, deep-water snappers, and spiny lobster. Fish traps are used to catch spiny lobster and various reef fish, such as silk snapper, mutton snapper, lane snapper, hogfish, yellowtail snapper, white grunt, red hind, and parrotfish species, while lobster traps mainly catch spiny lobster (Agar et al. 2017). Fish traps are more common than lobster traps because of their versatility in catch, with 66% of commercial fishermen using fish traps and 20% using a combination of fish and lobster traps (Agar et al. 2017).

Landings of spiny lobster in Puerto Rico have generally increased each year since ACLs were established in 2012, with a brief decline in 2017 when Hurricanes Irma and Maria hit the region (Table 3.3.1). Reporting of harvest location from unknown areas has improved since 2012, with the majority of the spiny lobster landings since 2013 reported from state waters (0-9 nautical miles). In Puerto Rico, more than half of the spiny lobster landings were reported as harvested using dive gear, followed by trap gear, and then net gear (Table 3.3.2).

Table 3.3.1. Landings of spiny lobster (in pounds) in Puerto Rico for 2012-2019 with the percent reported from state waters (0-9 nautical miles), federal waters (9-200 nautical miles), or unknown location.

Year	Spiny Lobster Landings (lbs)*	Percent from State Waters	Percent from Federal Waters	Percent from Unknown Area
2012	385,811	26%	11%	63%
2013	275,424	71%	8%	21%
2014	376,779	77%	8%	15%
2015	418,273	78%	9%	13%
2016	449,233	87%	7%	5%

[17] At the time of amendment preparation, the most recent and complete year of landings available was from 2019.

Year	Spiny Lobster Landings (lbs)*	Percent from State Waters	Percent from Federal Waters	Percent from Unknown Area
2017	283,221	91%	7%	3%
2018	520,829	93%	5%	3%
2019	488,968	90%	8%	2%

* Puerto Rico landings are adjusted using an expansion factor determined by Department of Natural and Environmental Resources staff at the Fisheries Research Laboratory, which is based on intercept sampling of commercial fishermen.
(Source: NMFS SERO 2021)

Table 3.3.2. Percent of spiny lobster landings in Puerto Rico for 2012-2019 reported by gear type.

Year	Diving	Traps	Nets*
2012	58%	39%	3%
2013	64%	30%	6%
2014	59%	35%	6%
2015	57%	38%	5%
2016	53%	41%	6%
2017	58%	37%	5%
2018	62%	34%	4%
2019	57%	37%	6%

* Gill nets and trammel nets are prohibited gear types in federal waters for the harvest of spiny lobster.
(Source: NMFS SERO 2021)

In 2018, 10,964 of the total 26,372 trips reported by commercial fishermen included landings of spiny lobster. Of those 10,964 trips, the most commonly caught species during the same trip included queen conch, hogfish, and queen triggerfish, among others (Table 3.3.3). In 2019, 12,366 of the total 30,731 trips reported by commercial fishermen included landings of spiny lobster. The same species were the most commonly co-occurring catch in 2019, both in pounds and frequency of trips.

Table 3.3.3. Landings (in pounds) of spiny lobster and co-occurring species landed and number of trip tickets that reported spiny lobster and co-occurring species in Puerto Rico in 2018 and 2019.

Species	2018 Landings	2018 Trips	2019 Landings	2019 Trips
Lobster Spiny	520,829	10,964	488,734	12,365
Conch Queen	172,718	3,520	100,809	3,485
Hogfish	62,939	2,841	52,893	3,131
Triggerfish Queen	44,933	2,279	45,646	2,925
Boxfish, Unspecified	31,144	1,975	33,562	2,305
Grouper Red Hind	26,422	1,387	23,117	1,460
Octopus, Unspecified	15,833	989	14,238	1,305
Parrotfishes, Unspecified	23,518	868	25,508	1,231
Snapper Mutton	21,327	944	18,782	1,168
Snapper Lane	18,856	623	21,595	1,031
Snapper, Unspecified	14,068	615	14,351	835
Porgy, Unspecified	11,325	498	9,437	735
Snapper Yellowtail	11,551	530	10,836	713
Grunt, Unspecified	14,606	262	15,788	529
Lionfish	3,883	225	4,698	291
Snapper Cubera	4,186	206	3,742	280
Goatfish Spotted	4,483	172	3,374	205
Crab, Unspecified	657	156	1,036	196
Jack Bar	3,639	124	3,332	165
Grouper, Unspecified	3,321	155	2,862	161
Squirrelfish	1,896	123	1,844	159
Snapper Silk	5,673	111	3,952	154
Grouper Coney	1,755	81	1,629	123
Mackerel Cero	628	27	1,221	81
Snook Common	292	13	2,704	71
Snapper Vermilion	937	44	2,287	69
Grunt White	484	20	1,437	50
Goatfish Yellow	749	48	450	49
Mackerel King	1,031	49	1,036	49
Lobster Ridged Slipper	200	18	300	46
Crab Coral	186	21	235	45
Shark Tiger	3,667	53	3,899	43
Sharks Requiem, Unspecified	2,050	40	2,269	42
Shellfish, Unspecified	1,112	64	758	41
Stingrays, Unspecified	404	23	1,615	39
Grouper Yellowfin	897	39	747	26
Jacks	1,581	18	2,038	25

Species	2018 Landings	2018 Trips	2019 Landings	2019 Trips
Tunny Little	1,433	18	1,661	16
Mojarras, Unspecified	Conf	Conf	310	15
Shark Lemon	225	12	476	15
Drummer Whitemouth	330	9	662	13
Herring Sardinella	92	5	146	13
Mullet White	259	12	134	12
Snapper Blackfin	1,832	23	701	12
Ballyhoo	855	12	589	11
Grouper Misty	-	-	494	11
Jack Horse-Eye	48	6	133	11
Fishes Bony, Unspecified	563	12	335	10
Barracuda	75	5	125	8
Crab Blue Land	290	9	187	7
Tuna Skipjack	Conf	Conf	160	6
Wahoo	736	8	169	6
Snapper Queen	309	7	321	5
Tuna And Mackerels, Unspecified	Conf	Conf	173	5
Tuna Albacore	140	5	391	5
Tuna Blackfin	278	6	95	5
Dolphinfish	1,231	6	Conf	Conf
Snapper Black	180	5	Conf	Conf
Lobster Spanish Slipper	85	13	Conf	Conf
Eel Moray Green	Conf	Conf	Conf	Conf
Shark Reef	Conf	Conf	Conf	Conf
Snapper Cardinal	Conf	Conf	Conf	Conf
Snapper Schoolmaster	-	-	Conf	Conf
Squids, Unspecified	-	-	Conf	Conf
Surgeonfish Doctorfish	-	-	Conf	Conf
Topsnail West Indian	-	-	Conf	Conf
Tuna Yellowfin	-	-	Conf	Conf
Grunt Bluestriped	-	-	Conf	Conf
Shark Hammerhead Great	-	-	Conf	Conf
Shark Sharpnose Sevengill	-	-	Conf	Conf
Shrimp Penaeus, Unspecified	-	-	Conf	Conf

Conf = Confidential data
(Source: NMFS SERO 2021)

3.3.2 St. Thomas and St. John

Landings of spiny lobster in St. Thomas and St. John are available from self-reported commercial fishermen logbooks since 1974, and include information on fishing gear type and location where the catch was landed. In the USVI landings are assumed to be fully reported and correction factors are not used. Commercial fishermen target a variety of species using multiple gear types, with 80.8% using more than one method of fishing (e.g., trap fishing, line fishing, net fishing, or diving) (Kojis et al. 2017). Approximately 44% of the commercial fishermen in St. Thomas and St. John target spiny lobster (Kojis et al. 2017). In 2019,[18] 29 of the 67 commercial fishermen in St. Thomas and St. John that reported their catch reported landings of spiny lobster.

In St. Thomas and St. John, fish traps are used to catch spiny lobster and various reef fish, such as queen triggerfish, red hind, gray angelfish, doctorfish, white grunt, saucereye porgy, mutton snapper, and parrotfish species, while lobster traps primarily catch spiny lobster. Kojis et al. (2017) found that roughly 40% of commercial fishermen used fish traps and 11-12% of commercial fishermen used plastic or wire lobster traps. Only 32% commercial fishermen fished by diving and most skin and SCUBA divers used snares for catching spiny lobster (Kojis et al. 2017).

Landings of spiny lobster in St. Thomas and St. John have remained fairly stable since ACLs were established in 2012, peaking in 2016 (Table 3.3.4). Reporting of harvest location from unknown areas has remained constant since 2012, albeit at low levels (less than 5%). The majority of spiny lobster are reported from federal waters (3-200 nautical miles) (Table 3.3.4). In St. Thomas and St. John, the majority of spiny lobster are harvested using trap gear, with a small percentage harvested using dive gear (Table 3.3.5).

Table 3.3.4. Landings of spiny lobster (in pounds) in St. Thomas and St. John for 2012-2019 with the percent reported from state waters (0-3 nautical miles), federal waters (3-200 nautical miles), or unknown location.

Year	Spiny Lobster Landings (lbs)	Percent from State Waters	Percent from Federal Waters	Percent from Unknown Area
2012	83,157	24%	76%	0%
2013	84,513	16%	79%	5%
2014	92,261	18%	81%	1%
2015	109,455	29%	69%	3%
2016	121,695	34%	61%	5%
2017	91,911	41%	59%	0%
2018	86,708	55%	45%	0%
2019	88,100	46%	54%	0%

(Source: NMFS SERO 2021)

[18] At the time of amendment preparation, the most recent and complete year of landings available was from 2019.

Table 3.3.5. Percent of spiny lobster landings in St. Thomas and St. John for 2012-2019 reported by gear type.

Year	Diving	Traps
2012	2%	98%
2013	1%	99%
2014	1%	99%
2015	1%	99%
2016	2%	98%
2017	6%	94%
2018	7%	93%
2019	1%	99%

(Source: NMFS SERO 2021)

In 2018, 806 of the total 1,756 trips reported by commercial fishermen included landings of spiny lobster. Of those 806 trips, the most commonly caught species during the same trip included, queen triggerfish, red hind grouper, and gray angelfish, among others (Table 3.3.6). In 2019, 755 of the total 1,471 trips reported by commercial fishermen included landings of spiny lobster. The same species were generally the most commonly co-occurring catch in 2019, both in pounds and frequency of trips.

Table 3.3.6. Landings (in pounds) of spiny lobster and co-occurring species landed and number of trip tickets that reported spiny lobster and co-occurring species in St. Thomas and St. John in 2018 and 2019.

Species	2018 Landings	2018 Trips	2019 Landings	2019 Trips
Lobster, Spiny	86,708	806	86,869	755
Triggerfish, Queen	20,587	438	14,746	362
Grouper, Red Hind	13,538	433	12,869	336
Angelfish, Gray	7,543	418	5,744	300
Cowfish, Scrawled	4,603	385	3,447	310
Surgeonfish, Doctorfish	3,708	359	3,603	295
Snapper, Yellowtail	2,850	359	2,347	281
Grunt, White	6,248	354	5,955	315
Squirrelfish	2,837	353	2,608	311
Triggerfish, Unspecified	4,721	351	2,847	226
Porgy, Saucereye	3,714	347	2,919	270
Grouper, Coney	2,089	323	1,967	257
Grunt, Bluestriped	3,584	320	3,551	274
Surgeonfish, Blue Tang	2,484	313	2,135	248
Parrotfish, Stoplight	3,048	309	3,141	263

Species	2018 Landings	2018 Trips	2019 Landings	2019 Trips
Angelfish, French	3,411	302	2,465	209
Parrotfish, Redtail	2,207	255	2,467	257
Grunt, Cottonwick	1,743	253	1,128	194
Hogfish	2,180	222	1,862	171
Grunt, Margate	2,279	189	2,131	143
Snapper, Mutton	2,663	183	1,289	115
Angelfish, Queen	1,330	178	1,429	182
Crab, Unspecified	1,417	136	863	120
Lionfish	1,940	128	1,884	114
Snapper, Lane	2,036	122	457	57
Porgy, Jolthead	592	75	247	28
Grouper, Yellowfin	1,270	69	850	44
Grouper, Red	1,075	53	864	40
Snapper, Blackfin	1,828	50	2,138	72
Blue Runner	598	47	107	9
Parrotfish, Redfin	181	27	216	28
Snapper, Silk	1,344	22	1,335	8
Grunt, Tomtate	110	20	157	23
Parrotfish, Redband	201	17	182	14
Mackerel, King	311	16	97	5
Jack, Bar	204	16	-	-
Nassau Grouper	610	11	-	-
Jack, Almaco	570	11	-	-
Snapper, Vermilion	88	11	82	6
Porgy, Sheepshead (Calamus)	77	10	41	7
Parrotfish, Princess	196	9	237	10
Grouper, Tiger	209	8	Conf	Conf
Parrotfish, Queen	202	8	231	11
Schoolmaster	195	8	Conf	Conf
Grouper, Graysby	9	7	Conf	Conf
Wahoo	300	6	-	-
Surgeonfish, Ocean	44	6	68	7
Jacks	250	5	-	-
Spadefish	18	5	Conf	Conf
Snapper, Queen	117	4	-	-
Octopus, Unspecified	20	4	Conf	Conf
Lobster, Spanish Slipper	19	4	-	-
Conch, Queen	1,383	18	-	-
Needlefish, Unspecified	-	-	186	23
Grouper, Black	Conf	Conf	Conf	Conf

Species	2018 Landings	2018 Trips	2019 Landings	2019 Trips
Dolphinfish	Conf	Conf	Conf	Conf
Grouper, Misty	Conf	Conf	Conf	Conf
Rainbow Runner	Conf	Conf	-	-
Grouper, Yellowmouth	Conf	Conf	-	-
Topsnail, West Indian	Conf	Conf	Conf	Conf
Snapper, Black	Conf	Conf	Conf	Conf
Barracuda	Conf	Conf	-	-
Sharks, Requiem, Unspecified	Conf	Conf	-	-
Herrings	Conf	Conf	Conf	Conf
Tuna, Blackfin	Conf	Conf	Conf	Conf
Bream, Sea	Conf	Conf	Conf	Conf
Grouper, Yellowedge	Conf	Conf	-	-
Tuna And Mackerels, Unspecified	Conf	Conf	-	-
Pompano, Florida	Conf	Conf	-	-
Shark, Reef	-	-	Conf	Conf
Tunny, Little	-	-	Conf	Conf
Hind, Rock	-	-	Conf	Conf

Conf = Confidential data
(Source: NMFS SERO 2021)

3.3.3 St. Croix

Landings of spiny lobster in St. Croix are available from self-reported commercial fishermen logbooks since 1975, and include information on fishing gear type and location where the catch was landed. In the USVI, landings are assumed to be fully reported and correction factors are not used. Commercial fishermen target a variety of species using multiple gear types, with 70% using more than one method of fishing (e.g., diving, line fishing, trap fishing) (Kojis et al. 2017). Kojis et al. (2017) found that 59.6% of the commercial fishermen in St. Croix targeted spiny lobster. In 2019,[19] 19 of the 47 commercial fishermen in St. Croix that reported their catch reported landings of spiny lobster.

In St. Croix, commercial landings reported using dive gear have consistently been greater than landings reported for hook-and-line or trap gear. Half of the fishermen surveyed in St. Croix reported owning their own SCUBA gear, and almost all reported using snares (to target spiny lobster) or spears (to target reef fish) during diving operations (Kojis et al. 2017). In St. Croix, fish traps are used to catch spiny lobster and various reef fish, such as blackfin snapper, silk snapper, schoolmaster, red hind grouper, and queen triggerfish, while lobster traps primarily catch spiny lobster, although only one fishermen reported using lobster traps.

[19] At the time of amendment preparation, the most recent and complete year of landings available was from 2019.

Landings of spiny lobster in St. Croix have generally decreased each year since ACLs were established in 2012 (Table 3.3.7). Reporting of harvest location from unknown areas has fluctuated since 2012, generally occurring at low levels (less than 10%). The majority of spiny lobster are reported from state waters (0-3 nautical miles) each year (Table 3.3.7). In St. Croix, the majority of spiny lobster are harvested using dive gear, followed by trap gear (Table 3.3.8).

Table 3.3.7. Landings of spiny lobster (in pounds) in St. Croix for 2012-2019 with the percent reported from state waters (0-3 nautical miles), federal waters (3-200 nautical miles), or unknown location.

Year	Spiny Lobster Landings (lbs)	Percent from State Waters	Percent from Federal Waters	Percent from Unknown Area
2012	87,073	51%	49%	0%
2013	59,398	57%	41%	2%
2014	39,724	64%	30%	5%
2015	44,963	55%	38%	7%
2016	31,582	63%	31%	7%
2017	26,193	65%	29%	6%
2018	10,970	59%	39%	2%
2019	15,721	59%	30%	11%

(Source: NMFS SERO 2021)

Table 3.3.8. Percent of spiny lobster landings in St. Croix for 2012-2019 reported by gear type.

Year	Diving	Traps
2012	82%	18%
2013	90%	10%
2014	94%	6%
2015	87%	13%
2016	97%	3%
2017	89%	11%
2018	94%	6%
2019	92%	8%

(Source: NMFS SERO 2021)

In 2018, 313 of the total 804 trips reported by commercial fishermen included landings of spiny lobster. Of those 313 trips, the most commonly caught species during the same trip included, stoplight parrotfish, queen triggerfish, and queen conch, among others (Table 3.3.9). In 2019, 384 of the total 939 trips reported by commercial fishermen included landings of spiny lobster. The same species were generally the most commonly co-occurring catch in 2019, both in pounds and frequency of trips, although in a different order of importance.

Table 3.3.9. Landings (in pounds) of spiny lobster and co-occurring species landed and number of trip tickets that reported spiny lobster and co-occurring species in St. Croix in 2018 and 2019.

Species	2018 Landings	2018 Trips	2019 Landings	2019 Trips
Lobsters, Spiny	10,970	313	15,325	384
Parrotfish, Stoplight	6,020	159	3,813	105
Triggerfish, Queen	2,977	146	2,137	137
Conch, Queen	6,466	105	7,950	114
Grouper, Red Hind	893	90	1,510	110
Schoolmaster	1,163	84	1,867	113
Grunt, Bluestriped	844	77	673	65
Grouper, Coney	666	77	830	62
Parrotfish, Redtail	1,864	74	3,421	112
Parrotfish, Redfin	1,128	65	934	71
Snapper, Mutton	493	63	410	40
Surgeonfish, Doctorfish	667	59	803	57
Angelfish, French	594	59	64	21
Angelfish, Gray	516	54	375	45
Goatfish, Unspecified	509	49	52	15
Snapper, Gray	427	48	308	38
Parrotfish, Queen	707	42	326	22
Parrotfish, Redband	371	38	625	59
Surgeonfish, Blue Tang	194	37	810	62
Hind, Rock	268	32	327	28
Blue Runner	455	29	164	9
Surgeonfish, Ocean	410	29	275	15
Snapper, Lane	370	28	234	11
Grunt, Tomtate	470	28	207	19
Snapper, Queen	377	27	-	-
Grunt, Cottonwick	373	26	Conf	Conf
Porgy, Saucereye	34	18	24	11
Porgy, Jolthead	28	13	19	10
Grunt, White	65	10	917	59
Snapper, Yellowtail	39	9	62	19
Cowfish, Scrawled	43	9	143	11
Lionfish	65	9	37	8
Angelfish, Queen	70	8	266	17
Parrotfish, Princess	102	6	331	23
Squirrelfish	41	5	168	13
Jack, Bar	Conf	Conf	40	4
Grunt, Margate	Conf	Conf	146	24
Triggerfish, Unspecified	Conf	Conf	107	9

Species	2018 Landings	2018 Trips	2019 Landings	2019 Trips
Barracuda	Conf	Conf	Conf	Conf
Snapper, Blackfin	Conf	Conf	Conf	Conf
Snapper, Vermilion	Conf	Conf	-	-
Grouper, Yellowfin	Conf	Conf	-	-
Grouper, Red	Conf	Conf	Conf	Conf
Grouper, Tiger	Conf	Conf	-	-
Grunt, Unspecified	Conf	Conf	-	-
Snapper, Mahogany	Conf	Conf	-	-
Crab, Unspecified	-	-	48	9
Hogfish	-	-	6	5
Snapper, Silk	-	-	31	12
Bream, Sea	-	-	Conf	Conf
Snapper, Black	-	-	Conf	Conf
Sharks, Requiem, Unspecified	-	-	Conf	Conf
Rainbow Runner	-	-	Conf	Conf
Tuna, Unspecified	-	-	Conf	Conf
Tunny, Little	-	-	Conf	Conf

Conf = Confidential data
(Source: NMFS SERO 2021)

3.4 Description of the Economic Environment

3.4.1 Introduction

The 2017 hurricane season was disastrous for both the Puerto Rico and USVI economies. In a span of a few weeks in September, Hurricane Irma and Hurricane Maria devastated the island areas.

Irma was estimated to have caused $1 billion in damages in Puerto Rico (Sullivan and Fieser 2017). Hsiang and Houser (2017) from the Climate Impact Lab estimated the impact of Hurricane Maria using an econometric model of the costs of cyclones over the past 60 years and applied it to the characteristics of Hurricane Maria and the economic conditions before the hurricane in Puerto Rico. They found that Maria could lower Puerto Rican incomes by 21% over a 15-year period - a cumulative $180 billion in lost economic output. They concluded that it could take 26 years for Puerto Rico to return to its pre-Maria economic conditions.

The Puerto Rican consulting firm Estudios Técnicos (2017) estimated the capital loss from Hurricane Maria in the range of $16 to $20 billion. Damages to the island's electric and communication infrastructures were estimated to be as high as $1.6 billion and $567 million, respectively. Estudios Técnicos also estimated a loss of income by employees of at least $1

billion. NOAA National Centers for Environmental Information estimated damages caused by Hurricane Maria of $90.0 billion in Puerto Rico.[20]

The USVI economy is small and extremely vulnerable to natural disasters - windstorms, earthquakes, tsunamis - as well as external economic shocks due to the high degree of trade dependence and lack of economic diversification (USVI Bureau of Economic Research [BER] 2020). Hurricane Irma passed over St. Thomas as a Category 5 storm on September 6, 2017, with peak winds of 178 miles per hour. Two weeks later, on September 20, Hurricane Maria hit St. Croix, to the southeast, as a Category 5 storm. Damages from Irma exceeded $2.4 billion in the USVI (USDA National Resources Conservation Service Caribbean Area).[21]

Maria damaged or destroyed 70% of the buildings on St. Croix, including schools and the island's only hospital. Public revenues, according to estimates based on USVI fiscal data, were halved after the two hurricanes (Congressional Research Service 2018/2020). The USVI government borrowed funds to cover some budget deficits, which raised concerns over levels of public debt and unfunded pension liabilities. Local policymakers proposed tax increases and austerity measures.

Descriptions of the economies of the island areas (Puerto Rico, St. Croix and St. Thomas and St. John) prior to the 2017 hurricanes are found in the Environmental Assessments for the Comprehensive Fishery Management Plans and are incorporated by reference. The remainder of this section focuses on the post-hurricane economies of the island areas.

3.4.2 Puerto Rico

3.4.2.1 General Economic Conditions

The number of Puerto Ricans leaving for the mainland increased to 301,304 in 2017; however, many returned later. Net out migration in 2017 was 77,321 persons, meaning 223,983 persons migrated to the island that year (U.S. Census Bureau 2020).

Despite the adverse impacts of the 2017 hurricane season, the annual unemployment rate fell in 2018 and 2019, but it rose again in 2020. However, the labor force continued its general declining trend after 2017 despite the bump in 2019 (Figure 3.4.1). Note that the unemployment rate in 2020 was substantially lower than it had been from 2012 through 2016, when it was never fell below 11.8% (U.S. Department of Labor [USDOL] Bureau of Labor Statistics [BLS]).

[20] https://www.ncdc.noaa.gov/billions/events.pdf
[21] https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/pr/newsroom/features/?cid=nrcseprd1420889

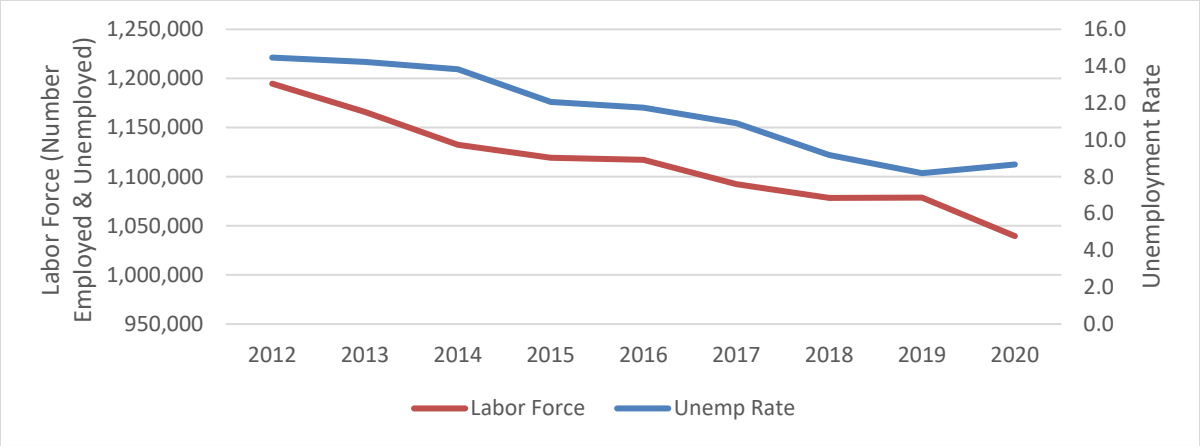

Figure 3.4.1. Labor force and unemployment rate in Puerto Rico, 2012 – 2020. (Source: USDOL BLS)

Most of Puerto Rico's farms are located in the central and western municipalities, and Hurricane Maria's path took it through much of the island's prime farmland. Puerto Rico's Secretary of Agriculture stated to the New York Times that 80% of the island's crops with a preliminary estimated value of $780 million were wiped out by the hurricane (Robles and Ferré-Sadurní 2017). Plantain, banana, and coffee crops were hit the hardest. Approximately half of the coffee plants were lost (Ayala 2017).

The chicken and egg industry lost 60% of its production (Ayala 2017). Approximately 2 million of the island's 2.6 million chickens were killed, many of them drowned, and poultry housing and processing equipment were destroyed (Dorell 2017). Dairy cows died and surviving cows have been less productive than before. Communities and households lost gardens and family livestock. The federal government's response to the losses incurred by dairy farm operations included $12 million to the island's 253 licensed dairy operations to purchase feed for their estimated combined 94,000 cows for 30 days (U.S. Department of Agriculture [USDA] Farm Service Agency [FSA] 2017).

The 2018 Puerto Rico USDA Census of Agriculture (USDA 2020) shows a sharp decline in the number of farms and their land (cuerdas) from 2012 to 2018. The sharpest decline in the number of farms were those with one to nine cuerdas (Table 3.4.1).

Table 3.4.1. Number of farms, total amount of farmland, and number of farms by land size, 2012 and 2018.

Year	Number of Farms	Total Amount of Farm Land	Number Farms with 1 - 9 Cuerdas	Number Farms with 10 - 19 Cuerdas	Number Farms with 20 - 49 Cuerdas	Number Farms with 50 - 99 Cuerdas	Number Farms with 100 - 175 Cuerdas	Number Farms with 175 - 259 Cuerdas	Number Farms with 260 or more Cuerdas
2012	13,159	584,988	5,129	2,859	2,872	940	563	401	395
2018	8,230	487,775	2,213	1,853	1,950	952	579	330	353
Change	-37.46%	-16.62%	-56.85%	-35.19%	-32.10%	1.28%	2.84%	-17.71%	-10.63%

(Source: Puerto Rico USDA 2018 Census of Agriculture)

The Puerto Rico Planning Board estimated that Hurricane Maria had a $43.1 billion impact on the island's economy as of October 12, 2018 (Lloréns Vélez 2018). The Planning Board said losses for the private sector alone totaled $30 billion, with manufacturing reporting the highest loss of income and agriculture among the highest damage to infrastructure and equipment. After taking Federal Emergency Management Administration (FEMA) and private insurer disbursements into account, the net adverse impact to the economy was $30.3 billion.

Hurricane Maria did not cause damages to the territory's pharmaceutical industry. In 2018, five of the world's top ten selling drugs (Humira, Eliquis, Opdivo, Enbrel and Xarelto) were manufactured there, and internationally, eight of the 15 top-selling pharmaceutical products are made in Puerto Rico (Miller 2020). In 2019, nine out of Puerto Rico's top 10 commodity exports to the rest of the world were pharmaceutical or medical device products (Census U.S. International Trade Data). In 2020, there were 50 pharmaceutical and 30 medical-device manufacturing sites dotted throughout the island. In 2019, pharmaceutical exports totaled more than $44 billion, and, of that, $30.89 billion of that total was exported to the U.S. market.

Puerto Rico's real gross domestic product (GDP) declined in 2019 and 2020 (Figure 3.4.2), which is consistent with its declining trend since 2006. Real GDP in 2019 was 12% lower than it was in 2016, and in 2020, it was 7.5% less than it was in 2019 due in part to a series of earthquakes and the COVID-19 pandemic. Public debt represented 59% of GDP in 2019 and 65% of GDP in 2020.

Gross national income (GNI) per capita declined by 8.35% from 2016 through 2019 (Figure 3.4.3). The World Bank has not yet reported a 2020 estimate of GNI per capita.

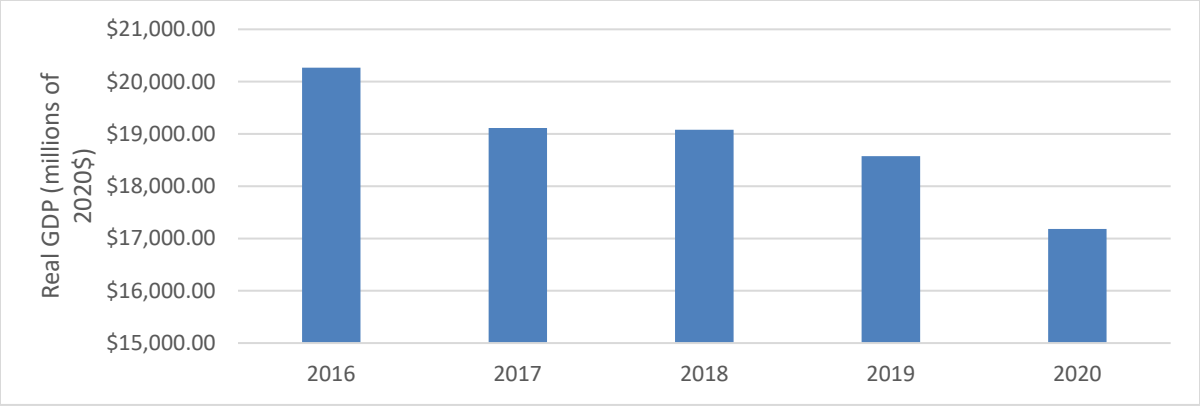

Figure 3.4.2. Puerto Rico real GDP (constant 2020 U.S. dollars), 2016 – 2020.
(Source: World Bank for GDP 2016 – 2019, Knoema for GDP for 2020, and BEA for implicit price deflator)

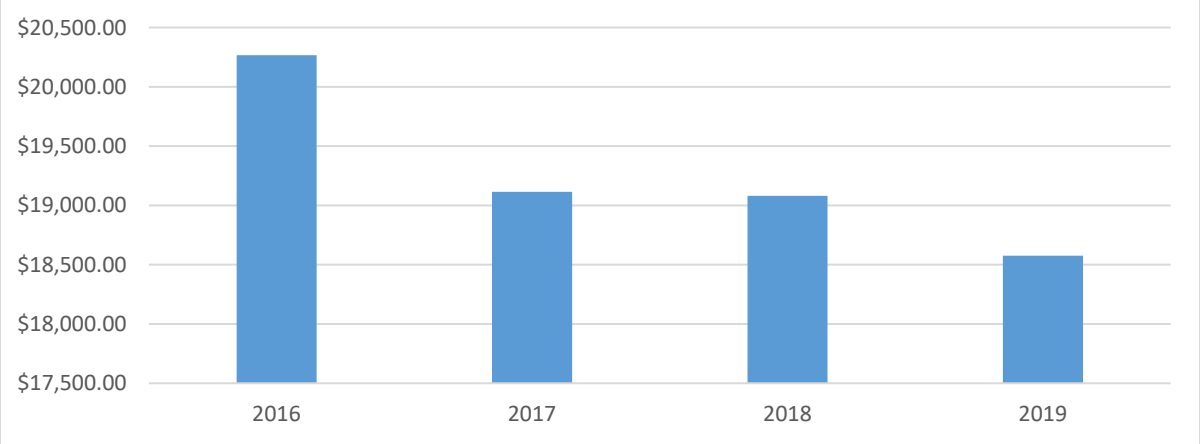

Figure 3.4.3. Puerto Rico's GNI per capita (constant 2020 U.S. dollars), 2016 – 2019.
(Source: World Bank for GNI per capita and BEA for implicit price deflator)

Because Puerto Rico lies on the boundary between the North American and Caribbean plates, the archipelago is prone to earthquakes and tsunamis. There were three significant earthquakes in January 2020 and each had many strong aftershocks. On January 6, 2020, there was a 5.8 magnitude earthquake, followed the next day by a 6.4 magnitude earthquake, which was centered off the southern coast, 6 miles south of Indios. It knocked out all power and caused at least $110 million in damages according to Reuters (Valentin Ortiz 2020). Another estimate put that figure at $3.1 billion (Kaske and Levin 2020). More than 600 homes and other buildings were destroyed, one person died, and there were damages to bridges and roads. Also, thousands of homes and other buildings were damaged. The iconic Punta Ventana, a natural formation that is a popular destination for tourists, collapsed.

Approximately 70% of Puerto Rico's power is generated along the south coast, while approximately 70% of its demand is along the north coast. The territory's largest power plant, the Costa Sur power plant with a capacity of 970 megawatts, was knocked out of service from

cracked foundations, ruptured pipes, split water tanks, a damaged turbine and damages to the plant's control room. Puerto Rico Electric Power Authority (PREPA) shut down the power grid as a safety precaution, and two-thirds of the utility's 1.4 million customers were without power for days. The Costa Sur plant was not back online until August 2020. On January 11, there was an aftershock that registered at 5.9 magnitude.

Many of these aftershocks were of significant magnitude and made relief and recovery difficult. Over two dozen quakes had a magnitude of 4.5 or more. On January 15, there was a 5.2 earthquake and ten days later, a 5.0 magnitude earthquake hit near Guayanilla. On 14 January, PREPA said service had been restored for 99% of its customers. On May 2, 2020, the same area was rocked by a magnitude 5.4 earthquake that caused new damage in Ponce. The United States Geological Survey (USGS) stated that it was an aftershock of the January 7 magnitude 6.4 earthquake, and USGS included it in the earthquake swarm that they had been tracking since January. Another magnitude 4.8 aftershock struck the area at the beginning of August, causing further damage and slowing repairs. A USGS report predicts that the aftershocks could continue for a decade (van der Elst et al. 2020). The continuance of aftershocks and damages from the aftershocks complicates estimates of the economic impacts of the damages in 2020.

Most renewable energy-generating facilities survived Hurricane Maria with modest amounts of damage, but a solar photovoltaic farm at Humacao and the Punta Lima wind farm at Naguabo - both on Puerto Rico's east coast where the eye of the storm came ashore - were badly damaged. The solar photovoltaic farm was rebuilt, while the Punta Lima wind farm remained non-operational as of May 2020 (U.S. Energy Information Administration [USEIA]). The earthquakes in early 2020 did not damage any renewable generating facilities. The solar micro grids using rooftop solar panels that were installed primarily by private, federal, and non-profit organizations after the hurricanes in 2017, were able to maintain power supply in some communities following the earthquakes.

Although Puerto Rico has, on average, more than 65% sunny hours per day and 22 miles per hour winds year-round, less than 3% of all the energy produced there is through renewable energy. Under the Puerto Rico Energy Public Policy Act, which was signed into law in May 2019, that has to change. PREPA must obtain 40% of its electricity from renewable resources by 2025, 60% by 2040, and 100% by 2050 (USEIA). The territory's renewable resources include wind, hydropower, and solar energy. For fiscal year 2020, 2.5% of PREPA's electricity came from renewable energy, with solar photovoltaic accounting for half and wind accounting for one-third of total renewable generation. The remainder came from hydroelectric and landfill gas facilities (USEIA).

Tourism's contribution to GDP fell from 5.68% in 2016 to 5.50% in 2017 and 4.82% in 2018 (Puerto Rico Tourism Company). Both the earthquakes and SARS pandemic (COVID-19) of

2020 (and that continues into 2021) has greatly affected island tourism. In 2019, there were approximately 1.11 million tourist arrivals; however, that fell to approximately 0.523 million in 2020. Figure 3.4.4 shows the number of arrival guests through August of each year since 2017 and note the sharp declines in 2018 and 2020.

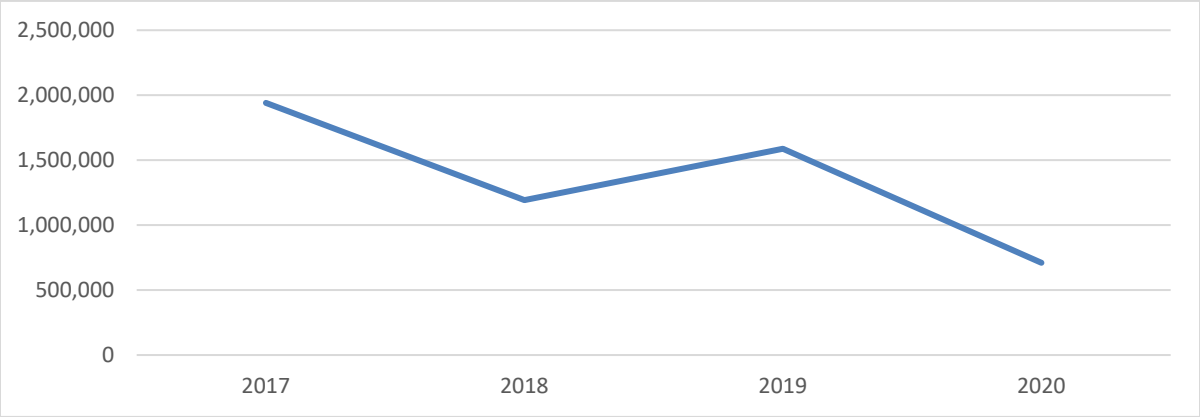

Figure 3.4.4. Arrival guests through August of each year, 2017 – 2020.
(Source: Puerto Rico Tourism Company, Registrations and Occupancy Report)

The labor force continues to shrink as shown in Figure 3.4.5. Note that there is no data for the size of the labor force in March or April 2020.

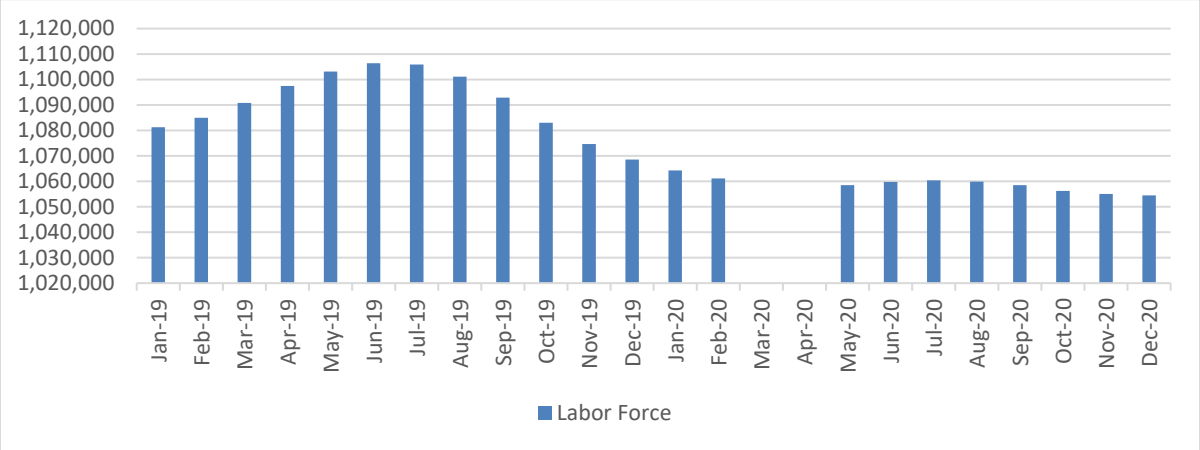

Figure 3.4.5. Monthly labor force, January 2019 – December 2020.
(Source: USDOL BLS)

After years of wrangling with its creditors, the territory disclosed a plan in September 2019 for resolving the biggest governmental bankruptcy in United States history, by cutting $129 billion in debts to about $86 billion - a reduction of 33 percent (New York Times September 27, 2019). In June 2020, the Supreme Court unanimously ruled that the financial oversight board, which

was established by Congress to oversee Puerto Rico's finances after the 2014 bankruptcy, was constitutional (Coleman 2021).

In February 2021, the board announced that it has reached an agreement in principal with creditors to reduce a portion of the U.S. territory's more than $70 billion public debt load. However, Governor Pedro Pierluisi rejected the agreement for reasons that it overburdened pensioners. The board responded with a revised plan in March that includes a proposed cut of up to 8.5% to monthly pensions of at least $1,500. That has long been a point of contention between the board and the governor, who has repeatedly said he would not approve such cuts. Ultimately, the plan also has to be approved by a judge overseeing Puerto Rico's bankruptcy-like process. If that occurs, the plan would reduce Puerto Rico's outstanding debt from $35 billion to $7.4 billion, an 80% cut. Among other things, it also would cut total debt service payments by more than 60%, which the board said would save the government nearly $60 billion in debt service payments. Governor Pierluisi who has previously said he would reject any plan with high pension cuts, said the government will declare in court that it does not fully support the plan, but still, he called the proposal a step in the right direction.

3.4.2.2 Economic Description of the Fishery

Estimated annual landings of spiny lobster, as noted in Section 3.3.1, have gradually been increasing since ACLs were established in 2012.[22] Commensurate with this increase, the dockside value of these landings has also been gradually increasing peaking at almost $3.5 million in 2018, before falling marginally to $3.33 million in 2019 (Table 3.4.2). The increased value is somewhat less pronounced when expressed on a deflated basis as a result of a relatively stable deflated per pound price which changed little during the eight-year period ending in 2019.[23]

Table 3.4.2. Ex-vessel value and average price of spiny lobster per pound in Puerto Rico for 2012-2019.

Year	Landings (Pounds)	Value ($)		Price ($/lb)	
		Current	Deflated[a]	Current	Deflated
2012	385,811	2,429,083	2,703,569	6.30	7.01
2013	275,412	1,747,305	1,918,540	6.34	6.97
2014	376,779	2,414,956	2,608,152	6.41	6.92
2015	418,273	2,681,686	2,893,539	6.41	6.92

[22] These landings are considered 'estimates' because, as discussed in Section 3.3.1, all landings are not reported and landings that are reported are thus adjusted using an expansion factor determined by DNER staff at the Fisheries Research Laboratory.

[23] Specifically, the difference between the highest observed annual deflated price ($7.06 in 2017) and the lowest observed annual deflated price ($6.79 in 2018) was only about four percent.

Year	Landings (Pounds)	Value ($)		Price ($/lb)	
		Current	Deflated[a]	Current	Deflated
2016	449,233	2,920,828	3,110,681	6.50	6.92
2017	283,221	1,909,666	1,999,781	6.74	7.06
2018	519,864	3,470,626	3,533,097	6.67	6.79
2019	488,316	3,333,652	3,333,652	6.83	6.83

[a] Values and prices are deflated based on the 2019 Consumer Price Index.

The information presented in Section 3.3 also indicates that approximately 40% of the trips reported by commercial fishermen in in 2019 included landings of spiny lobster (12,366 of the total 30,731 trips). These trips frequently harvest species co-occurring with the harvest of spiny lobster.[24] Estimated annual revenues generated from the landing of these co-occurring species are presented in Table 3.4.3. As indicated, estimated annual revenues associated with the co-occurring harvests have ranged from about $1.35 million in 2013, to about $2.0 million in 2018. The price per pound of these co-occurring species gradually increased over the 2012-2019 period approaching $4.00 in the more recent years. The increase was somewhat less when inflation is removed, but still substantially larger than that observed for spiny lobster. The increasing deflated annual price trend observed for the co-occurring species may reflect a changing species composition, a change in demand/supply of the co-occurring species, or some amalgam.

Table 3.4.3. Ex-vessel value and price per pound co-occurring species landed with spiny lobster in Puerto Rico for 2012-2019.

Year	Landings (Pounds)	Value ($)		Price ($/lb)	
		Current	Deflated[a]	Current	Deflated
2012	507,310	1,608,715	1,790,500	3.17	3.53
2013	402,243	1,353,258	1,485,877	3.36	3.69
2014	466,076	1,537,349	1,660,337	3.30	3.56
2015	482,078	1,606,366	1,733,269	3.33	3.33
2016	475,793	1,628,102	1,733,928	3.42	3.64
2017	353,569	1,406,567	1,467,049	3.98	4.15
2018	521,953	2,043,477	2,080,259	3.92	3.99
2019	441,983	1,734,545	1,734,545	3.92	3.92

[a] Values and prices are deflated based on the 2019 Consumer Price Index.

[24] A detailed listing of the co-occurrence species as well as the number of trips in which they were landed is presented in Table 3.1.3

A comparison of the information in Tables 3.4.2 and 3.4.3 provides insight to several features. First, landings of the co-occurring species, expressed on a poundage basis, exceeded landings of spiny lobster by a significant margin in the earlier years of analysis. However, this margin declined over time and by 2018 spiny lobster landings approached the landings of co-occurring species while 2019 spiny lobster landings exceeded the landings of co-occurring species (by almost 50,000 pounds). Second, while landings of co-occurring species, expressed on a poundage basis, tended to exceed spiny lobster landings during the earlier years, the value of spiny lobster landings consistently exceeded the value of co-occurring species; often by more than $1.0 million. This reflects the significantly higher per pound price received by fishermen for spiny lobster. This price differential, however, appears to have narrowed in more recent years.

A comparison of the information in Tables 3.4.2 and 3.4.3 also highlights the fact that landings of both spiny lobsters and co-occurring species were both abnormally low in 2017; undoubtedly reflecting the impact from Hurricanes Irma and Maria. Of greater interest, however, is the fact that 2018 landings of both spiny lobsters and co-occurring species were the highest on record during the eight-year period of analysis. This may suggest some 'surplus' stocks harvested in 2018 that evaded harvest in 2017.

Revenues per trip can be ascertained based on those trips where a trip ticket is submitted. Based on these trips, total revenues per trip (i.e., spiny lobsters and co-occurring species) averaged about $240 during the eight-year period of analysis with an increasing trend during the later years (Table 3.4.4). Revenues from the landing of spiny lobsters ranged from a low of 56% of total trip revenues in 2013, to a high of 66% in 2019. Despite a significant decline in estimated industry-wide landings of spiny lobsters and co-occurring species in 2017 (see Tables 3.4.2 and 3.4.3), estimated spiny lobster catch per trip in 2017 approximated the eight-year average while the landings of co-occurring species were the highest observed during the eight-year period. This would suggest the decline in industry-wide 2017 landings reflect a decline in number of trips as opposed to a decline in harvest per trip.

Table 3.4.4. Average revenues per trip ($) from spiny lobster and co-occurring species in Puerto Rico for 2012-2019.

Year	Spiny Lobster Revenues		Revenues From Co-occurring Species		Total Revenues	
	Current	Deflated[a]	Current	Deflated	Current	Deflated
2012	120	133	83	93	203	226
2013	114	125	89	97	202	222
2014	136	146	88	95	224	242
2015	145	157	88	95	234	252
2016	159	170	89	95	248	264
2017	153	160	111	115	264	275

Year	Spiny Lobster Revenues		Revenues From Co-occurring Species		Total Revenues	
	Current	Deflated[a]	Current	Deflated	Current	Deflated
2018	173	176	98	100	271	275
2019	182	182	95	95	277	277

[a] Based on the 2019 Consumer Price Index.

As noted in Section 3.3.1, the harvest of spiny lobsters in Puerto Rico occurs in both state waters (0-9 nautical miles) and federal waters (9-200 nautical miles) with harvests from state waters dominating the catch. Estimated per trip revenues (spiny lobster and co-occurring species) from both state and federal waters for the 2012-2019 period are presented in Table 3.4.5. Since 2016, revenues (unweighted) from the harvest of spiny lobsters in state waters have averaged $167 per trip compared to $186 in federal waters.[25] Similarly, revenues generated from the harvest of co-occurring species in state waters since 2016 averaged $99 per trip compared to $97 in federal waters. Total (unweighted) revenues from state waters averaged $266 per trip compared to $283 in federal waters. This relatively small differential in per trip revenues (about six percent) in conjunction with a multitude of other factors (e.g., rougher sea conditions in a small boat and the higher fuel costs associated with an increased travelling distance) may help to explain the relatively small percentage of trips occurring in federal waters (see Table 3.1.1).[26] Furthermore, while not shown in Table 3.4.5, calculated prices between spiny lobsters reported to be harvested in state waters were not found to be significantly different from those lobsters reported to be harvested from federal waters.

Table 3.4.5. Average revenues per trip ($) from spiny lobster and co-occurring species by area fished in Puerto Rico for 2012-2019.

Year	Spiny Lobster Revenues			Revenues From Co-occurring Species			Total Revenues		
	State Waters	Federal Waters	Unknown Area	State Waters	Federal Waters	Unknown Area	State Waters	Federal Waters	Unknown Area
2012	122	126	117	76	127	79	199	254	197
2013	117	133	99	88	124	80	205	256	179
2014	140	144	117	89	99	80	229	243	197
2015	151	149	118	89	99	79	240	248	197
2016	162	155	133	91	90	60	253	245	193
2017	151	192	139	110	113	130	261	306	269
2018	173	211	133	99	89	81	272	299	214
2019	183	185	138	96	97	62	279	281	200

[25] The starting point of 2016 was selected because that was the first year where landings from 'unknown area' was less than 10% (see Table 3.1.1).

[26] While there appears to be little difference in average trip revenues from harvests in state waters vis-à-vis federal waters, revenues from 'unknown area' are consistently less than either revenues from state or federal waters.

As discussed in Section 3.3.1, traps and diving have represented in excess of 90% of the commercial harvest of spiny lobster in Puerto Rico since 2012 (Table 3.1.2) with reported harvests from diving consistently exceeding reported harvests from traps. Approximately 70% of trips reporting the harvest of spiny lobster from federal waters indicate that the harvest was taken via diving with the figure approaching 80% in 2019.

While important to the Island's economy, economic analysis of Puerto Rico's commercial fishing industry is limited. With respect to the Island's commercial diving sector, the most comprehensive study is that conducted by Agar and Shivlani (2016) who interviewed 'active' divers between March 2014 and March 2015 in an effort to ascertain characteristics of the fishermen and their fishing practices. The researchers found that the commercial divers had various economic objectives associated with their fishing trips with about two-thirds of the fishermen reporting having a 'target' (e.g., catch and/or income) that that he hoped to achieve. About a quarter of the interviewees reported maximizing benefits (i.e., catching as much as possible) as their trip objective.

Gross returns per trip among diving operations according to Agar and Shivlani (2016) ranged from \$75 to \$700 and averaged \$251.[27] Total variable costs per trip, according to Agar and Shivlani (2016) averaged \$81 resulting in net earnings per trip of about \$170. The crew size (including the captain) averaged 2.4 indicating per trip net earnings per person of about \$70 (with owner-captains generally receiving somewhat more than crew members).

Agar et al. (2017) also examined the commercial Puerto Rico trap fishery with data for the analysis coming from active trap fishermen. Interviews were conducted between June 2014 and January 2016. The average boat length among participants was 20 feet. About two-thirds of the participants reported fishing exclusively with fish traps while another 20% reported fishing with both fish traps and lobster traps. Among survey participants, about 40% reported a trip objective of maximizing landings while about 30% had an objective of covering costs. On average, respondents reported making an average of 2.3 trips per week with average landings per trip being 57 pounds. Gross revenues per trip were estimated to equal \$290 (a median of \$207) with total variable costs per trip equaling \$57. This resulted in estimated net earnings of \$232 per trip.

[27] This number compares favorably to the revenue figures (for all trips reporting the harvest of spiny lobster) presented in Table 3.4.14. Specifically, 2014 estimated per trip revenues based on trip tickets equaled \$224 or about 90% of that reported by Agar and Shivlani (2016).

3.4.3 St. Croix and St. Thomas and St. John

3.4.3.1 General Economic Conditions

Since after the devastating twin hurricanes of 2017, the most dynamic sector of the USVI economy has been construction. Federal disaster assistance is spurring reconstruction, infrastructure repair, and several hazard mitigation activities, resulting in high demand for construction workers. As shown in Figure 3.4.6, the number of jobs in construction more than doubled from 2017 to 2019: 1,618 in August 2017 and 4,076 in August 2019. However, the COVID-19 pandemic caused a decline in construction in 2020 and early 2021. Employees in the construction, mining and logging sector, which are essentially all in construction (96%) in the USVI, declined in 2020 and early 2021, but stayed above the numbers prior to the hurricanes as seen in Figure 3.4.7.

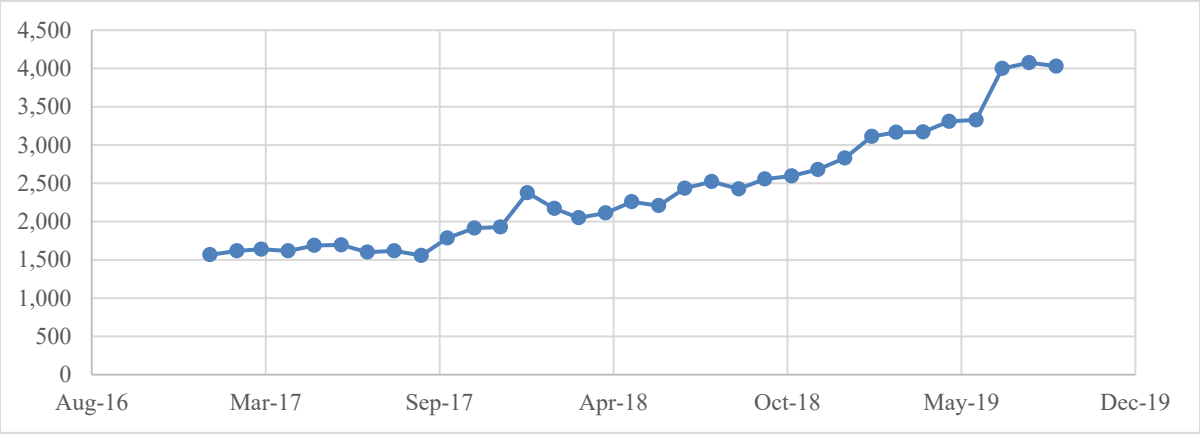

Figure 3.4.6. Construction jobs in USVI, January 2017 – September 2019.
(Source: USVI DOL, Labor Market Basket)

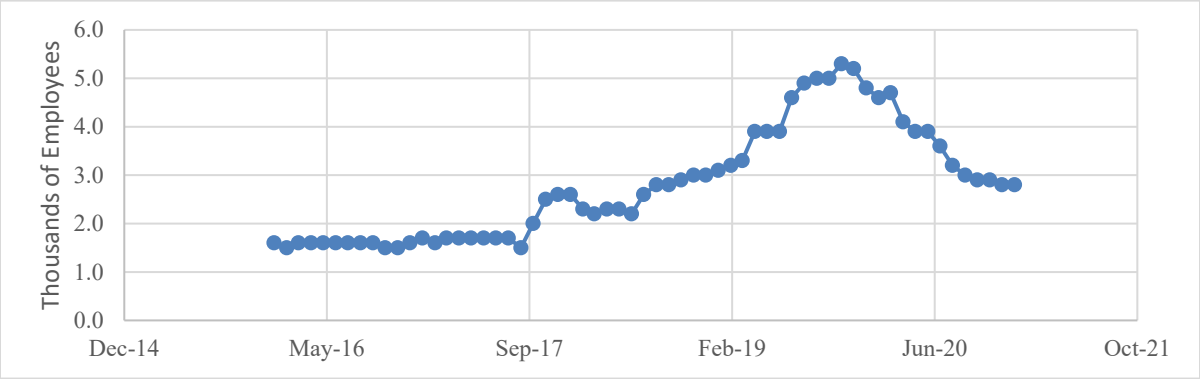

Figure 3.4.7. Employees in construction, mining and logging sector in USVI, January 2016 to January 2021.
(Source: U.S. BLS)

In March 13, 2020, Governor Bryan issued an Executive Order and Proclamation declaring a State of Emergency in response to the pandemic. Ten days later the Governor issued a "stay-at-home" order and ordered all non-essential businesses to remain closed, beginning March 25. The order also officially limited gatherings to 10 persons or fewer, closed all bars, prohibited restaurants from offering dining room service, and limited taxis and safaris to half-capacity passenger loads.[28] On April 6, Governor Bryan ordered the closure of all beaches through April 20. On April 13, 2020, the Governor announced that the U.S. Department of the Interior's Office of Insular Affairs has given the U.S. Virgin Islands $7,863,776 in funding from the Coronavirus Aid, Relief, and Economic Security (CARES) Act Federal COVID-19 stimulus bill. Also on that day, the Federal Aviation Administration awarded the USVI $41,145,247 to maintain the territory's airports as part of the CARES Act Federal stimulus bill. On May 4, the USVI began to allow some non-essential businesses to reopen; however, the State of Emergency was extended on May 7 for another 60 days, which meant it would not expire until July 12. On May 21, 2020, Governor Bryan announced he was easing restrictions on bars and restaurants, allowing bars to reopen and restaurants to serve dine-in customers beginning the Tuesday after Memorial Day. Seven days later the Governor announced that the USVI would move to the "Open Doors" phase, which would allow all business to reopen. With that, hotels, villas and Airbnb vendors were able to begin taking reservations and hospitality-related businesses had restrictions lifted. Thermal scanners were installed at the airports and other measures were put into place to track visitors and their health. On July 9, 2020, Governor Bryan tightened restrictions on travelers and set a 10% positivity rate as the threshold, affecting visitors from any state at that rate or higher, which at that date were: Alabama; Arizona; Florida; Georgia; Idaho; Kansas; Mississippi; Nevada; South Carolina; and Texas.

Even before the pandemic affected travel and tourism, Hurricanes Irma and Maria were disastrous to USVI tourism. Not only were Hurricanes Irma and Maria disastrous for tourism but also they had a tremendous impact on both commercial and recreational fishing (Stoffle et al. 2020). In the immediate aftermath of the hurricanes, the number of stay-over tourist arrivals declined, and employment in the leisure and hospitality sector plummeted, as several large hotel properties closed for renovations. The number of employees in the leisure and hospitality and trade, transportation and utilities sectors began to recover in 2019, but they declined again in 2020 (Figure 3.4.8). Employment in the manufacturing sector was not similarly affected, and it rose from 566 employees in August 2017 to 760 in August 2019 and has stayed relatively constant since then despite the pandemic.

[28] On April 2, 2020, the U.S. President declared that a major disaster existed in the USVI based on COVID-19, which opened the door to getting Federal assistance to mitigate the virus.

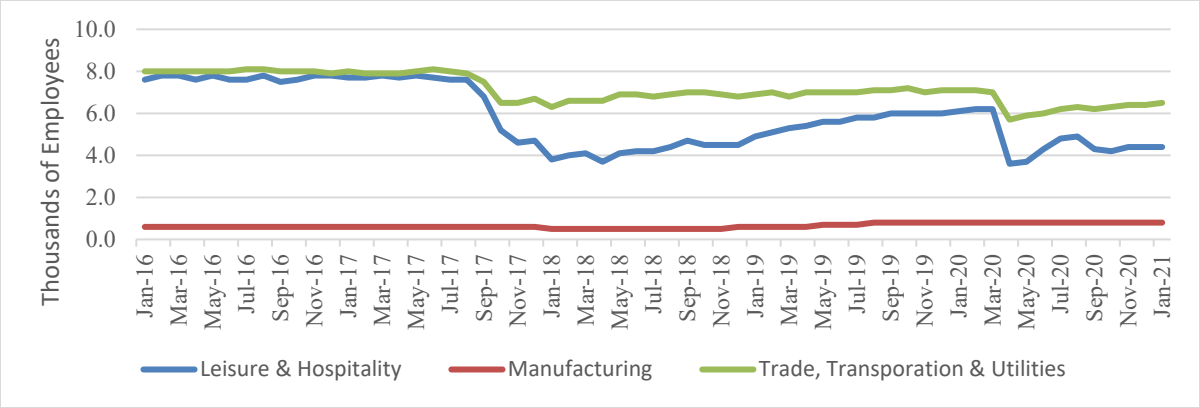

Figure 3.4.8. Employees in the leisure and hospitality, manufacturing, and trade, transportation and utilities sectors in USVI, January 2016 to January 2021.
(Source: U.S. BLS)

Charlotte Amalie in St. Thomas, which is one of the most popular cruise destinations in the Caribbean, suffered severe damage, and two cruise ports were closed for weeks. From 2014 through 2016, an average of 23 ships made call in September and another 29 in October. There were only two cruise ship calls to St. Thomas in September and none in October of 2017.

The peak cruise season runs from December through April. Although the numbers of monthly cruise passenger arrivals and ship calls rebounded in December 2017, the numbers of passengers and ship calls from January through April of 2018 were less than they had been the previous four years. Total annual visitor arrivals declined in 2018, but rebounded in 2019 and forecasts for 2020 were optimistic; however, that optimism was short-lived and visitor arrivals declined dramatically in 2020[29] (Figure 3.4.9).

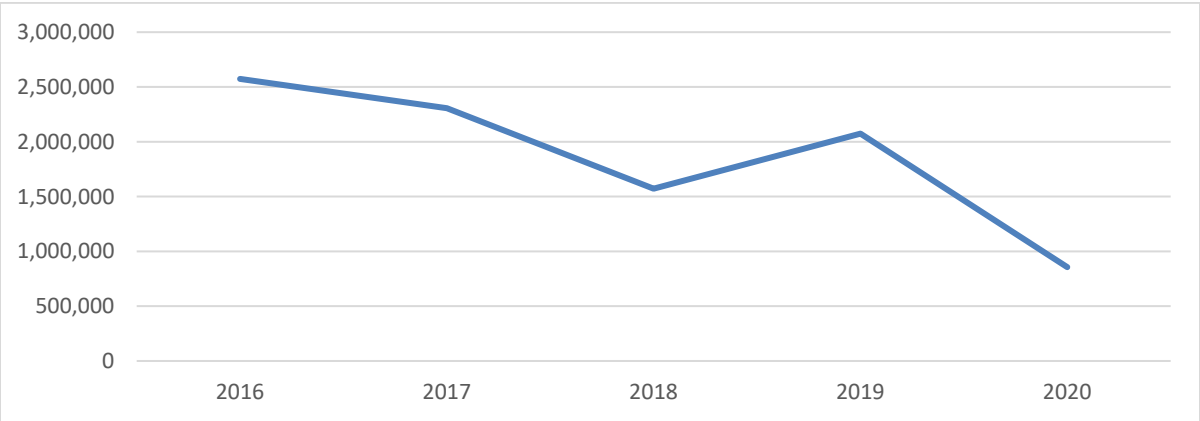

Figure 3.4.9. Total USVI visitor arrivals, 2016 – 2020.
(Source: USVI BER)

[29] In 2016, there were approximately 2.57 million visitor arrivals, in 2020 there were approximately 0.86 million.

Real GDP grew by 1.5% in 2018 and then by 1.7% in 2019, which generated optimism for the USVI economy in 2020, but that was before the pandemic. Real GDP fell by 14.2% in 2020 (USVI BER) (Figure 3.4.10).

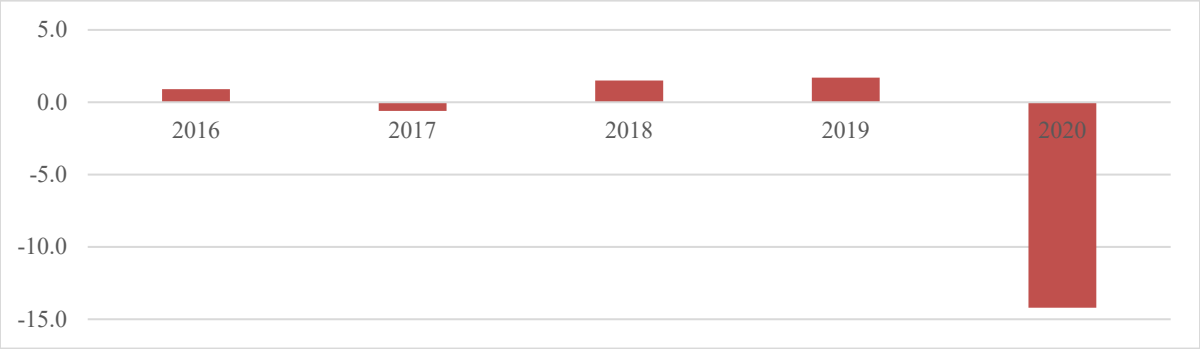

Figure 3.4.10. Annual change in real GDP, 2016 – 2020.
(Source: USVI BER, November 2020)

Petroleum products account for 42% of total exports in 2018. However, that was largely a re-export business, and little value was added in the territory. That is expected to change since St. Croix's long-idled refinery, now the Limetree Refinery, restarted in February 2021. Although it has brought back jobs, it is also bringing back memories of the pollution produced by the former HOVENSA refinery. According to Reuters (March 8, 2021), the U.S. Environmental Protection Agency (EPA) wants the refinery's owners, Limetree Bay Ventures, to increase its monitoring of air quality due to emissions affecting the nearby neighborhoods, but the owners have so far balked.

After tourism and petroleum, the next most important sector is the production and export of rum. Rum constituted 41% of total exports in 2018 by value. Rum exports to the mainland increased from 2017 to 2019 (Figure 3.4.11).

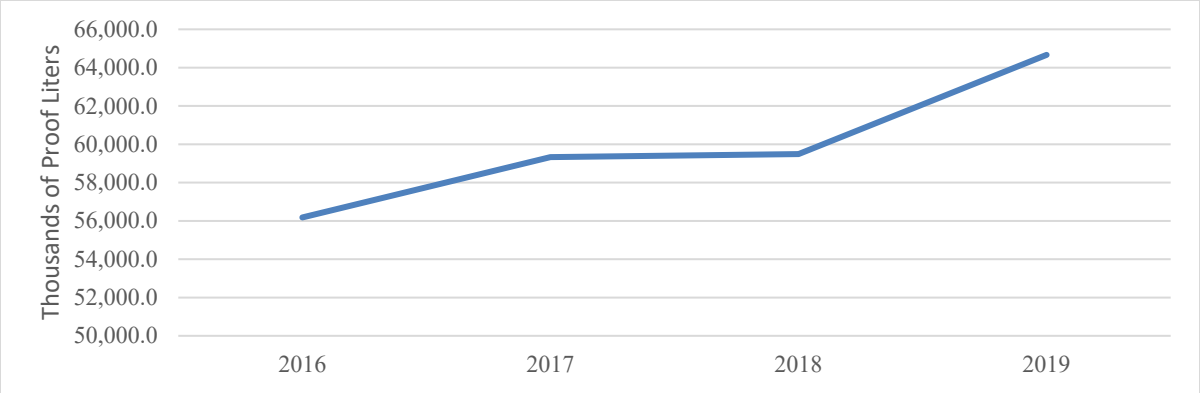

Figure 3.4.11. Annual change in rum exports to U.S.
(Source: USVI BER, Annual Economic Indicators, May 20, 2020)

The USVI economy performed better in 2018 and 2019, exhibiting positive real economic growth, higher revenues, decreasing unemployment, and improving fiscal balances and liquidity positions for the central government. However, the improvement in economic performance was primarily due to an infusion of Federal disaster relief assistance that is helping rebuild the economy.

Despite the positive achievements and progress on reconstruction, the economy still faces many weaknesses and vulnerabilities that could result in the return of significant deficits and financial distress, namely the pending insolvency of Government Employee Retirement System (GERS) and the mounting liquidity issues at Water and Power Authority (WAPA), a semi-autonomous government-owned electric, water, and sewer utility. To minimize these risks, the quality of financial management and governance has to improve across the public sector, new economic growth needs to be stimulated, tourism products need to be revitalized and differentiated, and credible plans shaped to stabilize GERS and improve the management and financial performance of WAPA.

The main internal threats to the USVI economy are the massive unfunded liabilities of the GERS and the illiquidity of WAPA. The likely consequences of the dire financial situations of these two entities would be a reduction in the benefits paid to retirees after 2023 in the case of GERS and demands for more transfers from the central government in the case of WAPA.

In 2019, the main driver in the economy was government spending. Government spending increased dramatically after 2017, with an influx of federal disaster assistance. In 2018, government spending was estimated to be 42% of GDP, when for the decade before the hurricanes (2007-2016), the average government share of GDP was 26.36%.[30] Although the

[30] In 2018, the USVI's commercial fishing fleet landed 445,184 pounds of finfish and shellfish, generating approximately $2.96 million in commercial value (NMFS 2020a), which in turn generated approximately $15.2

official GDP for 2019 has not yet been calculated, the expected 2019 government spending as a share of GDP is likely to be in the 30% range (USVI BER March 25, 2020).

3.4.3.2 Description of the Fishery

As noted in Section 3.3.2, the vast majority of spiny lobster landings in St. Thomas and St. John are taken by trap and these landings have remained relatively stable since ACLs were established in 2012. By comparison, the majority of spiny lobster landings in St. Croix are taken by diving and harvests from waters off this island have declined steadily and significantly since 2012 (see Section 3.3.3).

Annual dockside values of spiny lobster harvests from St. Thomas and St. John for the 2012-2019 period are given in Table 3.4.6. During this period, annual spiny lobster revenues averaged $843,000 and ranged from a low of $665,000 in 2012 to a high of $1.1 million in 2016. The annual price of the landed spiny lobster, with the exception of 2012, consistently fluctuated around $9.00 per pound.[31]

Table 3.4.6. Landings, value, and price of spiny lobster in St. Thomas and St. John for 2012-2019.

Year	Landings (Pounds)	Value ($)		Price ($/lb)	
		Current	Deflated[a]	Current	Deflated
2012	83,157	665,254	740,428	8.00	8.90
2013	84,513	769,064	844,432	9.10	9.99
2014	92,261	839,571	906,737	9.10	9.83
2015	109,455	985,095	1,049,126	9.00	9.58
2016	121,695	1,095,255	1,142,351	9.00	9.39
2017	91,911	829,795	865,476	9.03	9.42
2018	86,708	777,361	791,353	8.97	9.13
2019	86,869	781,817	781,817	9.00	9.00

[a] Values and prices are deflated based on the 2019 Consumer Price Index.

Annual values associated with spiny lobster harvests from St. Croix for the 2012-2019 period are given in Table 3.4.7. Spiny lobster revenues averaged $307,000 per year during the eight-year

million in total value added that accounted for approximately 0.38% of GDP, whereas it accounted for approximately 0.64% of GDP in 2014.

[31] It should be noted that the price information for the USVI is somewhat questionable in that prices appear to rarely change. It is not known whether this reflects the 'true' situation (i.e., fishermen may not adjust price based on demand) or is an artifact of the method used to ascribe a price to the harvested product. In addition, very few prices were given in 2019 and the prices used in this analysis were based on those few prices. Thus, values as well as prices in St. Thomas and St. John as well as St. Croix should be viewed with some caution.

period ending in 2019. In conjunction with the steady and significant decline in pounds landed, the annual value of spiny lobster landings fell from about $700,000 in 2012 to less than $150,000 in 2019. The decline in both pounds landed and the value of these landings reflects, in part, a sharp decline in number of trips. In 2012, for instance, the number of trips was in excess of 2,000. By 2015 the number of trips had fallen to about 1,000 and continued to fall to 313 in 2018, before increasing to almost 400 in 2019. The annual price of the landed spiny lobster ranged from approximately $7.50 per pound to $9.00 per pound. Little to no trend in the price is evident after removing the influence of inflation.

Table 3.4.7. Landings, value, and price of spiny lobster in St. Croix for 2012-2019.

Year	Landings (Pounds)	Value ($)		Price ($/lb)	
		Current	Deflated[a]	Current	Deflated
2012	87,073	696,586	775,300	8.00	8.90
2013	59,398	440,139	483,273	7.41	8.14
2014	39,724	294,355	317,903	7.41	8.00
2015	44,963	337,228	363,869	7.50	8.09
2016	31,582	237,048	252,456	7.51	7.99
2017	26,193	225,267	234,953	8.60	8.97
2018	10,970	86,540	88,098	7.89	8.03
2019	15,325	137,925	137,925	9.00	9.00

[a] Values and prices are deflated based on the 2019 Consumer Price Index.

Relevant revenue and price information for co-occurring species landed with spiny lobster in St. Thomas and St. John for the 2012-2019 period is given in Table 3.4.8. The value of these co-occurring species averaged about $670,000 during the period and ranged from a low of about $530,000 in 2019, to a high of $800,000 in 2016. A comparison of the information in Tables 3.4.6 and 3.4.8 indicates that landings of these co-occurring species accounted for about 45% of total revenues during the period with annual values falling in the narrow range of 40% to 48%.

Table 3.4.8. Ex-vessel value and price of co-occurring species landed with spiny lobster in St. Thomas and St. John for 2012-2019.

Year	Landings (Pounds)	Value ($)		Price ($/lb)	
		Current	Deflated[a]	Current	Deflated
2012	104,100	603,218	671,382	5.79	6.45
2013	109,216	633,148	695,197	5.79	6.37
2014	128,886	746,088	805,775	5.79	6.20
2015	114,844	660,047	712,191	5.75	6.20
2016	138,566	800,601	852,460	5.78	6.15
2017	121,835	703,934	734,203	5.78	6.03
2018	115,120	667,822	679,843	5.80	5.91
2019	91,308	529,814	529,814	5.80	5.80

[a] Values and prices are deflated based on the 2019 Consumer Price Index.

Relevant revenue and price information for co-occurring species landed with spiny lobster in St. Croix for the 2012-2019 period is given in Table 3.4.9. The value of these co-occurring species averaged about $600,000 annually during the period and ranged from high of about $1 million annually in the earlier years to a less than $200,000 in the later years.

Table 3.4.9. Ex-vessel value and price of co-occurring species landed with spiny lobster in St. Croix, 2012-2019.

Year	Landings (Pounds)	Value ($)		Price ($/lb)	
		Current	Deflated[a]	Current	Deflated
2012	221,580	1,285,871	1,431,174	5.80	6.46
2013	161,941	939,949	1,032,064	5.80	6.37
2014	99,134	575,344	621,372	5,80	6.27
2015	92,167	535,304	577,593	5.81	6.27
2016	70,955	413,399	440,270	5.83	6.20
2017	63,835	370,320	386,244	5.80	6.05
2018	29,873	173,309	176,429	5,80	5.91
2019	30,804	178,667	178,667	5.80	5.80

[a] Values and prices are deflated based on the 2019 Consumer Price Index.

Fishermen in the USVI contend that, given the lack of an export market for their product, the quantity of fish they harvest on any given trip is determined strictly by local market conditions

(i.e., what they believe they can sell in the local market at some established price).[32] Given the well-established economic issues associated with the islands, particularly St. Croix, the large decline in landings (both spiny lobster and co-occurring species) is not unexpected.

Total revenues per trip (i.e., spiny lobsters and co-occurring species) among St. Thomas and St. John commercial fishermen for the 2012-2019 period are presented in Table 3.4.10. These revenues averaged about $1,560 per trip ($1,650 per trip after adjusting for inflation) during the eight-year period of analysis and exhibited stability.

Table 3.4.10. Average revenues per trip ($) from spiny lobster and co-occurring species in St. Thomas and St. John, 2012-2019.

Year	Spiny Lobster Revenues		Revenues From Co-occurring Species		Total Revenues	
	Current	Deflated[a]	Current	Deflated	Current	Deflated
2012	617	686	559	622	1,176	1,308
2013	754	828	621	682	1,375	1,509
2014	892	964	793	856	1,685	1,820
2015	954	1,016	639	689	1,593	1,705
2016	957	999	700	765	1,657	1,764
2017	845	881	719	748	1,564	1,629
2018	965	982	829	843	1,793	1,825
2019	981	981	665	665	1,646	1,646

[a] Values and prices deflated based on the 2019 Consumer Price Index.

Total revenues per trip (i.e., spiny lobsters and co-occurring species) among St. Croix commercial fishermen for the 2012-2019 period are presented in Table 3.4.11. These revenues averaged about $845 per trip ($900 per trip after adjusting for inflation) during the eight-year period of analysis and exhibited stability. Thus, it appears as though all of the sharp decline in the aggregate St. Croix landings (both spiny lobster and co-occurring species) reflects a reduction in trips rather than any significant change in catch per trip.

Table 3.4.11. Average revenues per trip ($) from spiny lobster and co-occurring species in St. Croix, 2012-2019.

Year	Spiny Lobster Revenues		Revenues From Co-occurring Species		Total Revenues	
	Current	Deflated[a]	Current	Deflated	Current	Deflated
2012	341	379	629	700	969	1,079
2013	278	305	593	652	871	957

[32] The argument often made by these fishermen is that annual changes in landings do not reflect changes in stock status but rather changes in market forces.

Year	Spiny Lobster Revenues		Revenues From Co-occurring Species		Total Revenues	
	Current	Deflated[a]	Current	Deflated	Current	Deflated
2014	275	297	538	581	813	879
2015	335	361	531	573	866	934
2016	284	303	496	528	780	831
2017	318	332	523	546	841	877
2018	277	282	554	564	830	845
2019	349	349	452	452	802	802

[a] Values and prices deflated based on the 2019 Consumer Price Index.

Estimated per trip revenues (spiny lobster and co-occurring species) from both state and federal waters for St. Thomas and St. John are presented in Table 3.4.12. Total revenues per trip among the St. Thomas and St. John fishermen are relatively high averaging well in excess of $1,100. The average per trip revenues from federal waters tend to exceed comparable statistics from the state waters by a sizeable margin (generally $500 to $800) and surpassing the $1,000 threshold in 2019.

Table 3.4.12. Average revenues per trip ($) from spiny lobster and co-occurring species by area fished in St. Thomas and St. John for 2012-2019.

Year	Spiny Lobster Revenues		Revenues From Co-occurring Species		Total Revenues	
	State Waters	Federal Waters	State Waters	Federal Waters	State Waters	Federal Waters
2012	515	675	379	648	894	1,323
2013	618	821	417	682	1,035	1,503
2014	887	902	283	902	1,170	1,804
2015	870	1,018	290	765	1,160	1,783
2016	784	1,075	499	874	1,283	1,949
2017	679	1,018	565	864	1,244	1,882
2018	975	952	510	1,214	1,485	2,166
2019	1,048	1,028	279	1,065	1,327	2,355

Estimated per trip revenues (spiny lobster and co-occurring species) from both state and federal waters for St. Croix are presented in Table 3.4.13. In general, revenues from the harvest of spiny lobster in federal waters contributes a smaller proportion of total revenues than that observed in St. Thomas and Puerto Rico. In St. Thomas/St. John, for example, the contribution of spiny lobster to total revenues (from federal waters) rarely fell below 50% while the proportion in Puerto Rico was even higher.

Table 3.4.13. Average revenues per trip ($) from spiny lobster and co-occurring species by area fished in St. Croix for 2012-2019.

Year	Spiny Lobster Revenues		Revenues From Co-occurring Species		Total Revenues	
	State Waters	Federal Waters	State Waters	Federal Waters	State Waters	Federal Waters
2012	306	386	564	715	870	1,101
2013	248	339	593	591	841	930
2014	254	232	492	466	746	698
2015	315	409	416	732	731	1,141
2016	262	361	354	807	616	1,168
2017	299	370	406	753	705	1,123
2018	252	329	417	853	669	1,182
2019	316	464	360	771	676	1,235

3.5 Description of the Social Environment

The social environments of Puerto Rico and the USVI have been described in detail in the Puerto Rico Fishery Management Plan (FMP) (CFMC 2019a), the St. Thomas and St. John FMP (CFMC 2019b), and the St. Croix FMP (CFMC 2019c), and are summarized below.

3.5.1 Puerto Rico

There is insufficient data to isolate specific communities where lobster fishing is important for Puerto Rico and the USVI. This description of the social environment will be more general in its description of fishing overall and will provide specific detail about lobster fishing where possible.

In Figure 3.5.1 a number of Puerto Rico communities are identified that have “villa pesqueras” located within or near the community. These organizations provide infrastructure, such as docking facilities and other resources to assist fishermen with their fishing business and activities. Not all fishermen belong to these organizations, but majority of them do according to Matos-Caraballo and Agar 2011. The majority of fishermen in Puerto Rico sell most of their catch but do reserve a small quantity for household consumption (Griffith et al. 2007).

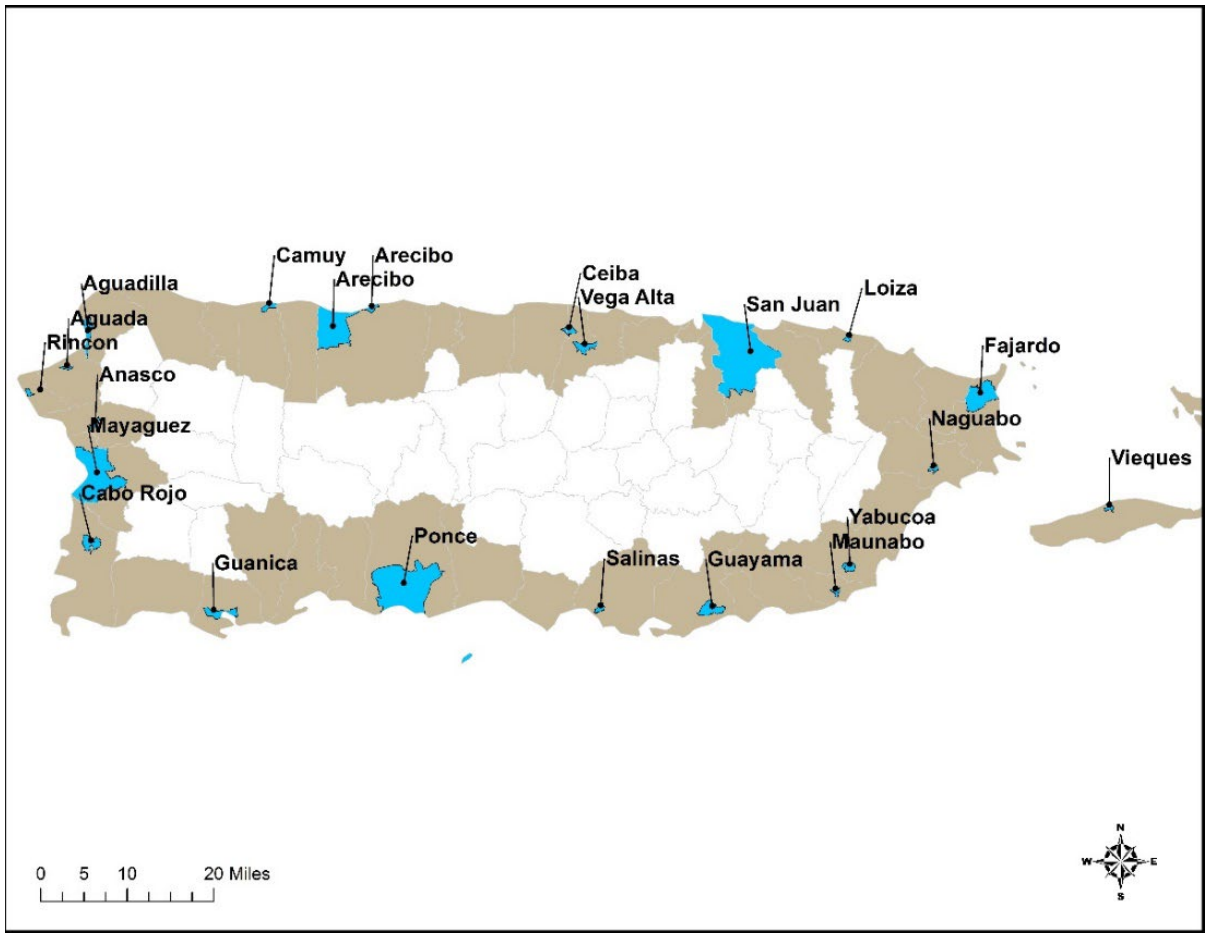

Figure 3.5.1. Puerto Rico coastal communities with villas pesqueras.
(Source: SERO Social Science Branch/U.S. Census Bureau Tigerline Shapefiles 2018)

Fishermen in Puerto Rico are older with an average age of 50 and have long tenures in commercial fishing with an average of 29 years. Fishermen were also highly dependent upon fishing as a source of household income with those in the western region most dependent (83%), those in the east (78%), south (77%) and north (55%) (Matos-Caraballo and Agar 2011).

Lobster fishermen in Puerto Rico are likely spread throughout many of the communities in Figure 3.5.1. A little over 49% of fishermen in Puerto Rico fished for lobster according to Matos Caraballo and Agar (2011) with the highest percentages on the South and East coasts.

The number of traps fished follows the number of fishermen reporting fishing for lobster with the highest average number of traps being fished in the South and East coasts (Matos-Caraballo and Agar 2011).

Fishermen overall sell their fish through multiple avenues with a little over a third peddling their catch themselves, a third sold to wholesalers and a little less than a third sold to fishing associations. Few fishermen sell their catch directly to fish stores or restaurants. Lobster is not

likely to be peddled as much as other species as it is most likely targeted for the tourist market, which is likely through restaurant sales (Matos-Caraballo and Agar 2011).

Certainly, several events that are more recent have had significant impacts on the fishermen of Puerto Rico since the Census of 2008 has occurred. Both hurricanes Maria and Irma and the more recent COVID-19 pandemic have affected the livelihoods of fishermen and their families. The economic loss, including damages, from Hurricane Maria to Puerto Rico fishermen was estimated to be in the range of $20 million and a loss of jobs at the time close to 146 (J. Agar, NMFS Southeast Fisheries Science Center, personal communication). There was some concern as to whether the fishing industry would be able to recover to pre-storm levels. In their study one year later, Agar et al. 2020 found that fishery landings did improve and that landings had contracted by $1.4 million in value over the last quarter of 2017, however, losses did vary considerably. Spiny lobster had accounted for close to 14% of those losses, yet fish and lobster traps accounted for most of the revenue losses during that time and the east coast was hit the hardest losing nearly 55% of the total of 6,700 traps reported being lost. Employment losses did seem to recover, as after about 6 months, a large majority of fishermen reported returning to pre Maria workforce levels (Agar et al. 2020).

COVID-19 Pandemic

While there has been some recovery from hurricanes, the most recent disaster is concerning as the COVID-19 pandemic has now compounded the impacts of previous disasters and has imposed a significant economic hardship on fishermen from the island. A survey conducted by NOAA (2021) found that of the 318 commercial fishermen who responded, 96 % reported that they had suffered impacts to their fishing operations as a result of the pandemic during the first six months of 2020. Loss of revenue was reported by 87% of those who responded when compared to the first six months of last year as more than 90% stopped fishing operations for a period of time. Many lost crew as a result with approximately 25 % reporting some reduction in the number of helpers. Seafood dealers also suffered impacts from the pandemic with 98% reporting impacts from the pandemic. Revenues were decreased by an average of 56% by over 90% of those reporting and at the time of the survey were operating at about 33% of capacity.

3.5.2 St. Thomas and St. John

Commercial fishing St. Thomas and St. John is relatively small scale with vessels averaging approximately 25 ft. in length. Most vessels are fiberglass or fiberglass and wood with outboard motors. More vessels have inboard motors than in the past and are more likely to have more horsepower (Kojis et al. 2017).

In the most recent census for St. Thomas and St. John, fishermen targeted lobster with about 30% of the time with shellfish only accounting for approximately 23% of the overall landings.

Fishermen used traps and SCUBA gear to catch lobster and most sales were to hotels and restaurants (Kojis et al. 2017).

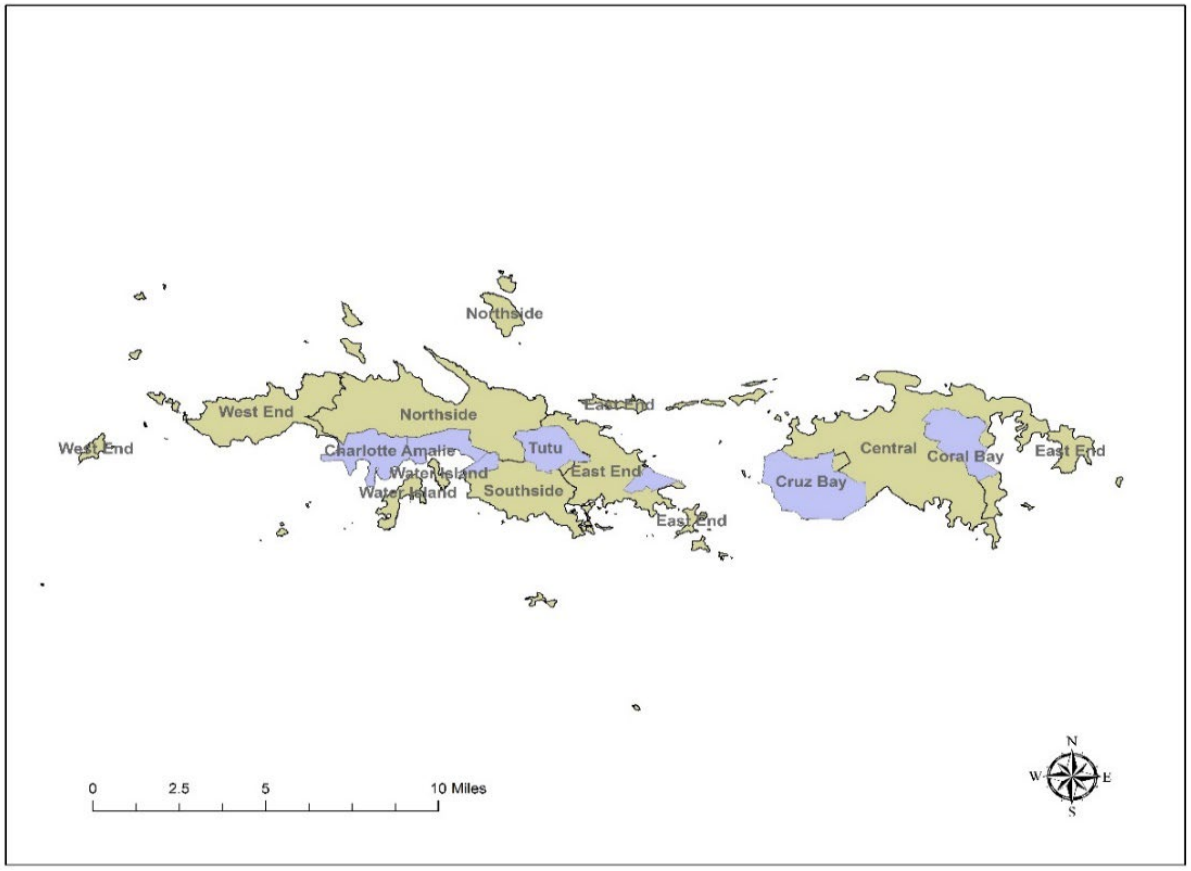

Figure 3.5.2. St. Thomas and St. John coastal communities and subdistricts.
(Source: SERO Social Science Branch/US Census Tigerline Shapefiles 2018)

The majority of fishermen keep their vessels moored along the coast, both on the Northside and Southside of St. Thomas, and the east end of St. John and near Cruz Bay (Figure 3.5.2). Frenchtown on the Southside was the most popular location to moor vessels on St. Thomas (Kojis et al. 2017). Fishermen in St. Thomas and St. John live in 37 different estates on the two islands; however, there were two primary locations where fishermen lived: Frenchtown and St. Peter.

3.5.3 St. Croix

Fishing on St. Croix is also smaller in scale like the other islands. Vessels are small and most fishermen own one boat with only a few owning more than one. The average vessel size in St. Croix was less than 22 ft. with the longest being 45 ft in length. Engines are primarily outboards

and may be used on several different vessels if a fisherman owns more than one (Kojis et al. 2017).

Fishermen of St. Croix resided in three primary zip codes corresponding to the following areas on the island: Christiansted, Fredricksted and Kingshill, but were scattered over 50 different estates (Figure 3.5.3). The two estates with the most fishermen were Frederikstead and Clifton Hill, which is more southcentral. Another docking facility often used was at Gallows Bay near Christiansted (Kojis et al. 2017).

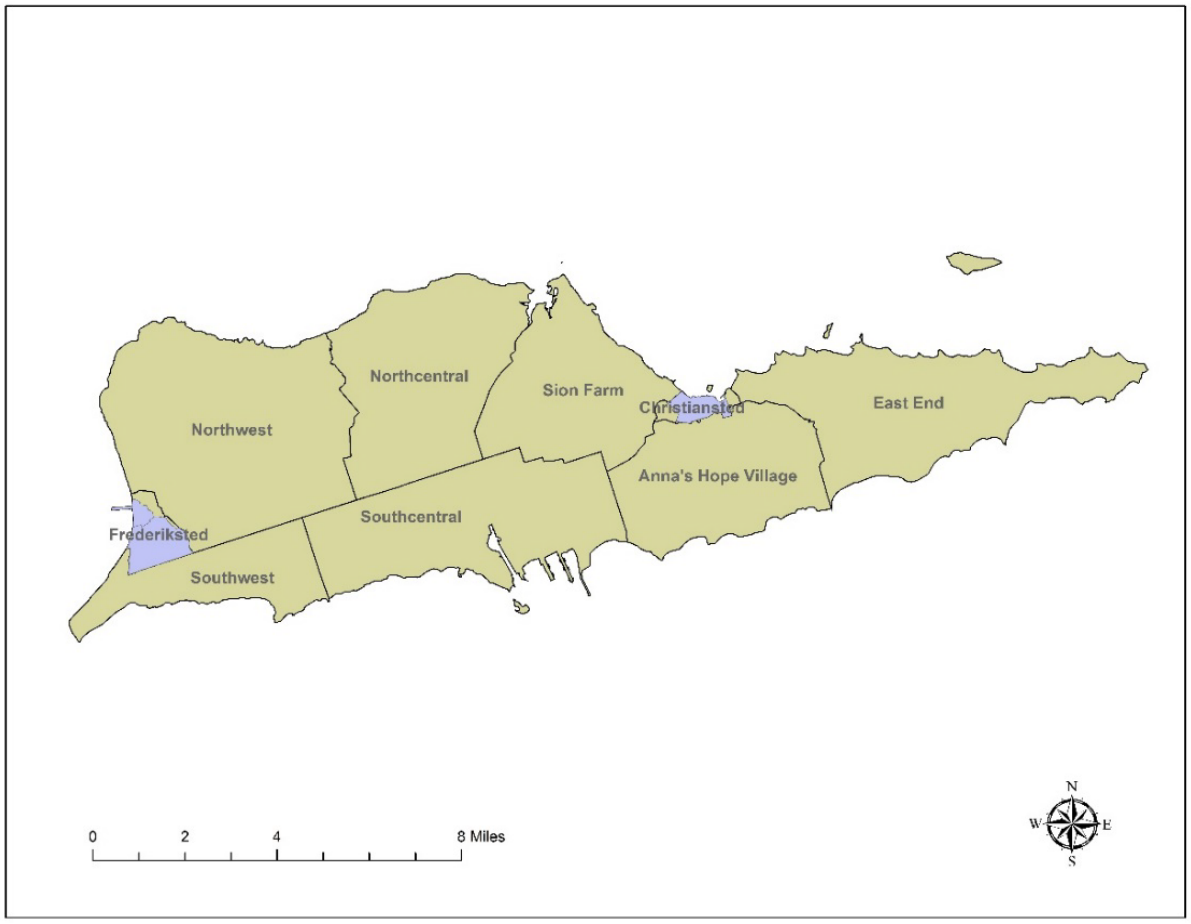

Figure 3.5.3. St. Croix coastal communities and subdistricts.
Source: SERO Social Science Branch/US Census Tigerline Shapefiles 2018

Fishermen of St. Croix also had a higher average age at 57, with the average age of active fishermen slightly lower at 55. Their average tenure in fishing was also high with an average of 27 years and the majority of fishermen identified themselves as Hispanic with another large percentage identifying as West Indian (Kojis et al. 2017).

Most fishermen used several types of gear to fish with, although trap fishermen were more dependent on one type of gear. Trap fishing was the third most common type of fishing gear

used by fishermen on St. Croix with fewer than one third using traps. However, close to 60% of fishermen in St. Croix said that spiny lobster was an important species. Lobster ranked 2nd in importance to reef fish which is ranked 1st on all the USVI islands (Kojis et al. 2017). Because tourists and visitors prefer lobster, commercial fishermen find ready customers in hotels and restaurants catering to tourists (Valdes Pizzini et al., 2010; Stoffle et al., 2009).

COVID-19 Pandemic

To understand the effects of the COVID-19 pandemic, NOAA Fisheries (NMFS 2021b) social scientists conducted phone surveys with 87 commercial and charter fishermen on the islands of St. Croix, St. Thomas, and St. John. Of those that responded, 87% reported revenue losses during the first six months of 2020. Approximately 30% of fishermen reported losing some crew members. When comparing their fishing activity to the first six months of 2019, they reported on average operating at about 48% if capacity at the time of the survey.

3.5.4 Environmental Justice (EJ) Considerations

In order to assess whether a community may be experiencing EJ issues, a suite of Community Social Vulnerability Indices (CSVI) created to examine the social vulnerability of coastal communities was developed for the majority fishing communities in the U.S (Colburn and Jepson 2012). Using a unit of analysis at the county rather than census designated places a viable suite of social vulnerability indices were successfully created using the same methodology for all counties within the coastal Southeast including Puerto Rico and the USVI. Using the same variables with minor adjustments, a principal component factor analysis was conducted with results meeting the same criteria used previously in creating the CSVIs. The resulting index factor scores for each community will be reported here.

The three indices reported most often in the Southeast Region are poverty, population composition, and personal disruptions. The variables included in each of these indices have been identified through the literature as being important components that contribute to an individual's or community's vulnerability. Indicators such as increased poverty rates for different groups, more single female-headed households and children under the age of 5, disruptions such as higher separation rates, and unemployment all are signs of vulnerable populations. These indicators are closely aligned to previously used measures of EJ, which used thresholds for the number of minorities and those in poverty, but are more comprehensive in their assessment. For those municipalities (Puerto Rico) or subdistricts (USVI) that exceed the threshold it would be expected that they would exhibit vulnerabilities to sudden changes or social disruption that might accrue from regulatory change.

3.5.4.1 Puerto Rico

As is evident in Figure 3.5.4, the majority of municipalities show substantial vulnerabilities with most exceeding both thresholds of ½ and 1 standard deviation for two of the indices and some exceeding both thresholds for all indices. Cabo Rojo, Arecibo and San Juan are the only municipalities that do not exceed the one-half standard deviation for personal disruption. However, these vulnerabilities do not take into consideration the recent devastation from Hurricanes Irma and Maria. It is expected that even though these municipalities have high vulnerabilities depicted here, they could now have even higher vulnerability scores as a result of the impacts from recent hurricanes.

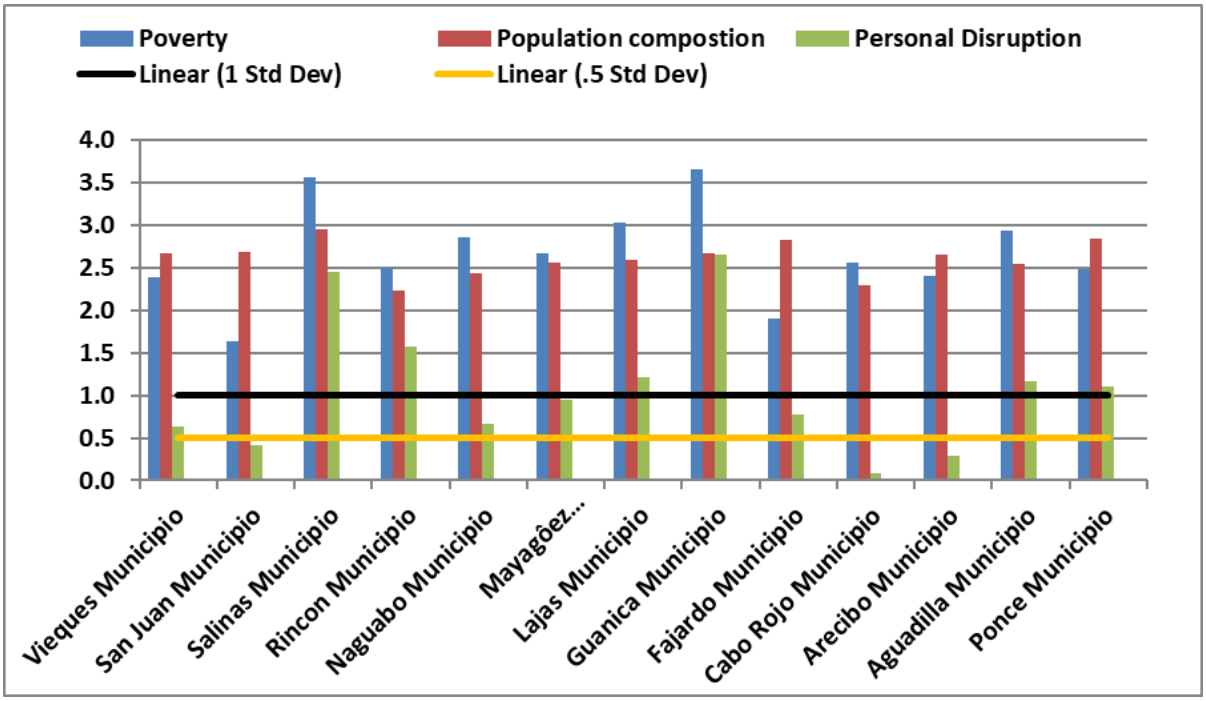

Figure 3.5.4. Social vulnerability indices for Puerto Rico coastal municipalities.
(Source: SERO County Social Vulnerability Indicators database (ACS 2010) 2018)

The vulnerabilities that are depicted here do not mean that any actions within this amendment will have negative impacts, only that if there are any negative effects most municipalities may have a difficult time absorbing the impacts and their recovery may be hindered.

3.5.4.2 St. Thomas and St. John

As is evident in Figure 3.5.5, the majority of subdistricts for St. Thomas and St. John show few vulnerabilities with only one exceeding both thresholds of one-half and one standard deviation for at least two of the indices. Charlotte Amalie is the only subdistrict that has two indices exceeding both thresholds. Most other communities show few if any vulnerabilities. Several

communities do exceed the threshold for population composition, which is likely a reflection of a higher population of minorities. However, these vulnerabilities do not take into consideration the devastation from Hurricanes Irma and Maria and the recent COVID-19 pandemic. It is expected that even though these municipalities have high vulnerabilities depicted here, they could now have higher vulnerability scores as a result of the impacts from the disasters that have occurred recently.

The vulnerabilities depicted here do not mean that any actions within this amendment will have negative impacts, only that if there are any negative effects many communities that are experiencing high vulnerabilities may have a difficult time absorbing the impacts and their recovery may be hindered.

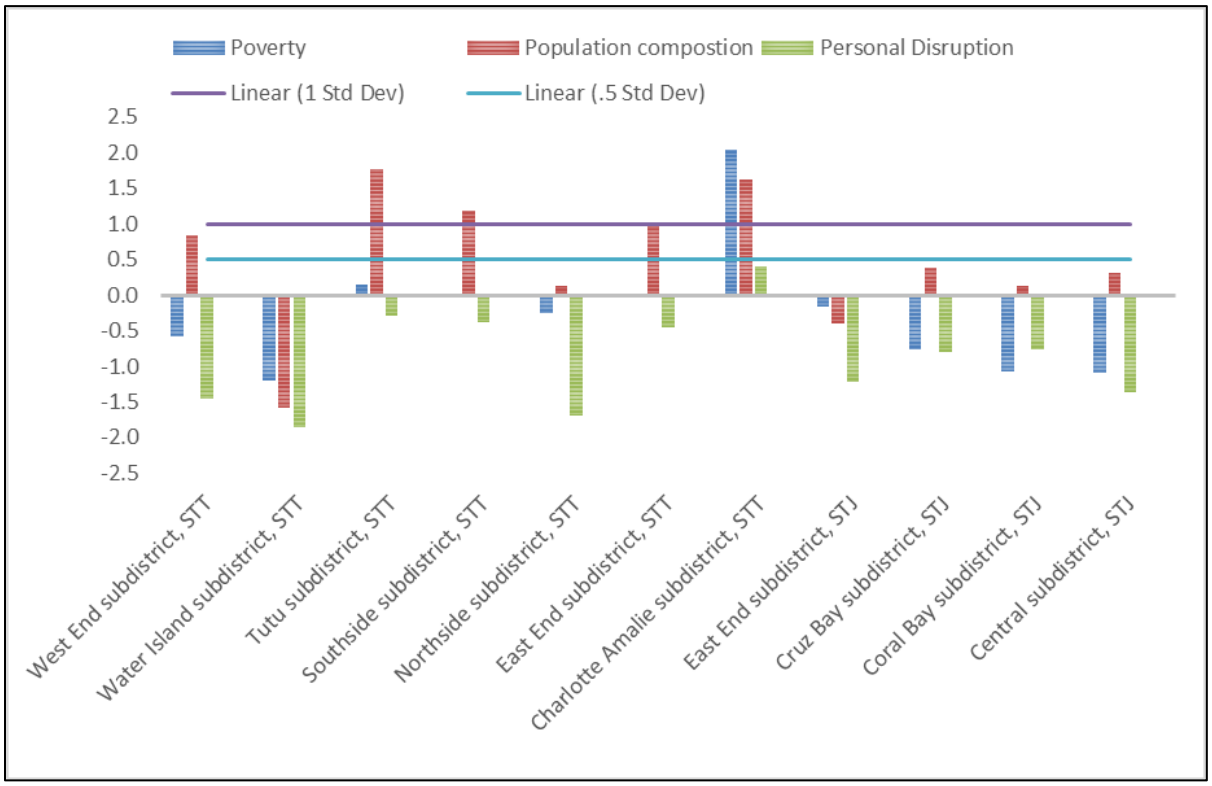

Figure 3.5.5. Social vulnerability indices for St. Thomas (STT) and St. John (STJ) coastal subdistricts.
(Source: SERO County Social Vulnerability Indicators database (ACS 2014) 2018)

3.5.4.3 St. Croix

As is evident in Figure 3.5.6, the majority of subdivisions show vulnerabilities with most exceeding both thresholds of one-half and one standard deviation for at least two of the indices. Northcentral, East End and Anna's Hope are the only subdistricts that have fewer than two

indices exceeding the thresholds. However, these vulnerabilities do not take into consideration the devastation from Hurricanes Irma and Maria or the recent COVID-19 pandemic. It is expected that even though these municipalities have high vulnerabilities depicted here, they could now have even higher vulnerability scores as a result of the impacts from recent hurricanes.

The vulnerabilities depicted here do not mean that any actions within this amendment will have negative impacts, only that if there are any negative effects that those communities experiencing high vulnerabilities may have a difficult time absorbing the impacts and their recovery may be hindered.

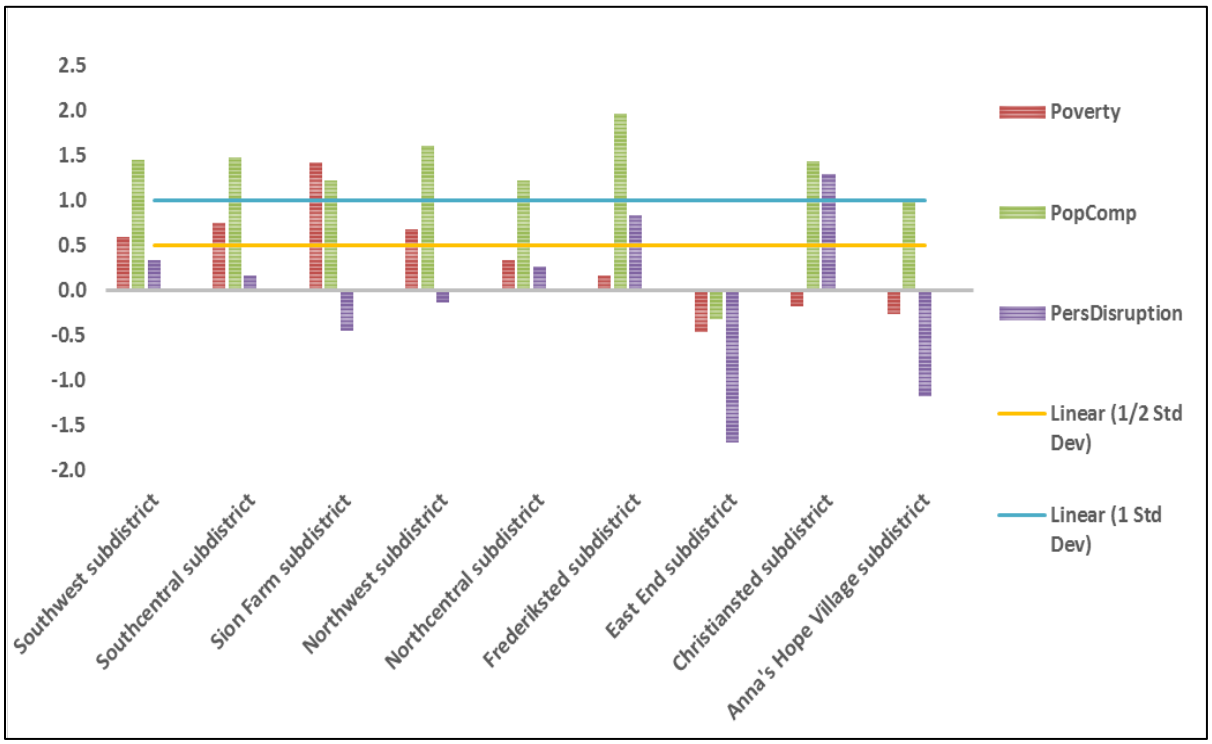

Figure 3.5.6. Social vulnerability indices for St. Croix coastal subdistricts.
(Source: SERO County Social Vulnerability Indicators database (ACS 2014) 2018)

3.6 Description of the Administrative Environment

The administrative environment was discussed in detail in the Puerto Rico, St. Thomas and St. John, and St. Croix FMPs, which is incorporated herein by reference and summarized below.

3.6.1 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 nm from shore, as well as authority over U.S. anadromous species and continental shelf resources that occur beyond the EEZ.

Responsibility for federal fishery management decision-making is divided between the U.S. Secretary of Commerce (Secretary) and eight regional Fishery Management Councils that represent the expertise and interests of constituent states. Regional Fishery Management 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 proposed plans and amendments after ensuring that management measures are consistent with the Magnuson-Stevens Act, and with other applicable laws summarized in Appendix B. In most cases, the Secretary has delegated this authority to NMFS.

The Caribbean Fisheries Management Council (Council) is responsible for the conservation and management of fishery stocks within federal waters surrounding Puerto Rico, St. Thomas and St. John (USVI), and St. Croix (USVI). These waters extend to 200 nautical miles offshore from the seaward boundaries of Puerto Rico (9 nm from shore) and the USVI (3 nm from shore). The Council consists of seven voting members: four members appointed by the Secretary, at least one of whom is appointed from each of the Commonwealth of Puerto Rico and the USVI; the principal officials with marine fishery management responsibility and expertise for the Commonwealth of Puerto Rico and the USVI, who are designated as such by their Governors; and the Regional Administrator of NMFS for the Southeast Region.

The Council's Scientific and Statistical Committee reviews the data and science used in assessments, FMPs, and amendments. Regulations implementing the FMPs are enforced through actions of the NOAA's Office for Law Enforcement, the U.S. Coast Guard, and various state authorities.

The public is involved in the fishery management process through participation at public meetings, on advisory panels and through council meetings that, with few exceptions for discussing personnel matters, are open to the public. The regulatory process is in accordance with the Administrative Procedure 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.

3.6.2 Puerto Rico and U.S. Virgin Islands Fisheries Management

The purpose of state representation at the Council level is to ensure state participation in federal fishery management decision-making and to promote the development of compatible regulations in state and federal waters. The state governments have the authority to manage their respective fisheries including enforcement of fishing regulations, and exercises legislative and regulatory authority over their states' natural resources through discrete administrative units. Although each agency listed below is the primary administrative body with respect to the state's natural resources, all states cooperate with numerous state and federal regulatory agencies when managing marine resources.

3.6.2.1 Commonwealth of Puerto Rico

The Commonwealth of Puerto Rico has jurisdiction over fisheries in state waters extending up to 9 nm from shore. Those fisheries are managed by Puerto Rico's Department of Natural and Environmental Resources (DNER) per Puerto Rico Law 278 of November 29, 1998 as amended, known as Puerto Rico's Fisheries Law, which establishes public policy regarding fisheries. 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 Fishing Regulations 6902, implemented in 2004, included regulations for the management of marine managed areas for fisheries purposes and imposed regulations for the protection of several species such as the Nassau grouper and the red hind. Puerto Rico Regulations 7949, implemented in 2010, is the current regulatory mechanism for management of fishery resources in Puerto Rico state waters as well as for those resources and areas with shared jurisdiction with the U.S. government through the Council.

3.6.2.2 U.S. Virgin Islands

The USVI has jurisdiction over fisheries in state waters extending up to 3 nm from shore. The USVI's Department of Planning and Natural Resources (DPNR) is responsible for the conservation and management of USVI fisheries and enforcement of boating and fishing regulations. The DPNR's Division of Fish and Wildlife (DFW) is responsible for data collection pertaining to the fisheries of the USVI. The DFW monitors commercial and recreational fisheries and provides recommendations to the DPNR Commissioner on matters relating to fisheries management. Rules and regulations for the USVI fisheries are codified in the Virgin Islands Code, primarily within Title 48 Chapter 12.

More information about these agencies can be found from the following web pages:

Puerto Rico DNER: https://www.drna.pr.gov/

USVI DPNR: https://dpp.vi.gov/agency/department-planning-and-natural-resources

Chapter 4. Environmental Consequences

4.1 Action 1: Spiny Lobster Overfishing Limit (OFL), Acceptable Biological Catch (ABC), and Annual Catch Limit (ACL)

Summary of Management Alternatives

Alternative 1. No Action. The OFL proxy, ABC, and ACL (which equals optimum yield [OY]) for spiny lobster would remain as specified under the Puerto Rico FMP (Fishery Management Plan), St. Thomas and St. John FMP, and St. Croix FMP.

Alternative 2. Select the variable-catch approach for specifying OFLs and ABCs for spiny lobster, and use the variable-catch ABCs to derive the spiny lobster variable-catch ACLs (which equals OY), under one of the sub-alternatives listed below.

Sub-alternative 2a. OY = ACL = ABC
Sub-alternative 2b. OY = ACL = ABC x 0.95
Sub-alternative 2c. OY = ACL = ABC x 0.90

Alternative 3 (Preferred for all three island-based FMPs). Select the constant-catch approach for specifying the OFL and ABC for spiny lobster, and use the constant-catch ABC to derive the spiny lobster constant-catch ACL (which equals OY), under one of the sub-alternatives listed below.

Sub-alternative 3a. OY = ACL = ABC
Sub-alternative 3b (Preferred). OY = ACL = ABC x 0.95
Sub-alternative 3c. OY = ACL = ABC x 0.90

4.1.1 Effects on the Physical Environment

Effects on the physical environment generally occur from fishing effort associated with interactions between fishing gear (e.g., fish traps and spiny lobster traps) and the bottom substrate or from anchoring. As mentioned in Chapter 3, spiny lobster are predominately harvested via diving methods (e.g., using snares) in Puerto Rico and St. Croix and by trap gear in St. Thomas and St. John. Recreational data are not available for spiny lobster in any of the three islands/island groups, but anecdotal information suggests that the majority of recreational harvest of spiny lobster occurs via diving. Of these gear types and methods, traps are most likely to cause direct damage to the physical environment (i.e., benthic habitat) from setting and retrieval of traps, and dragging, which could cause damage to corals and habitat.

Through this action, the Council could reduce the ACLs for spiny lobster from those specified in the island-based FMPs. The analysis below assumes for the alternatives that would reduce the ACLs, harvest would be constrained to those lower ACLs, which would in turn reduce the amount of trips taken or gear retrieved and deployed when fishing for spiny lobster and effects to the physical environment. That reduction in harvest relative to the current level would correlate to fewer interactions between fishing gear and anchors with the bottom, which would benefit the

physical environment. However, as noted above, for the Puerto Rico and St. Croix fisheries, which predominantly use diving methods to harvest spiny lobster, the reduction in allowable harvest would not likely result in as many gear-bottom interactions.

Alternative 1 (No Action) would retain the OFL proxy, ABC, and ACL for spiny lobster specified under the Puerto Rico FMP, St. Thomas and St. John FMP, and St. Croix FMP. No effects on the physical environment would be expected as the catch levels would not change (no changes in fishing effort from the baseline), thus current interactions with the substrate from gear and anchors would not change.

Under **Alternative 2**, the OFLs, ABCs, and ACLs specified for spiny lobster for each island/island group would be less than those specified under **Alternative 1**. **Alternative 2** would be expected to decrease any potential negative effects to the physical environment by decreasing the harvest levels allowed for spiny lobster (assuming harvest is constrained to these lower allowable levels). The reference point values set under **Alternative 2** would decrease each year from 2021 to 2023, translating into potentially less harvest through time, thus providing greater benefits to the physical environment through time from fewer interactions between fishing gear or anchors and the bottom. Additionally, the management uncertainty buffer used to set the ACL from the ABC would increase from **Sub-alternative 2a** (no buffer) to **Sub-alternative 2c** (10% buffer). Thus, more benefits to the physical environment would be expected under **Sub-alternative 2c**, as it sets the lowest harvest level of the three sub-alternatives.

Similar to **Alternative 2**, **Preferred Alternative 3** could decrease negative effects to the physical environment through lower harvest levels (assuming harvest is limited to these allowable levels). Under **Preferred Alternative 3**, the OFLs, ABCs, and ACLs specified for spiny lobster for each island/island group would also be less than those specified under **Alternative 1**, but unlike **Alternative 2**, the values set under **Preferred Alternative 3** would be set at constant levels from 2021 to 2023. However, the total amount of harvest allowed under **Preferred Alternative 3** would be equal to the total amount of harvest allowed under **Alternative 2**, and so total effects to the physical environment under the two alternatives would be expected to be the same. The sub-alternatives under **Preferred Alternative 3** would set the ACL from the ABC using the same management uncertainty reduction buffers specified in the **Alternative 2** sub-alternatives and physical effects would vary when compared to **Alternative 1**. The Caribbean Fishery Management Council (Council) chose **Sub-alternative 3b** (5% buffer from ABC to ACL) as their preferred. Both **Alternative 2** and **Preferred Alternative 3** would be expected to provide greater benefits to the physical environment than **Alternative 1** through fewer impacts to the bottom from fishing gear and anchors.

Notwithstanding the above, in a multi-species fishery, where fish and spiny lobster are often caught together in trap gear (e.g., in the St. Thomas and St. John fishery and a small percentage

of the Puerto Rico fishery), reducing harvest of one stock but allowing harvest of others may not reduce overall trips taken or gear hauled and may not generate associated positive effects to the physical environment. The above discussion would represent the greatest potential benefits to the physical environment. This benefit could be reduced depending on the extent to which fishermen fish for other species with the same or more damaging gear to offset the lower ACL, which in turn depends on market conditions and other factors affecting the ability to alter fishing practices. Those factors are difficult to predict. However, even under the discussion of **Alternative 2** or **Preferred Alternative 3** above, which assumes lower harvest levels reduce effort, benefits to the physical environment would be minimal in St. Croix and Puerto Rico due to the primary methods used to harvest spiny lobster (i.e., diving) and higher in St. Thomas and St. John due to the potential reduction in the use of trap gear.

4.1.2 Effects on the Biological/Ecological Environment

Management actions that affect the biological and ecological environment mostly relate to the impacts of fishing on a species' population size, life history, and the role of the species within its habitat. Removal of the species from the population through fishing reduces the overall population size. Fishing gear have different selectivity patterns that refer to a fishing method's ability to target and capture organisms by size and species. This would include the number of discards, mostly sublegal sized individuals or species caught during seasonal closures, and the mortality associated with releasing these species.

As described in Chapter 3, spiny lobster are targeted by commercial and recreational fishermen in Puerto Rico and the U.S. Virgin Islands. The majority of harvest occurs through diving gear, with trap gear predominantly used by commercial fishermen in Puerto Rico and St. Thomas and St. John. Diving is considered a highly selective fishing method and all legal-sized spiny lobster caught by divers are assumed to be retained (SEDAR 57 2019). Similarly, the only spiny lobsters discarded from traps would include sublegal individuals and berried females. Although these retention levels of spiny lobster from the fisheries are high, the SEDAR 57 stock assessments for Puerto Rico, St. Croix, and St. Thomas and St. John determined each spiny lobster stock was not undergoing overfishing and not overfished.

Alternative 1 (No Action) would maintain the OFL proxy (sustainable yield level), ABC, and ACL for spiny lobster set under the island-based FMPs. Those OFL proxies and ABCs were set using definitions under Tier 4 of the ABC Control Rule included in each of the island-based FMPs, for which the spiny lobster stocks were considered to be data limited with no acceptable assessment available. Following the accepted stock assessments for spiny lobster, the management reference points under **Alternative 1** do not reflect the best scientific information available and if future harvest of spiny lobster is landed at or near at the allowable harvest levels under **Alternative 1**, then overfishing as defined under SEDAR 57 could be occurring.

Contrary to **Alternative 1**, **Alternative 2** and **Preferred Alternative 3** (described below) would set OFLs, ABCs, and ACLs following the accepted SEDAR 57 spiny lobster stock assessments using Tier 3 definitions for OFL and ABC, which are considered to be data limited but with an accepted assessment available. Applying the best scientific information available would ensure that federally managed stocks are harvested sustainably while protecting reproductive capacity and maintaining effective ecological contributions.

The OFLs and ABCs under **Alternative 2** would be substantially less that the OFL proxies and ABCs under **Alternative 1**, providing increased benefits to the biological/ecological environment for the spiny lobster stocks through the increased conservation of the stocks when compared to the status quo. As mentioned in Chapter 2, although the OFLs specified under **Alternative 2** for each island/island group would be set at a level above the SEDAR 57 maximum sustainable yield (MSY) proxy, the OFL projections corresponded to a surplus in the spiny lobster biomass that allow for a higher level of catch that decreases each year towards the respective MSY proxy. The ACLs under **Alternative 2** would also be less than the ACLs under **Alternative 1**, with the greatest decrease in allowable harvest occurring in Puerto Rico (a difference of 135,645 to 179,581 pounds [lbs], depending on Sub-alternative and year). The decrease in the spiny lobster ACL in St. Thomas and St. John (37,040 to 89,757 lbs) would be similar to the decrease in St. Croix (21,128 to 83,058 lbs). For each island/island group, the greatest biological benefits (i.e., the greatest reduction in allowable harvest) would occur for the ACLs specified under **Sub-alternative 2c**, which sets the ACL at 90% of the ABC.

The total harvest allowed under **Preferred Alternative 3** would be equal to the total harvest allowed under **Alternative 2**, so total benefits to the biological/ecological environment would be expected to be the same under the two alternatives. However, the OFLs, ABCs, and ACLs set under **Preferred Alternative 3** would be constant for 2021-2023, and would not converge in time towards the respective MSY proxy set for spiny lobster under SEDAR 57. As mentioned above in the discussion of **Alternative 2**, the current spiny lobster spawning stock biomass is above the level that produces MSY and no negative effects to the stocks would be expected from the OFLs being above the MSY proxy. The ACLs under **Preferred Alternative 3** would be less than the ACLs under **Alternative 1**, again with the greatest decrease in allowable harvest occurring under **Sub-alternative 3c** (i.e., ACL = ABC * 0.90). **Preferred Sub-alternative 3b**, which would set the ACL at 95% of the ABC for each island/island group, would result in a reduction of harvest for 2021-2023 of 157,919 lbs for Puerto Rico, 66,574 lbs for St. Thomas and St. John, and 56,861 lbs for St. Croix from the ACLs under **Alternative 1**. Under **Preferred Alternative 3** and **Alternative 2** the ACLs for 2024 and later would be the same, in both instances reflecting the value specified under the variable catch approach for the year 2023. Benefits to the biological/ecological environment would be expected to be the same under the two alternatives. **Preferred Sub-alternative 3b**, which allows for a 5% buffer from the ABC to

ACL, would be expected to have a greater biological effect than **Sub-alternative 3a** (no buffer) but less than **Sub-alternative 3c** (10% buffer).

The benefits discussed above for **Alternative 2** and **Preferred Alternative 3** would represent the greatest potential benefits to the biological/ecological environment, because it assumes the greatest potential reduction in harvest. Similar to the analysis of effects to the physical environment, this benefit could be reduced depending on the extent to which fishermen fish for other species, or shift effort to fish in state waters. Shifting effort from federal waters to state waters would likely negate much, if not most, of the benefits that might otherwise be forthcoming from revision of the ACLs under **Alternative 2** or **Preferred Alternative 3**. The extent of that change in fishing behavior is difficult to predict. However, assuming that the lower harvest levels equate to fewer spiny lobster removals, it is anticipated that benefits to the biological/ecological environment would occur under **Alternative 2** or **Preferred Alternative 3** (e.g., reduction in fishing mortality) compared to **Alternative 1**, but would be minimal.

The gear types used to harvest spiny lobster could affect species outside of the fisheries, such as Endangered Species Act (ESA)-listed species that occur in the action area (e.g., sea turtles and corals). The gear types used to harvest spiny lobster by the island-based fisheries are the same as those analyzed in the biological opinion for the island-based FMPs. With respect to those ESA-listed species (see Section 3.2.3), similar effects to those described in the biological opinion for each species could be expected depending on the extent to which the reduction in the harvest levels results in a reduction in the amount of gear deployed and interactions between that gear and the listed species. However, at this time it is uncertain how fishing under the ACLs proposed under **Alternative 2** or **Preferred Alternative 3** would impact ESA-listed species compared to the status quo (under **Alternative 1**). Overall, it is expected that the decreases in ACLs under **Alternative 2** and **Preferred Alternative 3** from the ACLs set under the island-based FMPs (i.e., the ACLs under **Alternative 1**) would reduce the potential interactions between fishing related activities (e.g., interactions with gear, vessels, anchors) and ESA-listed species.

4.1.3 Effects on the Economic Environment

Alternative 1 (No Action) would maintain the OFL proxy, ABC, and ACL for spiny lobster set under the island-based FMPs (Table 1.1). Thus, the ACL for the Puerto Rico spiny lobster fishery would be maintained at 527,232 lbs, the ACL for the St. Thomas and St. John spiny lobster fishery would be maintained at 209,210 lbs, and the ACL for the St. Croix spiny lobster fishery would be maintained at 197,528 lbs.

Given the status quo nature of **Alternative 1**, there would be no direct economic effects associated with the no action alternative. There could, however, be indirect effects associated with maintaining the status quo. Specifically, results from the SEDAR 57 island-based stock

assessments concluded that the ACLs specified in the island-based FMPs may provide insufficient protection of the island-based spiny lobster stocks at levels of effort in excess of those needed to harvest OFL on an annual basis. Thus, maintaining the status quo could, at some point in time, result in overfishing and/or overfished stocks. This, in turn, would translate to a long-run loss in revenue, income, and, potentially, fishing-related jobs.

Alternative 2 and **Preferred Alternative 3** would set OFLs, ABCs, and ACLs based on the accepted SEDAR 57 stock assessments using Tier 3 definitions for OFL and ABC. The OFLs and ABCs under both **Alternative 2** and **Preferred Alternative 3** are substantially lower than those under **Alternative 1** (status quo) with **Preferred Sub-alternative 3b** (OY =ACL = ABC x .95) being lower than the status quo (**Alternative 1**) but larger than those under **Sub-alternative 2c** or **Sub-alternative 3c**. Maximum reductions in annual harvests, expressed in pounds (whole weight) can be calculated by subtracting the variable-catch or constant-catch ACLs recommended by the Scientific and Statistical Committee as reduced by the Council's management uncertainty buffer (given in Table 2.4) from the ACLs given in the respective FMPs. The maximum reduction in pounds can then be converted to maximum losses in revenues by multiplying by the respective island prices.[33]

Maximum first year and cumulative five-year reduction in revenues under each of the Sub-alternatives of **Alternative 2** for each of the island platforms are presented in Table 4.1. For all islands/island groups, the maximum reduction in revenues, based on 2019 prices given in Section 3.4.2.2, increases as one moves from **Alternative 2 Sub-alternative 2a** to **Alternative 2 Sub-alternative 2c.** These increasing maximum losses in revenues as one moves from **Alternative 2 Sub-alternative 2a** to **Alternative 2 Sub-alternative 2c** reflect the reductions in the spiny lobster ACL for each of Puerto Rico, St. Thomas and St. John, and St. Croix as the management uncertainty buffers are increased.

Note that in the first year of analysis (i.e., maximum first-year losses), revenue losses associated with the variable-catch ACL exceed the corresponding losses associated with the constant-catch ACLs for any given management uncertainty buffer.[34] Looking at longer-term losses, however, paints a different picture. For any given management uncertainty buffer, specifically, maximum revenue losses associated with either the variable-catch ACLs or the constant-catch ACLs would be equal. For Puerto Rico, for example, the maximum first year loss in revenues associated with the variable-catch ACL with a moderate amount of management uncertainty buffer (e.g**., Sub-alternative 2b**) was found to equal about $1.060 million, while the loss for same constant-catch ACL scenario (**Preferred Sub-alternative 3b**) was found to be $1.079 million. Yet the

[33] Consideration was not given to how prices may increase as restrictions (i.e., fishing season reductions) become more onerous. The limited price data that are available for the respective islands (Table 3.4.2, Puerto Rico; Table 3.4.6, St. Thomas and St. John; Table 3.4.7, St. Croix) give no indication of significant price changes associated with a change in landings.

[34] It is important to keep in mind that these revenue losses are measured in relation to maintaining the status quo.

cumulative five-year losses were identical under the two scenarios ($5.425 million). This reflects the fact that larger losses (reduction in harvests) are incurred in the upfront years under the variable-catch ACL scenarios vis-à-vis constant-catch ACL scenarios but the converse is true in the later years (i.e., larger losses would be incurred under the constant-catch ACL scenarios vis-à-vis the variable-catch ACL scenarios). With respect to the constant-catch scenarios, furthermore, lost revenues associated with any given scenario would remain constant for three years before increasing in year four.

Table 4.1. Maximum revenue losses associated with revising island/island group spiny lobster ACLs.

Island/Island Group	Alt 1	Sub-alt. 2a	Sub-alt. 2b	Sub alt. 2c	Sub-alt. 3a	Preferred Sub-alt. 3b	Sub-alt 3c
Maximum First-Year Losses ($1,000s)							
Puerto Rico	0	926	1,060	1,195	946	1,079	1,211
St. Thomas/St. John	0	333.4	410.8	488.3	531.6	599.2	666.7
St. Croix	0	190.2	269.5	348.9	445.1	511.7	578.4
Maximum Cumulative Five-Year Losses ($1,000s)							
Puerto Rico	0	4,763	5,425	6,087	4,763	5,425	6,087
St. Thomas/ St. John	0	2,971	3,294	3,616	2,971	3,294	3,616
St. Croix	0	2,601	2,916	3,230	2,601	2,916	3,230

It is important to recognize that revenue losses reported in Table 4.1 for the alternative variable-catch ACL and constant-catch ACL scenarios should be considered 'upper-bound' estimates with actual losses being less - and potentially significantly less. There are several reasons for making this, one of them being enforcement. If enforcement is inadequate, a certain (potentially large) amount of spiny lobster harvest from federal waters may continue even after the triggering and application of AMs (which would be fishing season reductions in federal waters).[35]

A second reason for asserting that the actual revenue losses under the various alternatives may be significantly less than those provided in Table 4.1 reflects the actions taken by fishermen in response to the triggering and application of AMs (in this case fishing season reductions in federal waters). Take, for example, Puerto Rico. As documented in Section 3.3.1, only a small share of the Puerto Rico annual harvest of spiny lobster is taken from federal waters; about 7% to 8% since 2016. This equates to about 35,000 lbs per year based on total annual landings

[35] Enforcement of the prohibition of fishing specific to only one species (i.e., spiny lobster in this case) via fishing season reductions would almost certainly be exceedingly difficult since the fisherman would need to be observed in the act of taking spiny lobster from federal waters, or law enforcement would otherwise need to be able to prove the harvest occurred in or from federal waters.

averaging 435,000 lbs. Per trip spiny lobster revenues derived from fishing in federal waters since 2016 averaged about $185 (Table 4.3.5). The information in conjunction with price information (Table 3.4.1) allows one to estimate the average lobster harvest per trip in federal waters during the 2016-2019 period (27 lbs) indicating that spiny lobster was taken on about 1,300 trips annually in federal waters during 2016-2019.[36]

What would be the outcome if triggering and the application of AMs result in the closure of federal waters to the harvest of spiny lobster? If the AMs require a year-round closure of federal waters to spiny lobster harvesting, what would happen to these 1,300 trips? First, they could continue to fish in federal waters as before with the exception that they would not be allowed to take spiny lobster. Thus, these 1,300 trips would continue to be taken in federal waters but spiny lobster cannot be retained.[37] As indicated in Table 3.4.5, however, spiny lobster constitutes the majority of revenues derived from federal waters and precluding spiny lobster from the catch would likely make an otherwise profitable trip unprofitable unless they can compensate for the loss in spiny lobster revenues with an increased harvest of other species. Second, and more likely, fishermen could respond to the triggering and application of AMs (closure of federal waters to spiny lobster fishing) by increasing the number of trips taken in state waters. As suggested by the information in Table 3.4.5, there has been little difference between average trip revenues in federal versus state waters since 2016 (total average per trip revenues equaling about $283 in federal waters versus $266 in state waters). Increasing trips in state waters would result in an increased harvest of spiny lobsters from state waters (as indicated in Table 3.4.5, since 2016 average per trip revenues from the harvest of spiny lobster in federal waters have exceeded comparable figures from state waters by only about 10%; $185 versus $167). This shift in effort (i.e., trips) from federal to state waters provides a second explanation as to why the estimates of lost revenues presented in Table 4.1 should be considered maximums. Furthermore, the shifting of effort from federal waters to state waters would likely negate much, if not most, of the benefits (i.e., protection of the spiny lobster resource from overfishing conditions and subsequent consequences) that might otherwise be forthcoming from implementation of **Preferred Alternative 3** or, for that matter, **Alternative 2**.[38]

A third reason why the numbers presented in Table 4.1 should be considered as 'upper bound' estimates is that they do not consider the fact that AMs would relate only to the harvest of spiny lobster in federal waters. Estimated spiny lobster landings from federal waters off Puerto Rico since 2016, as noted, have averaged only about 35,000 lbs per year, which is considerably less than any decreases in allowable harvest under **Alternative 2** (135,645 lbs to 179,581 lbs

[36] As noted, the great majority of spiny lobster fishing activities in the federal waters off Puerto Rico entail diving activities. Based on cost estimates provided by Agar and Shivlani (2016), a quasi producer surplus estimate of approximately $100 per trip can be derived. This would suggest total quasi producer surplus from trips in federal waters (where lobster is included in the catch) of $130,000.
[37] Since most of the trips are diving related, it may be preferable to state that lobster cannot be targeted while diving.
[38] This assertion, as will be considered shortly, pertains primarily to Puerto Rico.

depending on the sub-alternative and year) as well as **Preferred Alternative 3** (138,482 lbs to 179,581 lbs depending upon the sub-alternative and the year).

While the discussion to point has primarily centered on Puerto Rico's commercial spiny lobster fishery, the same general observations would likely hold to a lesser extent for St. Croix and St. Thomas and St. John. With respect to St. Croix, more than one-half of annual spiny lobster harvests have historically occurred in state waters. Spiny lobster revenues from federal waters, expressed on a per trip basis, have tended to exceed the comparable figure from state waters by a significant amount, which is also the situation with respect to average total revenues per trip (Table 3.4.12). However, triggering and the application of AMs that result in the closure of federal waters to the harvest of spiny lobster in St. Croix would certainly result in some increased effort in state waters the extent of which, however, is unknown. Since diving is the primary method for taking spiny lobster in St. Croix, there may be some ability of fishermen fishing in federal waters to recoup some of the revenue losses (from regulations restricting the harvest of spiny lobster in federal waters) by targeting other species.[39] This would likely mitigate some of the effort (i.e., trip) movement from federal to state waters. Revenue losses would, ultimately, be correlated with the length of the closure.

An overwhelming proportion of spiny lobster harvests in St. Thomas and St. John are taken by trap (Table 3.1.4). This being a relatively non-selective gear, there is probably only limited ability among fishermen harvesting spiny lobsters in federal waters to recoup some of the revenue losses that would be forthcoming from a triggering of an AM (fishing season reductions for spiny lobster in federal waters).[40]

As indicated in Table 3.4.12, average per trip revenues from spiny lobster and co-occurring species in St. Thomas and St. John are relatively large with revenues from federal waters exceeding those from state waters by a relatively large margin (generally in the $600 to $800 range). However, if one subtracts spiny lobster revenues generated from federal waters from total revenues generated from federal waters, one finds that the remaining revenues are generally substantially less than total revenues generated from fishing in state waters. This would suggest that trip migration from federal waters to state waters may be relatively large (with the extent of

[39] Movement of effort from federal waters to state waters would likely be less in St. Croix than in Puerto Rico because the difference between per trip average revenues between federal and state waters in St. Croix is significantly larger than that for Puerto Rico.

[40] It is assumed that fishermen would not make any significant changes in the gear employed in response to a seasonal closure in federal waters. Given that traps have historically accounted for more than 90% of spiny lobster landings in St. Thomas and St. John (see Table 3.1.5), one can surmise that the trap is by far the most efficient gear for harvesting spiny lobster on these islands. As such, it would appear to be unlikely that any significant proportion of fishermen would change gear in response to a seasonal closure.

it being dependent on the length of the fishing season reduction). The migration of effort to state waters could lead to higher harvests of lobsters in state waters.[41]

Overall, the review of the alternatives in Action 1 yields somewhat mixed results. Both **Alternative 2** and **Preferred Alternative 3** are believed to yield some protection (i.e., prevention from overfishing) of the spiny lobster stocks in St. Croix and St. Thomas and St. John with a lower level of protection in Puerto Rico. The amount of protection and related benefits would largely depend on the susceptibility of spiny lobster to overfishing and the amount of migration of effort into state waters as a result of triggering an AM.

While there are likely benefits associated with the revised ACLs resulting from the SEDAR 57 island-based stock assessments, which suggest that the ACLs specified in the island-based FMPs may provide insufficient protection of the island-based stocks (e.g., the ACLs specified in the island-based FMPs are greater than the majority of the OFLs derived from the stock assessments), it cannot be stated with any degree of certainty that the benefits of the added stock protection for each of the island-based stocks offset adverse economic effects. Thus, it cannot be stated with any certainty that **Alternative 2** or **Preferred Alternative 3** outperforms the status quo (**Alternative 1**) from an efficiency (i.e., benefit/cost) perspective. Given this to be the case, one cannot state that the **Preferred Sub-alternative 3b** maximizes benefits vis-à-vis other non-status quo alternatives considered in the amendment. It can be stated with certainty that the long-run adverse effects associated with **Sub-alternative 2a** and **Sub-alternative 3a** would have the least (and identical) adverse economic effects, outside the Status Quo (**Alternative 1**), while **Sub-alternative 2c** and **Sub-alternative 3c** would have the largest (and identical) long-run adverse effects. The long-run adverse effects associated with **Preferred Sub-alternative 3b** would fall in between **Sub-alternative 2a (Sub-alternative 3a)** and **Sub-alternative 2c (Sub-alternative 3c)**. However, the alternatives associated with the lowest long-run adverse impacts may inadequately account for management uncertainty so the lower long-run adverse effects may come at the cost of reduced benefits (i.e., associated with adequate protection of the island-based stocks).

4.1.4 Effects on the Social Environment

Setting management reference points such as OFL, ABC, ACL and OY can impose social effects. Those impacts may be recognized after the catch limits are implemented and subsequent actions, such as AMs, follow to ensure compliance with those limits. The social effects of

[41] While it is believed that the migration from federal to state waters would be relatively high in response to a seasonal closure in federal waters, it may be less than 100%; particularly if the seasonal closure is relatively limited in time duration. As such, NMFS could try to fashion the federal closure period to account for a migration assuming NMFS was able to predict this migration. This, however, creates an additional management issue. Specifically, accounting for the migration from federal to state waters would necessitate a time-extension of the seasonal closure in federal waters. This time extension, in turn, would lead to a higher proportion of effort moving from federal to state waters (with the fishermen always having the final move).

retaining reference points for lobster under **Alternative 1** may be negative because those reference points may not reflect the most recent information on stock status that was generated from SEDAR 57 stock assessments. Although **Alternative 1** would have few short term negative social impacts, there may be longer term impacts that need consideration. Current reference points may have longer term negative effects on the stock, which would in turn have negative impacts upon the fishery and fishermen as the possibility of overfishing as determined under the SEDAR 57 assessments may increase. **Alternative 2** would use a variable-catch approach that decreases harvest over time that would be expected to have benefits for the stock but may increase the negative social impacts in the short term from decreased income opportunities. Under **Preferred Alternative 3**, the ACLs for spiny lobster would decrease in 2021 from the levels as specified in the island-based FMPs, decline again in 2024 and then remain constant. Again, there may be negative social impacts from the decreasing catch levels, but the magnitude of those negative impacts would depend on the degree to which fishermen were able to modify their fishing activities (e.g., shift fishing activities from federal to state waters).

Under Action 1, **Alternative 1** would have the least adverse social effects. The sub-alternatives for **Alternative 2** and **Preferred Alternative 3** would have slightly more negative social effects with **Sub-alternatives 2a** and **3a**, **Sub-alternative 2b** and **Preferred Sub-alternative 3b** having more negative social effects respectively. **Sub-alternatives 2c** and **3c**, could have the largest adverse social effects. Those effects come primarily from decreasing catch levels, which, if there are few or no substitutes for lobster, or if effort does not shift to state waters, could have negative economic impacts that would lead to negative social effects. Furthermore, **Alternative 2** (i.e., ACLs change each year from 2021-2023) would be expected to have greater negative social effects than **Preferred Alternative 3** (i.e., ACLs remain the same for 2021-2023) given the fishermen's preference for ACLs that do not change.

Of course, the social effects can also be affected by outside influences on the fishery, the fishermen and their communities. Recent events, e.g. natural disasters, economic turmoil, pandemic, etc., have had impacts that are difficult to measure. Recent assessments noted in Section 3.5 have been able to give some indication of the impacts, but in the short term, such social disruptions and their longer term impacts are not completely known. This is of special concern since many of the communities identified, especially in Puerto Rico demonstrate vulnerabilities as measured by social indicators. Negative economic impacts from decreasing catches may be mitigated by a number of strategies, such as substituting other species, but also seeking alternative sources of income. Some of those strategies would depend upon the state of the larger economy which may or may not have recovered from the outside influences mentioned above.

4.1.5 Effects on the Administrative Environment

Modifying management reference points including the OFLs, ABCs, and ACLs does not typically result in substantial effects on the administrative environment. **Alternative 1** is not expected to impact the administrative environment because it would not change the current management reference points. **Alternative 2** and **Preferred Alternative 3** would result in a short-term increased burden on the administrative environment through the need to take administrative action to specify new management reference points, including catch limits, and the required rulemaking to implement this management change. Once these changes to catch levels are implemented, the type of regulations needed to manage the fisheries that target spiny lobster would remain unchanged, regardless of the harvest levels set. The lower catch levels under **Alternative 2** and **Preferred Alternative 3** could result in more accountability measures triggered and applied, which would have more administrative burden (discussed under Action 2 below). Some administrative burden is anticipated with respect to outreach as it relates to notifying stakeholders of the changes to harvest levels.

4.2 Action 2: Spiny Lobster Accountability Measure (AM) Trigger

Summary of Management Alternatives

Alternative 1. No Action. Use the AM trigger described in the Puerto Rico FMP, St. Thomas and St. John FMP, and St. Croix FMP for spiny lobster, as follows: an AM would be triggered if spiny lobster landings exceed the spiny lobster ACL, unless NMFS' SEFSC determines the overage occurred because data collection/monitoring improved rather than because landings increased. Landings from the following years, in order, would be used to evaluate an exceedance of the spiny lobster ACL.

(1) Landings from 2018
(2) Landings from 2019
(3) Two-year average of landings from 2019 and 2020
(4) Three-year average of landings from 2019, 2020, and 2021
(5) Thereafter, a progressive running three-year average (2020-2022, 2021-2023, etc.).

The NMFS Southeast Regional Administrator in consultation with the Council may deviate from the specific time sequences based on data availability.

Alternative 2 (Preferred for all three island-based FMPs). Use the average of the most recent three years of spiny lobster landings to trigger an AM. An AM is triggered if average landings exceeded average ACLs in place during those years. The years of landings used to trigger an AM can be adjusted to account for the best scientific information available.

Alternative 3. Use the most recent single year of spiny lobster landings to trigger an AM. An AM is triggered if landings exceeded the ACL in place during that year. The years of landings used to trigger an AM can be adjusted to account for the best scientific information available.

4.2.1 Effects on the Physical Environment

For Action 2, effects to the physical environment would depend on the degree to which the AMs limit the number of days available for fishing activities targeting spiny lobster during the fishing season (i.e., the length of the fishing season reduction). Analysis of effects for Action 2 contains multiple assumptions: (1) landings of spiny lobster each year are at or near the applicable ACL; thus, the variability in landings is minimal; (2) if an AM is triggered the AM (i.e., fishing season reduction) is applied; (3) when the AM is applied fishermen stop fishing for spiny lobster in federal waters and do not shift effort to state waters; (4) spiny lobster fishermen only fish for spiny lobster (i.e., they would not target another species with the same gear when spiny lobster season is closed); and (5) fishermen do not increase effort in federal waters during the open part of the season to offset the closure, and the AM limits harvest to the ACL.

Based on those assumptions, when an AM is triggered and applied, the shortened fishing season would correlate to fewer interactions between fishing gear and anchors and the bottom, which in turn would benefit the physical environment.

Alternative 1 (No Action) would not revise the sequence of years of landings specified in the island-based FMPs in order to evaluate whether an AM is triggered (and subsequently applied). No additional benefits or costs to the physical environment would be expected under this alternative from those described in the island-based FMPs. **Alternative 1** would use a combination of a single year of landings and multi-year average of landings to evaluate if an AM for spiny lobster is triggered. In general, using a multi-year average of landings to trigger an AM would dampen variability in the landings. Where there is minimal variability in the landings around the ACL, using an average would reduce the probability that an AM would be triggered and applied. For example, if one year of annual landings was minimally above the ACL and the other two years of annual landings were minimally below the ACL, then the three-year average would likely be below the ACL and would not trigger an AM. If not using an average, an AM would be triggered and may be applied in the year with the overage. **Alternative 1** would not have the benefit of using average landings until the third year of implementation, increasing the likelihood that AMs would be triggered in the first two years after implementation. Thus, in the first two years following implementation, **Alternative 1** would provide greater benefits to the physical environment than the subsequent years through the increased probability that an AM is triggered and applied and the length of the fishing season for spiny lobster, and thus the fishing effort and gear use, is reduced.

Preferred Alternative 2 would compare a three-year average of landings to the average ACL during that time period to determine if an AM is triggered for spiny lobster. As explained above, using a multi-year average would be expected to dampen variability in the landings and trigger an AM-based closure less frequently. Therefore, **Preferred Alternative 2** would be expected to provide fewer benefits to the physical environment expected through fishing season closures and the associated reduction in gear-bottom interactions when compared to the first two years of **Alternative 1**, which compare a single year of landings to the ACL. However, by the fourth year of implementation, **Alternative 1** would also use a three-year average of landings as the AM trigger, and the effects of **Preferred Alternative 2** and **Alternative 1** from that time and later would be the same.

Alternative 3 would potentially trigger an AM more often than **Alternative 1** and **Preferred Alternative 2**, as it compares a single year of landings to the ACL and would not be able to account for variability in annual landings in any year. Thus, **Alternative 3** would be expected to provide the greatest benefits to the physical environment, followed by **Alternative 1** and then **Preferred Alternative 2**.

However, it is recognized that while landings of spiny lobster are generally harvested at a consistent level through time, the amount of landings could increase based on biological and economic factors (e.g., increased recruitment or market demand). If future landings of spiny lobster occur above the specified ACL on a consistent basis, or at a exponentially high level in a

single year, then the benefits of using a multi-year average to dampen variability in the landings would be reduced because that average could be above the ACL for multiple years. In those instances of high landings, using a single year of landings would also result in an AM triggered and applied in that single year, though AMs would not be triggered in later years when landings are reduced. In a three-year average scenario, however, averaging a single, very high year of landings could result in multi-years of average landings in excess of the ACL. If landings were well below the specified ACLs, then an AM would not be triggered and applied under the three alternatives. These scenarios would provide the upper and lower thresholds for benefits to the physical environment. Since future landings are difficult to predict, effects from this action to the physical environment are expected somewhere between the upper and lower bounds. In the event that AMs are frequently triggered and applied, and gear use and effort are reduced, benefits to the physical environment would be minimal in St. Croix and Puerto Rico due to the primary methods used to harvest spiny lobster (i.e., diving), and higher in St. Thomas and St. John due to the potential reduction in the use of trap gear.

4.2.2 Effects on the Biological/Ecological Environment

The triggering and application of AMs (i.e., fishing season reductions) would be expected to result in positive biological/ecological effects through a reduction in fishing effort on the stock. Reduced fishing effort could result in a more natural size distribution of individuals and an increase in the abundance of individuals in the population, thus increasing the reproductive potential of the stock. Although negative effects could occur through the potential increase in regulatory discards caught during a closure, the discard mortality of spiny in the Puerto Rico, St. Thomas and St. John, and St. Croix fisheries was deemed negligible (SEDAR 57 2019).

Under **Alternative 1**, which uses a prescribed sequence of years of landings to evaluate if an AM is triggered, AMs are more likely to be triggered in the first two years after implementation, as they compare a single year of landings to the ACL instead of using a multi-year average of landings. After the initial two years, a multi-year average of landings would be compared to the ACL, and AMs would be less likely to be triggered. Thus, in the first two years after implementation, if an AM is triggered and applied, resulting in a shortened fishing season, **Alternative 1** would provide some benefits to the biological/ecological environment by reducing fishing effort for the species. These benefits may decline over time if the multi-year averages of landings used reduce the likelihood that an AM is triggered and applied.

Preferred Alternative 2 would be expected to trigger an AM less frequently than **Alternative 1**, since it compares a three-year average of landings to the ACL, which would dampen the variability that may occur in the annual landings. This alternative would be expected to provide the least amount of benefits to the biological/ecological environment through the triggering and application of AMs. However, effects under **Preferred Alternative 2** would be the same as

under **Alternative 1** in the fourth year of implementation, as they would use the same three-year average of landings to evaluate whether an AM is be triggered.

Alternative 3 compares a single year of landings to the ACL each year and would be expected to trigger and apply an AM more frequently when compared to **Alternative 1** and **Preferred Alternative 2**, which use a multi-year average of landings. Therefore, **Alternative 3** would be expected to provide the greatest benefits to the biological/ecological environment through more frequent application of AMs and reductions in fishing effort on the spiny lobster stocks.

The benefits to the biological/ecological environment discussed above were based on the likelihood of the AM being triggered and applied using alternative configurations of years of spiny lobster landings, with the main assumptions that landings occur at or near the specified ACL each year (i.e., they are not highly variable). If future landings are much lower than the ACLs, then an AM would not be triggered and applied under any of the alternatives, but maintaining harvest at or under the established harvest levels would be beneficial to the species. If future landings increase substantially above the specified ACLs, an AM would likely be triggered and applied under all alternatives, and benefits to the stock from the fishing season reduction would help offset the costs of harvesting above the ACL. It should also be noted that the extent of the biological benefits from an AM-based closure would depend on the degree that fishermen shift harvest of spiny lobster to state waters, or for those fishermen that use trap gear, they continue using traps to harvest other species (e.g., reef fish), during a spiny lobster fishing season reduction, which could impact the health of spiny lobsters caught in the trap gear. If the shift to state waters happens, and harvest of lobster continues regardless of AMs triggered and applied, then there would be no benefits to the biological/ecological environment under any of the alternatives. However, that extreme scenario is not anticipated to occur, and it is expected that any AMs triggered and applied would equate to reduced effort and protections to the stock.

When an AM is triggered and applied, the reduction in the length of the fishing season would potentially result in a decrease of interactions between the ESA-listed species in the action area (e.g., sea turtles, finfish, and corals) and the gear types and fishing methods used to harvest spiny lobster (e.g., trap gear, diving, and vessel anchors). The magnitude of those benefits would depend on the length of the season reduction, which are dependent on future landings and difficult to predict. As described above, more frequent AMs would be expected under alternatives that compare a single year of landings to the ACL (**Alternative 3** and years 1 and 2 following implementation of **Alternative 1**) compared to alternatives that use a multi-year average of landings (**Preferred Alternative 2** and years 3 and later following implementation of **Alternative 1)**. Therefore, **Alternative 3** would likely provide greater benefits to the ESA-listed species in the action area when compared to **Alternative 1** and **Preferred Alternative 2.**

4.2.3 Effects on the Economic Environment

The AMs outlined in Action 2 are meant to provide some measure of protection to the respective spiny lobster stocks in the unforeseen situation that harvests exceed ACLs. This protection comes about via subsequent application of AMs (which would be fishing season reductions in federal waters).

Two types of costs are associated with the triggering and application of AMs. First, there are costs to the fishermen through increased uncertainty regarding future fishing practices and thus the inability to adequately plan. Business practices are most efficient when uncertainties are held to a minimum. Increasing the applications of AMs leads to greater planning uncertainty by the commercial fishing sector and may also result in greater costs associated with, say, movement of traps from federal waters to state waters. Frequent applications of AMs also impose greater costs to the federal government than when applications of AMs are less frequent.

Under Action 2, **Preferred Alternative 2** would use the average of the most recent three years of spiny lobster landings to trigger an AM where an AM is triggered if average landings exceeded average ACLs in place during those years. Only the most recent single year of spiny lobster landings would be used to trigger an AM under **Alternative 3** in which case an AM is triggered if landings exceeded the ACL in place during that year. Under **Alternative 1** (the status quo alternative) a multi-year sequence (one year, one year, two years, and finally a three-year average) would continue to be used to estimate landings in relation to the ACL.

The most frequent triggers and application of AMs are expected to occur under **Alternative 3**. Frequent triggers and application of AMs may simply represent large external recruitment to the local fisheries or, in the case of Puerto Rico, use of an expansion factor that may inaccurately expand the sample of trips and landings to the population of trips and landings. Thus, **Alternative 3** would generate the greatest adverse economic effects with benefits not significantly greater than those which would be provided under **Alternative 1** or **Preferred Alternative 2**. The benefit, of course, would be protection of the stock but this must be weighed against the probability that a single year of an abnormally high harvest (i.e., a harvest exceeding the ACL) could be the result of a (previous) favorable external recruitment versus excess fishing on the local stock which, in turn, could lead to future local recruitment problems.

Alternative 1 is a hybrid of **Preferred Alternative 2** and **Alternative 3**. Given that it uses only a single year for triggering the application of AMs during the first two years of the program, it initially suffers from the same shortcoming as that discussed with respect to **Alternative 3**. This shortcoming though is temporary in that the effects of **Alternative 1** and **Preferred Alternative 2** would be the same once they use the same three-year moving average.

4.2.4 Effects on the Social Environment

Accountability measures provide some fail safe for management in case unforeseen overages occur in harvesting a resource. The AM revisions proposed in Action 2 are an attempt to capture some variability that occurs with the landings over time while also providing for the delayed landings data that occur for the Caribbean by proposing multi-year averages. With **Alternative 1**, there would initially be the possibility that AMs would be triggered more frequently with single years being used until a time series is established. This may produce short term negative social impacts if they are indeed triggered and applied annually, but at the same time would have longer term benefits by protecting the resource. Again, the severity of the social impacts would depend upon whether fishermen can find suitable substitutes for spiny lobster in terms of markets and their annual fishing round. In contrast, **Preferred Alternative 2** uses a three-year average from the beginning, so is an attempt to take into consider variability of landings over time. The proposed AM in **Alternative 3** uses a single year as the measure to trigger an AM, but does not take into consideration of the variability of landings over time or how the fishery may be impacted by outside influences that were mentioned in Action 1. Which of these alternatives would have the least negative social effects is difficult to determine. The alternative that best reflects fishing trends and prevents overages from occurring is the more desirable. Those that incorporate running averages, and allow flexibility based on data availability, like the **Preferred Alternative 2**, may be more in tune with fishing practices at the time considered and what may occur in the future, and thereby be the more desirable in terms of reducing negative social impacts.

4.2.5 Effects on the Administrative Environment

Alternative 1 (No Action) would not require additional rulemaking and would therefore have no additional effects on the administrative environment. **Preferred Alternative 2** and **Alternative 3** would both have minor, short-term administrative effects as they would require rulemaking to modify the AM trigger for spiny lobster under the three island-based FMPs. Under all alternatives, if an AM was triggered and applied, a temporary rule to implement an AM-based closure would be published by the agency as necessary. However, under **Preferred Alternative 2**, AMs may not be triggered and applied as often as under **Alternative 1** or **Alternative 3**, thus reducing the administrative burden from the temporary rule process.

4.3 Cumulative Effects Analysis

While this environmental assessment (EA) is being prepared using the 2020 Council on Environmental Quality National Environmental Policy Act Regulations, the cumulative effects discussed in this section meet the two-part standard for "reasonable foreseeability" and "reasonably close causal connection" required by the new definition of effects or impacts. Below is the five-step cumulative effects analysis that identifies criteria that must be considered in an EA.

1. *The area in which the effects of the proposed action will occur* – The affected area of this proposed action encompasses the state and federal waters of the U.S. Caribbean and includes the communities of Puerto Rico and the U.S. Virgin Islands (USVI) islands of St. Thomas, St. John, and St. Croix that fish for spiny lobster. For more information about the area in which the effects of this proposed action will occur, please see Chapter 3, Affected Environment, which describes these resources as well as other relevant features of the human environment.

2. *The impacts that are expected in that area from the proposed action* – The proposed action would (1) update management reference points for the spiny lobster stock in each island-based FMP including the MSY or MSY proxy, maximum fishing mortality threshold, and minimum stock size threshold following the accepted stock assessments (SEDAR 57 2019); (2) set OFLs, and ABCs for spiny lobster using definitions specified in the ABC Control Rule included in each island-based FMP and set ACLs from those ABCs, reducing those values from the OFL proxies, ABCs, and ACLs specified in the island-based FMPs; and (3) revise the spiny lobster AM so that the AM would be triggered if the average of the most recent three years of spiny lobster landings exceeds the average ACLs in place during those years. The environmental consequences of the proposed action are analyzed in Section 4.1 and Section 4.2.

Spiny lobster are primarily harvested via diving methods in Puerto Rico and St. Croix, which has minimal impacts to the benthic environment, and via trap gear in St. Thomas and St. John. Generally the decrease in the OFLs, ABCs, and ACLs (Action 1) from the status quo should provide benefits to the physical environment through fewer gear-bottom interactions, assuming harvest is constrained to these lower levels. Due to the methods primarily used to harvest spiny lobster, those benefits would be expected to be minimal in Puerto Rico and St. Croix (i.e., spiny lobster primarily harvested via diving methods) and higher in St. Thomas and St. John (i.e., spiny lobster primarily harvested via trap gear) (Section 4.1.1). Fishermen in St. Thomas and St. John use trap gear to target multiple species, so changing fishing limits for one stock would not automatically change overall fishing effort. Setting OFLs, ABCs, and ACLs based on best scientific information available (i.e., SEDAR 57 and Tier 3 of the ABC Control) would be expected to provide increased benefits to the biological/ecological environment for spiny lobster through the increased conservation of the stocks (Section 4.1.2). Short-term negative economic

and social effects could occur from the decreasing catch levels (Sections 4.1.3 and 4.1.4), but those effects would be mitigated by the fishermen's ability to shift fishing activities to other species (a higher probability in multi-species fisheries) or to state waters. In addition, long-term economic and social benefits could be expected, because managing based on best scientific information available better protects against the risk of overfishing and is more likely to provide for long-term use of the resource. Modifying management reference points is not expected to substantially affect the administrative environment, either adversely or beneficially (Section 4.1.5) because once the changes are implemented, the type of regulations needed to manage the fisheries that target spiny lobster would remain unchanged.

Revising the AM trigger for spiny lobster to compare a three-year average of landings to the average ACLs during those years (Action 2) would increase the likelihood that an AM is not triggered and applied. Fewer AMs triggered and applied could result in more effects to the physical environment if more interactions between fishing gear and the bottom occur. However, due to the fishing methods primarily used to harvest spiny lobster in Puerto Rico and St. Croix (i.e., diving) few interactions would be expected to occur (Section 4.2.1). In St. Thomas and St. John, where the majority of spiny lobster are harvested using trap gear, fewer AMs could correspond to more effects to the physical environment from gear interactions. Similarly, fewer AMs triggered and applied would be expected to provide fewer benefits to the biological/ecological environment (Section 4.2.2). Revising the AM trigger, resulting in fewer AMs triggered and applied, would reduce negative economic and social impacts associated with AM-based closures in the short-term (Sections 4.2.3 and 4.2.4). Long-term effects would depend on the extent to which AMs are necessary to protect and ensure the long-term access to the resource. Revising the AM trigger would have minor, short-term effects to the administrative environment through the rulemaking required to modify the AMs for spiny lobster, but would potentially have beneficial longer-term effects through fewer temporary rules required to announce AM-based closures (Section 4.2.5).

3. *Other past, present and reasonably foreseeable future actions that have or are expected to have impacts in the area* – Listed are actions under development in the U.S. Caribbean that would be expected to have impacts associated with them.

Other fishery related actions – The island-based FMPs were approved by the Secretary of Commerce on September 22, 2020, and reorganized management measures from the U.S. Caribbean-wide level to each island management area. The cumulative effects associated with the island-based FMPs were analyzed in the EAs for the Puerto Rico FMP (CFMC 2019a), St. Thomas and St. John FMP (CFMC 2019b), and the St. Croix FMP (CFMC 2019c). Those cumulative effects analyses (CEA) are incorporated here by reference. The majority of the management measures included in the U.S. Caribbean-wide FMPs remained substantively unchanged under each island-based FMP, as the island-based FMPs incorporated most of those

management measures that applied within each island area. The EAs in the island-based FMPs analyzed cumulative effects of the actions included in the FMPs that modified management measures including: listing the species to be managed in federal waters; organizing how those species would be managed (as single stocks, in stock complexes, and with indicator stocks); revising or establishing (for species new to federal management) reference points (e.g., ACLs) and AMs; and updating framework procedures available for future management actions. The CEAs described how transitioning from U.S. Caribbean-wide FMPs to island-based FMPs only rearranged past Council actions and would not affect past actions taken by federal or non-federal entities. Specific to spiny lobster, each island-based FMP retained management measures such as size limits and recreational bag limits and revised the management reference points, classifying spiny lobster as a Tier 4a stock (data limited with no accepted assessment, but the stock has relatively low vulnerability to fishing pressure) under the newly established ABC Control Rule. The CEA found that the overall impacts of the actions included in the island-based FMPs would be minimal. Following the accepted SEDAR 57 stock assessments, spiny lobster would now be classified as a Tier 3 stock (data limited with an accepted assessment) under the ABC Control rule, and this action would revise the reference points specified for spiny lobster under the island-based FMPs.

A goal of establishing the island-based FMPs was to ensure the continued health of fishery resources occurring in the exclusive economic zone surrounding each island/island group within the context of the unique biological, ecological, economic, and cultural characteristics of those resources and the communities dependent upon them. The island-based FMPs established a place-based framework designed to provide the foundation for conserving and managing the Puerto Rico, St. Thomas and St. John, and St. Croix fisheries within an integrative, ecosystem-based approach. The Council, in partnership with NMFS and other regional constituencies, is in the process of moving towards implementation of ecosystem-based fishery management (EBFM) in the U.S. Caribbean. EBFM enables a more holistic approach to decision-making by considering trade-offs among fisheries, aquaculture, protected species, biodiversity, habitats, and the human community, within the context of climate, habitat, ecological, and other environmental change.

As mentioned in Chapter 1, the Council would likely request the SEFSC provide an interim assessment for spiny lobster by 2023 to update OFL projections and set catch levels for 2024 and later years. That interim assessment would update the model projections used in the SEDAR 57 stock assessments with more recent commercial landings and length-composition data, as available, for each island/island group. Following that interim assessment, subsequent amendment and rulemaking would likely occur to update, at minimum, spiny lobster OFLs, ABCs, and ACLs. It is also anticipated that the Council would request that a future stock assessment for spiny lobster in each island/island group through the SEDAR process be planned

for a future date (see http://sedarweb.org/ for the SEDAR Assessment Schedule for the Southeast Region).

Non-fishery related actions – Actions affecting the U.S. Caribbean fisheries, including effects of global climate change, were included in the CEAs for the island-based FMPs. Other issues affecting human communities (e.g., high fuel costs, increased seafood imports, restricted access to fishing grounds, regional economies) were considered in the island-based FMPs.

Emerging information sheds light on how global climate change would affect, and is already affecting, fishery resources and the habitats upon which they depend. Impacts commonly mentioned are sea level rise, increased frequency of severe weather events, and change in air and water temperatures. In the U.S. Caribbean region, major climate-induced concerns include: (1) threats to coral reef ecosystems - coral bleaching, disease, and ocean acidification; (2) threats to habitats from sea level rise – loss of essential fish habitat; (3) climate-induced changes to species phenology and distribution, (4) changes in resource composition in fishing areas, (5) rise in temperature including ocean temperatures and their relationship to more severe and frequent storms, (6) droughts, and (7) effects on environmental justice. Climate change may impact spiny lobster stocks in the future (see Section 3.2.1.3), but the level of impacts cannot be quantified at this time, nor is the time frame known in which these impacts would occur. The proposed action is not expected to significantly contribute to climate change through the increase or decrease in the carbon footprint from fishing, as this action would not be expected to change how the fishery is prosecuted.

In 2017, Hurricanes Maria and Irma severely affected all islands in the U.S. Caribbean region. Stresses to the social structures and economies of the islands caused by the hurricanes are discussed in detail in Sections 3.4 and 3.5. Socially and economically, impacts to gear and infrastructure were substantial, which prevented fishing in the short-term and caused some fishermen to modify their fishing methods, gear, or target species to adapt to new environmental conditions. Additional constraints occurred from loss of market demand due to increased emigration and reduced tourism. Tropical weather events would continue to be a certainty for the region, and experts predict that climate change would increase the frequency and severity of the tropical events.

U.S. Caribbean fisheries experienced broad declines in both effort and harvest in 2020 as a result of the COVID-19 public health crisis. Global protective measures (e.g., restaurant closures, social distancing protocols) instituted in March 2020 contributed to an almost-immediate impact on commercial, recreational, and subsistence fishermen. On March 15, 2020, the Governor or Puerto Rico instituted a 2-week closure (curfew) for the majority of businesses on the island of Puerto Rico. Although commercial fishermen were exempt from the curfew, 96% of those surveyed reported that COVID-19 related factors had affected their fishing operations and

resulted in decreased revenues (NMFS 2021a). In early 2020, many fishermen in USVI were still struggling to recover from the 2017 hurricanes, with charter fishermen just starting to recover from the decline in tourism related to hotel closures and infrastructure damage related to the storms. In mid-March 2020, the Governor of the USVI announced the closure of USVI to all tourists, which lasted until mid-July. After a brief reopening to tourism, the USVI was closed again once the COVID-19 threshold was exceeded. Of those surveyed, 87% of commercial fishermen in the USVI reported revenue losses (NMFS 2021a). COVID-19 significantly altered the environment related to the management of the nation's fisheries and effects of the pandemic would be expected to continue in the U.S. Caribbean region, at least in the short-term.

4. *The impacts or expected impacts from these other actions* - The cumulative effects from managing fishery resources in the U.S. Caribbean, including spiny lobster, have been analyzed in other actions as listed in part three of this section. They include detailed analysis of the Puerto Rico, St. Thomas and St. John, and St. Croix fisheries, effects on non-targeted and protected species, and habitats in the U.S. Caribbean. The effects of this action would be expected to be positive in the long term, as they ultimately act to maintain the spiny lobster stocks at a level that would allow the maximum benefits in yield and increased fishing opportunities to be achieved. Some short-term minor negative impacts on the social and economic environments could occur due to the lower ACLs when compared to the status quo and if AM-based closures related to those revised ACLs occur in the future. However, these effects would be reduced, compared to taking no action, as the stocks would be managed based on the best scientific information available.

5. *The overall impact that can be expected if the individual impacts are allowed to accumulate* – Cumulative effects resulting from the revision of spiny lobster management reference points and AMs, in combination with other past, present, and reasonably foreseeable future actions, would be expected to be minimal in each island-management area. Some minor short-term negative effects to the social and economic environments would result from the decrease in ACLs and any increase in associated AMs that are triggered and applied, although long-term positive effects would be expected through the increased conservation and continued access to the spiny lobster stocks. Conversely, positive effects to the physical and biological/ecological environments would be expected from decreased ACLs and increased AMs.

No significant overall impacts to the biological/ecological environment, to protected species occurring within that environment, to the habitats constituting and supporting that environment, or to the dependent socio-economic environment would be expected from the cumulative past, present, or reasonably foreseeable future actions as it would not be expected to significantly affect current fishing practices (i.e., U.S. Caribbean fisheries would continue to target multiple species using multiple gear types; see Section 3.3). Similarly, no significant cumulative effects

would be expected to result from reasonably foreseeable future actions that may be taken, by other federal or non-federal agencies in combination with this action.

6. Summary - The proposed action is not expected to have significant effects to the physical, biological/ecological, economic, social, or administrative environments. Any effects of the proposed action, when combined with other past actions, present actions, and reasonably foreseeable future actions are not expected to be significant. The effects of the proposed action are, and will continue to be, monitored through collection of data by NMFS, individual state programs, stock assessments and stock assessment updates, life history studies, economic and social analyses, and other scientific observations.

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) it provides a comprehensive review of the level and incidence of impacts associated with a proposed or final regulatory action; (2) it provides a review of the problems and policy objectives promoting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problem; and (3) it 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 the regulations are a "significant regulatory action" under the criteria provided in Executive Order (E.O.) 12866. This RIR analyzes the impacts this action would be expected to have on the spiny lobster fishery of the U.S. Caribbean.

5.2 Problems and Objectives

The problems and objectives addressed by this action are discussed in Section 1.2.

5.3. Description of the Fishery

A description of the U.S. Caribbean spiny lobster fishery is provided in Section 3.3.

5.4 Impacts of Management Measures

5.4.1 Action 1: Spiny lobster Overfishing Limit (OFL), Acceptable Biological Catch (ABC), and Annual Catch Limit (ACL)

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.1.3. The following discussion summarizes the expected economic effects of the preferred alternative.

Preferred Alternative 3 selects a constant-catch approach for specifying the OFL and ABC for spiny lobster, and use the constant-catch ABC to derive the spiny lobster ACL (which equals OY). The analysis concluded that there are likely to be benefits from **Preferred Alternative 3** in terms of enhanced stock protection associated with reduced risk of overfishing or venturing toward an overfished status. **Preferred Sub-alternative 3b** recognizes that that there is uncertainty in the management process and takes this uncertainty into account via providing an extra buffer between the ABC and ACL.

These benefits, which cannot be quantified, likely differ by island (island group) with benefits to protection of the Puerto Rico stock being less than the benefits to the St. Croix stock and the St. Thomas and St. John stock. The analysis concluded that benefits are likely to be limited due to the fact that any action taken to protect the island-based stocks (i.e., accountability measures by way of fishing season reductions) are limited to federal waters. Given this to be the case, a certain segment of the commercial fishing population is likely to respond to fishing season reductions by migrating their fishing practices from federal waters to state waters. If the response to fishing season restrictions is significant (i.e., movement of fishing practices from federal waters to state waters) the **Preferred Sub-alternative3b** may fail to meet its objective (i.e., sufficient protection of the respective island spiny lobster stocks). While the focus of this discussion is on the outcome of the preferred alternative, it should be noted that all of the alternatives considered in the amendment suffer from the same shortcomings.

Given that benefits cannot be adequately determined but may well dissipate due to response by fishermen to fishing season restrictions, one cannot conclude that the **Preferred Alternative 3b** outperforms the status quo (**Alternative 1**) from an efficiency (i.e., benefit/cost) perspective. Nor can it be asserted that the **Preferred Sub-alternative 3b** maximizes benefits vis-à-vis other non-status quo-considered alternatives in the amendment. Finally, it is noted that there are alternatives that would have lower long-run adverse effects associated with **Preferred Sub-alternative 3b**. However, these alternatives may inadequately account for management uncertainty so the lower long-run adverse effects may come at the cost of reduced benefits (i.e., associated with protection of the island-based stocks).

5.4.2 Action 2: Spiny Lobster Accountability Measure (AM) Trigger

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.2.3. The following discussion summarizes the expected economic effects of the preferred alternative.

Preferred Alternative 2 uses the average of the most recent three years of spiny lobster landings to trigger an AM. The AM is triggered if average landings exceeded average ACLs in place during those years. Two types of costs were identified with the triggering and application of AMs. First, there are costs to the fishermen through increased uncertainty regarding future fishing practices. Business practices are most efficient when uncertainties are held to a minimum. Increasing the applications of AMs leads to greater planning uncertainty by the commercial fishing sector and may also result in greater costs associated with, say, movement of traps from federal waters to state waters. Frequent applications of AMs also impose greater costs to the federal government than when applications of AMs are less frequent. **Preferred Alternative 2** was found to minimize these costs vis-à-vis other alternatives. While the benefits of **Alternative 3** (which would use the most recent single year of spiny lobster landings to

trigger an AM, where the AM is triggered if landings exceeded the ACL in place during the year), were found to exceed those of **Preferred Alternative 2**, it was concluded that these provided benefits did not outweigh the added cost.

5.5 Public and Private Costs of Regulations

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. Estimated costs associated with this action include:

Council costs of document preparation, meetings, public hearings, and information dissemination	$46,000
NMFS administrative costs of document preparation, meetings, and review	$120,000
TOTAL	$166,000

The estimate provided here does not include any law enforcement costs.

5.6 Determination of Significant Regulatory Action

Pursuant to E. O. 12866, a regulation is considered a "significant regulatory action" if it is likely to result in: (1) an annual effect of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities; (2) create a serious inconsistency or otherwise interfere with an action take 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 the E.O. Based on the information provided above, 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 effects of various alternatives contained in the regulatory action and to ensure the agency considers alternatives that minimize the expected economic effects on small entities while meeting the goals and objectives of the applicable statutes (e.g., the Magnuson Stevens Fishery Conservation and Management Act [Magnuson-Stevens Act]).

With certain exceptions, the RFA requires agencies to conduct an initial regulatory flexibility analysis (IRFA) for each proposed rule. The IRFA is designed to assess the effects various regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize those effects. An IRFA is primarily conducted to determine whether the proposed regulatory action would have a significant economic effect on a substantial number of small entities. In addition to analyses conducted for the Regulatory Impact Review (RIR), the IRFA provides: (1) a description of the reasons why the action is being considered by the agency; (2) a succinct statement of the objectives of, and legal basis for, the proposed regulatory action; (3) a description and, where feasible, an estimate of the number of small entities to which the proposed regulatory action will apply; (4) a description of the projected reporting, record-keeping, and other compliance requirements of the proposed regulatory action, including an estimate of the classes of small entities that 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; and (6) a description of any significant alternatives to the proposed regulatory action which accomplish the stated objectives of applicable statutes and would minimize any significant economic effects of the proposed regulatory action on small entities.

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

A discussion of the reasons why action by the agency is being considered is provided in Section 1.1. The purpose of this proposed rule is to update management reference points for spiny lobster under the island-based fishery management plans (FMP), consistent with the best

scientific information available to prevent overfishing and achieve optimum yield (OY). Following the Southeast Data, Assessment and Review (SEDAR) 57 spiny lobster stock assessments, the spiny lobster stock in each island-based FMP would change from Tier 4a (data limited, no accepted assessment available) to Tier 3 (data limited, accepted assessment available) in the Caribbean Fishery Management Council's (Council) Acceptable Biological Catch (ABC) Control Rule, which is included in each island-based FMP. The accountability measure (AM) trigger for spiny lobster would also be revised to (1) respond to landings information available since the AM trigger was developed under the island-based FMPs and (2) anticipate changes to the spiny lobster ACLs moving forward, following the spiny lobster stock assessments. More information can be found in Chapter 1 of this document.

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

The rule concerns recreational and commercial fishing for spiny lobster in federal waters in the U.S. Caribbean. Recreational fishermen (anglers) who fish for spiny lobster or any species are not considered small entities as that term is defined in 5 U.S.C. 601(6), whether fishing from for-hire fishing, private or leased vessels. Therefore, estimates of the number of anglers directly affected by the rule and any impacts on them are not assessed here. No recreational landings data are collected in the U.S. Caribbean.

The rule would apply to businesses that operate in the commercial fishing industry and particularly, those that operate commercial fishing vessels that harvest spiny lobster in federal waters off Puerto Rico and the U.S. Virgin Islands (USVI). A business in the commercial fishing industry (NAICS code 11411) is a small business if it is independently owned and operated, is not dominant in its field of operation (including its affiliates) and its combined annual receipts are no more than $11 million for all of its affiliated operations worldwide. The Puerto Rico fishery as a whole is estimated to generate direct revenues of $6.06 million (2020 dollars) annually, assuming current landings have fully recovered from the 2017 hurricane season (NMFS 2017), and the USVI fishery as a whole is estimated to generate direct revenues of $5.48 million (2020 dollars) annually, assuming full recovery from the 2017 hurricane season (Mapp 2017). Therefore, all commercial fishing businesses in Puerto Rico, St. Croix, and St. Thomas and St. John are small.

In 2016, there were 1,074 licensed commercial fishermen in Puerto Rico (CFMC 2019a), and each of those licensed commercial fishermen represent a small commercial fishing business. In 2016, 811 of those commercial fishermen submitted catch reports and the average annual revenue for one of these small businesses in Puerto Rico is approximately $7,472 (2020 dollars). Not all of the 811 small businesses operated in the exclusive economic zone (EEZ) off Puerto Rico; only 383 of them did (SERO Caribbean Branch logbook data 2020). In 2019, 46.6% of

active commercial fishermen reported landings of spiny lobster. Using that percentage and the number of active fishermen prior to the 2017 hurricane season, an estimated 378 of 811 small commercial fishing businesses harvest spiny lobster. Furthermore, all of those 378 small businesses may operate in federal waters and may be directly affected by the proposed rule.

The most recent Census of Licensed Fishers of the U.S. Virgin Islands reported 141 licensed commercial fishermen in St. Croix and 119 licensed commercial fishermen in St. Thomas and St. John (Kojis et al. 2017), and each of those fishermen represents a small commercial fishing business. The average annual revenue for one of these small USVI small businesses is $21,077 (2020 dollars). In 2011, 29.5% of licensed commercial fishermen in St. Thomas and St. John and 57.8% of commercial fishermen in St. Croix reported that they fished for spiny lobster. If those figures currently apply in the EEZ off the USVI, then an estimated 35 small commercial fishing businesses in St. Thomas and St. John and 81 small commercial fishing businesses in St. Croix target spiny lobster and may be directly affected by the proposed rule.

6.4 Description of the projected reporting, record-keeping and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for the preparation of the report or records

This proposed regulatory action would not establish any new reporting or record-keeping requirements.

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

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

6.6 Significance of economic effects on small entities

Substantial number criterion

If implemented, this proposed regulatory action is expected to directly regulate 46.6% of active commercial fishing businesses in Puerto Rico, 29.5% of the active small commercial fishing businesses in St. Thomas and St. John, and 57.8% of the active small commercial fishing businesses in St. Croix.

Significant economic effects

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 directly regulated by this regulatory action have been determined to be small entities. Thus, 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?

Data on the costs and profits of the small businesses directly regulated by this proposed rule are not collected. However, the estimates of losses of revenues and the percentage of annual revenues that those losses represent offer insight into if the proposed rule would significantly reduce profits.

Action 1 would change management reference points for spiny lobster. Specifically, **Action 1**, **Preferred Alternative 3**, would use the constant-catch approach for specifying the overfishing limit (OFL) and ABC for spiny lobster, and use the constant-catch ABC to derive the spiny lobster constant-catch annual catch limit (ACL) (which equals OY). **Preferred Alternative 3b** would set the OY and ACL equal to 95% of the ABC. **Action 1**, **Alternative 1** (no action alternative), would retain the OFL proxy, ABC, and ACL (which equals OY) for spiny lobster as specified under the Puerto Rico FMP, St. Thomas and St. John FMP, and St. Croix FMP.

This proposed rule is expected to be implemented in 2023. The island-based FMPs are effective as of October 13, 2022, and are assumed here to establish the baseline ACLs for spiny lobster for purposes of this analysis.

Under **Action 1**, **Preferred Alternatives 3** and **3b**, the ACLs[42] (in pounds [lbs]) for spiny lobster would decrease from the levels as specified in the island-based FMPs as shown in Tables 6.1 and 6.2.

[42] These ACLs (baseline and proposed) are for combined commercial and recreational landings; however, no recreational landings data are collected for spiny lobster in the U.S. Caribbean. Hence, the ACLs for each island area are determined using commercial landings data only.

Table 6.1. Spiny Lobster ACLs under Alternative 1 (no action) and Preferred Alternatives 3 and 3b of Action 1 by island area.

Island Area	Year	Alt. 1 (Baseline) ACL (lbs ww)	Preferred Alts. 3 and 3b ACL (lbs ww)	Proposed Change in ACL (lbs ww)
Puerto Rico	2023	527,232	369,313	-157,919
	2024 and beyond	527,232	366,965	-160,267
St. Thomas & St. John	2023	209,210	142,636	-66,574
	2024 and beyond	209,210	126,089	-83,121
St. Croix	2023	197,528	140,667	-56,861
	2024 and beyond	197,528	120,830	-76,698

Table 6.2. Spiny lobster ACLs under Alternative 1 and Preferred Alternatives 3 and 3b of Action 1 as Percentage of Baseline ACL by island area.

Island Area	Year	Percentage of Baseline ACL (Alt. 1)	Percentage of Baseline ACL (Preferred Alts. 3 and 3b)	Proposed Percentage Change in ACL
Puerto Rico	2023	100%	70.05%	-29.95%
	2024 and beyond	100%	69.60%	-30.40%
St. Thomas & St. John	2023	100%	68.18%	-31.82%
	2024 and beyond	100%	60.27%	-39.73%
St. Croix	2023	100%	71.21%	-28.79%
	2024 and beyond	100%	61.17%	-38.83%

Action 2 concerns the sequence of years of landings data that are used to generate the estimate of landings that would be compared to the ACL for triggering an AM for the spiny lobster stock under each FMP. The baseline and revised sequences would apply to all three island areas.

Under **Action 2**, **Alternative 1** (No Action), the sequence of landings used to estimate spiny lobster landings in comparison to the ACL is as follows beginning with the first year of implementation of the island-based FMPs, which is 2022, and varies from a single year's landings to an average of the recent two and three years of landings and there is two-year lag on landings data availability (Table 6.3, column two). However, the Regional Administrator in consultation with the Council may deviate from the specific time sequences based on data availability.

Table 6.3. Comparison of Action 2, Alternative 1 and Preferred Alternative 2 sequences of landings used to estimate landings for comparison with the ACL.

Year	Alternative 1 (No Action) Variable Sequence of Landings	Preferred Alternative 2 3-Year Average of Landings
2023	Single year (landings 2 years before 2023)	3-year average (landings 2, 3 and 4 years before 2023)
2024	Single year (landings 2 years before 2024)	3-year average (landings 2, 3 and 4 years before 2024)
2025	2-year average (landings 2, and 3 years before 2025)	3-year average (landings 2, 3 and 4 years before 2025)
2026	3-year average (landings 2, 3 and 4 years before 2026)	3-year average (landings 2, 3 and 4 years before 2026)
2027+	3-year average (landings 2, 3, and 4 years before 2027)	3-year average (landings 2, 3 and 4 years before 2027)

Action 2, **Preferred Alternative 2**, would change the sequence of landings to the average of the most recent three years of spiny lobster landings; however, the sequence could be adjusted to account for the best scientific information available (Table 6.3, column three). Note that after 2025 both **Preferred Alternative 2** and **Alternative 1** would generate the same estimate of landings.

Under **Action 2**, **Alternative 1** (No Action), an AM would be triggered if the estimate of landings exceeded the ACL, unless NMFS determined the overage was based on improved data collection or monitoring rather than an actual increase in catch. The comparisons of the baseline ACLs to the baseline landings estimate (**Action 2**, **Alternative 1** [No Action]) for each island area are shown in Tables 6.4 to 6.6.

Table 6.4. Comparison of baseline ACL and baseline estimate of landings for Puerto Rico.

Year	Alt. 1 (Baseline) ACL (lbs ww)	Baseline Estimate of Landings Compared to ACL
2023	527,232	2021 landings
2024	527,232	2022 landings
2025	527,232	2022-2023 landings average
2026	527,232	2022-2024 landings average
2027+	527,232	2023-2025 landings average

Table 6.5. Comparison of baseline ACL and baseline estimate of landings for St. Croix.

Year	Alt. 1 (Baseline) ACL (lbs ww)	Baseline Estimate of Landings Compared to ACL
2023	197,528	2021 landings
2024	197,528	2022 landings
2025	197,528	2022-2023 landings average
2026	197,528	2022-2024 landings average
2027+	197,528	2023-2025 landings average

Table 6.6. Comparison of baseline ACL and baseline estimate of landings for St. Thomas and St. John.

Year	Alt. 1 (Baseline) ACL (lbs ww)	Baseline Estimate of Landings Compared to ACL
2023	209,210	2021 landings
2024	209,210	2022 landings
2025	209,210	2022-2023 landings average
2026	209,210	2022-2024 landings average
2027+	209,210	2023-2025 landings average

Under **Action 2, Preferred Alternative 2**, the AM would be triggered if the estimate of landings (3-year average) exceeds the corresponding 3-year average ACL, unless NMFS determined the overage was based on improved data collection or monitoring rather than an actual increase in catch. From 2019 through 2021, which is prior to implementation of the island-based FMPs, the ACL for spiny lobster was 327,920 lbs in Puerto Rico, 107,307 lbs in St. Croix, and 104,199 lbs in St. Thomas and St. John. As the island-based FMPs are implemented in 2022 and this action is expected to be implemented in 2023, the estimate of landings and corresponding 3-year average ACL for each island area from 2023 through 2027 are presented in Tables 6.7 - 6.9.[43] After 2027, the 3-year average ACL for each island area remains constant as shown below.

[43] The implementation of the island-based FMPs in 2022 is not assumed to retroactively change the spiny lobster ACL from 2019 through 2021. Hence, the 2019 through 2021 average ACLs reflect the ACL stated in the 50 CFR 622.12 as of September 10, 2022 for those years, i.e., 327,920 lbs for Puerto Rico, 107,307 lbs for St. Croix and 104,199 lbs for St. Thomas and St. John. Effective October 13, 2022, the ACLs in effect for fishing year 2022 are 527,232 for Puerto Rico, 197,528 for St. Croix, and 209,210 for St. Thomas and St. John.

Table 6.7. Comparison of average ACL and estimate of landings for Puerto Rico under Action 2, Preferred Alternative 2.

Year	Estimate of Landings	Average ACL	ACLs for Average	Average ACL
2023	2019 – 2021 landings ave.	2019 – 2021 ACL ave.	327,920; 327,920; 327,920	327,920
2024	2020 – 2022 landings ave.	2020 – 2022 ACL ave.	327,920; 327,920; 527,232	394,357
2025	2021– 2023 landings ave.	2021 – 2023 ACL ave.	327,920; 527,232; 369,313	408,155
2026	2022 – 2024 landings ave.	2022 – 2024 ACL ave.	527,232; 369,313; 366,965	421,170
2027	2023 – 2025 landings ave.	2023 – 2025 ACL ave.	369,313; 366,965; 366,965	367,748
2028+	2024 – 2026 landings ave.	2024 – 2026 ACL ave.	366,965; 366,965; 366,965	366,965

Table 6.8. Comparison of average ACL and estimate of landings for St. Croix under Action 2, Preferred Alternative 2.

Year	Estimate of Landings	Average ACL	ACLs for Average	Average ACL
2023	2019 – 2021 landings ave.	2019 – 2021 ACL ave.	107,307; 107,307; 107,307	107,307
2024	2020 – 2022 landings ave.	2020 – 2022 ACL ave.	107,307; 107,307; 197,528	137,381
2025	2021– 2023 landings ave	2021 – 2023 ACL ave.	107,307; 197,528; 140,667	148,501
2026	2022 – 2024 landings ave.	2022 – 2024 ACL ave.	197,528; 140,667; 120,830	153,008
2027	2023 – 2025 landings ave.	2023 – 2025 ACL ave.	140,667; 120,830; 120,830	127,442
2028+	2024 – 2026 landings ave.	2024 – 2026 ACL ave.	120,830; 120,830; 120,830	120,830

Table 6.9. Comparison of average ACL and estimate of landings for St. Thomas and St. John under Action 2, Preferred Alternative 2.

Year	Estimate of Landings	Average ACL	ACLs for Average	Average ACL
2023	2019 – 2021 landings ave.	2019 – 2021 ACL ave.	104,199; 104,199; 104,199	104,199
2024	2020 – 2022 landings ave.	2020 – 2022 ACL ave.	104,199; 104,199; 209,210	139,203
2025	2021– 2023 landings ave.	2021 – 2023 ACL ave.	104,199; 209,210; 142,636	152,015
2026	2022 – 2024	2022 – 2024	209,210; 142,636; 126,089	159,312

Year	Estimate of Landings	Average ACL	ACLs for Average	Average ACL
	landings ave.	ACL ave.		
2027	2023 – 2025 landings ave.	2023 – 2025 ACL ave.	142,636; 126,089; 126,089	131,605
2028+	2024 – 2026 landings ave.	2024 – 2026 ACL ave.	126,089; 126,089; 126,089	126,089

Under **Action 2**, **Alternative 1** and **Preferred Alternative 2**, if the AM is triggered, NMFS will reduce the length of the federal fishing season for spiny lobster within that fishing year within the EEZ by the amount necessary to prevent landings from exceeding the ACL, unless NMFS determines the ACL was exceeded because data collection or monitoring improved rather than because landings increased. Under the no action alternative, the AM is triggered if the ACL, which is constant, is less than the baseline estimate of landings (see Tables 6.4 – 6.6 for baseline estimates compared to baseline ACL). Under the preferred alternative, the AM is triggered if the 3-year average ACL is less than the corresponding 3-year average estimate of landings.

The proposed action would not change the process of applying the AM, which is as follows: if the NMFS estimates that landings have exceeded the ACL, the Assistant Administrator will file a notification with the Office of the Federal Register to reduce the length of the spiny lobster fishing season within that fishing year by the amount necessary to prevent landings from exceeding the ACL, unless NMFS determines that a fishing season reduction is not necessary based on the best scientific information available.

All dollar figures that follow are in 2020 dollars.

Puerto Rico

Landings of spiny lobster from 2012 through 2019 represent baseline landings because they are the most recent landings data available. During that 8-year period, there was no single year or multi-year average of annual landings of spiny lobster in Puerto Rico that exceed the baseline ACL of 527,232 lbs. Baseline annual landings range from 275,424 to 520,829 lbs (Figure 6.1). Consequently, it is expected that from 2023 through 2027 baseline landings (**Alternative 1** of **Action 2**) would be less than the baseline ACL (**Alternative 1** of **Action 1**) and there would be no triggering of the AM, and therefore, no impact on small businesses in Puerto Rico under the status quo.

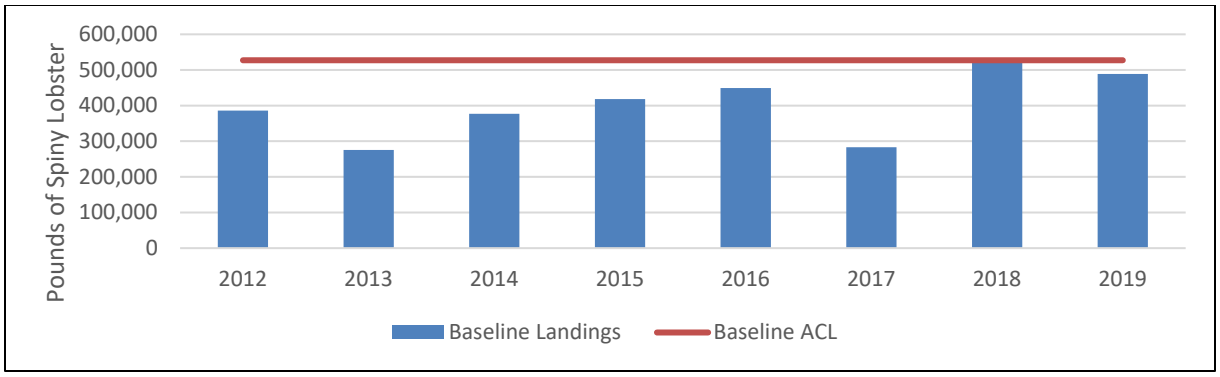

Figure 6.1. Comparison of baseline landings and baseline ACL, Puerto Rico. (Source: NMFS SERO for landings).

The highest and lowest three years of landings in Puerto Rico from 2012 through 2019 are used to produce a range of estimated landings, which are then compared to the average ACLs from 2023 through 2027 in order to analyze the combined impact of **Preferred Alternatives 3** and **3b** of **Action 1** and **Preferred Alternative 2** of **Action 2**.[44] The average of the highest three years of landings is 486,343 lbs, which is greater than the 3-year average ACL for each year from 2023 through 2027. Table 6.10 shows the maximum difference.

Table 6.10. Maximum 3-year average of landings estimate, 3-year average ACL, and maximum overage of landings, 2023 - 2027.

Year	Landings Estimate (lbs)	Average ACL (lbs)	Landings Estimate Exceeds Average ACL?	Overage Estimate (lbs)
2023	486,343	327,920	Yes	158,423
2024	486,343	394,357	Yes	91,986
2025	486,343	408,155	Yes	78,188
2026	486,343	421,170	Yes	65,173
2027	486,343	367,748	Yes	118,595
Average	**486,343**	**383,870**	**Yes**	**102,473**

If NMFS determined that the above estimated overage was consistent with the best scientific information available, the AM would be applied. The average price of spiny lobster is estimated to be $7.17 per pound. Over the 5-year period from 2023 through 2027, the maximum average annual impact would be a reduction of spiny lobster landings of 102,473 lbs with a value of $734,731 (Table 6.11). The average 378 small businesses in Puerto Rico that harvest spiny lobster would each lose, on average, 26.01% of annual revenue from 2023 through 2027; however, in 2023 the average loss would be 40.22% of annual revenue. Note that this maximum

[44] The highest three years rather than the highest three consecutive years are used here for conservative purposes. For the same reason the lowest three years rather than the lowest three consecutive years are used.

impact presumes all harvest of spiny lobster occurs in federal waters and a shortening of the federal season would eliminate an entire overage.

Table 6.11. Maximum overage of landings, maximum revenue loss, and maximum average revenue loss and percentage of average revenue loss per small business, 2023 - 2027.

Year	Maximum Overage Estimate	Maximum Revenue Loss	Average Revenue Loss per Small Business	Average Revenue per Small Business	Average Revenue Loss as Percentage of Average Revenue
2023	158,423	$1,135,893	$3,005	$7,472	40.22%
2024	91,986	$659,540	$1,745	$7,472	23.35%
2025	78,188	$560,608	$1,483	$7,472	19.85%
2026	65,173	$467,290	$1,236	$7,472	16.54%
2027	118,595	$850,326	$2,250	$7,472	30.11%
Average	**102,473**	**$734,731**	**$1,944**	**$7,472**	**26.01%**

The average of the lowest three years of landings of spiny lobster is 311,808 lbs. Table 6.12 shows the minimum difference. The average ACL exceeds the landings estimate for each year, and there would be no triggering of the AM and no impact on the 378 small businesses that harvest spiny lobster in Puerto Rico.

Table 6.12. Minimum 3-year average landings estimate, 3-year average ACL, and minimum overage of landings, if any, 2023 - 2027.

Year	Landings Estimate (lbs)	Average ACL (lbs)	Landings Estimate Exceeds Average ACL?	Overage Estimate (lbs)
2023	311,808	327,920	No	None
2024	311,808	394,357	No	None
2025	311,808	408,155	No	None
2026	311,808	421,170	No	None
2027	311,808	367,748	No	None
Average	**311,808**	**383,870**	**No**	**None**

St. Croix

Landings of spiny lobster from 2012 through 2019 represent baseline landings. During that 8-year period, there was no single year or multi-year average of annual landings of spiny lobster in St. Croix that exceed the baseline ACL of 197,528 lbs. Baseline annual landings range from 10,970 to 87,073 lbs (Figure 6.2). Consequently, it is expected that from 2023 through 2027 baseline landings (**Alternative 1** of **Action 2**) would be less than the baseline ACL (**Alternative 1** of **Action 1**) and there would be no triggering of the AM, no application of the AM and no impact on small businesses in St. Croix under the status quo.

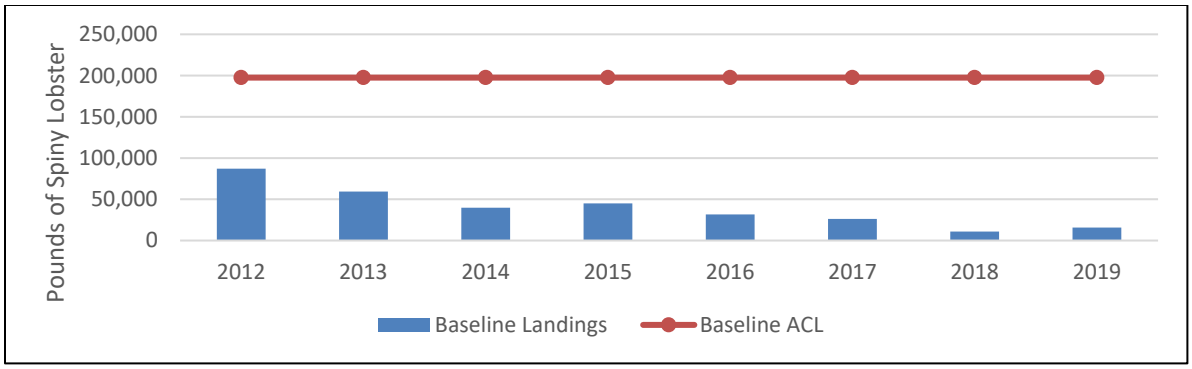

Figure 6.2. Comparison of baseline landings and baseline ACL, St. Croix.
(Source: NMFS SERO for landings).

The highest and lowest three years of landings in St. Croix from 2012 through 2019 are used to evaluate a range of the impact from 2023 through 2027. The average of the highest three years of landings is 63,811 lbs and the average of the lowest three years of landings is 17,628 lbs, and both are lower than the proposed corresponding 3-year average ACL for each year (Table 6.13). Consequently, there would be no triggering of the AM and no impact on the 81 small businesses that harvest spiny lobster in St. Croix.

Table 6.13. Maximum and minimum 3-year average of landings estimates, 3-year average ACL, and overage of landings, if any, 2023 - 2027.

Year	Maximum Landings Estimate (lbs)	Minimum Landings Estimate (lbs)	Average ACL (lbs)	Landings Estimate Exceeds Average ACL?	Overage Estimate
2023	63,811	17,628	107,307	No	None
2024	63,811	17,628	137,381	No	None
2025	63,811	17,628	148,501	No	None
2026	63,811	17,628	153,008	No	None
2027	63,811	17,628	127,442	No	None
Average	**63,811**	**17,628**	**134,728**	**No**	**None**

St. Thomas and St. John

Landings of spiny lobster from 2012 through 2019 represent baseline landings. During that 8-year period, there was no single year or multi-year average of annual landings of spiny lobster in St. Thomas and St. John that exceed the baseline ACL of 209,201 lbs. Baseline annual landings range from 83,157 to 121,695 lbs (Figure 6.3). Consequently, it is expected that from 2023 through 2027 baseline landings (**Alternative 1** of **Action 2**) would be less than the baseline ACL (**Alternative 1** of **Action 1**) and there would be no triggering of the AM, no application of the AM, and no impact on small businesses in St. Thomas and St. John under the status quo.

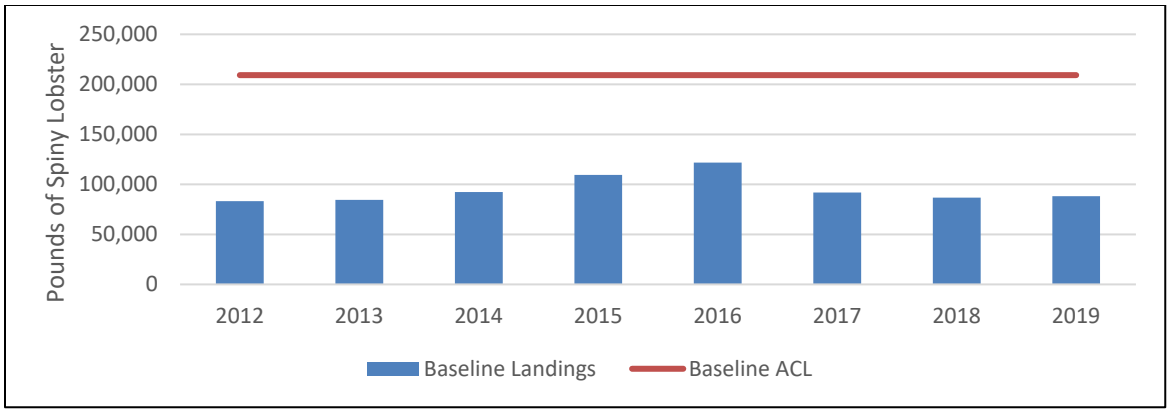

Figure 6.3. Comparison of baseline landings and baseline ACL, St. Thomas and St. John. (Source: NMFS SERO for landings).

The highest and lowest three years of landings in St. Thomas and St. John from 2012 through 2019 are used to evaluate a range of the impact from 2023 through 2027. The average of the highest three years of landings is 107,804 lbs and the average of the lowest three is 84,793 lbs. The average of the highest three years of landings (107,804 lbs) is greater than the corresponding 3-year average ACL (104,199 lbs) in 2023, but less than the 3-year average ACL from 2024 through 2027 (Table 6.14).

Table 6.14. Maximum 3-year average landings estimate, 3-year average ACL, and overage, if any, 2023 - 2027.

Year	Landings Estimate (lbs)	Average ACL (lbs)	Landings Estimate Exceed Average ACL?	Overage (lbs)
2023	107,804	104,199	Yes	3,605
2024	107,804	139,203	No	None
2025	107,804	152,015	No	None
2026	107,804	159,312	No	None
2027	107,804	131,605	No	None
Average	**107,804**	**137,267**	-	-

If NMFS determined that the above estimated overage of landings in 2023 were consistent with the best scientific information available, the AM would be applied. The average price of spiny lobster is estimated to $7.17 per pound. In 2023, the maximum average annual impact would be a reduction of spiny lobster landings of 3,605 lbs with a value of $25,848 (Table 6.15). The average 35 small businesses that harvest spiny lobster would lose, on average, 0.70% of its annual revenue from 2023 through 2027. However, in 2023, the average loss would be 3.50% of annual revenue, followed by no loss thereafter. Note that this maximum impact presumes all harvest of spiny lobster occurs in federal waters and a shortening of the federal season would eliminate the entire overage.

Table 6.15. Maximum overage of landings, maximum revenue loss, and average revenue loss and percentage of average revenue loss per small business, 2023 - 2027.

Year	Maximum Overage Estimate	Maximum Revenue Loss	Average Revenue Loss per Small Business	Average Revenue per Small Business	Average Revenue Loss as Percentage of Average Revenue
2023	3,605	$25,848	$739	$21,077	3.50%
2024	None	$0	$0	$21,077	0.00%
2025	None	$0	$0	$21,077	0.00%
2026	None	$0	$0	$21,077	0.00%
2027	None	$0	$0	$21,077	0.00%
Average	**721**	**$5,170**	**$148**	**$21,077**	**0.70%**

The average of the lowest three years of landings of spiny lobster is 84,793 lbs. Table 6.16 shows the minimum difference. As the estimate of landings is less than the average ACL for each year from 2023 through 2027, there would be no triggering of the AM and no impact on small businesses.

Table 6.16. Minimum 3-year average landings estimate, 3-year average ACL, and minimum overage of landings, if any, 2023 - 2027.

Year	Landings Estimate (lbs)	Average ACL (lbs)	Landings Estimate Exceeds Average ACL?	Overage Estimate (lbs)
2023	84,793	104,199	No	None
2024	84,793	139,203	No	None
2025	84,793	152,015	No	None
2026	84,793	159,312	No	None
2027	84,793	131,605	No	None
Average	**84,793**	**137,267**	**No**	**None**

Summary

There would be no impact on any small commercial fishing businesses in St. Croix that harvest spiny lobster.

From 2024 through 2027, there would be no impact on any of the small businesses in St. Thomas and St. John that harvest spiny lobster. In 2023, however, there could be an adverse impact on 29.5% (35) of the 119 small commercial fishing businesses in St. Thomas and St. John. That impact would occur if the maximum 3-year average landings estimate is consistent with more current landings. In that case, the maximum impact per small business in St. Thomas and St. John that harvests spiny lobster would be a reduction in annual revenue of $739 in 2023, which represents 3.50% of annual revenue from all landings. However, if the minimum landings estimate is more consistent with more current landings, there would no impact on those small businesses. Hence, over the 5-year period from 2023 through 2027, the average annual impact

ranges from $0 to $148 per small commercial fishing business in St. Thomas and St. John that harvests spiny lobster, which represents from 0% to 0.70% of the average annual revenue of those businesses.

From 2023 through 2027, there could be an adverse impact on 46.6% (378) of the 811 active small commercial fishing businesses in Puerto Rico if the maximum 3-year average landings estimate is consistent with more current landings. If so, the maximum impact per small business that harvests spiny lobster would be a reduction in annual revenue ranging from $1,236 to $3,005, while averaging $1,944. Those reductions in annual revenue represent from 16.54% to 40.22% (averaging 26.01%) of the annual revenue from all landings for each of the 378 small businesses that harvest spiny lobster in Puerto Rico. However, if the minimum landings estimate is more consistent with actual landings, there would be no impact on small businesses in Puerto Rico. Hence, over the 5-year period from 2023 through 2027, the average annual impact ranges from $0 to $1,944 per small commercial fishing business in Puerto Rico that harvests spiny lobster, which represents from 0% to 26.01% of the average annual revenue of those businesses.

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

Considered, but not selected, alternatives to Action 1 would have higher or lower ACLs than the preferred alternative. Generally the more an ACL is reduced, the larger the potential adverse impact because it increases the likelihood that the AM would be triggered and then applied. Hence, **Alternatives 2c** and **3c** of **Action 1** (with larger decreases in the ACLs) would have larger maximum adverse impacts than **Preferred Alternative 3b**, while **Alternatives 2a** and **3a** (with smaller decreases in the ACLs) would have smaller maximum adverse impacts than the preferred alternative, if any.

A considered, but not selected, alternative (**Alternative 3**) to **Action 2** would have the estimate of landings based on the most recent single year's landings. Such an estimate is vulnerable to atypical fluctuations of landings, and, consequently, that alternative would likely result in more triggering and application of the AM than **Preferred Alternative 2**. Hence, the adverse impact on small businesses in Puerto Rico would likely be greater under **Alternative 3** than the preferred alternative.

Chapter 7. List of Preparers

List of personnel that assisted with development of the Generic Framework Amendment 1 and Environmental Assessment.

Table 7.1. List of interdisciplinary plan team members and other contributors.

Name	Agency	Title
Graciela García-Moliner	CFMC	IPT Co-lead / Fishery Biologist
Liajay Rivera	CFMC	Technical Assistant for Ecosystem Based Fisheries Management
Sarah Stephenson	NMFS/SFD	IPT Co-lead / Fishery Biologist
María del Mar López	NMFS/SFD	Caribbean Operations Branch Lead / Fishery Biologist
Michael Jepson	NMFS/SFD	Anthropologist
Denise Johnson	NMFS/SFD	Economist
Ed Glazer	NMFS/SFD	Fisheries Social Scientist
Adam Bailey	NMFS/SFD	Technical Writer
Michael Larkin	NMFS/SFD	Data Analyst
Patrick O'Pay	NMFS/PRD	Fishery Biologist
Adyan Rios	NMFS/SEFSC	Biologist
Brent Stoffle	NMFS/SEFSC	Anthropologist
Noah Silverman	NMFS/SERO	Regional NEPA Coordinator
Jocelyn D'Ambrosio	NOAA/GC	Attorney
Miguel Borges	NOAA/OLE	Enforcement Officer

CFMC = Caribbean Fishery Management Council, NMFS = National Marine Fisheries Service,
SFD = Sustainable Fisheries Division, PRD = Protected Resources Division,
SEFSC = Southeast Fisheries Science Center, SERO = Southeast Regional Office,
GC = General Counsel, OLE= Office of Law Enforcement

Chapter 8. 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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Appendix A. Island-based Fishery Management Plans Acceptable Biological Catch Control Rule

Tier 1: Data Rich	
Condition for Use	Full stage-structured stock assessment available with reliable time series on (1) catch, (2) stage composition, and (3) index of abundance. The assessment provides estimates of minimum stock size threshold (MSST), maximum fishing mortality threshold (MFMT), and the probability density function (PDF) of the overfishing limit (OFL).
MSY	MSY = long-term yield at F_{MSY} (or, MSY proxy = long-term yield at F_{MSY} proxy); assumes spawner-recruit relationship known.
SDC	MFMT = F_{MSY} or proxy MSST = 0.75*long-term Spawning Stock Biomass at MFMT (SSB_{MFMT}) OFL = Catch at MFMT
ABC	ABC = OFL as reduced (buffered) by scientific uncertainty[1] and reflecting the acceptable probability of overfishing[2]. The buffer is applied to the PDF of OFL (σ), where the PDF is determined from the assessment (where $\sigma > \sigma_{min}$) [3]. ABC= d * OFL where d = Scalar if $B \geq B_{MSY}$; Scalar * ($B-B_{critical}$) / ($B_{MSY}-B_{critical}$) if $B < B_{MSY}$ Scalar = 1 if acceptable probability of overfishing is specified (<0.5), < 1 if not specified (=0.5). $B_{critical}$ is defined as the minimum level of depletion at which fishing would be allowed.
Tier 2: Data Moderate	
Condition for Use, MSY, SDC	Data-moderate approaches where two of the three time series (catch, stage composition, and index of abundance) are deemed informative by the assessment process, and the assessment can provide MSST, MFMT, and PDF of OFL.
ABC	Same as Tier 1, but variation of the PDF of OFL (σ) must be greater than 1.5 σ_{min} (in principle there should be more uncertainty with data-moderate approaches than data-rich approaches).
Tier 3: Data Limited: Accepted Assessment Available	
Condition for Use	Relatively data-limited or out-of-date assessments
MSY	MSY proxy = long-term yield at proxy for F_{MSY}
SDC	MFMT = F_{MSY} proxy MSST = 0.75* SSB_{MFMT} or proxy OFL = Catch at MFMT
ABC	ABC determined from OFL as reduced (buffered) by scientific uncertainty[4] and reflecting the acceptable probability of overfishing[2] a. Where the buffer is applied to the PDF of OFL when the PDF is determined from the assessment (with $\sigma \geq 2\sigma_{min}$) **OR** b. Where ABC = buffer * OFL, where buffer must be ≤ 0.9
Tier 4: Data Limited: No Accepted Assessment Available	
MSY	MSY proxy = long-term yield at proxy for F_{MSY}.
SDC	MFMT = F_{MSY} proxy MSST = 0.75* SSB_{MFMT} Sustainable yield level (SYL)[5] = a level of landings that can be sustained over the long-term. OFL proxy = SYL
Tier 4a **Conditions for Use**	No accepted[6] assessment, but the stock has relatively low vulnerability to fishing pressure. A stock's vulnerability to fishing pressure is a combination of its productivity and its susceptibility to the fishery. Productivity refers to the capacity of the stock to produce MSY and to recover if the population is depleted. Susceptibility is the potential for the stock to be impacted by the fishery. If SSC consensus[7] cannot be reached on the use of Tier 4a, Tier 4b should be used.
SYL	SYL = Scalar * ***75th percentile*** of reference period landings, where the reference period of landings is chosen by the Council, as recommended by the SSC in consultation with the SEFSC. Scalar ≤ 3 depending on perceived degree of exploitation, life history and ecological function.
ABC	ABC = buffer * SYL, where buffer must be ≤ 0.9 (e.g., 0.9, 0.8, 0.75, 0.70…) based on the SSC's determination of scientific uncertainty[8].
Tier 4b **Conditions for Use**	No accepted[6] assessment, but the stock has relatively high vulnerability to fishing pressure (see definition in Tier 4a Condition for Use), or SSC consensus[7] cannot be reached on the use of Tier 4a.
SYL	SYL = Scalar * ***mean*** of the reference period landings, where the reference period of landings is chosen by the Council, as recommended by the SSC in consultation with the SEFSC. Scalar < 2 depending on perceived degree of exploitation, life history, and ecological function.
ABC	ABC[9] = buffer * SYL, where buffer must be ≤ 0.9 (e.g., 0.9, 0.8, 0.75, 0.70…) based on the SSC's determination of scientific uncertainty[8].
Footnotes	[1]Scientific uncertainty would take into account, but not be limited to, the species life history and ecological function. [2]Acceptable probability of overfishing determined by Council. [3]σ_{min} could be equal to coefficient of variation; σ_{min} is in a log scale. [4]Scientific uncertainty would take into account, but not be limited to, the species life history and ecological function, the perceived level of depletion, and vulnerability of the stock to collapse. [5]MSY $\geq$ SYL. See Appendix G for a detailed explanation of SYL. [6]Accepted means that the assessment was approved by the SSC as being appropriate for management purposes. [7]The SSC defines consensus as having 2/3 of the participating members in favor of a Tier 4a assignment, otherwise the assignment would be Tier 4b of the ABC CR. [8]Scientific uncertainty would take into account, but not be limited to, deficiencies in landings data, availability of ancillary data, species life history, and ecological function, perceived level of depletion, and vulnerability of the stock to collapse. [9]The ABC for a Tier 4b stock should not exceed mean landings during the reference period.

Appendix B. 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 Procedure 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, which can be waived in certain instances.

The proposed rule associated with this framework amendment will include a request for public comment, and if approved, upon publication of the final rule, there will most likely be a 30-day wait period before the regulations are effective in compliance with the APA.

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).

Upon submission to the Secretary of Commerce, NMFS will determine if this framework amendment is consistent with the Coastal Zone Management programs of Puerto Rico and the U.S. Virgin Islands (USVI), to the maximum extent possible. Their determination will then be submitted to the responsible agencies under Section 307 of the CZMA administering approved Coastal Zone Management programs.

Information Quality Act (IQA)

The IQA (Public Law 106-443) effective October 1, 2002, requires the government 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 IQA 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 disseminate 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 (FMP) and amendments and the use of best available information is the second national standard under the Magnuson-Stevens Act. To be consistent with the IQA, 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 that federal agencies must ensure actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered species or destroy or adversely modify the habitat designated as critical habitat (habitat essential to the species' conservation). The ESA requires NMFS to consult with the appropriate administrative agency (itself for most marine species, and the U.S. Fish and Wildlife Service for all remaining species) when proposing an action that may affect threatened or endangered species or critical habitat. Consultations are necessary to determine the potential impacts of the proposed action. They conclude 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 completed a biological opinion on September 21, 2020, evaluating the impacts of the Puerto Rico, St. Thomas and St. John, and St. Croix fisheries on ESA-listed species. Refer to Section 3.2.3 for additional information.

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 the Puerto Rico, St. Thomas and St. John, and St. Croix FMPs will have no adverse impact on marine mammals. In the 2022 List of Fisheries published by NMFS, all gear types used to harvest spiny lobster (e.g., trap/pot, dive, hand/mechanical collection) in the Puerto Rico, St. Thomas and St. John, and St. Croix fisheries are considered Category III (87 FR 23122). 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. This Framework Amendment does not change the list of authorized gear types in these fisheries and as such would not alter this determination.

Paperwork Reduction Act (PRA)

The 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.

Essential Fish Habitat (EFH)

The Magnuson-Stevens Act includes EFH requirements, and as such, each existing and 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 managed species, as described under the Puerto Rico, St. Thomas and St. John, and St. Croix FMPs. As specified in the Magnuson-Stevens Act, EFH consultation is required for federal actions, which may adversely affect EFH. Any required consultation requirements will be completed prior to implementation of any new management measures.

National Environmental Policy Act (NEPA)

The 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.

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.

NMFS has preliminarily determined that the proposed action would not have a significant economic impact on a substantial number of small entities.

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. Federal agency responsibilities under this Executive Order include conducting their programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons from participation in, denying persons the benefit of, or subjecting persons to discrimination under, such, programs policies, and activities, because of their race, color, or national origin. Furthermore, each federal agency responsibility set forth under this Executive

Order shall apply equally to Native American programs. Environmental justice considerations are discussed in Chapter 3.

The action in this framework amendment is not expected to negatively impact minority or low-income populations.

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 Comprehensive Amendment to the Fishery Management Plans (FMP) of the U.S. Caribbean (CFMC 2005) designated habitats of particular concern in Puerto Rico and St. Croix for managed corals and established management measures to minimize, to the extent practicable, adverse effects caused by fishing on those habitats. There are no implications to coral reefs by the actions proposed in this amendment.

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 framework amendment.

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.

This action 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 (MPA)

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 will not affect any MPAs in federal waters off Puerto Rico, St. Thomas and St. John, or St. Croix.