# Generic Amendment to the Fishery Management Plans for Puerto Rico, St. Thomas and St. John, and St. Croix: Modification to the Buoy Gear Definition

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

**Version 2 (DRAFT)**
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# Environmental Assessment Cover Sheet

**Name of Action:** Generic Amendment to the Fishery Management Plans for Puerto Rico, St. Thomas and St. John, and St. Croix: Modification to the Buoy Gear Definition.

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**Type of Action**

( ) Administrative ( ) Legislative
(X) Draft ( ) Final

This Environmental Assessment is being prepared using the 2020 CEQ NEPA Regulations. The effective date of the 2020 CEQ NEPA 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 Environmental Assessment began on DATE, 2021, 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 |
| CFMC | (Council); Caribbean Fishery Management Council |
| EA | environmental assessment |
| EEZ | exclusive economic zone |
| EIS | environmental impact statement |
| FMP | fishery management plan |
| MSA | (Magnuson-Stevens Act); Magnuson-Stevens Fishery Conservation and Management Act |
| MSY | maximum sustainable yield |
| NMFS | National Marine Fisheries Service |
| OFL | overfishing limit |
| OY | optimum yield |
| SEFSC | Southeast Fisheries Science Center |
| SSC | Scientific and Statistical Committee |
| USVI | United States Virgin Islands |

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# Chapter 1. Introduction

## 1.1 What Action is Being Proposed

At the 170th Caribbean Fishery Management Council (Council) meeting in August 2020, the Council requested staff begin work on an amendment to the Comprehensive Fishery Management Plan (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/St. John FMP), and the Comprehensive FMP for the St. Croix EEZ (St. Croix FMP), collectively known as the island-based FMPs, that would allow for the use of a specific hook and line gear type (buoy gear) to fish commercially for deep-water reef fish in Puerto Rico and the U.S. Virgin Islands (USVI). This amendment to the island-based FMPs includes and is limited to an action to modify the definition of buoy gear. The Secretary of Commerce approved the island-based FMPs on September 22, 2020, and regulations to implement the plans are under development. The island-based FMPs are expected to be in effect in 2022.

Buoy gear is an authorized hook and line gear type for the commercial harvest of reef fish in each of the Puerto Rico, St. Thomas and St. John, and St. Croix FMPs. Other authorized gear types include automatic reel, bandit reel, handline, longline, rod and reel, trap, pot, and spear (50 CFR 600.725(v) gear table) (Table 1.1)[1]. Appendix A.1 of this document lists the species included under the Reef Fish category of each the island-based FMPs. Deep-water snappers (e.g., queen snapper, cardinal snapper) which are mainly targeted with buoy gear are included under this category. Buoy gear is also an authorized gear type for the harvest of managed pelagic fish in each of the Puerto Rico, St. Thomas and St. John, and St. Croix FMPs. Managed pelagic species are also listed in Appendix A.1.

Federal regulations at 50 CFR 622.2 define hook and line as automatic reel, bandit gear, buoy gear, handline, longline, and rod and reel. Under federal regulations, buoy gear is defined as follows:

> *Buoy gear* means fishing gear that fishes vertically in the water column that consists of a single drop line suspended from a float, from which no more than 10 hooks can be connected between the buoy and the terminal end, and the terminal end contains a weight that is no more than 10 lb. (4.5 kg). The drop line can be rope (hemp, manila, cotton or other natural fibers; nylon, polypropylene, spectra or other synthetic material) or monofilament, but must not be cable or wire. The gear is free-floating and not connected to other gear or the vessel. The drop line

[1] The regulations implementing the island-based FMPs have not yet been proposed for public comment, and thus the specific text included in the gear tables may change, but the authorized gear types will remain the same.

must be no greater than 2 times the depth of the water being fished. All hooks must be attached to the drop line no more than 30 ft. (9.1 m) from the weighted terminal end. These hooks may be attached directly to the drop line; attached as snoods (defined as an offshoot line that is directly spliced, tied or otherwise connected to the drop line), where each snood has a single terminal hook; or as gangions (defined as an offshoot line connected to the drop line with some type of detachable clip), where each gangion has a single terminal hook.

Federal regulations also define other allowable gear types under the hook and line category:

*Automatic reel* means a reel that remains attached to a vessel when in use from which a line and attached hook(s) are deployed. The line is payed out from and retrieved on the reel electrically or hydraulically.

*Bandit gear* means a rod and reel that remain attached to a vessel when in use from which a line and attached hook(s) are deployed. The line is payed out from and retrieved on the reel manually, electrically, or hydraulically.

*Handline* means a line with attached hook(s) that is tended directly by hand.

*Longline* means a line that is deployed horizontally to which gangions and hooks are attached. A longline may be a bottom longline, i.e., designed for use on the bottom, or a pelagic longline, i.e., designed for use off the bottom. The longline hauler may be manually, electrically, or hydraulically operated.

*Rod and reel* means a rod and reel unit that is not attached to a vessel, or, if attached, is readily removable, from which a line and attached hook(s) are deployed. The line is payed out from and retrieved on the reel manually, electrically, or hydraulically.

## 1.2 Why is the Council Considering Action?

In Puerto Rico and the USVI, small-scale commercial fishermen harvesting deep-water reef fish, particularly snappers (e.g., queen and cardinal snappers) and groupers typically use a type of hook and line gear. The type of hook and line gear is known as vertical bottom line or "cala" in Puerto Rico and as deep-drop gear in the USVI. Vertical bottom line gear configuration and fishing methods used to harvest these deep-water snapper and groupers vary in terms of equipment and materials used, hook type, size and number, number of lines used, types of bait, soaking time, and fishing grounds. *Calas* or vertical bottom line gear can be either attached to the vessel while deployed in the water and retrieved with an electrical reel or unattached to the

vessel while in the water in a ***buoy gear*** configuration until the lines are ready to be retrieved with an electrical reel. The buoy gear configuration is typically used by experienced fishermen targeting deep-water snappers and groupers in Puerto Rico and to a lesser extent in the USVI. This type of locally used buoy gear configuration is known as "cala con boya" in Puerto Rico and as "deep-drop buoy gear" in the USVI and is used to mainly fish for deep-waters snappers and groupers: cardinal and queen snapper up to 1500 ft (457m; 250 fathoms) and to a lesser degree for species in the Puerto Rico, St. Thomas and St. John, and St. Croix Snapper 1 stock complex (i.e., Puerto Rico: silk, black, blackfin, vermilion, and wenchman; USVI: silk, black, blackfin and vermilion).

Buoy gear is defined in federal regulations applicable to Caribbean fisheries (see federal definition above), but deep-water snapper and grouper fishermen in Puerto Rico and the USVI have expressed to the Council during Council meetings that they would like to increase the maximum number of hooks that are allowed under the legal definition of buoy gear to reflect how the gear has been used in state waters in both Puerto Rico and the USVI. The buoy gear type defined in 50 CFR 622.2 cannot contain more than 10 hooks connected between the buoy and the terminal end, while state law does not impose a limit on the number of hooks on the the local deep-water reef fish buoy gear used in state waters. Therefore, in state waters, deep-water reef fish buoy gear can contain more than 10 hooks connected between the buoy and the terminal end depending on fisher's preference, species targeted, fishing conditions, among other reasons.

The use of any gear not listed as authorized for the Puerto Rico, St. Thomas and St. John, and St. Croix fisheries is prohibited (50 CFR 600.725(v)). The authorized gears for those fishing commercially for reef fish and pelagic species managed under the Puerto Rico FMP, the St. Thomas/St. John FMP, and the St. Croix FMP are automatic reel, bandit gear, buoy gear, handline, longline, rod and reel, trap, pot, spear. A buoy gear configuration with more than 10 hooks between the buoy and the terminal end does not meet the legal definition of "buoy gear" in 50 CFR 622.2 and is not considered authorized "buoy gear." Such gear does not meet the definition of any other hook and line gear authorized. Therefore, the local deep-water buy gear used in state waters mentioned above cannot be used by those fishing commercially for reef fish or other species managed under the island-based FMPs unless that gear type is added as an allowable gear type under the island-based FMPs for fishing for those species or the definition of buoy gear is amended to include more than 10 hooks. Alternatively, individuals may petition to use the gear.[2] In this amendment, the Council would modify the definition of "buoy gear" included in 50 CFR 622.2 to address the use of additional hooks preferred by some commercial

[2] The federal regulations set forth a process for a person seeking to use a gear not authorized for a particular fishery to notify the appropriate Council, here the Caribbean Fishery Management Council, of the intent to use a the gear and to obtain permission to do so. See 50 CFR 600.725(v); 50 CFR 600.747.

fishermen of Puerto Rico, St. Croix, and St. Thomas and St. John harvesting deep-water snappers and groupers.

### 1.2.1 Statement of Purpose and Need

The purpose of this amendment is to modify the definition of buoy gear included in federal regulations at 50 CFR 622.2 to allow for the use of a larger number of hooks with this gear type when fishing commercially for deep-waters snapper and groupers managed under the Puerto Rico FMP, the St. Thomas and St. John FMP, and the St. Croix FMP.

The need for this amendment is to ensure that commercial fishermen fishing for deep-water snappers and groupers in federal waters off Puerto Rico, St. Croix, and St. Thomas and St. John, can use buoy gear with more than 10 hooks preferred by some fishermen, while eliminating user conflicts.

## 1.3 Where Will the Action Have an Effect?

Under the Puerto Rico FMP (CFMC 2019a), the St. Thomas/St. John FMP (CFMC 2019b), and the St. Croix FMP (CFMC 2019c), the Council is responsible for managing fishery resources, including reef fish, in federal waters in the U.S. Caribbean region (Figure 1.1). The Puerto Rico EEZ, described in detail in the Puerto Rico FMP and incorporated herein by reference, ranges from 9-200 nautical miles [17-370 kilometers] from the shore of the Commonwealth of Puerto Rico. The St. Thomas/St. John EEZ, described in detail in the St. Thomas/St. John FMP and incorporated herein by reference, ranges 3-200 nautical miles (6-370 kilometers) from shore of St. Thomas and St. John, USVI. The St. Croix EEZ, described in detail in the St. Croix FMP and incorporated herein by reference, ranges 3-200 nautical miles (6-370 kilometers) from the shore of St. Thomas and St. John, USVI.

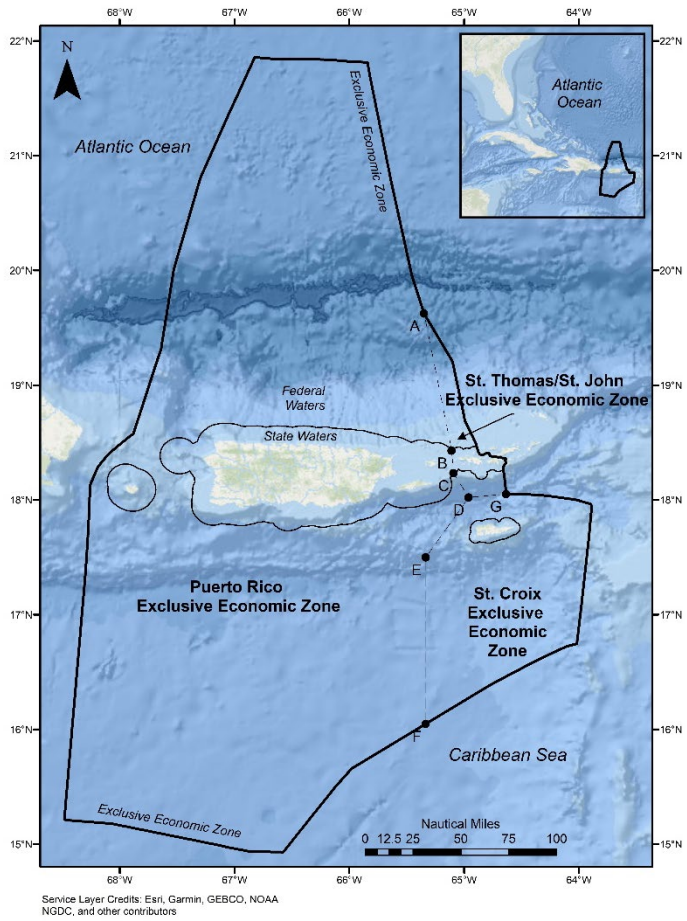


**Figure 1.1.** U.S. Caribbean region with boundaries between the Puerto Rico, St. Thomas/St. John, and St. Croix management areas.

## 1.4 History of Management

Prior to development of the Puerto Rico, St. Thomas/St. John, and St. Croix FMPs, reef fish stocks and stock complexes throughout the U.S. Caribbean (included in the Puerto Rico, St. Thomas/St. John, and St. Croix EEZs) were managed within the Reef Fish FMP of Puerto Rico and the USVI (CFMC 1985), as amended. The original Reef Fish FMP included only shallow-water reef fish species (originally titled Shallow-water Reef Fish FMP). The deep-water reef fish (e.g. snappers groupers), which are the main subject of this amendment, were added for

management through Amendment 2 to the Reef Fish FMP in 1993. A detailed history of management for the reef fish component of the Puerto Rico fishery, the St. Thomas/St. John fishery, and the St. Croix fishery is included in Appendix C of each of Puerto Rico, St. Thomas/St. John, and St. Croix FMPs. Below is a summary of those amendments to the original Reef Fish FMP that contained actions specifically related to deep-water reef fish. These actions and regulatory measures are incorporated into the island-based FMPs, and are reflected in management of the reef fish component of the Puerto Rico fishery, the St. Thomas/St. John Fishery, and the St. Croix fishery, under the respective island-based FMP. Pelagic species were included for management in the island-based FMPs. Management measures for these species are included in each of the island-based FMPs.

**Amendment 2 to the Reef Fish FMP (1993)**
Amendment 2 expanded the existing fishery management unit in the Reef Fish FMP to include the following deep-water reef fish, to address their decline in landings: tiger grouper, black snapper, queen snapper, blackfin snapper, silk snapper, wenchman, vermilion snapper, yellowedge grouper, red grouper, misty grouper, tiger grouper, greater amberjack, almaco jack, blackline tilefish, and sand tilefish. The amendment also retitled the FMP from the Shallow-water Reef Fish FMP to the FMP for the Reef Fish Fishery of Puerto Rico and the USVI. The Amendment also applied existing definitions of maximum sustainable yield and optimum yield to all reef fish within the revised fishery management unit, with the exception of marine aquarium finfish, and established seasonal closures for red hind grouper in areas off Puerto Rico and St. Croix and for all Council-managed fish in the Mutton Snapper Spawning Aggregation Area off St. Croix.

**Regulatory Amendment 2 to the Reef Fish FMP (1996)**
The framework amendment established seasonal closures in two additional areas off the west coast of Puerto Rico (Abrir La Sierra Bank and Bajo de Sico). It also closed the EEZ portions in three areas to all fishing between December 1 and February 28, each year: 1.5-mile radius centered around a buoy to be deployed in the area known as Bajo de Sico; 1.5-mile radius around Buoy 8 at Tourmaline Bank; and 1.5-mile radius around Buoy 6 at Abrir La Sierra Bank.

**Amendment 3 to the Reef Fish FMP (2005)**
Part of the Sustainable Fisheries Act Amendment: prohibited the use of bottom tending gear (traps, pots, gillnets, trammel nets, bottom longlines) in the seasonally closed areas of Tourmaline, Bajo de Sico, Abrir la Sierra, Lang Bank, the Mutton Snapper Spawning Aggregation Area, and Grammanik Bank; prohibited the filleting of fish at sea; established a seasonal closure in the area known as Grammanik Bank south of St. Thomas prohibiting all fishing from February 1 – April 30 of each year; established seasonal closures (no fishing or possession), every year during the specified months, for: silk, black, blackfin and vermillion

snapper from October 1 through December 31; tiger, yellowfin, yellowedge, red and black from February 1 through April 30.

**Amendment 5 to the Reef Fish FMP (2011)**

Among other measures, the amendment separated grouper unit (GU) 4 into two units, GU4 (yellowfin, red, tiger [black grouper was added to GU4]) and GU5 (yellowedge, misty), and modified the snapper unit (SU) by adding cardinal snapper to SU2 and moved wenchman to SU1. The amendment also specified ACLs and accountability measures (AMs) for species undergoing overfishing (snappers, groupers, parrotfish, and queen conch), established or redefined management reference points, including a proxy for maximum sustainable yield (MSY proxy) and an estimate of OY, OFLs, for species undergoing overfishing (snappers, groupers, queen conch, parrotfish), specified separate commercial and recreational ACLs in Puerto Rico based on the preferred management reference point time series and allocated the ACLs in the U.S. Caribbean EEZ by island groups (i.e. Puerto Rico, St. Thomas/St. John, and St. Croix) according to the subzones established in the 2010 Caribbean ACL amendment.

# Chapter 2. Proposed Action and Alternatives

## Action: Modification of the Buoy Gear Definition

In this action, the Caribbean Fishery Management Council (Council) would modify the buoy gear definition for fisheries managed under each of the Comprehensive Fishery Management Plans (FMP) for the Puerto Rico Exclusive Economic Zone (EEZ) (Puerto Rico FMP), the Comprehensive FMP for the St. Thomas/St. John EEZ (St. Thomas/St. John FMP), and the Comprehensive FMP for the St. Croix EEZ (St. Croix FMP), collectively known as the island-based FMPs.

**Alternative 1**. No Action. The definition of buoy gear specified in 50 CFR 622.2 would be retained.

**Alternative 2.** Modify the definition of buoy gear in 50 CFR 622.2 as it applies to the commercial sector harvesting managed reef fish in the EEZ off Puerto Rico, St Thomas and St. John, and St. Croix to allow the use of up to 25 hooks connected between the buoy and the terminal end.

**Alternative 3.** Modify the definition of buoy gear in 50 CFR 622.2 as it applies to the U.S. Caribbean EEZ to allow the use of up to 25 hooks connected between the buoy and the terminal end.

## Discussion of Proposed Alternatives

Under **Alternative 1**, the definition of buoy gear in federal regulations at 50 CFR 622.2 would remain unchanged. The buoy gear definition included in Section 622.2 is re-stated in Section 1.1 of this document. One of the specific requirements under this definition is that buoy gear cannot contain more than 10 hooks connected between the buoy and the terminal end. There is no alternative definition of buoy gear applicable to fishing in federal waters off Puerto Rico, St. Thomas/St. John, and St. Croix. Thus, in components of the Puerto Rico Fishery, the St. Thomas/St. John Fishery, and the St. Croix Fishery where buoy gear is an authorized gear—such as the commercial sector of those fishing for managed reef fish—fishers must limit the gear to 10 hooks. Gear with more than 10 hooks connected between the buoy and the terminal end does not meet the legal definition of "buoy gear," or any other gear authorized for those fishing commercially for managed reef fish and other Council-managed species in federal waters off Puerto Rico, St. Thomas/St. John, and St. Croix.

Currently, in state and federal waters off Puerto Rico, St. Thomas and St. John, and St. Croix, some fishers fishing commercially for deep-water reef fish managed under the island-based FMPs, use a buoy gear configuration that is similar as that defined in federal regulations except for the maximum number of hooks used. Because of data limitations, it is not clear how much harvest occurs using gear containing more than 10 hooks between the buoy and the terminal end in federal waters. Under **Alternative 1**, gear containing more than 10 hooks between the buoy and the terminal end would not meet the legal definition of "buoy gear" in 50 CFR 622.2, or any other gear authorized for those fishing commercially for managed reef fish species or any other Council-managed species. Use of this gear with more than 10 hooks to fish commercially for managed species, including deep-water reef fish, would continue to be prohibited (or non-authorized) in federal waters. Under this scenario, fishers that use more than 10 hooks connected between the buoy and the terminal end to fish commercially for managed reef fish or other Council-managed species in federal waters off Puerto Rico, St. Thomas and St. John, and St. Croix would need to modify their gear configuration, limiting the number of hooks used to 10 or fewer, to meet the definition of authorized "buoy gear" and come into compliance with the law.

**Alternative 2** proposes to modify the definition of buoy gear in federal regulations at 50 CFR 622.2 as it applies to the commercial sector of those fishing for reef fish managed under the Puerto Rico FMP, the St. Thomas/St. John FMP, and the St. Croix FMP. Under **Alternative 2**, the modified definition would increase the maximum number of hooks that can be used to harvest managed reef fish from 10 to 25. This new maximum number of hooks would allow those fishing commercially in federal waters for managed reef fish to legally use the gear configuration employed by some in state waters and federal waters off Puerto Rico and the USVI. The modification would only apply to those using this gear type to fish commercially for managed reef fish species. It would not change the definition of buoy gear as it applies to the harvest of other species in the Puerto Rico. St Thomas and St. John, and St. Croix fisheries. Moreover, the rest of the specifications included in the definition of "buoy gear" such as weight, construction materials for the drop line, and length of the drop line would remain unchanged.

Given that Puerto Rico, St. Thomas and St. John, and St. Croix fisheries are multi-species, fishermen may harvest other species while targeting deep-water reef fish with buoy gear, usually as incidental catch, and this could include Council-managed pelagic species as well as non-managed species (See Section 3.4). Buoy gear as currently defined in 50 CFR 622.2 (i.e., maximum of 10 hooks) is an authorized gear type for the commercial harvest of reef fish and pelagic species in the island-based FMPs. Buoy gear is also an authorized gear for the commercial and recreational harvest of non-managed species (non-FMP species) and non-managed pelagic species in federal waters off Puerto Rico, St. Thomas/St. John, and St. Croix. Thus, under **Alternative 2**, the maximum number of hooks that can be used with buoy gear to

commercially harvest Council-managed pelagic species as well as non-managed species will continue to remain at 10. **Alternative 2** could be problematic for commercial fishermen who on the same trip, harvest deep-water reef fish, Council-managed pelagics and/or non-managed species with buoy gear because they would not be able to retain any species other than Council-managed reef fish harvested with buoy gear containing more than 10 hooks per line. **Alternative 2** would make enforcement of this regulation difficult if during an intervention, buoy gear with more than 10 hooks is onboard with both managed reef fish and other species.

To avoid enforcement complications and unintended consequences (i.e., restrictions) to fishermen harvesting multiple species on a trip, **Alternative 3** proposes to change the definition of buoy gear in the EEZ and that means that for all fisheries where buoy gear is authorized, the gear can have up to 25 hooks. Buoy gear as currently defined in 50 CFR 622.2 is an authorized gear type for the commercial harvest of reef fish and pelagic species in the island-based FMPs, for the commercial and recreational harvest of non-FMP species and non-managed pelagic species in federal waters off Puerto Rico, St. Thomas/St. John, and St. Croix. The definition of buoy gear under **Alternative 3** would apply to all harvest in the Caribbean EEZ similar to the application of the definition under **Alternative 1.**

Under either of **Alternatives 2** and **3**, the changes are limited to the definition of buoy gear, and do not alter any other gear type.

In summary, **Alternatives 2** and **3** would both increase the maximum number of hooks that can be used with buoy gear to 25 per line, depending on target or location, contrasting with **Alternative 1** which maintains the limit at 10 hooks. However, **Alternative 2** only affects fishermen fishing commercially for managed reef fish with authorized buoy gear, while both **Alternatives 1** and **3** affect all fishers using authorized buoy gear in U.S. Caribbean waters.

# Chapter 3. Affected Environment

This section describes the environment and resources included within federal waters off Puerto Rico, St. Thomas/St. John, and St. Croix that would be affected by the proposed action. Additional information on the physical, habitat, 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/St. John FMP (CFMC 2019b), and the St. Croix FMP (CFMC 2019c), and are incorporated by reference and summarized below.

## 3.1 Physical Environment

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 U.S. Caribbean exclusive economic zone (EEZ) covers an area of approximately 75,687 $mi^2$ (196,029 $km^2$).

### 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.

### 3.1.2 St. Thomas/St. John

The St. Thomas/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).

### 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).

## 3.2 Habitat Environment and Essential Fish Habitat

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 Essential Fish Habitat Final Environmental Impact Statement (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. Appendix J in each of the IBFMPs describes the preferred habitats for all reef fish species managed on each island/island group.

### 3.2.1 Essential Fish Habitat

Essential fish habitat (EFH) is defined in the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) as "those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S. C. 1802(10)). EFH information for species affected by this amendment is described in each of the IBFMPs and is summarized below.

Specific categories of EFH identified in the IBFMPs, which are utilized by federally managed fish and invertebrate species, include both estuarine/inshore and marine/offshore areas. Specifically, estuarine/inshore EFH includes estuarine emergent and mangrove wetlands, submerged aquatic vegetation, intertidal flats, palustrine emergent and forested systems, and the estuarine water column. Additionally, marine/offshore EFH includes live/hard bottom habitats,

coral and coral reefs, seagrass and algal plains, sand and shell substrate, and the marine water column. Essential fish habitat includes the spawning area in the water column above the adult habitat. Due to the steep continental slopes that occur off Puerto Rico and the USVI, the majority of fish habitat occurs within the 100 fathoms (183 m) contour line, as does the majority of fishing activity for Council-managed species. Beyond 100 fathoms, the sea bed drops off dramatically and is difficult to fish, as it requires larger vessels and more gear (e.g., more line for fish traps, handlines, etc.), both of which are not typical of U.S. Caribbean fisheries. As a result of the lack of discrete habitat mapping, as well as explicit spatial effort information, especially in the area between the 100-fathom contour and the outer boundary of the U.S. Caribbean EEZ, assumptions had to be made regarding the distribution of species with deep-water or pelagic life stages. Thus, for those deep-water species, in instances when the literature, data, or expert opinion reported the presence of one or more life stage occurring deeper than 100 fathoms (183 m), EFH was assumed to extend to the outer boundary of the U.S. Caribbean EEZ.

Reef Fish EFH in the Puerto Rico FMP: EFH for the Reef Fish consists of all waters from mean high water to the outer boundary of the U.S. Caribbean EEZ (habitats used by eggs and larvae) and all substrates from mean high water to 100 fathoms depth (habitats used by other life stages). In addition, for the juvenile and adult life stages of African pompano, rainbow runner, and crevalle jack, EFH includes all waters from mean high water to 100 fathoms. For gray triggerfish, the eggs are not associated with the water column, and this area is not EFH for the eggs. The Reef Fish EFH description includes the newly managed species: yellowmouth grouper, cubera snapper, gray triggerfish, crevalle jack, African pompano, and rainbow runner.

Pelagic Fish EFH in the Puerto Rico FMP: EFH for little tunny (*Euthynnus alleteratus*) and blackfin tuna (*Thunnus atlanticus*) (Tuna stock complex); king mackerel (*Scomberomus cavalla*) and cero mackerel (*Scomberomus regalis*) (Mackerel stock complex) consists of all waters from mean high water to the outer boundary of the U.S. Caribbean EEZ (habitats used by eggs, larvae, juveniles and adults) and sargassum substrate from mean high water to the outer boundary of the U.S. Caribbean EEZ (habitats used by eggs and larvae). All life stages of these species are pelagic.

EFH for wahoo (*Acanthocybium solandri*) (Wahoo stock) consists of all waters from mean high water to the outer boundary of the U.S. Caribbean EEZ (habitats used by eggs, larvae, juveniles, and adults) and sargassum, coral reef, and hard bottom substrates from mean high water to the outer boundary of the U.S. Caribbean EEZ (habitats used by juveniles, adults, and larvae [for larvae, sargassum substrates only]).

EFH for dolphin (*Coryphaena hippurus*) and pompano dolphin (*Coryphaena equiselis*) (Dolphinfish stock complex) consists of all waters from mean high water to the outer boundary of the U.S. Caribbean EEZ (habitats used by eggs, larvae, juveniles, and adults) and coral reefs, hard bottom, and sargassum substrates from mean high water to the outer boundary of the U.S. Caribbean EEZ (habitats used by juveniles, adults, and larvae [for larvae, sargassum substrates only]).

EFH for great barracuda (*Sphyraena barracuda*) (Barracuda stock) consists of all waters and sargassum substrates from mean high water to the outer boundary of the U.S. Caribbean EEZ (habitats used by eggs and larvae), and all waters and mangroves, seagrass, coral reefs, and hard bottom substrates from mean high water to 100 fathoms (habitats used by juveniles [water column, mangrove, seagrass], and adults [water column, coral, hard bottom]).

EFH for tripletail (*Lobotes surinamensis*) (Tripletail stock) consists of all waters from mean high water to the outer boundary of the U.S. Caribbean EEZ (habitats used by eggs, larvae, juveniles, and adults) and sargassum substrates from mean high water to the outer boundary of the U.S. Caribbean EEZ (habitats used by eggs and larvae).

Reef Fish EFH in the St. Croix FMP: EFH for the Reef Fish in the St. Croix FMP consists of all waters from mean high water to the outer boundary of the U.S. Caribbean EEZ (habitats used by eggs and larvae) and all substrates from mean high water to 100 fathoms depth (habitats used by other life stages).

Pelagic Fish EFH in the St. Croix FMP: EFH for dolphin (*Coryphaena hippurus*) consists of all waters from mean high water to the outer boundary of the U.S. Caribbean EEZ (habitats used by eggs, larvae, juveniles, and adults) and coral reef, hard bottom, and sargassum substrates from mean high water to the outer boundary of the U.S. Caribbean EEZ (habitats used by juveniles, adults, and larvae [for larvae, sargassum substrates only]).

EFH for wahoo (*Acanthocybium solandri*) consists of all waters from mean high water to the outer boundary of the U.S. Caribbean EEZ (habitats used by eggs, larvae, juveniles, and adults) and sargassum, coral reef, and hard bottom substrates from mean high water to the outer boundary of the U.S. Caribbean EEZ (habitats used by juveniles, adults, and larvae [for larvae, sargassum substrates only]).

Reef Fish EFH in the St. Thomas and St. John FMP: EFH for the Reef Fish consists of all waters from mean high water to the outer boundary of the EEZ (habitats used by eggs and larvae) and all substrates from mean high water to 100 fathoms depth (habitats used by other life stages).

Pelagic Fish EFH in the St. Thomas/St. John FMP: EFH for dolphin (*Coryphaena hippurus*) consists of all waters from mean high water to the outer boundary of the U.S. Caribbean EEZ (habitats used by eggs, larvae, juveniles, and adults) and coral reef, hard bottom, and sargassum substrates from mean high water to the outer boundary of the U.S. Caribbean EEZ (habitats used by juveniles, adults, and larvae [for larvae, sargassum substrates only]).

EFH for wahoo (*Acanthocybium solandri*) consists of all waters from mean high water to the outer boundary of the U.S. Caribbean EEZ (habitats used by eggs, larvae, juveniles, and adults) and sargassum, coral reef, and hard bottom substrates from mean high water to the outerboundary of the U.S. Caribbean EEZ (habitats used by juveniles, adults, and larvae [for larvae, sargassum substrates only]).

## 3.3 Biological and Ecological Environment

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 environment for the species managed in federal waters in the respective island/island group management area, including deep-water reef fish and pelagic species (mostly caught incidentally), which are incorporated herein by reference and summarized below. Reef fish and pelagic species are managed as stocks or stock complexes. See Appendix A.1 for a complete list of species managed under the Reef Fish and Pelagic groups on each of the IBFMPs.

### 3.3.1 Description of the Species Affected by this Amendment

The waters off Puerto Rico, St. Thomas/St. John, and St. Croix support hundreds of marine fish species and invertebrates including corals and organisms associated to coral reefs. The reef fish component/group of the Puerto Rico fishery in the Puerto Rico FMP contains 51 species of fish. The reef fish component of the St. Croix fishery includes 41 species. The reef fish component of the St. Thomas/St. John fishery includes 45 species. Many of these stocks are taken primarily in commercial, subsistence, and/or recreational fisheries. Appendices I and J in each of the island-based FMPs contain specific information about the distribution and habitat, life history, diet, reproduction and spawning characteristics for all species in the St. Thomas/St. John FMP.

Council-managed species harvested with vertical bottom line gear (which includes buoy gear) include deep-water reef fish species such as snappers and groupers. The following species within the Reef fish group in each island-based FMP, occur in deeper-habitats and are directly targeted by the commercial sector or indirectly harvested by commercial fishers while pursuing target species. These species are expected to be affected by this amendment as they are

harvested commercially with vertical bottom line gear, although not exclusively with buoy gear. Although infrequent, some managed pelagic species are also caught incidentally with bottom line gear. Those are not included in this table.

**Table 3.3.1.** List of snapper and grouper species harvested in the deep-water vertical bottom line component of the reef fish fishery in each of Puerto Rico, St. Thomas/St. John, and St. Croix.

| Species | Puerto Rico FMP | St. Thomas/St. John FMP | St. Croix FMP |
|---|---|---|---|
| Snappers | black, blackfin, silk, vermilion, wenchman, cardinal, queen | black, blackfin, silk, vermilion, queen | black, blackfin, silk, vermilion, queen, cardinal, wenchman |
| Groupers | yellowmouth, yellowedge, misty | yellowmouth, yellowedge, misty | misty |

This list in not all inclusive, and only lists those species that have been identified by fishers as being actively targeted with vertical bottom line gear, including buoy gear, or that are occasionally caught with bottom line gear, and species reported in commercial catch report forms from 2012-2018, where available, or identified in the literature (i.e., Overly (2020); Scharer-Umpierre et al. (2019).

Landings data from Puerto Rico commercial catch report forms from 2018 and 2019 list other species as reported on the same trip with deep-water snappers/groupers. These species are very infrequently reported and in small quantities. These include: queen triggerfish, lemon shark, Atlantic scombrops, bar jack, cubera snapper, lane snapper, mutton snapper, yellowtail snapper, king mackerel, unspecified boxfish, requiem shark unspecified, dolphinfish, tuna, red hind, unspecified grunt, yellowfin grouper, cero mackerel, almaco jack, tiger shark, sharpnose, shark unspecified, and reef shark. Appendix B lists some of the species incidentally caught in the Puerto Rico deep-water snapper/grouper fishery identified in the literature. Additional information about bycatch can be found in Section 3.3.2 below.

#### 3.3.1.1 Life History and Biology

Appendix J in each of the island-based FMPs contains a comprehensive description of the life history and biology of each of the species that may be affected by this amendment, described in Table 3.3.1.

### 3.3.2 Bycatch

Each of the Puerto Rico, St. Thomas/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 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/St. John, and St. Croix, as compared to other regions. What little bycatch that does occur is generally confined to regulatory discards. Under the island-based management approach, regulatory discards include:

Year-round:

- Nassau grouper: Federal and state laws require that Nassau grouper landed in the U.S. Caribbean be returned unharmed to the water;
- Goliath grouper: Federal and state laws require that Goliath grouper landed in the U.S. Caribbean be returned unharmed to the water;
- Juvenile yellowtail snapper: Federal law requires that catches of yellowtail snapper under 12 inches (30.5 cm) in fork length be returned to the water (yellowtail snapper are not regulated in the state waters of the USVI and the minimum size in Puerto Rico waters is 10.5 inches [26.7 cm] fork length, about the same as in federal waters)

Seasonal:

- Red hind, yellowfin, yellowedge, red, tiger, and black groupers; silk, black, blackfin, and vermilion snappers; lane and mutton snappers: federal law prohibits fishing for and possession of these species during their respective EEZ closed seasons. USVI state laws also prohibits fishing for and possession of these species during the state closed seasons to varying degrees (note that the silk, blackfin, black, and vermilion snapper closure applies only in state waters).

The action in this amendment is not expected to significantly increase or decrease the magnitude of bycatch or bycatch mortality in Puerto Rico, St. Thomas and St. John, and St. Croix fisheries, as the action would not substantially change how the fisheries operate. Section 3.3.1 above and Appendix B list species that have been identified in the literature as bycatch of the deep-water bottom line fishery or that are listed in the Puerto Rico or USVI commercial catch report forms as landed in the same trip as deep-water snappers/groupers harvested with vertical bottom line gear.

### 3.3.3 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.[3] 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.

The National Marine Fisheries Service (NMFS) completed a biological opinion on September 21, 2020, evaluating the impacts of the Puerto Rico, St. Thomas/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 island-based FMP fisheries or fisheries conducted under each of the island-based FMPs are is not likely to jeopardize the continued existence of the North Atlantic Population Segment (NA DPS) green sea turtle, South Atlantic DPS green sea turtle, hawksbill sea turtle, Nassau grouper, oceanic whitetip shark, the Central and SA 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 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.

[3] 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).

## 3.4 Description of the Deep-water Reef Fish Component of the Puerto Rico, St. Thomas/St. John, and St. Croix Fisheries

Each of the island-based FMPs contain a comprehensive description of the fisheries and sectors occurring within the respective EEZ and are incorporated in here by reference. Information from SEDAR 26, the original Reef Fish FMP and Amendment 2 was also used to draft this section. This section describes the deep-water reef fish fishery component on each island, with a focus on commercial fishing for deep-water reef fish that are conducted with buoy gear.

### 3.4.1 Deep-water Reef Fish Management

Deep-water reef fish species were incorporated into the Reef Fish FMP in 1993 (formerly known as the FMP for the Shallow-water Reef Fish Fishery of Puerto Rico and the U.S. Virgin Islands (USVI); Federal Register, Vol. 50, No. 167: 34850-34855). The Lutjanidae species incorporated included: queen snapper (*Etelis oculatus*), silk snapper (*L. vivanus*), black snapper (*Apsilus dentatus*), blackfin snapper (*L. buccannella*), wenchman (*Pristipomoides aquilonaris*) and vermillion snapper (*Rhomboplites aurorubens*). Others species such as deep-water groupers, jack, and tilefish were incorporated into the plan as well.

These deep-water species were incorporated into the FMP because of the decline in landings in general, and in the deep-water snapper aggregate specifically, from 1979 to 1990 (from 340 to 80 metric tons) (Reef Fish FMP Amendment 2, 1993). The primary objective for their inclusion was for the Council to take regulatory action if needed since at the time of the amendment the deep-water snapper fishery was "of less importance than the shallow water fishery in terms of effort and landings". The species of concern at the time was the silk snapper.

Reef fish (including deep-water snappers and other deep-water reef fish) in federal waters are managed with annual catch limits (ACL) for each Puerto Rico sector and for all harvest in the St. Croix and in St. Thomas and St. John (Table 3.4.1), with an aggregate bag limit for recreational harvest, seasonal closure for certain species (Table 3.4.2) and indirectly with area closures that protect spawning populations for some of the species and the habitat that supports those aggregations. Queen and cardinal snappers, two of the most important species in the deep-water reef fish component, have no additional harvest restrictions in federal waters, but are managed with a limited access entry permit and a quota in Puerto Rico state waters (see Section 3.4.2.1 E below).

**Table. 3.4.1.** Annual catch limits applicable to the deep-water reef fish component. Values are in pounds (lbs. whole weight)

| Stock/Stock Complex | Puerto Rico FMP | | St. Croix FMP | St. Thomas/St. John |
|---|---|---|---|---|
| | Commercial ACL | Recreational ACL | Total ACL | Total ACL |
| Snapper 1 (black, blackfin, **silk**, vermilion, wenchman) *wenchman not managed in St. Croix and St. Thomas/St. John | 424,009 | 111,943 | 61,455 | 20,090 |
| Snapper 2 (**queen**, cardinal) * cardinal not managed in St. Croix or in St. Thomas/St. John | 257,236 | 24,974 | 7,911 | 568 |
| PR Grouper 4 (black, red, tiger, yellowfin, yellowmouth) | 2,492 | 5,867 | N/A | N/A |
| PR Grouper 5 (misty, yellowedge) | 15,327 | 4,225 | N/A | N/A |
| STX Grouper 5 (black, red, tiger, yellowfin) | N/A | N/A | 701 | N/A |
| STX Grouper 6 (misty) | N/A | N/A | 77 | N/A |
| STT/STJ Grouper 4 (black, red, tiger, yellowfin) | N/A | N/A | N/A | 2,254 |
| STT/STJ Grouper 5 (yellowmouth, yellowedge, misty) | N/A | N/A | N/A | 390 |

**Table 3.4.2.** Seasonal closures for snapper species in federal and state waters of Puerto Rico and the USVI.

| SNAPPERS | | |
|---|---|---|
| **Snapper Unit 1: (1) silk, (2) black, (3) blackfin, (4) vermillion, (5) wenchman*** | | |
| | **Closed** | **Open** |
| **Federal** | Oct 1 – Dec 31 | Jan 1 – Sept 30 |
| **Puerto Rico** (only applies to silk and blackfin) | Oct 1 – Dec 31 | Jan 1 – Sept 30 |
| **USVI** (only applies to STT/STJ) | Oct 1 – Dec 31 | Jan 1 – Sept 30 |
| *Wenchman was transferred from Snapper Unit 2 to Snapper Unit 1 (Effective January 30, 2012. Seasonal closure does not apply to wenchman). | | |
| **Snapper Unit 2: (1) queen , (2) cardinal *new** | | |
| **Federal** | **No restrictions** | |
| **Puerto Rico** | | |
| **USVI** | | |
| *Cardinal was added to Snapper Unit 2 (Effective January 30, 2012) | | |

The commercial deep-water snapper-grouper reef fish component is artisanal and relatively small scale; however, it represents the largest fin fish resource in terms of weight of landings and estimated dollar values in the U.S. Caribbean EEZ (Tonioli and Agar 2011; Scharer et al. 2019). The deep-water fishery component ranges from the outer reaches of the shallow-water component (e.g., 40 fathoms) seaward to depths up to about 300 fathoms. Targeted fishes inhabiting the deep-water reef areas and slopes characterized by rocks, ledges, and corals generally are prosecuted with heavy duty traps and by electrically powered reels; bottom longlines are deployed to a limited extent (CFMC 1993). Non-targeted species are commonly caught incidentally while targeting deep-water snappers and groupers with those gears. The following sections characterize the vertical bottom line component of each of the Puerto Rico, St. Thomas and St. John, and St. Croix fisheries targeting deep-water snappers and groupers.

## 3.4.2 Description of the Deep-water Reef Fish Component of the Puerto Rico, St. Thomas/St. John, and St. Croix Fisheries that is Harvested with Vertical Bottom line/Buoy Gear

Deep-water reef fish, particularly deep-water snappers and groupers targeted by small-scale commercial fishers, are typically harvested with hook and line gear. The type of hook and line gear used is known as vertical bottom line or "*cala*" in Puerto Rico and deep-drop gear in the USVI, and includes buoy gear. Hook and line configurations and fishing methods used to harvest deep-water snapper and groupers vary in terms of equipment and materials used, hook type, size, and number, number of lines used, types of bait, soaking time, and fishing grounds. *Calas* or vertical bottom line gear can be attached to the boat until retrieved with an electrical

reel or used in a buoy gear configuration, which is typically used by more experienced fishermen targeting deep-water snappers and groupers in Puerto Rico and to a less extent in the USVI, and is not attached to the boat until the lines are ready to be retrieved with an electrical reel. The vertical bottom line buoy gear configuration is known as "cala con boya" in Puerto Rico and as "deep-drop buoy gear" in the USVI and is used to fish principally for cardinal and queen snapper (species in Snapper Complex 2 in Puerto Rico and St. Thomas/St. John, only queen in St. Croix) up to 1500 ft (457m; 250 fathoms) and to a lesser degree for species in the Snapper 1 stock complex in Puerto Rico (i.e., silk, black, blackfin, vermilion, and wenchman) and in St. Thomas/St. John and in St. Croix (i.e., silk, black, blackfin, vermilion) starting from 400 ft (122 m; 67 fathoms). The following sub-sections describe the vertical bottom line/buoy gear component in each of the Puerto Rico, St. Thomas and St. John, and St. Croix fisheries.

#### 3.4.2.1 Puerto Rico

**A. Characteristics of the Deep-water Vertical Bottom line Gear used in Puerto Rico**

Fishing with vertical bottom lines (locally known as "calas") is one of the most popular methods of hook and line fishing used to fish in Puerto Rico (Agar and Shivlani 2016).

In 1989, Matos-Caraballo and Torres-Rosado (1989) define the "cala" as a bottom line with one or more hooks anchored with approximately 1 to 8 pounds of lead and fished at depths ranging from 50-150 fathoms (300-900 feet). The hooks may either be hung paired from one or more hard frames of galvanized wire (ballestilla is a horizontal bottom line: Christmas tree and *fuete* are different styles of vertical bottom lines).

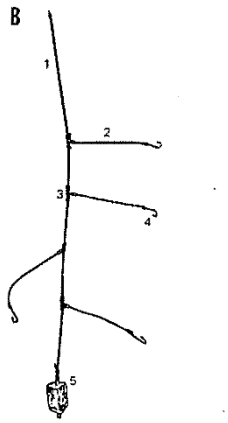


**Figure 3.4.1**. Depiction of a vertical line (cala) (Source: Matos-Caraballo and Torres-Rosado 1989)

Cala (or fuete) is the common vertical bottom line configuration along the west coast (Figure 3.4.1). In a 2014 survey, Agar and Shivlani (2016) reported that on average surveyed fishers fished two vertical bottom lines per trip (1-5 range, 2 median). They reported that the average vertical bottom line was 1,800 feet long (549 m; 300 fathom) (range reported was 200-9,000 ft.; 1,800 ft. median) and had 18 hooks (range of hooks reported was 5-80, 12 median, 30 mode). For example, the report mentions that west coast fishers tend to use between one and three vertical bottom lines which are 1,800 feet long with a 200 pounds, 18 braided line, and that the line has on average 25 circle hooks with range in size from 9/0 to 12/0. Agar and Shivlani's (2016) survey showed that the average commercial fishing vessel with vertical bottom line gear made three trips per week. Surveyed fishers reported that fishing trips averaged about 15 hours; although some said they fished up to 120 hours over a multi-day trip[4]. For more information specific about this gear, please see Section 3.6 of this document.

More recently, public testimony at Caribbean Council meetings and through personal communication between NMFS staff with Puerto Rico fishers indicate that in Puerto Rico, when using the buoy gear vertical bottom line configuration approximately 20-25 hooks are used per line because fishing is only conducted for a few hours and they have to fight with the currents and varying water conditions. Fishers have indicated that it is not practical or cost effective to use more hooks with this gear type because of the depths fished and currents. Fishers previously used more hooks but found out that using an average of 25 hooks per line is ideal, especially to optimize battery life of the electric reels that would retrieve the gear. (N. Crespo, west coast deep-water fisher, pers. communication, February 2021). The number of hooks preferred to be used by a fisher, in addition of the depth fished (depth depend on the species targeted), also depends on the area fished, the strength of the currents, past experiences with the loss of lines/catch, fisher's experience, among other factors. Because the use of buoy gear to harvest the the deep-water reef fish component of the Puerto Rico fishery is guided by bottom currents, weather patterns, and moon phases, deep-water snappers and groupers are not caught yearlong (strong currents and weather events immensely affect the pursue of this fishery).

**B. Species Targeted with Deep-water Vertical Bottom line Gear/Buoy Gear (Cala/Cala con boya) and Habitats and Depths Fished**

Fishermen in Puerto Rico target multiple species of fish and shellfish, including reef fish (especially snappers and groupers), coastal pelagics, deep-water pelagics, lobster, and conch (Figure 3.5.1). Finfish, historically the preferred food of local residents, constitutes the majority of the catch and value. Shallow water reef fish are the most important category of targeted

[4] The median trip was 11 hours long.

commercial fish, followed by deep-water snappers and spiny lobster, but target species vary by coastal region (Puerto Rico FMP 2019).

Snappers and groupers are found in coastal and deep-water reefs and are among the most targeted fishes. In 2016, snappers comprised 49% of the total reported landings of finfish and 65% of the value of finfish. Silk snapper (*Lutjanus vivanus*) comprised 32% of the snapper landings and 39% of the value, followed by snappers in the other category (unclassified) with 28% of the snapper landings and 33% of the value, yellowtail snapper (*Ocyurus chrysurus*) with 22% of snapper landings and 16% of the value, lane snapper (*Lutjanus synagris*), with 14% of snapper landings and 9% of the value, and mutton snapper (*Lutjanus analis*), with 4% of snapper landings and 3% of the value (NMFS 2017). The same year, groupers represented only 4.7% of the total landings of finfish and 4% of the value of finfish (NMFS 2017). Queen and silk snapper alone accounted for 86% of the vertical bottom line revenues in 2014 (NMFS 2016 in Agar and Shivlani 2016).

Among all gear types, silk and queen snapper are two of the most landed deep-water species from 2012 to 2019, with a total of 1,588,074 and 1,041,323 adjusted pounds, whole weight, respectively (Table 3.4.3). Fishing occurs mainly over muddy bottoms and rocky benthic habitat (or hard) at depths that range from 250 to 3,000 feet. Fishermen target deep-water snappers in shelf breaks and the edge of insular platforms. Along the west coast of Puerto Rico, the majority of the vessels fishing with vertical bottom lines targeting queen and cardinal snapper (Snapper Complex 2) in deeper waters (800-1,400 ft) tend to drift fish (*galoneando*) whereas those that target species such as silk, black, blackfin, vermilion, and wenchman (Puerto Rico Snapper Stock Complex 1) tend to fish while anchored because these species are found in shallower waters (600 ft.; 183m; 100 fathoms) (N. Crespo, west coast deep-water snapper fisher, pers. com, February 2021). In addition to snappers, which are the principal target in this fishery, misty groupers, glass eye snappers, and yellowmouth grouper are also incidentally captured with this gear, as well as some sharks. The most popular baits used by vertical bottom line fishers are squid, sardines, ballyhoo, and miscellaneous tunas (blackfin, skipjack and little tunny) (Shivlani and Agar 2016).

**Table 3.4.3.** Adjusted pounds (whole weight) of some deep-water snapper-grouper species landed in Puerto Rico each year (all gear types).

| Year | Misty grouper | Yellowedge grouper | Black snapper | Blackfin snapper | Cardinal snapper | Queen snapper | Silk snapper | Vermilion snapper |
|---|---|---|---|---|---|---|---|---|
| 2012 | 4,208 | 394 | 7,149 | 5,338 | 17,842 | 166,779 | 180,390 | 11,222 |
| 2013 | 3,829 | 303 | 6,691 | 6,270 | 11,502 | 97,030 | 118,084 | 7,266 |
| 2014 | 4,570 | 587 | 4,341 | 7,930 | 17,035 | 157,443 | 191,095 | 12,269 |

| Year | Misty grouper | Yellowedge grouper | Black snapper | Blackfin snapper | Cardinal snapper | Queen snapper | Silk snapper | Vermilion snapper |
|---|---|---|---|---|---|---|---|---|
| 2015 | 5,505 | 547 | 2,893 | 6,302 | 16,701 | 164,037 | 180,525 | 14,104 |
| 2016 | 3,450 | 940 | 8,274 | 9,830 | 9,340 | 115,088 | 211,793 | 13,386 |
| 2017 | 4,176 | 1,206 | 4,601 | 8,201 | 8,926 | 86,195 | 200,848 | 11,561 |
| 2018 | 3,793 | 777 | 5,134 | 10,647 | 9,911 | 102,303 | 194,172 | 13,220 |
| 2019 | 7,122 | 1,031 | 4,454 | 10,264 | 12,703 | 152,448 | 311,167 | 14,403 |
| **Total** | **36,654** | **5,785** | **43,537** | **64,781** | **103,959** | **1,041,323** | **1,588,074** | **97,432** |

### C. Commercial Fishers Participating in the Deep-water Vertical Bottom line/Buoy Gear Component of the Reef Fish Fishery

Approximately 60 commercial fishers currently possess the Deep-water Snapper Special Permit (See sub-section E below) from the Puerto Rico Department of Natural and Environmental Resources (DNER) to fish for queen and cardinal snappers in Puerto Rico state waters. This limited access permit was established in 2013. There is no similar permit in federal waters. Permit holders use vertical bottom line (*cala*) and/or the buoy gear configuration (*cala con boya*) to fish for cardinal and queen snappers in both state and federal waters. Fishing with these gear types also occurs in federal waters by non-permitted commercial fishers. The deep-water buoy gear configuration is a very specialized and highly species-specific gear type (N. Crespo, west coast deep-water fisher, pers. communication, February 2021) and it is mostly used by commercial fishers usually in the deeper reefs. In addition to queen and cardinal snapper, the buoy gear configuration may also be used by commercial fishers to harvest mid-depth reef species in the Snapper Complex 1 (silk, black, blackfin, vermillion, wenchman) in both federal and state waters, although not exclusively, as they also use other types of hook and line (*cala,* handline) and to a lesser extent, traps (Table 3.4.5 and Table 3.4.6). Illegal harvest of species in the Snapper Complex 2 and Snapper Complex 1 also occurs (e.g., harvest of queen and cardinal in state waters by non-permitted fishers; harvest of any species by non-licensed fishers). The number of commercial fishers currently using deep-water vertical bottom line (*cala*) to fish for deep-water snappers and groupers is estimated to be around 200 (DNER staff, personal communication, February 2021). Within this estimate, an unknown number of fishers use the buoy gear configuration (*cala con boya*) of deep-water vertical bottom line, which is the subject of this amendment. Information on the actual number of fishers using buoy gear is not collected.

The number of fishermen fishing in deep waters has also experienced fluctuations throughout the years. For example, a drop in number in 1996 and 2002 to 2008 could be attributed to higher fuel costs and tighter fishing regulations such as minimum size limits and closed seasons (Matos-Caraballo and Agar 2011). However, higher prices received for deep water species has increased

the number of fishermen participating in the deep-water snapper fishery (Matos-Caraballo and Agar 2011a). Table 3.4.5 shows the number of fishers that reported landings of deep-water snapper and grouper species from 2012 through 2019. Fishermen consistently reported landing silk and queen snapper more than other species in the deep-water category.

**Table 3.4.4.** Number of commercial fishermen in Puerto Rico that landed deep-water species each year (all gear types) in all Puerto Rico waters.

| Year | Misty grouper | Yellowedge grouper | Black snapper | Blackfin snapper | Cardinal snapper | Queen snapper | Silk snapper | Vermilion snapper |
|---|---|---|---|---|---|---|---|---|
| 2012 | 36 | 6 | 59 | 51 | 75 | 146 | 259 | 74 |
| 2013 | 44 | 9 | 58 | 66 | 79 | 152 | 267 | 76 |
| 2014 | 47 | 13 | 65 | 77 | 75 | 134 | 300 | 103 |
| 2015 | 46 | 10 | 58 | 73 | 79 | 130 | 276 | 99 |
| 2016 | 34 | 14 | 61 | 83 | 44 | 82 | 269 | 88 |
| 2017 | 40 | 19 | 60 | 74 | 62 | 103 | 264 | 84 |
| 2018 | 38 | 15 | 59 | 69 | 69 | 115 | 249 | 78 |
| 2019 | 42 | 13 | 61 | 71 | 89 | 145 | 333 | 95 |

**D. Fishing Areas**

The Puerto Rico FMP provides an in-depth description of the fishing areas fished in each of the Puerto Rico coasts. This information is incorporated by reference and summarized below. West coast commercial fishermen historically account for the largest number of annual fishing trips, from 45 percent in 2010 to 47 percent in 2011 of all trips off Puerto Rico. The west coast also accounts for the largest share of historical annual landings. From 1988 to 2016, the west coast represented approximately 39 percent of all landings by weight. The south coast ranked second with 28 percent of all landings, followed by the east coast with 20 percent and last the north coast with 14%.

*West Coast* - Puerto Rico's west coast has an insular shelf area that is greater than the shelf areas of the north and south coasts (Collazo and Calderón 1987, 1988), and has the largest fishing zone in the territory with over 30 fishing areas (Griffith et al. 2002). The commercial fisheries along Puerto Rico's west coast are the most productive and technologically advanced, and tend to generate from 30-50% of Puerto Rico's annual landings by weight.

Most of the vertical bottom line ("*cala*") fleet activity fishing for deep-water snapper-grouper takes place off the coast of Rincón (western Puerto Rico) and Cabo Rojo (southwestern Puerto

Rico) (Agar and Shivlani 2016; Keithly et al. 2013). Approximately 40-60 small-scale fishermen fish for these resources using hook and line gear, and traps, to a lesser extent. Species targeted are mostly silk snapper and queen snapper (Keithly et al. 2013). A small number of west coast fishermen target queen and cardinal snapper (Snapper Complex 2) in patchy, deep-water habitats influenced by dynamic oceanographic conditions. As a result, only a dedicated cohort of commercial fishermen maintains long-term participation and consistent success fishing for these deep-water stocks. Participant fishermen from Puerto Rico have been identified based on past licensing and landings data, and have been permitted by Puerto Rico's DNER to exclusively harvest queen and cardinal snapper from Puerto Rico's state waters (CFMC 2015). More information about this special permitting can be found in Section E below.

*South Coast* - The south coast, from Lajas to Guayama, is characterized by varied habitats from reefs to deep-water habitats that are fished for snappers, groupers, cero and king mackerels, tunas, barracuda, and billfishes (McClane 1974). Features that make the south coast more suitable for fishing operations include a larger insular shelf area, a somewhat less abrupt drop-off, the presence of a number of cays and sandy beaches that make the use of beach seines possible, and less exposure to storms, which is more conducive for the use of fish traps and pot. Most harvested reef fish species are yellowtail, mutton and lane snappers, porgy, parrotfish, hogfish and grunts. Deep-water species are also harvested (e.g., silk snapper) as well as pelagics such as dolphinfish and king mackerel, and baitfish such as ballyhoo and herring, with octopus also being very important. In La Parguera, historically a small fishing village in Lajas, Valdés-Pizzini and Schärer-Umpierre (2014) identified habitats and associated species recognized and fished by fishermen. Sea grasses and bedrock pavement with some hard and soft coral are fished for lobster, conch, yellowtail snappers, mutton snappers, grunts, and hogfish; coral reefs for snappers, lane snapper, red hind grouper, trunkfish, grunts, hogfish, parrotfish and octopus. The shelf drop-off is fished for dolphinfish, mackerels, groupers, deep-water snappers, yellowtail snapper, red hind grouper, blue runners, and jacks (Valdés-Pizzini and Schärer-Umpierre 2014).

*North Coast* - Matos-Caraballo and Agar (2008) discuss that because of the limited shelf, fishermen in the north coast fish in different locations, favoring the continental shelf (90%), the shelf break (84%), shore (67%), and, in deep waters (46%). In addition, because of the coastal topography offers little protection against heavy swells and rough seas, north coast fishermen favor the use of hook and lines, followed by net gears to a lesser extent, while SCUBA and traps are not that favored (Matos-Caraballo and Agar 2011a). In the north coast, reef fish are the most landed species, being yellowtail snapper, triggerfish, and parrotfish the most targeted, followed by deep-water snappers (silk and queen), pelagic species such as dolphinfish, king mackerel, and little tunny and target baitfish (herring, mullets, mojarras) (Matos-Caraballo and Agar (2011a).

*East Coast* - The east coast has the largest insular shelf size, and it represents 46% of Puerto Rico's insular shelf (Collazo and Calderón 1987, 1988). Depths of the waters along the east coast are less than 240 ft (73 m) throughout, which partially explains why the large majority of east coast commercial fishermen fish on the insular shelf: 94% in 2002 and 93% in 2008. The east coast features productive fishing grounds between Fajardo and Ceiba and the islands of Culebra and Vieques, where coral reef and deep-water habitats yield snappers, groupers, pelagic fish, lobster, and conch (Griffith et al. 2007), as well as wahoo and blue marlin (McClane 1974). This area also has a number of banks, islets, and cays (Jarvis 1932 in Matos-Caraballo and Agar 2011a). Because of the shallow shelf, fishermen can harvest multiple species with different gear types such as lines, traps, and SCUBA (Matos-Caraballo and Agar 2008). The most targeted species are the reef fish yellowtail, lane, and mutton snappers, hogfish, porgies, white grunt, and parrotfish (Matos-Caraballo and Agar 2011a). Deepwater snappers are also among the most targeted species, followed by coastal pelagics, spiny lobster, queen conch, and baitfish (Matos-Caraballo and Agar 2008).

Table 3.4.5 lists the percentage of landings for the deep-water snapper species cardinal, queen, silk, and blackfin snappers in Puerto Rico for select gear types, distinguishing between landings from the Puerto Rico EEZ, state waters, or unknown, which means no information was provided for harvest location (from all coasts combined). Deep-water buoy gear landings are included under the bottom line category.

**Table 3.4.5.** Percent of deep-water species landings by weight in Puerto Rico for select gear types reported per distance from shore (i.e., state waters, federal waters, and unknown).

| | | BOTTOM LINE | | | HAND LINE | | | LONG LINE | | | ROD AND REEL | | | FISH POT | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Species | State Waters | Federal Waters | Unk | State Waters | Federal Waters | Unk | State Waters | Federal Waters | Unk | State Waters | Federal Waters | Unk | State Waters | Federal Waters | Unk |
| 2012 | Snapper,cardinal | 25% | 27% | 48% | 34% | 9% | 57% | 90% | 0% | 10% | n/a | n/a | n/a | 54% | 0% | 46% |
| 2012 | Snapper,queen | 10% | 48% | 42% | 2% | 4% | 94% | 33% | 0% | 67% | n/a | n/a | n/a | 89% | 0% | 11% |
| 2012 | Snapper,blackfin | 7% | 28% | 66% | 12% | 0% | 88% | 0% | 100% | 0% | n/a | n/a | n/a | 24% | 20% | 56% |
| 2012 | Snapper,silk | 14% | 29% | 57% | 8% | 10% | 82% | 11% | 6% | 83% | n/a | n/a | n/a | 22% | 11% | 67% |
| 2013 | Snapper,cardinal | 56% | 17% | 28% | 53% | 0% | 47% | 73% | 27% | 0% | 100% | 0% | 0% | 100% | 0% | 0% |
| 2013 | Snapper,queen | 30% | 33% | 37% | 57% | 0% | 43% | 74% | 24% | 2% | 65% | 0% | 35% | 100% | 0% | 0% |
| 2013 | Snapper,blackfin | 34% | 38% | 28% | 72% | 22% | 7% | n/a | n/a | n/a | 35% | 0% | 65% | 77% | 10% | 13% |
| 2013 | Snapper,silk | 40% | 23% | 37% | 62% | 3% | 36% | 78% | 20% | 2% | 26% | 8% | 66% | 83% | 2% | 14% |
| 2014 | Snapper,cardinal | 53% | 36% | 11% | 87% | 0% | 13% | 100% | 0% | 0% | 100% | 0% | 0% | 0% | 0% | 100 % |
| 2014 | Snapper,queen | 19% | 60% | 21% | 62% | 31% | 7% | 79% | 13% | 8% | 62% | 0% | 38% | 64% | 36% | 0% |
| 2014 | Snapper,blackfin | 44% | 44% | 12% | 82% | 0% | 18% | 100% | 0% | 0% | 71% | 0% | 29% | 21% | 65% | 14% |
| 2014 | Snapper,silk | 47% | 35% | 19% | 30% | 8% | 62% | 78% | 11% | 11% | 43% | 9% | 48% | 81% | 7% | 12% |
| 2015 | Snapper,cardinal | 38% | 45% | 17% | 60% | 39% | 1% | 100% | 0% | 0% | 90% | 10% | 0% | 67% | 0% | 33% |
| 2015 | Snapper,queen | 23% | 53% | 24% | 29% | 64% | 7% | 98% | 0% | 2% | 20% | 80% | 0% | 100% | 0% | 0% |
| 2015 | Snapper,blackfin | 39% | 52% | 10% | 55% | 33% | 12% | 100% | 0% | 0% | 50% | 50% | 0% | 65% | 29% | 5% |
| 2015 | Snapper,silk | 39% | 35% | 26% | 47% | 25% | 28% | 91% | 1% | 7% | 79% | 18% | 3% | 86% | 6% | 8% |
| 2016 | Snapper,cardinal | 55% | 40% | 5% | 100% | 0% | 0% | 83% | 17% | 0% | n/a | n/a | n/a | n/a | n/a | n/a |
| 2016 | Snapper,queen | 40% | 52% | 8% | 84% | 6% | 10% | 84% | 16% | 0% | 100% | 0% | 0% | 56% | 44% | 0% |
| 2016 | Snapper,blackfin | 49% | 47% | 4% | 90% | 7% | 3% | n/a | n/a | n/a | 48% | 0% | 52% | 79% | 18% | 3% |
| 2016 | Snapper,silk | 50% | 44% | 7% | 62% | 14% | 24% | 97% | 3% | 0% | 71% | 19% | 9% | 86% | 9% | 5% |
| 2017 | Snapper,cardinal | 63% | 36% | 1% | 73% | 27% | 0% | n/a | n/a | n/a | 30% | 43% | 27% | 41% | 0% | 59% |
| 2017 | Snapper,queen | 51% | 48% | 2% | 52% | 37% | 11% | 57% | 43% | 0% | 56% | 31% | 12% | 100% | 0% | 0% |
| 2017 | Snapper,blackfin | 50% | 45% | 5% | 90% | 10% | 0% | n/a | n/a | n/a | 100% | 0% | 0% | 100% | 0% | 0% |

| Year | Species | BOTTOM LINE | | | HAND LINE | | | LONG LINE | | | ROD AND REEL | | | FISH POT | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | State Waters | Federal Waters | Unk | State Waters | Federal Waters | Unk | State Waters | Federal Waters | Unk | State Waters | Federal Waters | Unk | State Waters | Federal Waters | Unk |
| 2017 | Snapper,silk | 61% | 37% | 2% | 80% | 7% | 13% | 68% | 21% | 11% | 80% | 19% | 1% | 98% | 0% | 2% |
| 2018 | Snapper,cardinal | 56% | 43% | 1% | 61% | 36% | 3% | 100% | 0% | 0% | 12% | 73% | 15% | 100% | 0% | 0% |
| 2018 | Snapper,queen | 39% | 58% | 3% | 71% | 28% | 1% | 100% | 0% | 0% | 55% | 9% | 36% | 100% | 0% | 0% |
| 2018 | Snapper,blackfin | 62% | 37% | 1% | 46% | 51% | 3% | 100% | 0% | 0% | 100% | 0% | 0% | 100% | 0% | 0% |
| 2018 | Snapper,silk | 57% | 40% | 3% | 77% | 22% | 1% | 94% | 2% | 4% | 95% | 3% | 2% | 95% | 4% | 1% |
| 2019 | Snapper,cardinal | 40% | 56% | 4% | 95% | 5% | 0% | 100% | 0% | 0% | n/a | n/a | n/a | 0% | 0% | 100 % |
| 2019 | Snapper,queen | 36% | 61% | 2% | 78% | 19% | 3% | 86% | 0% | 14% | 66% | 15% | 18% | 61% | 0% | 39% |
| 2019 | Snapper,blackfin | 50% | 49% | 1% | 49% | 51% | 0% | n/a | n/a | n/a | n/a | n/a | n/a | 100% | 0% | 0% |
| 2019 | Snapper,silk | 51% | 46% | 2% | 79% | 16% | 5% | 67% | 8% | 25% | 77% | 12% | 11% | 92% | 3% | 5% |

### 3.4.2.2 U.S. Virgin Islands

**A. Characteristics of the Multi-hook Vertical Setlines/Deep-water Buoy Gear used in the USVI**

Multi-hook vertical setlines are used in the USVI, especially by St. Croix fishers to catch deep-water snapper and grouper along the insular shelf (Kojis et al. 2004). The gear type consists of a line that varies between 600 to 1,500 feet in length depending on the species fished, where each line is weighted with lead and has 25-30 hooks usually baited with squid. Circle hooks are commonly used to minimize the hooks catching on the bottom (Kojis et al. 2004). The buoy gear component of the USVI vertical setline used to fish for deep-water reef fish is known as deep-drop buoy gear. Olsen et al. (1974) provides a description of the vertical setline/deep drop buoy gear fishery, where multiple lines are often set from a boat using downriggers or buoyed and released. The gear is usually used while drift fishing because of the depth of the water and lines are pulled and redeployed one after another on a cycle. USVI fishers fish in short sets to minimize destruction of gear and loss of catch by sharks (Olsen et al. 1974), which is similar to the gear use by Puerto Rican fishermen. Several float lines may be set to fish a larger area until fish are located. Once fish are located, the fisher can concentrate on fishing several lines from the vessel. Chemical light sticks or battery-operated lights may be attached above the hooks as an attractor. Another version of the vertical setline is the use of 1" PVC pipe as a "tree" rig. Holes are drilled in the PVC pipe to accommodate hook leaders branching off the PVC pipe. The pipe is weighted at the bottom and buoyed with a small pressure float to keep the gear vertical in the water on the bottom. Vertical setlines may be fished from a boat and hauled to the surface with mechanical, hand crank reels or electric reels, or with hydraulic reels. During retrieval, the buoys can be unsnapped from the mainline and the line attached to the reel and reeled in (Olsen et al. 1974). Section 3.6.2 discusses specific information about the vertical setlines in the USVI.

Public testimony by USVI fishermen at Council meetings provided more recent information about buoy gear fishing in both St. Croix and St. Thomas and St. John (CFMC 174th Meeting, July 2021). In St. Croix, the buoy gear is not used year around, only when weather permits. Fishing activities also depend on lunar cycles. In St. Croix, the gear is used from 400 ft to 1,200 ft depth to fish principally for deep-water snappers and occasionally groupers. Gear configuration is similar to the buoy gear defined in federal regulations except for the number of hook used. The number of hooks used vary between 18-25 hooks per line (E. Schuster, St. Croix DAP Chair, 174th CFMC Meeting, July 2021). Distance from terminal end to hook is approximately 2 ft to avoid getting the hook snagged on rock or rubble bottom (C. Farchette, personal communication February 2021). The number of buoys used varies between 1-4 and the number used depends also on fish activity and avoidance of predators such as sharks. Some

fishers use light for fishing at deep-water areas. A typical fishing trip/day can be from 8 to 12 hours. Species used as bait include squid, small skipjack, and little tunny. Fish harvested are usually sold fresh and have high demand. The deep-drop buoy gear in St. Croix can be described as a "self-regulated fishery", which is very expensive to pursue and that requires experience (E. Schuster, St. Croix DAP Chair, 174th CFMC Meeting, 2021).

The deep-drop buoy gear fishery in St. Thomas/St/ John is smaller than in St. Croix due likely to the distance that fishermen need to travel to access deep-water snapper fishing grounds in the north and south of St. Thomas ( i.e., 20 miles to the north drop, 10 miles to the south drop) (J. Magras, St. Thomas/St. John DAP Chair, CFMC 174th Meeting, July 2021). Fishing is conducted by a few fishermen when weather is calm to fish for deep-water snappers and groupers principally from 250 to 350 feet deep. The number of hooks used can be up to 20 per line, but 10 hooks is the most common number used. Four sets of buoys are usually deployed. The fish harvested with this gear type is sold fresh as there is high demand for the small quantities sold (J. Magras, St. Thomas/St/ John DAP Chair, 174th CFMC Meeting, July 2021).

**B. Species Targeted with Deep-water Buoy Gear, and Habitats and Depths fished**

Commercial fishermen in St. Croix target a wide variety of species, usually depending on which fish or shellfish are easier to sell or generate the greatest amount of revenue. Reef fish (all gear types) are targeted by more than 80% of the fishermen, which includes several species in the grouper, snapper, triggerfish, parrotfish, grunt, wrasse, surgeonfish, and squirrelfish families (Kojis et al. 2017). Close to half of the fishermen surveyed by Kojis et al. (2017) also reported that they target spiny lobster and coastal pelagic species such as jacks and mackerels (All gear types). Fishers also reported targeting dolphinfish, wahoo, and deep-water snappers (all gear types) (CFMC 2019b, c). Commercial fishermen in St. Croix target blackfin, silk, black, queen, and cardinal snappers, with some groupers and sharks as incidental catch (CFMC 174th Meeting, 2021).

Species harvested with buoy gear in St. Thomas and St. John include silk snapper, blackfin snapper, misty grouper, wenchman, queen snapper, and other non-specified species.

**C. Commercial Fishers Participating in the USVI Deep-water Buoy Gear Component of the Reef Fish Fishery**

In a census of USVI commercial fishers, Kojis et al. 2017 noted that more fishers on St. Croix than on St. Thomas and St. John (Table 3.4.2) owned multi-hook gear. The species caught with this gear, deep-water snapper and grouper, are much more commonly fished on St. Croix than on St. Thomas and St. John. In the 2004 commercial fishers census, only one fisher from St.

Thomas/St. John reported owning this gear while 45 St. Croix fishers owned the gear (Kojis 2004). Kojis et al. (2017) further adds that in 2010, 2011, and 2016, three fishers in St. Thomas/St. John, while in St. Croix 26 fishers reported owning this gear in 2010-11 and 42 in 2016. Recent information provided at the 174th Council meeting discuss that in actuality the number of fishers using buoy gear is approximately 12, while in St. Thomas, the deep-drop buoy gear fishery is very small, with 2-4 fishermen currently pursuing this fishery.

**D. Fishing Areas**

The St. Thomas/St. John FMP and the St. Croix FMP provide an in-depth description of the fishing areas pursued in the respective islands coasts. In addition, the USVI Commercial fisher census from 2016 (Kojis et al. 2017) provides more details, which are summarized below in addition to more recent information.

The 2017 commercial fishers survey (Kojis et al. (2017) discuss that most fishing in USVI occurred in territorial waters (<3 nm from shore) followed by fishing in both territorial and federal waters (>3 nm to 200 nm from shore), and that 10.2% of the fishers surveyed fished exclusively in federal waters. The number and percentage of fishers that fish primarily in territorial waters of St. Croix is more than in St. Thomas/St. John. The authors note that this may be attributed to the narrower St. Croix shelf, excluding part of Lang Bank to the west) that lies in territorial waters. Kojis et al. (2017) further discuss that the shelf edge drops off precipitously to depths of >1,000 ft. and that Lang Bank's more hazardous sea condition, often deter fishers fishing in small boats from accessing the bank, particularly deeper areas that are in federal waters. In contrast, because the shelf on St. Thomas and St. John is wider, primary fishing grounds lie in federal waters (Kojis et al. 2017). Fishers fishing with vertical setline in St. Croix tend to target areas to the south of and along Lang Bank. While those that fish with vertical setline in St. Thomas/St. John fish in the north and south drops.

### 3.4.2.3 Licenses, Permits and Fees for the Harvest of Reef Fish (including deep-water reef fish)

Fishing vessel permits are not required to commercially harvest any Council-managed species in federal waters of the U.S. Caribbean (CFMC 2013c). Also, there are no federal licenses or permits required for the recreational harvest of reef fish, queen conch, spiny lobster, or aquarium trade species in the EEZ of the U.S. Caribbean. Efforts are underway to evaluate the development of a federal permit system in federal waters. In addition, there are Highly Migratory Species (HMS) permit requirements that apply to the commercial and the recreational sectors fishing in the U.S. Caribbean EEZ. In Puerto Rico Commonwealth waters, a commercial fishing license is required for all commercial fishermen including for full-time resident and non-

resident fishermen, part-time fishermen, beginners fishermen, ornamental fisheries, and owners of rental boats including party/headboat and charter boats. As an obligation of the harvest permit, commercial fishermen are required to submit monthly catch reports to the Puerto Rico DNER. Additional commercial permits are required for the harvest of spiny lobster, queen conch, common land crab, incidental catch, and sirajo goby (i.e., cetí) fisheries.

*Limited Entry Program for the Harvest of Deep-Water Snappers in Puerto Rico Commonwealth Waters*

Puerto Rico's DNER Administrative Order 2013-11 (DNER 2013) was implemented in August 14, 2013 to regulate the harvest of queen snapper (Etelis oculatus, (in Spanish, "cartucho") and the cardinal snapper (*Pristipomoides macrophthalmus* [in Spanish, muniama de afuera]) (Snapper Complex 2) and to grant special permission to those commercial fishermen dedicated to the capture of these species, while closing harvest to these resources to the rest of the commercial and recreational fishermen. This special permit was implemented to manage the number of fishermen accessing the Snapper Complex 2 and to thereby reduce the likelihood of overfishing the resource. The special permits were awarded to commercial fishermen that had a full-time or part-time commercial fishing license and could show evidence, through historical landings (i.e., harvest of these two species during at least five years and reported annual captures of over 500 pounds), that they targeted these two species (CFMC 2015). The special permit limits fishing trips per fisher to a maximum of 120 trips per year for the harvest of these two species. Fishers can only fish from vessels registered to fish commercially in Puerto Rico. As of Dec 2020, there were approximately 60 fishers permitted. This has also been the approximate number of permitted fishers in other years.

*USVI Territorial Waters*

The USVI requires commercial fishing licenses for (1) all commercial fishermen, (2) any person who uses a pot, trap, set-net, or haul seine, (3) any person who sells, trades, or barters any part of their catch (including charter boat operators who sell or trade their catch), and (4) commercial fishing helpers who must obtain a helper's permit to assist a licensed commercial fisher (the licensed commercial fisher must be onboard when the helper is fishing) (See USVI Handbook). USVI commercial fishermen are required to report their catch (all species) and effort for every trip (CFMC 2011a). Commercial Catch Report (CCR) forms must be submitted to the DPNR on a monthly basis, within two weeks after every fishing trip or within two weeks after the close of the month if no fishing took place (DPNR 2019). Commercial fishing licenses are only issued to U.S. citizens who are permanent residents of the USVI for at least one year. On August 24, 2001, the DPNR implemented a moratorium on issuance of new commercial fishing licenses, which remains in effect. License renewals are only issued to fishermen who have held a

commercial fishing license within three years of June 2001 and have complied with catch reporting requirements.

## 3.5 Economic Environment

### 3.5.1 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[5].

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).[6]

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

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

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.

### 3.5.2 Puerto Rico

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 as shown in Figure 3.5.1. Note that the unemployment rate in 2020 was substantially lower than it had been from 2012 through 2016, when it was never below 11.8% (U.S. Department of Labor [USDOL] Bureau of Labor Statistics [BLS]).

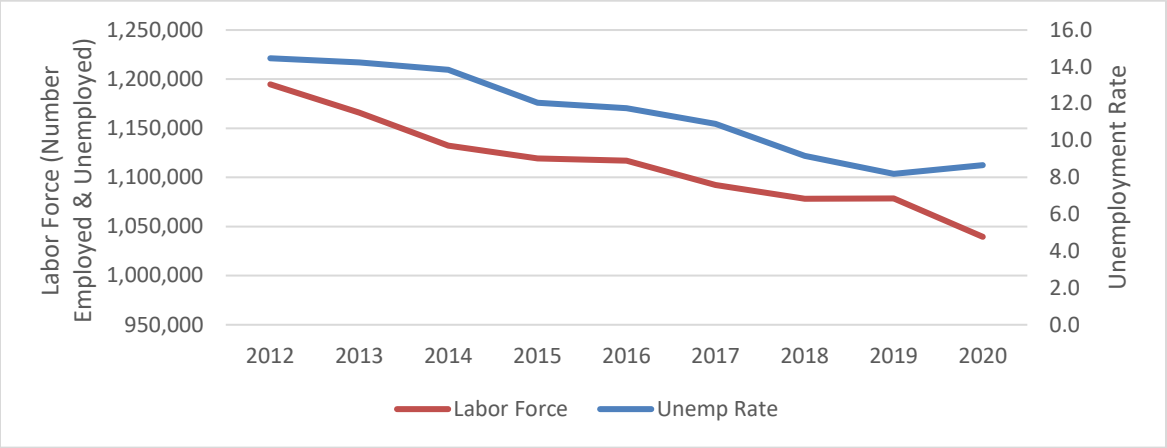


**Figure 3.5.1.** Labor force and unemployment rate in Puerto Rico, 2012 – 2020.
(Source: USDOL BLS)

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 3.5.1).

**Table 3.5.1**. 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 3.5.2), 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 3.5.3). The World Bank has not yet reported a 2020 estimate of GNI per capita.

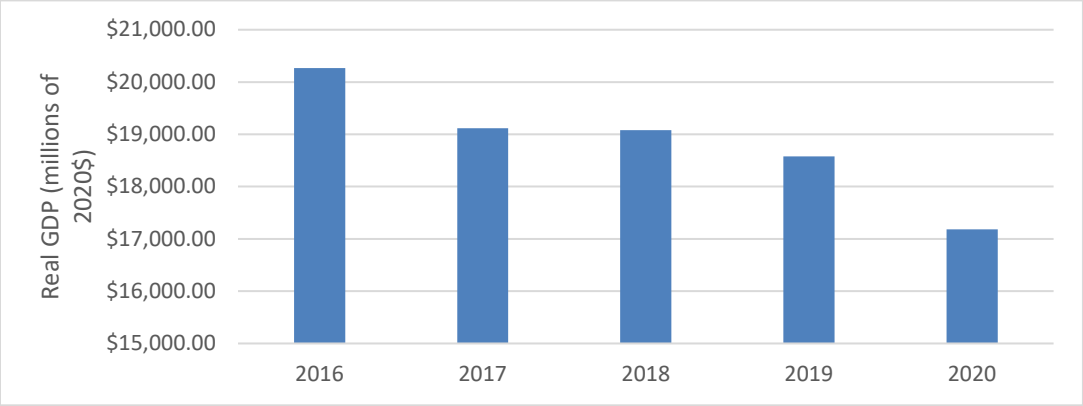


**Figure 3.5.2**. Puerto Rico real GDP (constant 2020 U.S. dollars), 2016 – 2020.
(Source: World Bank for GDP 2016 – 2019, Knoema for GDP for 2020, and BEA for implicit price deflator)

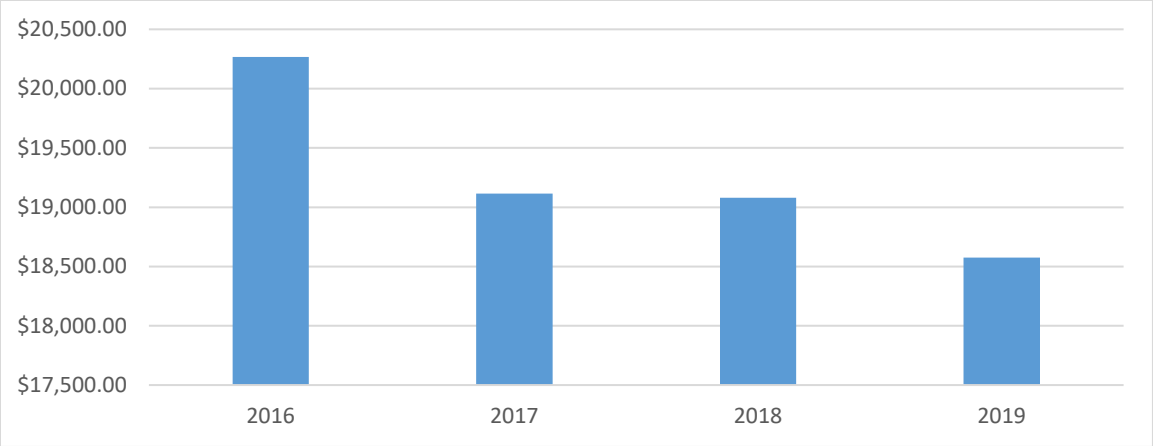


**Figure 3.5.3**. Puerto Rico's GNI per capita (constant 2020 U.S. dollars), 2016 – 2019. (Source: World Bank for GNI per capita and BEA for implicit price deflator)

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. In addition, 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.

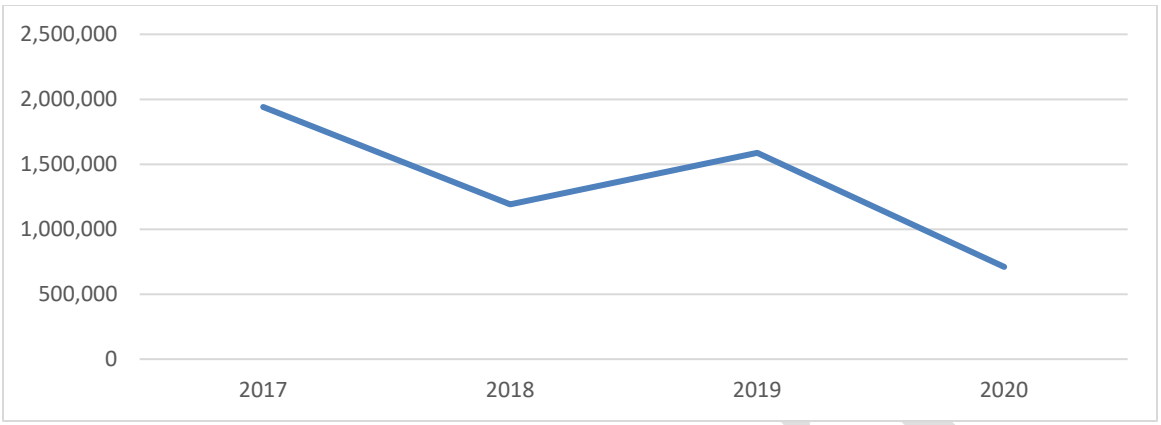


**Figure 3.5.4**. Arrival guests through August of each year, 2017 – 2020.
(Source: Puerto Rico Tourism Company, Registrations and Occupancy Report)

The labor force continues to shrink as shown in Figure 3.5.5. Note that there are no data for the size of the labor force in March or April 2020.

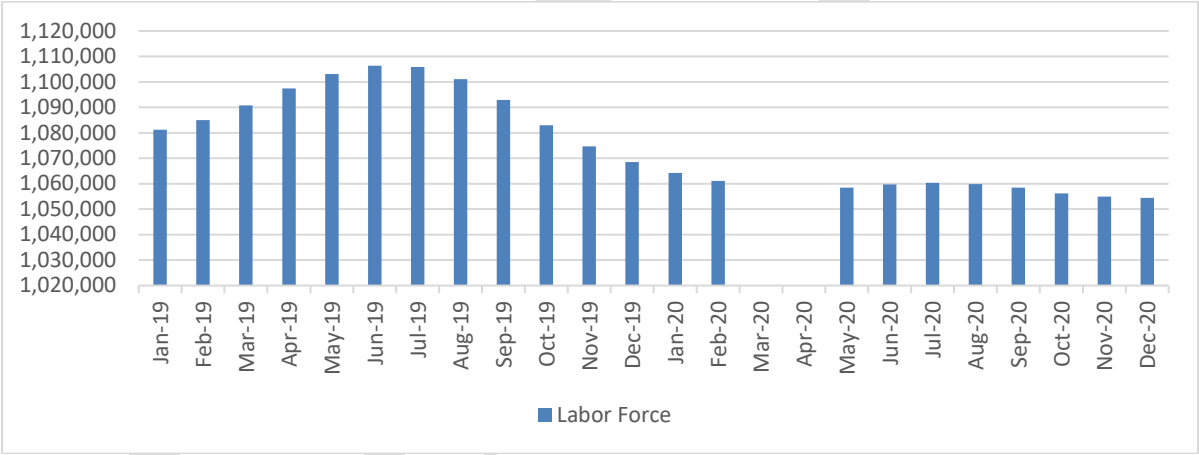


**Figure 3.5.5**. Monthly labor force, January 2019 – December 2020.
(Source: USDOL BLS)

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.

### 3.5.3 St. Croix and St. Thomas and St. John

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 3.5.6, 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 3.5.7.

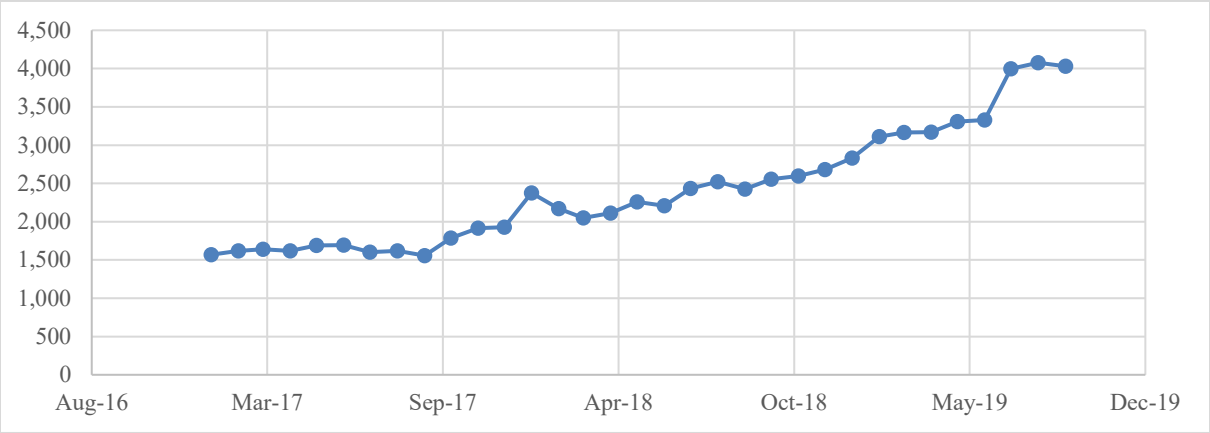


**Figure 3.5.6**. Construction jobs in USVI, January 2017 – September 2019.

(Source: USVI DOL, Labor Market Basket)

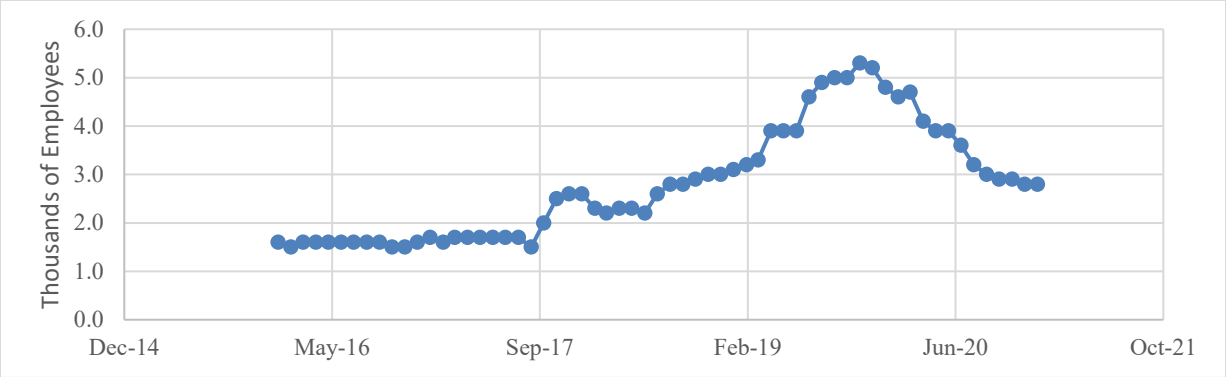


**Figure 3.5.7**. Employees in construction, mining and logging sector in USVI, January 2016 to January 2021.
(Source: U.S. BLS)

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.[7] 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

[7] 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.

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. 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 3.5.8). Employment in the manufacturing sector was not similarly affected, and it rose from 0.6 thousand (566) employees in August 2017 to 0.8 thousand (760) in August 2019 and has stayed relatively constant since then despite the pandemic.

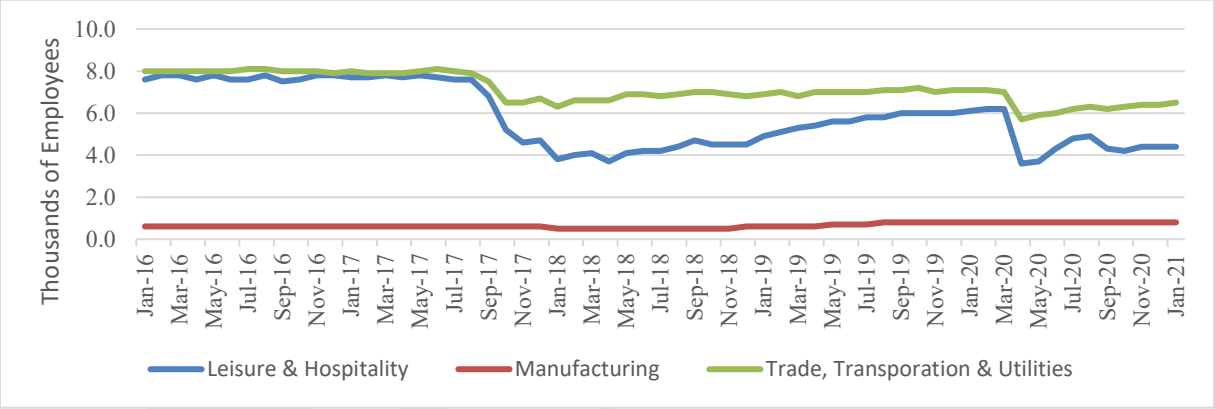


**Figure 3.5.8**. Employees in the leisure and hospitality, manufacturing, and trade, transportation and utilities sectors in USVI, January 2016 to January 2021.
(Source: U.S. BLS)

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[8] (Figure 3.5.9).

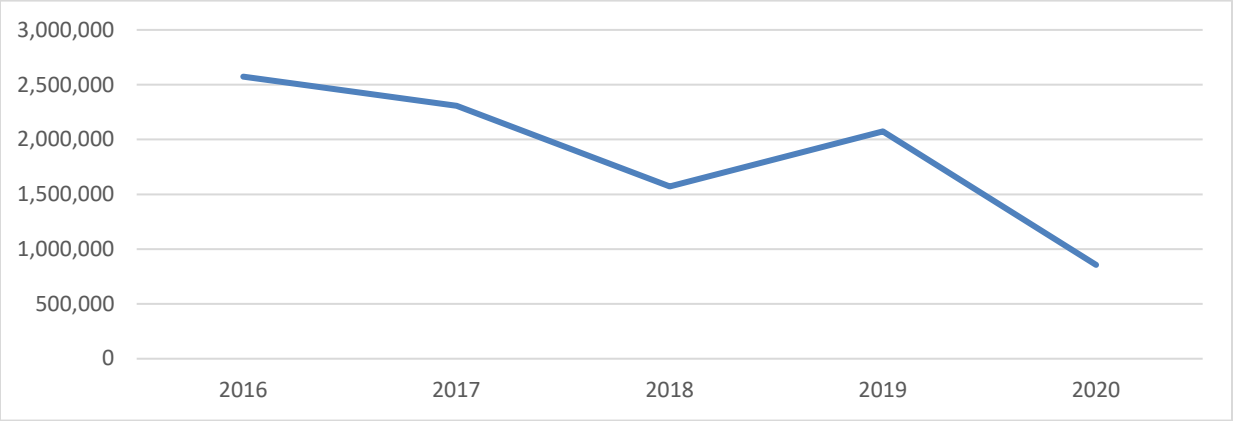


**Figure 3.5.9**. Total USVI visitor arrivals, 2016 – 2020.
(Source: USVI BER)

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 3.5.10).

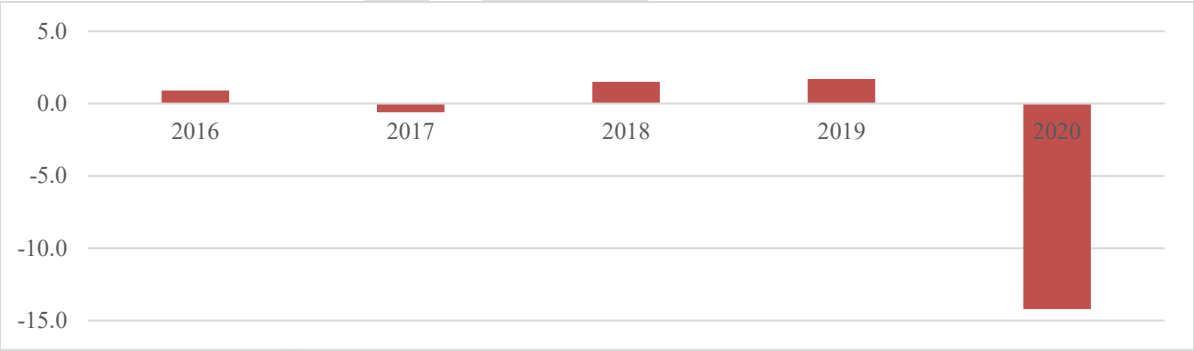


**Figure 3.5.10**. Annual change in real GDP, 2016 – 2020.
(Source: USVI BER, November 2020)

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

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 3.5.11).

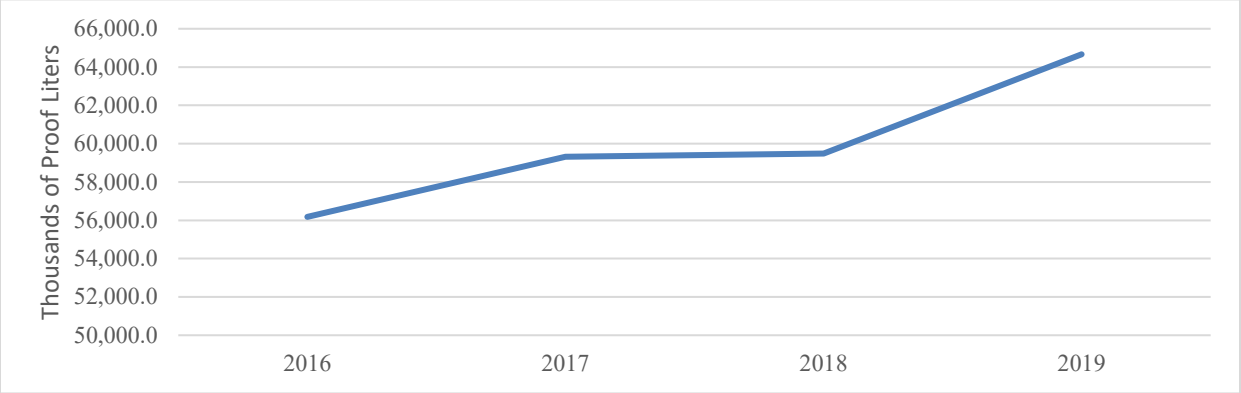


**Figure 3.5.11**. Annual change in rum exports to U.S.
(Source: USVI BER, Annual Economic Indicators, May 20, 2020)

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%.[9] Although the 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).

## 3.6 Description of the Social Environment

This section describes key dimensions of the social and cultural environments potentially affected by modification of the island-based FMPs to accommodate traditional use of buoy gear for capturing deep-water snappers and related species around Puerto Rico and the USVI. Links to original source materials are provided wherever possible in the cited references section, and interested readers are referred to the Caribbean FMPs for a wide variety of materials of relevance to the regulatory topic of interest.

### 3.6.1 Puerto Rico

Use of living marine resources has long been an important aspect of life on the islands in what is now called Puerto Rico. Rivera-Collazo (2011) describes Angostura on the north coast of Puerto Rico where settlers were living some 4,650 years ago. Today, a distinct and complex island society and culture are clearly apparent in Puerto Rico, with cultural traditions extending to many other parts of the world and back (Duany 2002; Reichard 2020). The estimated 2017 total population of residents on the islands of Puerto Rico was 3,449,000 persons in 2017, 99% of whom identify as Hispanic (Kaiser Family Foundation 2017). Although fishing activities are

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

undertaken by a small percentage of island residents, they are vital to local fishing families and communities, and provide an important source of food to residents and visitors alike.

#### 3.6.1.1 Commercial/Artisanal Fishing and Social Aspects of Fishing in Puerto Rico

Puerto Rico is a 3,515 square-mile archipelago of mostly small cays, islets, and coral reef ecosystems. Fisheries are conducted especially around the main island and also Vieques, Culebra, and banks near Mona and Desecheo islands (Agar et al. 2020). The most productive fish habitats, and most fishing activities, occur within the 100-fathom contour since the seabed drops off quickly beyond this point. The west coast of Puerto Rico is said to be the most productive fishing zone since the shelf is shallow here and extends far out to sea.

Puerto Rico fisheries are primarily artisanal in nature, with harvesters using small vessels, few crewmembers, and multiple types of gear. As stated by Agar and Shivlani (2017), "a captain and a deckhand (known as proel) run most fishing operations." Ecosystem and fishing knowledge are essential to success. As might be expected of an artisanal-type fishery, revenue tends to be limited. But this is not the sole measure of success, since most participants combine sale of seafood with consumption and sharing in extended family and community settings (Valle-Esquivel et al. 2011). Opportunities for expansion of commercial operations are limited since there is little in terms of an export market. This does not indicate isolation; however, since off-island supply chains provide engines, fuel, oil, gear, and other materials to local fleets.

Many harvesters work on the ocean on an occasional or part-time basis, often earning additional income through construction or similar part-time or opportunity-based work (Griffith and Valdés-Pizzini 2002; Griffith et al. 2007). The benefits of this strategy are particularly important to the overall household economy and when fish are absent or vessels or engines are not functioning.

Commercial pursuit of deep-water snappers and related species is extensive on the west coast of Puerto Rico, though it certainly occurs elsewhere. Trap fishing is common throughout, and pelagic fishing is a mainstay for many operations. Capture, sale, and/or consumption of spiny lobster and queen conch are also important. Typical gears include trolled and static hook and line; lobster and fish traps; beach seines, gill, cast, and trammel nets; slings and spears; hand lines; and various longline and bottom gear (Valle-Esquivel et al. 2011). Pelagic species are important to many. Guided offshore fishing very typically involves trolling for pelagic species with hook and line gear, and also some static hook and line fishing for deep-water snappers and similar species. Certain captains are involved in both the commercial and charter fishing sectors.

Gear traditionally used by commercial harvesters around Puerto Rico includes *cala con boya*. This vertical longline, multi-hook configuration is used to land various snapper species in deep water with strong currents and rough bottom conditions. Olsen et al. (1974) suggests the gear may have been relatively new in the Virgin Islands during the early 1970s, though its use in Puerto Rico may well be older.

With regard to the scope of relevant fishing activity around Puerto Rico, the most recent data regarding the number of resident commercial seafood harvesters indicate that 1,074 licensed harvesters were living in Puerto Rico in 2016, increasing to 1,275 in 2018. The latter number likely reflects purchase but not necessarily immediate use of fishing licenses when other forms of work diminished after Hurricane Maria in 2017. Some 714 harvesters are thought to have been actively fishing soon after the hurricane (pers. comm., Puerto Rico Department of Environment and Natural Resources 2019).

Matos-Caraballo and Agar (2011a; 2011b) report that commercial fishing is well distributed around Puerto Rico, with active harvesters residing in 39 coastal municipalities. While trailers and boat ramps are increasingly used as various moorings and harbors are lost to development (Griffith et al. 2013), Matos-Caraballo and Agar (2011b) determined that about 92% of fishermen land their catch in their home municipalities. This attachment to place indicates the importance of fisheries-related social life in communities, neighborhoods, and extended family settings around Puerto Rico. Approximately 34% of licensed harvesters were living on the west coast of the island during the late 2000s (mainly in Cabo Rojo, Rincón, Mayagüez, and Aguadilla), 27% on the south coast (primarily in Lajas, Salinas, Guánica, and Ponce), roughly 20% on the north coast (San Juan and Arecibo), and another 20% on the east coast (Vieques, Fajardo, and Naguabo). The typical commercial harvester was then 49 years old, had at least a high school diploma, and 29 years of fishing experience (Matos-Caraballo and Agar 2011b).

Commercial fishing in Puerto Rico typically involves multiple family members. Griffith et al. (2007) determined that over 40% of local fishing households earned all income through fishing, and Matos-Caraballo and Agar (2011c) found that 84% earned more than half of the annual household income through fishing. Women are known to fish commercially around Puerto Rico, but males are most typically involved, with many women supporting the overall household economy (Griffith and Valdés-Pizzini 2002).

Numerous factors influence the nature of artisanal fisheries in Puerto Rico. The north, west, and east sides are particularly vulnerable to major swell events occurring during winter, with all sides exposed to tropical storm swells, winds, and waves. Steep mountains affect local sea states, as do regional trade winds. These and other environmental factors have a bearing on when, for how long, how, and with what intensity fishing activities can occur. The presence, location,

movement, and prey-related behavior of marketable fish naturally also affect fishing effort and investment of time and money in the operation. Decisions about where and when to fish are also influenced by the condition of vessel and gear, the availability and skill-level of crew members, the ability of harvesters to persist as they age, and many other social and economic factors.

For participants in commercial fisheries around Puerto Rico, the relationship between fishing effort, market demand, and pricing is profound. Many harvesters market their own catch in community settings. Some also sell to buyers from local retail establishments and/or restaurants, and other businesses located elsewhere on the island. In Puerto Rico, the relationship between seafood harvesters and those who buy their products is a social process with human relationships at the core. Community-level research conducted with fishermen during the mid- and late-2000s indicates places where fisheries are particularly important organizing features of local society, culture, and economy. Griffith et al. (2007) identified communities with extensive dependence on fishing and related economic activities, including neighborhoods in Fajardo (Maternillo, Mansión del Sapo, and Puerto Real); La Estrella in Rincón; Pozuelo in Guayama; Punta Santiago in Humacao; La Playa in Ponce; Puerto Real in Cabo Rojo; and La Parguera in Lajas.

As noted by Griffith and Valdés-Pizzini (2002), and Griffith et al. (2007), villas pesqueras are an important social aspect of commercial/artisanal fishing in Puerto Rico, functioning much like fishing cooperatives and facilities for fishing- and seafood-related social interaction. Villas pesqueras were initiated as a fisheries development strategy in the 1960s and are now typical throughout the island's coastal towns and cities (Griffith et al. 2007). The Puerto Rico Department of Agriculture typically subsidizes infrastructure needed for mooring, launching, gear storage, sale of seafood, and other services, though some villas pesqueras are owned and maintained privately or by local fishing associations (Griffith et al. 2007).

Fishing and seafood are particularly important in certain family and community settings around Puerto Rico. Some islanders inherit the fishing way of life; others grow to base their lives around fishing, with all who persist eventually gaining knowledge of the ocean, atmosphere, and marine resources. Such knowledge can generate respect in certain communities, and the seafood itself is folded into old and evolving recipes for festivals and daily meals, and onto many plates, palates, hearts, and minds. Such cultural topics are addressed in Griffith and Pizzini (2002), who discuss the lives of fishermen and their families around Puerto Rico.

**Large-Scale Change: The Hurricane Season of 2017**

The hurricane season of 2017 was particularly active and damaging in the Atlantic Basin, where 17 named storms, 10 hurricanes, and six major hurricanes developed. Following initial damage from Hurricane Irma, Hurricane Maria devastated Puerto Rico as a high-end Category 4 storm

with peak winds of 155 mph. Maria lingered over the island for 30 hours, generating storm surge, severe flooding, landslides, massive agriculture impacts, widespread infrastructure damage, and extensive loss of life (NOAA 2017; Milken Institute School of Public Health 2018; Coto 2020; Chan et al. 2018).

With regard to impacts on island fisheries, it should be kept in mind that economic conditions were challenging for participants even before the hurricanes of 2017. Rates of household poverty continue to be extraordinarily high in Puerto Rico, consistently exceeding 43% since 2005. In 2018, the household poverty rate was 43.1%—more than double the rate for Mississippi, which has the highest rate of poverty of all states in the nation. In comparison, the national rate of household poverty was 13.1% in 2018 (U.S. Census Bureau 2018). Estimated median household income in Puerto Rico was $20,078 in 2015 and $57,617 for households in the 50 states. At 10%, the seasonally adjusted unemployment rate in Puerto Rico was twice the average across all states and D.C. (Guzman 2017; Kaiser Family Foundation 2017a).

The pre-existing poverty problem was majorly compounded by the 2017 hurricane season. Poverty must be considered in social context, which in Puerto Rico often involves the pooling of resources in extended family and community settings. But the relative lack of money in the average Puerto Rico household, coupled with fiscal deficit problems on the part of government (U.S. Government Accountability Office 2018), leaves island residents highly vulnerable to tropical storms and other disasters that generate economic shock and long-term social impacts. After Maria, the situation led many families to meet basic needs in urbanized areas on the island (Acosta et al. 2020), and also to massive out-migration, with some 133,500 residents departing in 2018—a 36.9% increase above the rate for the prior year (Glassman 2019). The storm caused major life trauma for many, with problems that are likely to linger for many years. Pasch et al. (2017:7) estimate physical damages caused by Hurricane Maria at $90.0 billion, indicating a long recovery period.

**Fishery-Specific Socioeconomic Effects of Hurricane Maria in Puerto Rico**

Given the strength of Hurricane Maria at landfall, many vessels were lost, harbors and moorings were damaged, essential supply chains were disrupted, and basic services were absent for many months. Lack of power and communications severely constrained fishing operations (Agar et al. 2020). In some cases, fishery participants and/or their family members were injured or lost their lives. Agar et al. (2020) conducted a socioeconomic assessment of Maria's impacts during the first year of the event. The work involved 664 in-person interviews or 78.3% of commercial harvesters thought to be active following Maria. The resulting data are useful both for understanding contemporary fishing around Puerto Rico, and for gauging hurricane impacts. Key characteristics of fishing operations maintained by harvesters involved in the study include:

(a) a mean age of 52.7 years; (b) extensive reliance on fishing revenue, which accounts for 58.6% of household income on average (71.8% on the west coast); (c) an average of 3.6 fishing trips per week, with a range of 3.8 trips/week on the south coast to 4.1 trips/week on the west coast; (d) 33.1 fishing hours per week on average, with a range of 40.5 hours on the east coast to 26.3 hours on the west; (e) average vessel length of ~20 feet using ~100 hp engines on average; and (g) vessels and gear valued at $18,123 on average, with a range of $11,063 on the south coast to $22,117 on the north (Agar et al. 2020:383).

Impacts from Maria were particularly difficult for harvesters who rely on certain types of gear, and for those based on the heavily impacted east and north coastlines. Agar et al. (2020:378) write that "Maria caused [overall] commercial landings to fall by 20%, owing to the loss of productive assets, extended power outages, and the loss of customers. While most fishing resumed when electric service was restored, losses totaled $17.8 million, with damages to vessel, engine, gear, and shore side infrastructure accounting for more than half of the losses and foregone revenue the remaining 49%. The east coast was hardest hit, as were fishermen who use traps, handlines, and commercial diving equipment (Agar et al. 2020:378). Citing landings information from the National Marine Fisheries Service (2019), Agar et al. (2020:386) state that 75% of revenue losses were concentrated on six species: queen conch (27%), yellowtail snapper (15%), spiny lobster (14%), lane snapper (7%), dolphinfish (6%) and queen snapper (6%). Around 6,700 traps were lost during the storm. Agar et al. (2020:386) also report that 165 or 16.3% of commercial fishermen active in 2016 departed the industry after the hurricane. The majority of participants did not significantly alter their operations, however, with the exception of those forced to use alternative launch sites or avoid places where habitat had been damaged by the storm. Recovery continues—now in the context of the first pandemic in over 100 years.

**The COVID-19 Pandemic and Fishery Impacts in Puerto Rico**

The ongoing pandemic continues to challenge the nation's marine fisheries and seafood industries. NOAA Fisheries (2021) provides specific understanding of initial pandemic effects in each fishery management region around the country, including Puerto Rico, where NMFS social scientists conducted interviews with 318 commercial fishermen during late summer of 2020. Among key findings, 96% of respondents reported that the pandemic had indeed affected fishing operations during its first six months in the U.S. Roughly, 87% reported reduced revenue, with decline of 65% on average. When asked about pandemic-related factors that hurt their fishing operations most, 79% reported a lack of markets or buyers, 71% reported the effects of state and local government restrictions, and 48% reported health safety measures. About 94% stopped fishing for some time during the first half of 2020, with 33% stopping for more than 3 months. Pandemic impacts during this period typically included a reduced number of trips, a lack of available markets, and difficulty obtaining supplies (NOAA Fisheries 2021).

A modified version of NOAA Fisheries survey was implemented with 47 seafood dealers around Puerto Rico, 93% of whom reported reduced revenue, with an average decrease of 56%. About 43% of affected businesses reported a loss of employees, and 56% decrease in revenue on average. When asked to identify the top three COVID-19 related factors that had impacted their businesses during its initial months in the U.S., 87% chose state and local market restrictions, 77% chose loss of marketing potential, and 70% chose implementation of health safety measures. About 87% of affected businesses were closed for at least some period during the first half of 2020. Reduced sales to restaurants and stores affected 94% of respondents, and diminished availability of seafood products affected 81% of respondents (NOAA Fisheries 2021)

### 3.6.2 St. Croix, St. Thomas, and St. John

For centuries now, persons of African, West Indian, French, and Danish descent have worked and lived in small communities scattered throughout the steep, rocky islands of St. Thomas and St. John and the larger, flatter island of St. Croix (Rogozinski 1994:82; Olwig 1993: 37). In conjunction with other occupations, especially small-scale farming, many early settlers became productive and efficient harvesters of seafood. A thorough review of pertinent historical aspects of fishing and subsistence living on St. Thomas and St. John is provided in IAI (2006, 2007). Governments, firms, and individuals from the U.S. eventually arrived in the islands, largely in pursuit of broad political and economic interests. The U.S. government purchased the islands from the Danish in 1917, just prior to World War I (Austin 2020). As described by Austin (2020: 3), mainland and local policymakers "eventually created a robust manufacturing sector in the U.S. Virgin Islands after World War II. But manufacturing has struggled in the 21st century." The 2012 closing of the Hess HOVENSA refinery on St. Croix was particularly detrimental to the region's economy, as it led to the loss of 2,000 jobs. Tourism and related services have increasingly come to dominate the economies of all the U.S. Virgin Islands.

Of significance in relation to the impacts of the 2017 hurricane season, St. Croix has long been the principal point of manufacturing and agricultural production in the USVI. The vast majority (~95%) of farmed acres, and some 75% of farms in the USVI were located on St. Croix in recent years. The effects of Hurricane Maria on the St. Croix landscape and public and privately owned infrastructure were profound, and recovery continues as it does on St. Thomas and St. John.

The estimated combined population of the U.S. Virgin Islands was 107,268 in 2017 (U.S. Census Bureau 2016). Levels of poverty are significantly higher in the USVI than elsewhere in the U.S., reaching 22% in the island during 2017, as compared to 14% on the continent (U.S. Census Bureau 2016). The unemployment rate was 13% in the USVI and 5% on the mainland in 2017,

with median household income estimated at $37,254 in the islands and $57,617 on the continent that year (Kaiser Family Foundation 2017b).

#### 3.6.2.1 Social and Cultural Aspects of Fishing on St. Thomas, St. John, and St. Croix

Fishing in the USVI has long been artisanal in nature. This was the case in the 1930s, when, as noted by IAI (2006:11) "some 400 fishermen were active in the islands, most of whom rowed or sailed small vessels to the fishing grounds." Fish traps and handlines were most commonly used at that time, and fishing was typically combined with small-scale farming. The growth of island populations, industries, and infrastructure was heavily influenced by increasing rates of leisure tourism during the 20th century (IAI 2006).

With specific regard to fishing activities on St. Thomas, St. John, and St. Croix, demand for seafood expanded late in the 20th century in conjunction with the increasing number of visitors, restaurants, and tourist destinations. At the same time, local fishing-oriented families were increasingly able to supplement ocean-derived income with that from part-time or periodic work arrangements that complemented the shifting nature of ocean conditions and the availability of marine resources. Individuals in some fishing-oriented families now hold high-paying positions in firms and institutions around the islands, and in some cases on the continent, benefiting the household, extended family, and those who continue to be engaged in local fisheries.

It is notable that large-scale economic change has in some ways enhanced the evolution of island culture, including cultural aspects of fishing. For instance, various technological advancements have, in the last 20 years, radically improved communication options and speed of contact between fishermen. Information of all kinds, such as the presence of bait or fish in a given location, pending weather conditions, and shifting market conditions are now immediately available to all with a cell phone. Local employment options and new technologies have helped enable the continuation of a traditional lifestyle that emphasizes fishing, strong social relationships between local families, and various cultural traditions in the island's fishing-oriented communities.

The concept of community can be defined in terms of networks of people who regularly interact to undertake fishing-related activities at sea or on land. This holds true for St. Croix, where Valdez-Pizzini et al. (2010) identified groups of fishermen and families connected by commercial fishing and associated activities. Fishing communities can also be envisioned in terms of places where overall involvement in and dependence on marine fisheries is particularly extensive (Colburn et al. 2016; Jepson and Colburn 2013; Jepson 2008). Island districts, and even whole islands, have been examined and considered in this way. For example, Stoffle et al. (2009) envision the island of St. Croix as a fishing community in and of itself. Fishing activities

in the USVI may also be seen as occurring extensively in specific parts of the islands. IAI (2006) identifies places where fishing-oriented families exhibit strong attachment to neighborhood and island districts, including the Northside, East End, and Southside districts of St. Thomas, and the East and West End districts of St. John.

**Contemporary Commercial/Artisanal Fisheries on St. Thomas, St. John, and St. Croix**
Many species of reef fish, the snapper/grouper complex of species, and various pelagic species, have long been of primary interest to commercial fishery participants in the USVI. Spiny lobster, whelks, conchs, and other shellfish are also important here. Fisheries as a whole continue to be essential sources of employment, food, and income in the islands, with commercial/artisanal participants landing an average of 1.4 million pounds of seafood worth $7.4 million each year between 2005 and 2015 (NOAA Fisheries 2017).

The recent work of Kojis (2017) describes the region's fisheries in detail, providing extensive information about the nature and extent of participation, use of various fishing gears, demographic aspects of participants, and other important information. Some 260 commercial fishery participants were identified in the USVI in 2016, with 119 residing on St. Thomas and St. John, and 141 on St. Croix. Fishing fleets and activities around the USVI are small-scale in nature, with the majority of harvesters regularly working less than three miles from shore. Labor is extensive, and many fishermen rely on their own knowledge and skills on the water and to fabricate and repair gear, maintain vessels and engines, and market their landings. Kojis et al. (2017) found that commercial fishery participants spend an average of 34.2 hours/week in the conduct of fishing-related activities, with little variation across the islands. As summarized in the table below, Kojis et al. (2017) provide useful insight into the nature of contemporary commercial/artisanal fishing and fishery participants around the USVI.

**Table 3.6.1.** Contemporary socioeconomic, demographic, and operational aspects of fishing in the USVI*

| Fishing-Related Variable | St. Croix | St. Thomas/St. John |
|---|---|---|
| Mean Age of Participant in Years | 56.9 | 55.0 |
| Years of Fishing Experience | 26.7 | 30.8 |
| Average Size of Immediate Household | 2.7 | 2.5 |
| Most Commonly Reported Ethnic Ancestry | Hispanic | French |
| Overall Level of Education | ↑ from Kojis (2004) | ↑ from Kojis (2004) |
| % Achieving High School Diploma | 46% | 63% |
| % Engaging in other Employment | 39.3% | 44.7% |
| % of Participants Dependent Solely on Fishing | 38.9% | 27.5% |
| Overall Dependence on Fishing Compared | Higher | Lower |

| Fishing-Related Variable | St. Croix | St. Thomas/St. John |
|---|---|---|
| Mean Length of Fishing Vessel | 21.9 feet | 24.6 |
| Mean Size of Outboard Engines | 90 hp | 110 hp |
| % Using Twin-Engine Craft | ~50% | Few |
| Present Value of Fishing Vessel and All Gear | $39,000 | $102,000 |

*Based on Kojis et al. (2017); **The authors correspondingly report that younger fishermen reported more years of formal education than older fishermen across the island groupings.

With regard to species deemed most important by local fishery participants participating in Kojis et al.'s study (2017), reef fish species remained the most important and commonly pursued across the islands. Coastal pelagic species were deemed secondarily important among participants on St. Thomas and St. John, followed by spiny lobster. St. Croix participants considered spiny lobster to be the second-most important fishery locally, with deep-water pelagic fishing the third most important. Hook and line gear is owned by 88% of participants in total, with relatively more fishermen from St. Thomas and St. John using rods and reels to capture large pelagics. Trap gear is said to be relatively less commonly used by fishermen on St. Croix than elsewhere (Kojis et al. 2017). Scuba gear is more commonly used to spear fish, snare spiny lobsters, and hand-gather queen conch on St. Croix and on the other islands, with such gear used by 54% of participants on St. Croix and only 14% on St. Thomas/St. John.

Of direct relevance to the underlying purpose of the present document, Kojis et al. (2017), assert that fishery participants, "particularly those on St. Croix, have diversified into other gears such as multi-hook vertical setlines, tuna reel buoy fishing, and vertical set lines [that employ a] single hook for [capture of] pelagic fish." As can be noted in the table, ownership of vertical set lines for snappers is relatively more common around St. Croix than around St. Thomas or St. John. Frequency of use over the course of the year, specific locations of use, or level productivity are not discussed in Kojis et al. (2017).

**Table 3.6.2.** Summary information on multi-hook vertical set lines used to capture deep-water snappers and groupers in the USVI*

| Location | N** | Number/% Sampled Who Own the Gear | Number Using the Gear Within 3 Miles | Number Using the Gear Beyond 3 Miles | Number Using the Gear in Both Zones | Mean Number of Hooks per Line | Mean Number of Lines Fished per Trip | Mean Hours Fished per Trip |
|---|---|---|---|---|---|---|---|---|
| **St. Thomas/ St. John** | 82 | 3/3.7% | 1 | 1 | 1 | 10† | 2.7 | 4.0 |
| | 109 | 42/38.5% | 6 | 0 | 33 | 12.2† | 2.9 | 6.5 |

| Location | N** | Number/% Sampled Who Own the Gear | Number Using the Gear Within 3 Miles | Number Using the Gear Beyond 3 Miles | Number Using the Gear in Both Zones | Mean Number of Hooks per Line | Mean Number of Lines Fished per Trip | Mean Hours Fished per Trip |
|---|---|---|---|---|---|---|---|---|
| **St. Croix** | | | | | | | | |

*From Kojis et al. (2017:81); ** N = total number of research participants responding to questions about any gear; †Only one participant from St. Thomas discussed use of the gear in 2016 and so the range in number of hooks used is the same as the mean; whereas the reported range in number of hooks deployed per line among the 42 St. Croix residents who own the gear is between 3 and 40.

Stoffle (pers. comm., 2021) recently interviewed fishery administrators and knowledgeable commercial fishery participants involved the USVI vertical setline fishery. The scientist notes that there may be some general confusion between buoyed vertical lines used for pelagic species and buoyed vertical set lines used in deep water conditions for snappers and groupers. Notably, the interviews indicate relatively less extensive participation in the USVI than indicated by Kojis et al. (2017), suggesting a recent shift away from use of the gear after the hurricane season of 2017. Stoffle's recent interviews, summarized here, provide useful insight into the fishery as currently practiced in the USVI:

> This is said to be a very fickle type of fishing, dependent as it is on good weather and sea states, certain moon phases, and specific movement or lack thereof of local currents. St. Croix fishermen state that if the fishing conditions are not all correct, there is no reason to fish. Fishermen report that under the best of circumstances, they are lucky to land 300 pounds in a day's fishing, and that failure to locate the fish is likely and common. Fishing at depth anywhere from 300 and 1,200 feet, most participants target queen snapper, goldeye snapper, blackfin snapper, black snapper, vermillion, and misty grouper. Most use electric reels and anywhere from 12 to 50 hooks, typically spaced about 6 inches apart. St. Croix fishermen tend to target areas to the south of, and along Lang Bank. Some may use up to six buoys/lines, setting each in sequence and returning to pull and rebait. The process continues if the fishing is good. Some fishermen are said to only use one line. Use of circle hooks is common. Squid, small skipjack, and little tunny are commonly used for bait. Some participants using a single line soak their gear only for a few minutes before retrieval, with the understanding that the bite typically occurs quickly if the fish are present. These deep water species are sold in the local marketplace, typically on Saturdays. The fish are said to be much-loved by local residents and ciguatera is not a problem for this complex of species. Typical price is around eight dollars per pound though gas prices are thought to potentially necessitate an increase in price. Island fishermen tend to target the species as a part of their annual round, which

includes numerous other target species and gear types. Fishermen report that only a small number of people pursue this fishery, with interviewees estimating only nine involved from St Croix (Summary of discussions between Stoffle and local interviewees, February 2021).

Among the most important issues discussed by fishery participants in the islands during the 2017 study by Kojis et al., was the perceived status of island fisheries, with only some 14% of study participants stating that the region's fisheries had improved since the prior study in 2010-2011 (Kojis et al. (2017). The overwhelming explanation across the sample was that the availability of preferred species had diminished in formerly highly productive fishing grounds in recent years. Participants on St. Croix asserted that regulations and area closures also underlie recent trends of diminished productivity. With regard to socioeconomic concerns, perspectives between island districts varied considerably, with 45% of participants on St. Croix reporting that their household economy was worse or much worse than five years previously, while only 21% of St. Thomas and St. John fishermen reporting this condition. This may relate to the recent closure of the HOVENSA refinery on St. Croix, indicating formerly strong economic linkages between St. Croix fishing families and a globally significant petroleum refinery (Kojis 2017).

**Recent Macro-Social Change: Impacts of the 2017 Hurricane Season in the USVI**

As discussed in relation to Puerto Rico and Puerto Rico fisheries, 2017 was a particularly damaging tropical storm season in the Caribbean. After causing major damage on Caribbean islands to the south, Category 5 Hurricane Irma passed directly over St. John and St. Thomas on September 6. Two weeks later, the dangerous right semi-circle of Hurricane Maria, also then a Cat-5 storm, passed over St. Croix before making landfall on Puerto Rico. Cangialosi et al. (2018) assert that, in addition to three deaths, the effects of Irma itself were profound across the USVI, with particularly severe initial impacts on St. Thomas and St. John:

With respect to initial impacts of the 2017 hurricanes on fleets around St. Croix, St. Thomas, and St. John, the extent of lost fishing income and long-term damage to fisheries-related infrastructure were profound. Crosson (2018) estimates that fleets on St. Croix endured some $2,148,665 in damages, stemming from: loss or damage to commercial fishing vessels and fishing gear; lost income; and loss or damage to fishing-related infrastructure. Estimated combined damages resulting from the same problems on St. Thomas and St. John totaled $3,632,806 (Crosson (2018). Charter fishing fleets also endured significant damages across the USVI, as did various gear suppliers and seafood businesses (Stoffle et al. 2020).

As discussed in Stoffle et al. (2020), "the [USVI] commercial and for-hire fisheries still had not yet fully recovered at the time of this study in 2019, almost twenty-two months after the impact of the two hurricanes, with some fishermen unable to either rebuild or recover at all."

Indicating the extent of early impacts, Stoffle et al. (2020) report that total unemployment in the USVI rose by some 12% or 4,500 lost jobs soon after the two storms impacted the region, and that by May 2018, only 600 jobs had been recovered. Moreover, "it took months before power was fully restored and transportation [was available to provide] access to land and sea destinations" (Stoffle et al. 2020). According to Austin (2018), the USVI also suffered *long-term* socioeconomic impacts, with lingering implications for fishery participants and/or family members who work in non-fishery sectors on a periodic, part-time, or full-time basis. This is because the tourism industry and the cruise ship and airline industries that support tourism were heavily impacted by the storms. As such, connections between the fishing industry and larger economy were continuing to recover in 2019, just prior to the arrival of the COVID-19 pandemic and its effects on the region (described in the following section).

**The COVID-19 Pandemic and Fishery Impacts on St. Croix, St. Thomas, and St. John**

During mid-March 2020, USVI Governor Albert Bryan, Jr. announced that in response to a local outbreak of coronavirus in the islands, the entry of all tourists into the USVI would be prohibited. This initial closure remained in place until mid-July when the outbreak appeared to be under control. Following a brief reopening, the islands were once again shut down to limit a subsequent outbreak. Soon after closures were being implemented in the USVI, NOAA Fisheries social scientists conducted interviews with 87 commercial and charter fishermen on the islands of St. Croix, St. Thomas, and St. John. A second round interviews was finalized in February 2021, with additional results from both rounds of survey work to be released in upcoming months.

Among the key findings from NOAA Fisheries (2021) initial survey of pandemic impacts among commercial harvesters in the USVI are the following: (a) 87% of USVI commercial fishermen reported revenue losses occurring between January 2020 and July 2020; (b) affected commercial fishermen reported an average decrease in revenue of 53%; (c) 31% reported a reduction in the number of crew members; and (d) commercial fishermen reported operating at 48% of normal fishing activity. Noting some cross-over participation between commercial and for-hire fleets and fisheries in the USVI, initial pandemic impacts were also determined to be significant among the charter sector, with key impacts including: (a) 100% of affected for-hire operators reported revenue losses; (b) affected for-hire businesses reported a 58% decrease in revenue on average; and (c) 31% reported a reduction in crew member and/ or employees (NOAA Fisheries 2021).

Finally, research participants in both the commercial and charter sectors were asked to identify the top three pandemic-related factors that had initially affected their operations. Some 63% of commercial fishermen stated that health safety measures had the greatest effects on their operations, followed by state and local government restrictions (61%), and finally by a relative

lack of markets or buyers (56%). Meanwhile, a lack of clients was most commonly considered the biggest problems among charter operators (79%), followed by state and local government restrictions (74%), and implementation of health and safety measures onboard (42%) (NOAA Fisheries 2021).

Given the severity of the entire sequence of disaster events affecting fisheries in Puerto Rico and across the USVI beginning in 2017, and also the extent of pre-existing economic challenges across the overall region, the situation may well call for an examination of cumulative impacts among fisheries and larger societies across the region.

## 3.7 Description of the Administrative Environment

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

### 3.7.1 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 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 C. 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 and the USVI. These waters extend to 200 nautical miles offshore from the seaward boundaries of Puerto Rico (9 nm from shore) and the USVI islands of St. Thomas, St. John, and St. Croix (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 Territory of the USVI; the principal officials with marine fishery management responsibility and expertise for the Commonwealth of Puerto Rico and the Territory of the USVI, who are designated as such by their Governors; and the Regional Administrator of NMFS for the Southeast Region.

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 Procedures Act, in the form of "notice and comment" rulemaking, which provides extensive opportunity for public scrutiny and comment, and requires consideration of and response to those comments.

### 3.7.2 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.

**Puerto Rico**

The Commonwealth of Puerto Rico has jurisdiction over commonwealth fisheries in 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 territorial waters as well as for those resources and areas with shared jurisdiction with the U.S. government through the Council.

**U.S. Virgin Islands**

The U.S. Virgin Islands (USVI) has jurisdiction over territorial fisheries in 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: http://www.drna.pr.gov/

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

# Chapter 4. Environmental Consequences

## 4.1 Effects on the Physical Environment

Physical effects are not expected from any of the alternatives as the buoy gear used to fish for deep-water reef fish in the U.S. Caribbean has a low potential for affecting the physical environment (e.g., entanglement) because of the types of habitat (e.g., rocky outcrops), and depths (i.e., 400-1,200 ft) where it is used. The use of anchors while fishing with this gear is also not common. For these reasons, no effects are expected from **Alternative 1** and increasing the maximum number of hooks that can be used with the buoy gear in **Alternatives 2** and **3** is not expected to increase interactions with the bottom. This action is not expected to affect essential fish habitat for any species in Puerto Rico, St. Croix or St. Thomas and St. John.

## 4.2 Effects on the Biological/Ecological Environment

For Council-managed fisheries, buoy gear as currently defined under federal regulations as well as the buoy gear configuration preferred by some commercial fishermen in Puerto Rico and the USVI, are mostly used to harvest deep-water snappers and groupers, with queen and cardinal snapper being the species most targeted with this gear type. There are other non-target species that appear in the landings that are harvested as bycatch while fishing for deep-water snappers such as certain species of jacks, and other non-managed species such as the Atlantic scombrops and the glasseye snapper, but these are infrequent. **Alternative 1** is the status quo and would not change the current definition of buoy gear in federal regulations. In general, biological/ ecological effects are not expected under **Alternative 1**. However, if there are fishers currently fishing with a buoy gear configuration that does not conform to the current definition (e.g. maximum of 10 hooks), those fishers would need to reduce the number of hooks to comply with federal regulations. If those deep-water reef fish fishers who reduce the number of hooks do not increase the number of trips or increase the amount of gear used (deploy additional sets) to compensate for the fishing opportunity lost, there would be some benefit to the biological/ecological environment of the target species by reducing fishing pressure.

**Alternative 2** would increase the number of hooks that could be used with buoy gear to fish commercially only for Council-managed reef fish to up to 25 hooks. The magnitude of any additional biological/ecological effect is dependent on the extent that commercial fishermen can and do increase the number of hooks deployed and increase landings of Council-managed reef fish species. Increasing the number of hooks or setlines does not necessarily translate into higher landings as fishing depends on many environmental factors as well. If fishers that already use 10 or fewer hooks (i.e., those in compliance) increase the number of hooks per setline and that

increase translates into higher landings, fishing pressure on reef fish target species could increase, increasing the potential for over exploitation of the deep-water reef fish resource. However, deep-water reef fish species in both Puerto Rico and the USVI are not considered to be undergoing overfishing and harvest is constrained by annual catch limits and recreational bag limits. Similar to **Alternative 1**, if those deep-water reef fish fishers who reduce the number of hooks to 25 or less (i.e., those not in compliance) do not increase the number of trips or increase the amount of gear used (deploy additional sets with max number of hooks) to compensate for any fishing opportunity lost from this change, there would be some benefit to the biological/ecological environment of the reef fish target species by reducing fishing pressure.

**Alternative 3** proposes to change the definition of buoy gear in the U.S. Caribbean EEZ and that means that for all fisheries where buoy gear is authorized, the gear can have up to 25 hooks. Buoy gear as currently defined in 50 CFR 622.2 is an authorized gear type for the commercial harvest of reef fish and pelagic species in the island-based FMPs, for the commercial and recreational harvest of non-FMP species and non-managed pelagic species in federal waters off Puerto Rico, St. Thomas/St. John, and St. Croix. The same effects discussed above for Council-managed reef fish species would be expected from this alternative. For Council-managed reef fish (particularly deep-water snappers and groupers), Council-managed pelagics and non-managed species, the magnitude of any biological/ecological effects from an increase in the number of hooks would also be dependent on the extent that commercial fishermen can and do increase the number of hooks deployed and the landings associated with that increase. Similar to **Alternative 2**, negative biological/ecological effects could be expected if an increase in hooks translates into higher landings for any of the species where buoy gear is an allowable gear and the increase in landings has the potential to overexploit the resource. However, this effect is not expected for coastal pelagics and other non-Council species because the harvest of these species while pursuing deep-water snappers/groupers with buoy gear is incidental and minimal.

No effects to ESA-listed species would be expected from any of the alternatives proposed in this action. Interactions with ESA-listed sea turtles and finfish (interactions with hook and line gear) are not commonly reported for the deep-water reef fish fishery. In addition, interactions with corals from the use of anchors are not expected, as this fishery is usually conducted while drifting and not anchoring. Listed corals are also not expected to be affected by hook and line gear fishing for deep-water reef fish because corals are usually not present in the areas fished (i.e., fishing occurs mainly over muddy bottoms and rocky benthic habitat at depths that range from 250 to 3,000 feet).

In summary, **Alternatives 2** and **3** would have their maximum biological/ecological effects if there is currently full compliance and commercial fishermen increase the number of hooks

deployed to no more than 25 hooks per line to maximize their landings and this increase translates into higher landings and the potential for overexploiting the resource. While the effects for Council-managed reef fish are expected to be similar for **Alternatives 2** and **3**, for Council-managed pelagic species and other non-managed species caught incidentally, potential negative effects from **Alternative 3** would be expected to be minimal but higher than those from **Alternative 2** because **Alternative 3** would increase the buoy gear hook limit that could be used to harvest these species. If commercial fishermen presently use the maximum number of hooks they prefer to use (and there may be presently zero compliance with the 10-hook limit), then **Alternatives 1**, **2** and **3** would have the same biological/ecological effects because there would be no increase in fishing effort or associated landings from any of the alternatives.

## 4.3 Effects on the Economic Environment

**Alternative 1** (No Action) would continue defining buoy gear as having no more than 10 hooks connected between the buoy and the terminal end. As such, it would have no adverse or beneficial economic effects beyond the baseline. **Alternative 2** would modify the definition to allow up to 25 hooks per line for commercially harvesting reef fish, which could generate additional ex-vessel revenues to commercial fishermen that harvest deep-water reef fish and additional jobs, income, sales, and value-added to seafood markets, restaurants, marine equipment suppliers, and other business sectors that are part of the broader seafood industry. However, the extent of the economic benefits depends on the number of hooks per line that Puerto Rico, St. Croix and St. Thomas/St. John commercial fishermen currently use to harvest reef fish in the EEZ. As stated in the description of the fisheries, commercial fishermen that use buoy gear in Puerto Rico use up to 25 hooks per line, while those in the St. Croix and St. Thomas/St John may use more than 10 hooks per line, but average 10. **Alternative 2** could be problematic for commercial fishermen who presently harvest both deep-water reef fish and coastal pelagic and other species with buoy gear on the same trip because the maximum number of hooks for harvesting coastal pelagic and other incidentally caught species would remain at 10 per line. Commercial fishermen would have to discard incidentally caught non-reef fish species taken with buoy gear with more than 10 hooks per line. **Alternative 3** would modify the definition to allow up to 25 hooks per line for harvesting deep-water reef fish and other species, such as coastal pelagics. Consequently, **Alternative 3** could generate the largest additional economic benefits of the three alternatives.

The magnitudes of the additional beneficial economic effects of **Alternatives 2** and **3** are dependent on the extent that commercial fishermen can and do increase the number of hooks deployed, landings and associated ex-vessel revenue from those landings. If commercial fishermen presently use the maximum number of hooks they prefer to use (and there may be

presently zero compliance with the 10-hook limit), then **Alternatives 1**, **2** and **3** would have the same economic effects because there would be no increase in fishing effort from any of the alternatives. **Alternatives 2** and **3** would have their maximum additional economic benefits if there is currently full compliance and commercial fishermen increase the number of hooks deployed to no more than 25 hooks per line to maximize their net revenues per trip; however, **Alternative 2's** maximum economic benefit would be less than that of **Alternative 3** (because **Alternative 2** would not increase the hook limit for coastal pelagic and other non-reef fish species, whereas **Alternative 3** would increase that limit).

## 4.4 Effects on the Social Environment

The level of success achieved by commercial fishing operations around Puerto Rico and the USVI is related in part to the capacity to flexibly adapt to the changing environmental, economic, and social factors and opportunities that characterize the industry. Success can be defined in dollar terms, in terms of social experience and the harvest of quality food for the family and community, and in terms of subjective experience, such as personal achievement. Significantly, such outcomes are not guaranteed, and in fact fishing-related challenges are often heightened by regional economic problems and disaster events, such as those recently generating major impacts among the societies and economies of Puerto Rico and the USVI.

The use of buoy gear to harvest deep-water snappers (and other species) continue to present social and economic opportunities for those regional fishery participants who possess the necessary gear and environmental knowledge to engage the fishery. As stated elsewhere, the no action alternative, **Alternative 1**, would not change the current definition of buoy gear. This definition includes the requirement that the gear cannot contain more than 10 hooks between the surface buoy and terminal end. For this reason, the no action alternative does not present the possibility of economic or social change or impact beyond the baseline, where such baseline assumes compliance with existing federal regulations. If analysis is to consider effects among persons not presently in compliance with existing regulations, some loss in the flexibility of the fishing operation would occur—potentially reducing the prospective level of success achieved during any given trip for which more than 10 hooks would otherwise be used. Reactions among those not presently in compliance could also involve a shift in attention and investment to other fisheries around the region and/or diminished involvement in commercial fisheries around the islands.

The modified definition of buoy gear specified in **Alternative 2** would allow for the use of as many as 25 hooks per buoyed line—specifically among commercial operations focused on harvest of federally managed reef fish. As recently discussed by Puerto Rico- and the USVI-

based harvesters who possess direct understanding of the fishery in question, the flexibility to use a greater number of hooks than is specified in existing federal regulations is in keeping with traditional patterns of gear use. Such patterns are said to have developed over multiple decades in conditions that call for differing gear-set and gear adjustment strategies, with the latter including adjustment to the number of hooks deployed in order to achieve maximum productivity in conditions that often include heavy currents, large swell, rough local sea states, rugged substrate, and varying behavior on the part of the desired fish species. Inasmuch as **Alternative 2** provides fishery participants with the option to use as many as 25 hooks per line, it improves the flexibility of strategic decision-making on-board, thereby increasing the potential for success and resulting social and economic benefits among participants in any given operation. However, this alternative also presents the potential for generating regulatory uncertainty and enforcement challenges since harvesters who deploy buoy gear sometimes incidentally harvest other managed or not presently managed species during the same trip, naturally retaining certain of those species on board. Regulatory/enforcement issues could result due to the fact that the maximum allowable number of hooks that can be deployed to harvest other reef fish species of commercial interest (such as certain pelagic species) would, by regulation, remain at 10 per line.

Importantly, **Alternative 3** minimizes the potential for regulatory and enforcement problems and any fleet-specific social and economic impacts that could result. This is the case since the alternative would modify the definition of buoy gear to include use of up to 25 hooks between the buoy and the terminal end for commercial harvest of the authorized species, including those incidentally harvested in this fishery. In this respect, the alternative addresses multiple buoy-based fisheries while also providing options for captains to determine and deploy an ideal number of hooks for any given set as needed to pursue the desired species given the environmental conditions at hand. Based on discussions with long-time island-based buoy gear specialists, such options better reflect the nature of the traditional buoy gear fishery and thereby improve the potential for trip-specific success. **Alternative 3** thus heightens the potential for captains and crew to experience success, where this is defined to include the provision of food and earnings and the continuation of fishery-specific and seafood-related social and cultural practices, among other positive outcomes. Again, such potential outcomes may best be seen in socioeconomic context—which for commercial harvesters based in Puerto Rico and the USVI, includes the large-scale disruptions and recovery processes following from the pandemic, the hurricanes of 2017, and other sources of social and economic change.

## 4.5 Effects on the Administrative Environment

**Alternative 1** is the status quo alternative and it is not expected to have any additional administrative effects. Both **Alternative 2** and **Alternative 3** would be expected to have short-term administrative effects from the preparation of this amendment and implementing regulations. Long-term administrative effects from **Alternative 2** would be expected if by increasing the number of hooks to maximize landings or profit, landings of deep-water reef fish (or other Council-managed reef fish) increase to the point where an annual catch limit(s) is exceeded, prompting a potential application of accountability measures and a closure for the affected species. The same can be said about **Alternative 3** for Council-managed pelagic species, but this is not expected because harvest of pelagic species with this gear is minimal or incidental. However, given that landings of species harvested with this gear type are combined for state and federal waters and may already include harvest with more than 10 hooks (this is more for Council-managed deep-water reef fish), this scenario would be unlikely under harvest levels set under the island-based FMPs.

**Alternative 2** presents the potential for some regulatory/enforcement issues because fishermen who deploy buoy gear to harvest deep-water reef fish could also fish for other species during the same trip and retain those species. The issue could result because the maximum allowable number of hooks per line that can be deployed to harvest other non-reef fish species would remain at 10 per line. This would difficult enforcement as it would be challenging to know what was harvested legally with this gear type. In contrast, **Alternative 3** would minimize this potential enforcement issue because the buoy definition under the alternative would apply for the commercial harvest of multiple species and not just to commercial reef fish fisheries under each island-based FMP.

## 4.6 Cumulative Effects Analysis

While this environmental assessment (EA) is being prepared using the 2020 Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) 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) of St. Thomas, St. John, and St. Croix that are dependent on fishing for deep-water reef fish. 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. *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 would reorganize management measures from the at the U.S. Caribbean-wide level to each island management area. The cumulative effects associated with the IBFMPs 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 island-specific management measures included in the U.S. Caribbean-wide FMPs would remain substantively unchanged under each island-based FMP. The EAs in the island-based FMPs analyzed cumulative effects of actions included in the FMPs to modify management measures including the list of species to be managed in federal waters; how those species would be managed (as single stocks, in stock complexes, and with indicator stocks); revised or established (for species new to federal management) reference points (e.g., ACLs) and AMs; and updated framework procedures available for future management actions. The cumulative effects analysis (CEA) described how transitioning from U.S. Caribbean-wide FMPs to island-based FMPs only rearranges past Council actions and would not affect past actions taken by federal or non-federal

entities. The CEA found that the overall impacts of the actions included in the island-based FMPs would be minimal.

A goal of establishing the island-based FMPs was to ensure the continued health of fishery resources occurring in the EEZ 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.

Other than the present action, no other actions are being developed by the Council or considered for implementation by NMFS that would affect reef fish stocks.

*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; and (3) climate-induced changes to species phenology and distribution (Osgood 2008). Climate change may impact spiny lobster stocks in the future (see Section 3.3.1.3), 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 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.

3. *The impacts or expected impacts from these other actions* - The cumulative effects from managing fishery resources in the U.S. Caribbean, including reef fish, 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.

4. *The overall impact that can be expected if the individual impacts are allowed to accumulate* – 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 3.1). 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.

5. *Summary* - The proposed action is not expected to have significant effects to the physical, biological, economic, or social 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 prompting 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.

## 5.2 Problems and Objectives

In Puerto Rico and the USVI, commercial fishermen targeting deep-water reef fish and incidentally harvesting other species have traditionally used buoy gear locally known as "cala con boya" in Puerto Rico and as "deep-drop buoy gear" in the USVI. Buoy gear as defined in 50 CFR Part 622.2 cannot contain more than 10 hooks connected between the buoy and the terminal end. However, commercial fishermen in Puerto Rico and the USVI are allowed to and traditionally use buoy gear in territorial waters that can contain more than 10 hooks connected between the buoy and the terminal end. Hence, the purpose of this action is to modify the federal definition of acceptable buoy gear so as to harmonize it with existing practices of harvesting deep-water reef fish and other species in the U.S. Caribbean.

## 5.3 Description of the Fisheries

Descriptions of the relevant components of the fisheries of Puerto Rico, St. Thomas/St. John and St. Croix are provided in Section 3.4. From 2012 through 2019, cala (vertical bottom line, which includes buoy gear) accounted for the largest average percentage of commercial landings of all species in Puerto Rico by both weight and value: 16% by weight and 21% by value.[10] Average annual ex-vessel revenue in Puerto Rico from species harvested with bottom line gear was $1,375,879 (2020 dollars) during the 8-year period from 2012 through 2019, and there was an

[10] All hook-and-line gears (bottom line (including buoy gear), hand line, long line, rod and reel, and troll line) accounted for an average of 40% of all annual landings by weight and 38% by value.

increasing trend (Figure 5.1).[11] The constant-dollar price per pound increased from $2.39 in 2012 to $4.44 in 2019 (2020 dollars) in Puerto Rico.[12]

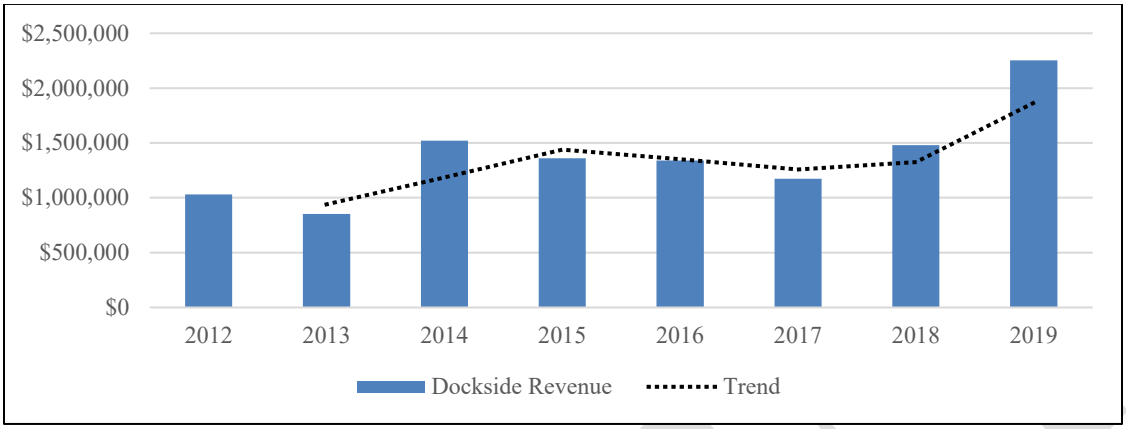


**Figure 5.1**. Annual ex-vessel revenue (2020 dollars) from landings of species harvested with bottom line gear in Puerto Rico and trend (2-year moving average) of that revenue, 2012-2019. (Source: NMFS SERO LAPPS (2021) for revenue and BEA for GDP deflator (May 27, 2021 release)).

In the USVI, deep-drop buoy gear is within the broad category of hook-and-line gear. From 2012 through 2019, hook-and-line gears accounted for an annual average of 16% of all commercial landings by weight in St. Thomas/St. John, and 31% of landings by weight in St. Croix. However, buoy gear accounts for a much smaller percentage of landings. From 2012 through 2018, nine USVI fishers used deep-drop buoy gear during those seven calendar years to harvest a total of 1,388 lbs ww of Snapper 1 (black, blackfin, silk and vermilion snapper) and Snapper 2 (queen snapper). The annual average would be 198 lbs ww of Snapper 1 and 2 harvested with deep-drop buoy gear in the USVI by one to two fishermen. An estimated 12 commercial fishermen in St. Croix and between 1 and 4 in St. Thomas/St. John use buoy gear (personnel communication CFMC July 2021).

Commercial landings (lbs ww) by all hook-and-line gears in St. Thomas/St. John show no obvious increasing or decreasing trend from 2012 through 2019, and 2017 commercial landings, despite the disastrous hurricane season, were greater than in 2013 (Figure 5.2). During the same 8-year period, commercial landings (lbs ww) by hook-and-line gears in St. Croix declined considerably after the disastrous 2017 hurricane season (Figure 5.3). In 2018 and 2019, landings by hook-and-line gears were 25% and 17% of what they had been in 2017.

[11] There were fishery disaster declarations in the U.S. Caribbean in 2017 because of Hurricanes Irma and Maria.
[12] The constant-dollar price (also called real-dollar price) is an adjusted price to compare prices from one year to another absent inflation.

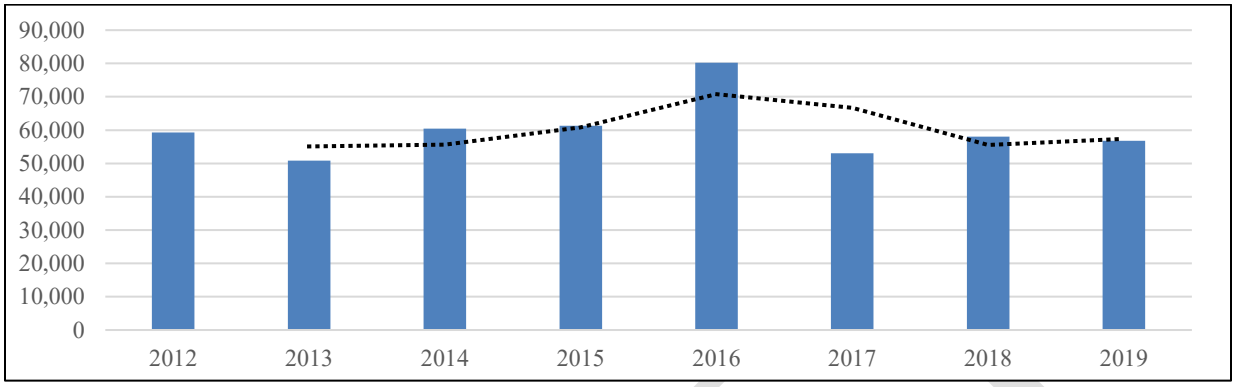


**Figure 5.2**. Annual commercial landings (lbs ww) and trend of those landings (2-year moving average) by all hook-and-line gears in St. Thomas/St. John, 2012 – 2019. (Source: NMFS SERO LAPPS 2021)

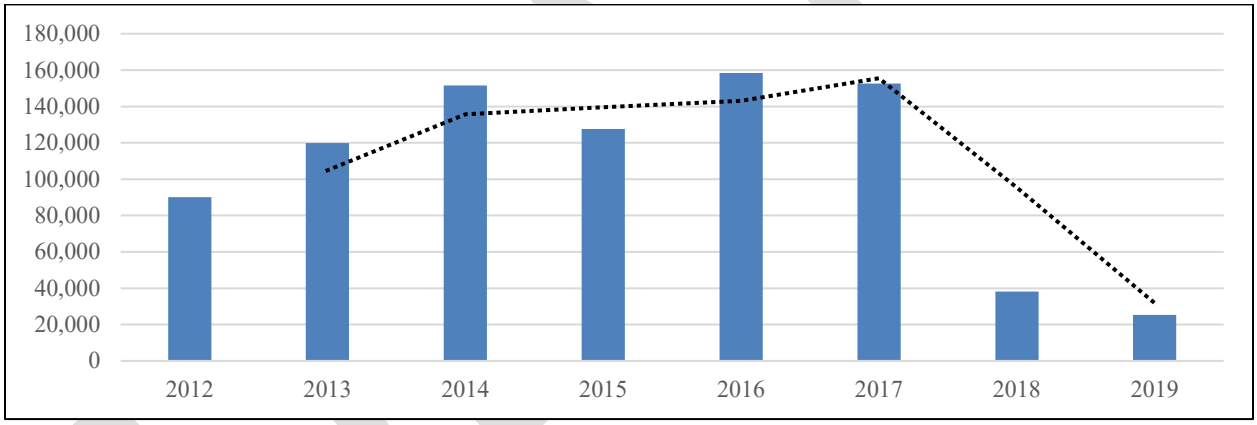


**Figure 5.3**. Annual commercial landings (lbs ww) in St. Croix by hook-and-line gears and trend (2-year moving average) of those landings, 2012 – 2019. (Source: NMFS SERO LAPPS 2021)

## 5.4 Impact of Management Measures

The proposed rule would modify the definition of buoy gear in federal regulations 50 CFR Part 622 as it applies to the commercial sector harvesting reef fish and other Council-managed species in federal waters off Puerto Rico, St. Thomas and St. John, and St. Croix. Specifically, it would increase the maximum number of hooks allowed from 10 to 25. The rest of the specifications included in the definition such as weight, construction materials for the drop line, and length of the drop line would remain unchanged.

It is common practice to assume full regulatory compliance when establishing the economic baseline; however, anecdotal evidence indicates that buoy gear traditionally used in federal waters of the U.S. Caribbean does not comply with current regulation. For that reason, the following sensitivity analysis examines the economic impact of the proposed rule with varying rates of baseline compliance: full (100%), half (50%), and none (0%).

With full compliance, NMFS expects all commercial fishermen in the U.S. Caribbean, who deploy buoy gear in the EEZ, currently use no more than 10 hooks per drop line and could increase the numbers of hooks used, which could increase landings and ex-vessel revenues from those landings.[13] An increase in ex-vessel revenues would generate other beneficial economic impacts such as income, jobs, sales and value-added. There is insufficient information, however, to quantify the numbers of commercial fishermen that would increase the number of hooks they use or the increase in the numbers of hooks deployed. There is also insufficient information to quantify the increases in landings, ex-vessel revenues, and other beneficial impacts.

With 50% compliance, NMFS expects half of commercial fishermen who currently use buoy gear in the U.S. Caribbean EEZ could increase the numbers of hooks they use, which could increase landings and ex-vessel revenues from those landings, but not as much as if there were full compliance. There is insufficient information to quantify either the numbers of commercial fishermen that would increase the number of hooks they use or the changes in the numbers of hooks deployed. Nonetheless, NMFS expects some commercial fishermen would increase the number of hooks they use, which would increase their landings and ex-vessel revenues.

With no compliance, none of the commercial fishermen who use buoy gear could increase the number of hooks used, and there could not be increases in landings and ex-vessel revenues from those landings. Hence, with 0% compliance, the economic effects of the proposed action could be the same as those of baseline (No-action alternative). However, even with 0% compliance, NMFS expects there could be commercial fishermen that currently use more than 10, but less than 25 hooks, and an unknown number of those commercial fishermen could increase the number of hooks they use, which would increase their landings and ex-vessel revenues.

NMFS expects the proposed rule would have beneficial economic impacts ranging from a positive economic benefit that would be at its maximum if there is currently full compliance to zero economic benefit (beyond the baseline) that would be at its minimum if there is currently

[13] Using more hooks increases effort-related trip costs, and a commercial fisherman would not increase the number of hooks used if the increase in costs reduced the fisherman's profit.

zero compliance and there would be no increase in effort. The lower the rate of baseline compliance, the smaller the economic benefits of the proposed rule.

## 5.5 Public 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. Costs to the private sector are discussed in section 5.4 above. Total public costs associated with this action include NMFS administrative costs of document preparation, meetings and review, which are estimated to total approximately $.

## 5.6 Determination of Significant Regulatory Action

Pursuant to E.O. 12866, a regulation is considered a "significant regulatory action" if it is likely to result in: 1) an annual effect of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities; 2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; 3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights or obligations of recipients thereof; or 4) raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this executive order (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 applicable statutes, to fit regulatory and informational requirements to the scale of businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure that such proposals are given serious consideration. The RFA does not contain any decision criteria; instead, the purpose of the RFA is to inform the agency, as well as the public, of the expected economic impacts of the alternatives contained in the fishery management plan (FMP) or amendment (including framework management measures and other regulatory actions) and to ensure that the agency considers alternatives that minimize the expected impacts while meeting the goals and objectives of the FMP and applicable statutes.

With certain exceptions, the RFA requires agencies to conduct a regulatory flexibility analysis for each proposed rule. The regulatory flexibility analysis is designed to assess the impacts various regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize those impacts. The following regulatory flexibility analysis was conducted to determine if the proposed rule would have a significant economic impact on a substantial number of small entities or not.

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

The primary purpose and need, issues, problems, and objectives of the proposed action are presented in Chapter 1 and are incorporated herein by reference.

## 6.3 Identification of federal rules which may duplicate, overlap or conflict with the proposed rule

No federal rules have been identified that duplicate, overlap or conflict with the proposed rule.

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

The rule would apply to businesses that operate in the commercial fishing industry and particularly, those that operate commercial fishing vessels that use buoy gear in federal waters off Puerto Rico and the USVI. Commercial fishermen who harvest deep-water reef fish and other species, such as Council-managed pelagics, have traditionally used buoy gear locally known as "cala con boya" in Puerto Rico and as "deep-drop buoy gear" in the 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 that 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. Thomas/St. John, and St. Croix are small.

In 2016, there were 1,074 licensed commercial fishermen in Puerto Rico (CFMC 2019), and each of those licensed commercial fishermen represent a small commercial fishing business. In 2016, 811 of those commercial fishermen submitted catch reports and 383 of them submitted reports operated in federal waters (SERO Caribbean Branch logbook data 2020). Puerto Rico's fishermen tend to target multiple categories of fish and shellfish, and the most popularly targeted category is reef fish. Approximately 77% of small businesses target reef fish, and approximately 56% target deep-water snapper. It is estimated that from 56% to 77% of the 383 small commercial fishing businesses that operate in federal waters off of Puerto Rico may be directly affected the proposed rule.

The most recent Census of Licensed Fishers of the U.S. Virgin Islands reported 119 licensed commercial fishermen in St. Thomas/St. John and 141 licensed commercial fishermen in St. Croix (Kojis et al. 2017), and each of those fishermen represent a small commercial fishing business. Kojis et al. (2017) found that 14.8% of licensed fishermen in St. Thomas/St. John and 52.3% of licensed fishermen in St. Croix harvest deep-water snapper.

However, not all licensed fishermen are actively fishing in any given year. For example, in 2016 at least 23 (19.3%) of the 119 licensed fishermen in St. Thomas/St. John and 67 (47.5%) of the 141 licensed commercial fishermen in St. Croix were not active (Kojis et al. 2017). If the above

percentages of licensed fishermen that harvest deep-water snapper apply to active fishermen that operate in the EEZ, an estimated 14 small commercial fishing businesses in St. Thomas/St. John and an estimated 39 small commercial fishing businesses in St. Croix would be directly affected by the proposed rule.

## 6.5 Description and economic impacts of the compliance requirements of the proposed rule

This proposed rule would modify the definition of buoy gear as it applies to the commercial sector harvesting reef fish and other Council-managed species in federal waters off Puerto Rico, St. Thomas and St. John, and St. Croix. Currently, buoy gear is defined as gear that fishes vertically in the water column and consists of a single drop line suspended from a float, from which no more than 10 hooks can be connected between the buoy and the terminal end, and the terminal end contains a weight that is no more than 10 lb (See full definition in Section 1.1). The proposed rule would change the definition to allow the use of up to 25 hooks connected between the buoy and the terminal end.

It is common practice to assume full regulatory compliance when establishing the baseline; however, anecdotal evidence indicates that buoy gear traditionally used in the U.S. Caribbean does not comply with current regulation. For that reason, the following sensitivity analysis examines the economic impacts of the proposed action with varying rates of baseline compliance: full (100%), half (50%), and none (0%).

Under **Preferred Alternative 2** of **Action 1** with full compliance, NMFS expects all of the small businesses that deploy buoy gear in the EEZ could increase the numbers of hooks they use, which could increase landings and dockside revenues from those landings. However, there is insufficient information to quantify either the numbers of small businesses that would increase the number of hooks they use or the changes in the numbers of hooks deployed. Using more hooks increases effort-related trip costs, and a commercial fishing business would not increase the number of hooks used if the increase in costs reduced its profit. Nonetheless, NMFS expects at least some of the small businesses would increase the number of hooks they use.

Under **Preferred Alternative 2** of **Action 1** with 50% compliance, NMFS expects half of the small businesses that currently use buoy gear in the EEZ could increase the numbers of hooks used, which could increase landings and dockside revenues from those landings, but not as much as if there were full compliance. There is insufficient information to quantify either the numbers of small businesses that would increase the number of hooks they use or the changes in the

numbers of hooks deployed. Nonetheless, NMFS expects some small businesses would increase the number of hooks they use, which would increase their landings and dockside revenues.

Under **Preferred Alternative 2** of **Action 1** with no compliance, NMFS expects none of the small businesses that currently use buoy gear in the EEZ could increase the number of hooks used (because they currently use 25 hooks per drop line), and there would be no changes in landings and dockside revenues from those landings. Hence, with 0% compliance, the economic effects of **Preferred Alternative 2** could be the same as those of **Alternative 1**. However, even with 0% compliance, there could be small businesses that currently use more than 10, but less than 25, hooks, and an unknown number of those small businesses could increase the number of hooks they use, which would increase their landings and dockside revenues.

**Summary**

There would be no adverse economic impact on any small businesses. The lower the rate of baseline compliance, the smaller the beneficial economic impact of **Preferred Alternative 2**. Hence, there would be no beneficial economic impact if there is currently no compliance and none of the small businesses can increase the number of hooks they presently deploy. However, NMFS expects at least some small businesses would increase the number of hooks they use, which would increase their landings of deep-water reef fish and dockside revenues from those landings.

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

The proposed action would not have a significant adverse economic impact on a substantial number of small commercial fishing businesses of Puerto Rico, St. Thomas/St. John or St. Croix. Therefore, an initial regulatory act analysis is not required and none has been prepared.

# Chapter 7. List of Preparers

**Table 7.1.** List of Interdisciplinary Plan Team (IPT) Members

| Name | Agency | Title |
|---|---|---|
| Maria del Mar López-Mercer | NMFS/SFD | IPT Co-Lead / Fishery Biologist |
| Graciela García-Moliner | CFMC | IPT Co-Lead / |
| Sarah Stephenson | NMFS/SF | Fishery Biologist |
| John McGovern | NMFS/SF | SFD Assistant Regional Administrator |
| Denise Johnson | NMFS/SF | Economist |
| Edward Glazier | NMFS/SF | Social Scientist |
| Jocelyn D'Ambrosio | NOAA/GC | Attorney |
| Scott Sandorf | NMFS/SF | Technical Writer |
| Patrick O'Pay | NMFS/PR | Fishery Biologist |
| Michael Larkin | NMFS/SF | Data Analyst |
| Nancy Cummings | NMFS/SEFSC | Fishery Biologist |
| Loren Remsberg | NOAA/GC | Enforcement Attorney |
| Brent Stoffle | NMFS/SEFSC | Anthropologist |
| Miguel Borges | NMFS/OLE | Assistant Special Agent |
| Mike Jepson | NMFS/SF | Social Sciences Branch Chief |
| Jose Rivera | NMFS/HCD | Fishery Biologist |
| | | |

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

# 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. List of Managed Reef Fish and Pelagic Stocks Included in Each of the Island-based FMPs

# St. Croix Reef Fish

- **Snappers**: black, blackfin, silk, vermilion, queen, lane, gray, mutton, schoolmaster, yellowtail
- **Groupers**: Nassau, goliath, graysby, coney, red hind, rock hind, black, red, tiger, yellowfin, misty
- **Parrotfishes**: blue, midnight, rainbow, queen, princess, redtail, stoplight, redband, striped, redfin
- **Surgeonfishes**: blue tang, ocean surgeonfish, doctorfish
- **Triggerfishes**: queen
- **Angelfishes**: queen, grey, French
- **Grunts**: white grunt, bluestriped
- **Squirrelfish**: longspine squirrelfish

# St. Croix Pelagics

**All new to management*

- **Dolphinfish**: dolphin, pompano dolphin
- **Mackerels and Tunas (Scombridae)**: wahoo

# St. Thomas/St John Reef Fish

- **Snappers**: black, blackfin, silk, vermilion, queen, lane, mutton, yellowtail
- **Groupers**: Nassau, goliath, coney, red hind, black, red, tiger, yellowfin, *yellowmouth**, yellowedge, misty
- **Parrotfishes**: blue, midnight, rainbow, queen, princess, redtail, stoplight, redband, striped, redfin
- **Surgeonfishes**: blue tang, ocean surgeonfish, doctorfish
- **Triggerfishes**: queen
- **Wrasses**: hogfish

- **Angelfishes**:  queen, grey, French
- **Grunts**: white grunt, bluestriped, margate
- **Jacks**: Blue runner
- **Porgies**:  jolthead, saucereye, sheepshead, sea bream

** New to management*

# St. Thomas/St. John Pelagics

**All new to management*

- **Dolphinfish**: dolphin, pompano dolphin
- **Mackerels and Tunas (Scombridae)**: wahoo

# Puerto Rico Reef Fish

- **Snappers**: black, blackfin, silk, vermilion, wenchman, cardinal, queen, lane, mutton, dog, schoolmaster, yellowtail, cubera*
- **Groupers**: Nassau, goliath, coney, graysby, black, red, tiger, yellowfin, yellowmouth*, yellowedge, misty, red hind, rock hind
- **Parrotfishes**: blue, midnight, rainbow, queen, princess, redtail, stoplight, redband, striped
- **Surgeonfishes**:  blue tang, ocean surgeonfish, doctorfish
- **Triggerfishes**:  ocean, queen, gray*
- **Wrasses**:  hogfish, puddingwife, Spanish hogfish
- **Angelfishes**:  queen, grey, French
- **Grunts**: white grunt
- **Jacks**: crevalle jack*, African pompano*, rainbow runner*

* *New to management*

# Puerto Rico Pelagics

**All new to management*

- **Tripletail**: tripletail

- **Dolphinfish**: dolphin, pompano dolphin
- **Mackerels and Tunas (Scombridae)**: little tunny, blackfin tuna, king mackerel, cero mackerel, wahoo
- **Barracudas**: great barracuda

# Appendix B. List of Species Identified in the Literature as Incidental Catch in the Deep-water Snapper/Grouper Fishery of Puerto Rico

Ault et al. (2018) identified the following species: lionfish (*Pterois volitans*), Jacks (*Seriola rivoliana and S. dumerili*), Atlantic scombrops (*Scombrops oculatus*), tilefishes (*Caulolatilus spp.*), Longfin Bulleye (*Cookeolus japonicus*), American sackfish (*Neoepinnula americana*), Oilfish (*Ruvettus pretiosus*), red hogfish (*Decodon puellaris*), beardfishes (*Polymixia spp.*), Spanish flag (*Gonioplectrus hispanus*), yellow flagfin (*Aulopus filamentosus*), pomfret (*Taractichthys longipinnis*), cornetfish (*Fistularia petimba*), grunt (*Pomadasys sp.*), groupers (*Hyporthodus spp*.) and various species of sharks (*Squalus cubensis, Ginglymostoma cirratum, Carcharhinus perezii, Mustelus spp., Scyliorhinus sp. and Hexanchus spp.*).

Reference: Ault, H.S, Smith, S.G., Apperldoorn, R, Lylestrom, C, Peña, N., Cass-Calay, S., Ruiz, H. Extending Fishery-Independent Surveys for Reef-fishes in Puerto Rico to Mid-Depth and Deep Reefs – Progress Report 2018 DNER.

Scharer-Umpierre et al. (2019) list the following species as caught in the Puerto Rico deep-water fishery: Aulopidae *Aulopus filamentosus;* Holocentridae *Ostichthys trachypoma;* Carcharhinidae *Carcharhinus perezi;* Scyliorhinidae *Scyliorhinus* sp.; Triakidae *Mustelus canis;* Hexanchidae *Heptranchias perlo;* Hexanchidae *Hexanchus nakamurai;* Ginglymostomatidae *Ginglymostoma cirratum;* Bramidae *Taractichthys longipinnis;* Caproidae *Antigonia capros;* Carangidae *Caranx crysos;* Carangidae *Caranx lugubris;* Carangidae *Decapterus tabl;* Carangidae *Seriola dumerili;* Carangidae *Seriola rivoliana;* Echeneidae *Echeneis naucrates;* Emmelichthyidae *Erythrocles monodi;* Gempylidae *Neoepinnula americana;* Gempylidae *Ruvettus pretiosus;* Haemulidae *Pomadasys* sp.; Labridae *Decodon puellaris;* Lutjanidae *Apsilus dentatus;* Lutjanidae *Etelis oculatus;* Lutjanidae *Lutjanus buccanella;* Lutjanidae *Lutjanus vivanus;* Lutjanidae *Pristipomoides aquilonaris;* Lutjanidae *Pristipomoides macrophthalmus;* Lutjanidae *Rhomboplites aurorubens;* Malacanthidae *Caulolatilus dooleyi;* Malacanthidae *Caulolatilus cyanops;* Priacanthidae *Cookeolus japonicus;* Scombropidae *Scombrops oculatus;* Serranidae *Cephalopholis fulva;* Serranidae *Epinephelus guttatus;* Serranidae *Gonioplectrus hispanus;* Serranidae *Hyporthodus flavolimbatus;* Serranidae *Hyporthodus mystacinus;* Serranidae *Hyporthodus nigritus;* Serranidae *Hyporthodus niveatus;* Serranidae *Serranus notospilus/phoebe;* Polymixiidae *Polymixia loweii;* Polymixiidae *Polymixia nobilis;* Scorpaenidae *Pontinus castor;* Scorpaenidae *Pterois volitans;* Dalatiidae *Dalatias licha;* Etmopteridae *Etmopterus hillianus;* Squalidae *Squalus cubensis;* Fistulariidae *Fistularia petimba.*

Reference: Scharer-Umpierre, M.T., Peña-Alvarado, N., Smith, St. G., Appeldoorn R., Ault, J.S. 2019. Deeper water fauna caught incidentally in the Puerto Rico fishery. La fauna de aguas profundas capturada incidentalmente en la pesquería de Puerto Rico. Le faune plus profonde capturée accidentellement dans la pêcherie de Porto Rico. GCFI 71.

Overly (2020) identified bycatch species from the deep-water snapper grouper fishery including: jacks (*Caranx lugubris, Seriola dumerili*), Altantic scombrops (*Scombrops oculatus*), tilefishes (*Caulolatilus williamsi, C. sp.*), lionfish (*Pterois volitans*), beardfishes (*Polymixia lowei, P. nobilis*), Tattler (*Serranus phoebe*), King snake eels (*Ophichthus rex*), New Granada drum (*Protosciaena trewavasae*), Three-spine bass (*Synagrops trispinosus*), and several shark species (*Squalus cubensis, S. clarkae, Mustelus canis*).

Reference: Overly, K. 2020. Essential Fish Habitat Classification and Age & Growth of Deepwater Snappers in Puerto Rico Using Remote Video Camera's Tethered to Deep Drop Fishing Gear. SEFSC. EFP F/SER28:SS Final Report.