

Amendment 3 to the Puerto Rico, St. Croix, and St. Thomas and St. John Fishery Management Plans: Management Measures for Dolphinfish and Wahoo



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

May 2024



Environmental Assessment Cover Sheet

Name of Action

Environmental Assessment for Amendment 3 to the Puerto Rico, St. Croix, and St. Thomas and St. John Fishery Management Plans: Management Measures for Dolphin and Wahoo

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Administrative
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This environmental assessment (EA) is being prepared using the 2020 Council on Environmental Quality National Environmental Policy Act Regulations as modified by the Phase I 2022 revisions. The effective date of the 2022 revisions was May 20, 2022, and reviews begun after this date are required to apply the 2020 regulations as modified by the Phase I revisions unless there is a clear and fundamental conflict with an applicable statute. This EA began on April 23, 2024, and accordingly proceeds under the 2020 regulations as modified by the Phase I revisions.

Abbreviations and Acronyms Used in this Document

ACL	annual catch limit
ACT	annual catch target
AM	accountability measure
CEA	cumulative effects analysis
CFMC	(Council); Caribbean Fishery Management Council
DAP	District Advisory Panel
DNER	Department of Natural and Environmental Resources (Puerto Rico)
DPNR	Department of Planning and Natural Resources (United States Virgin Islands)
DPS	distinct population segment
ESA	Endangered Species Act
EA	environmental assessment
EEJ	environmental equity and justice
EFH	essential fish habitat
EEZ	exclusive economic zone
FAD	fish aggregating device
FMP	fishery management plan
FL	fork length
HMS	Highly Migratory Species
MSA	(Magnuson-Stevens Act); Magnuson-Stevens Fishery Conservation and Management Act
MRFSS	Marine Recreational Fishery Statistics Survey
MRIP	Marine Recreational Information Program
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
RFA	Regulatory Flexibility Act
RIR	Regulatory Impact Review
SEFSC	Southeast Fisheries Science Center
TIP	Trip Interview Program
USVI	United States Virgin Islands

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Fishery Impact Statement

The Magnuson-Stevens Fishery Conservation and Management Act requires a Fishery Impact Statement (FIS) be prepared for all fishery management plan (FMP) amendments. The FIS contains an assessment of the expected biological, economic, and social effects of the conservation and management measures on: (1) fishery participants and their communities; (2) participants in the fisheries conducted in adjacent areas under the authority of another Council; and (3) the safety of human life at sea. Detailed discussion of the expected effects for all proposed changes is provided in Chapter 4. The FIS provides a summary of these effects.

The National Marine Fisheries Service (NMFS) and the Caribbean Fishery Management Council (Council), developed Amendment 3 to the Comprehensive FMP for the Puerto Rico Exclusive Economic Zone (EEZ), Amendment 3 to the Comprehensive FMP for the St. Croix EEZ, and Amendment 3 to the Comprehensive FMP for the St. Thomas/St. John EEZ (collectively Amendment 3) to establish size limits and recreational bag limits for dolphinfish (*Coryphaena hippurus*) and wahoo (*Acanthocybium solandri*).

Amendment 3, if implemented, would establish additional management measures for dolphinfish and wahoo in federal waters to (1) ensure undersized individuals have adequate time to mature and reproduce and (2) take a precautionary approach to management to protect against overfishing for resources with limited management structure. The affected area of this proposed action encompasses federal waters off Puerto Rico, St. Croix, and St. Thomas/St. John, and the fishing communities in the U.S Caribbean that depend on these pelagic resources.

Actions Contained in Amendment 3

Amendment 3 contains six actions, each with two sub-actions. Actions 1 and 2 are specific to the Puerto Rico FMP, Actions 3 and 4 are specific to the St. Croix FMP, and Actions 5 and 6 are specific to the St. Thomas/St. John FMP. For each FMP, the first action is specific to dolphinfish and the second action is specific to wahoo. For each action, sub-action (a) proposes a minimum size limit and sub-action (b) proposes a recreational bag limit. Preferred alternatives selected by the Council are as follows:

- **Action 1.** Establish size limits (Sub-action 1a) and recreational bag limits (Sub-action 1b) for dolphinfish in federal waters around Puerto Rico.
 - **Sub-action 1a - Preferred Alternative 3.** Establish a 24” fork length (FL) minimum size limit for the commercial or recreational harvest of dolphinfish in federal waters around Puerto Rico.
 - **Sub-action 1b - Preferred Alternative 3.** Establish a recreational bag limit in federal waters around Puerto Rico of 5 dolphinfish per person per day, not to exceed 15 dolphinfish per vessel per day, whichever is less.

- **Action 2.** Establish size limits (Sub-action 2a) and recreational bag limits (Sub-action 2b) for wahoo in federal waters around Puerto Rico.
 - **Sub-action 2a - Preferred Alternative 2.** Establish a 32” FL minimum size limit for commercial or recreational harvest of wahoo in federal waters around Puerto Rico.
 - **Sub-action 2b - Preferred Alternative 2.** Establish a recreational bag limit in federal waters around Puerto Rico of 5 wahoo per person per day, not to exceed 10 wahoo per vessel per day, whichever is less.

- **Action 3.** Establish size limits (Sub-action 3a) and recreational bag limits (Sub-action 3b) for dolphinfish in federal waters around St. Croix.
 - **Sub-action 3a - Preferred Alternative 3.** Establish a 24” FL minimum size limit for the commercial or recreational harvest of dolphinfish in federal waters around St. Croix.
 - **Sub-action 3b - Preferred Alternative 2.** Establish a recreational bag limit in federal waters around St. Croix of 10 dolphinfish per person per day, not to exceed 32 dolphinfish per vessel per day, whichever is less.

- **Action 4.** Establish size limits (Sub-action 4a) and recreational bag limits (Sub-action 4b) for wahoo in federal waters around St. Croix.
 - **Sub-action 4a - Preferred Alternative 2.** Establish a 32” FL minimum size limit for the commercial or recreational harvest of wahoo in federal waters around St. Croix.
 - **Sub-action 4b - Preferred Alternative 3.** Establish a recreational bag limit in federal waters around St. Croix of 2 wahoo per person per day, not to exceed 10 wahoo per vessel per day, whichever is less.

- **Action 5.** Establish size limits (Sub-action 5a) and recreational bag limits (Sub-action 5b) for dolphinfish in federal waters around St. Thomas/St. John.
 - **Sub-action 5a - Preferred Alternative 3.** Establish a 24” FL minimum size limit for the commercial or recreational harvest of dolphinfish in federal waters around St. Thomas/St. John.
 - **Sub-action 5b - Preferred Alternative 2.** Establish a recreational bag limit in federal waters around St. Thomas/St. John of 10 dolphinfish per person per day, not to exceed 32 dolphinfish per vessel per day, whichever is less.

- **Action 6.** Establish size limits (Sub-action 6a) and recreational bag limits (Sub-action 6b) for wahoo in federal waters around St. Thomas/St. John.
 - **Sub-action 6 - Preferred Alternative 2.** Establish a 32” FL minimum size limit for the commercial or recreational harvest of wahoo in federal waters around St. Thomas/St. John.
 - **Sub-action 6b - Preferred Alternative 3.** Establish a recreational bag limit in federal waters around St. Thomas/St. John of 2 wahoo per person per day, not to exceed 10 wahoo per vessel per day, whichever is less.

Assessment of Biological Effects

Minimum size limits for dolphinfish and wahoo caught in federal waters around Puerto Rico (Sub-actions 1a and 2a), St. Croix (Sub-actions 3a and 4a), and St. Thomas/St. John (Sub-actions 5a and 6a) would be established and would be expected to reduce the amount of juveniles removed by commercial and recreational fishermen. More juveniles left in the water could increase the number of adult fish, which could improve the overall spawning potential of each fish population. Requiring size limits when there were none before could increase the number of fish that are caught that now have to be thrown back (regulatory discards). Fishermen can help increase survival of the returned fish through safe handling methods. The total benefits to the biological environment would depend on the number of fish that are returned to the water that survive to mature-sized lengths and if those adult fish have time to reproduce before being removed by the fisheries. Puerto Rico and U.S. Virgin Island (USVI) commercial landings are reported in total weight (pounds) not by number of fish caught, so the exact number of dolphinfish and wahoo that would remain in the population each year under the preferred alternatives is unknown. Recreational catch and effort information (available for Puerto Rico from 2000-2016) suggests that recreational fishermen generally catch dolphinfish and wahoo larger than the preferred size limits.

Recreational bag limits for dolphinfish and wahoo caught in federal waters around Puerto Rico (Sub-actions 1b and 2b), St. Croix (Sub-actions 3b and 4b), and St. Thomas/St. John (Sub-actions 5b and 6b) would be established and would be expected to limit the amount of fish that recreational fishermen could keep each day. This would help protect against over harvest of dolphinfish and wahoo and increase the sustainability of each population. Requiring bag limits when there were none before, and with the proposed size limits, could increase the number of fish that thrown back to the water (regulatory discards) or are selectively thrown back while trying to catch larger-size fish, for example. Recreational catch and effort information (available for Puerto Rico from 2000-2016) suggests that recreational fishermen generally catch one dolphinfish or wahoo per day.

Currently, the Southeast Fisheries Science Center lacks sufficient information to characterize the status of dolphinfish or wahoo. As an example, research conducted along the U.S. East Coast, Gulf of Mexico, and the Bahamas indicates that discard mortality of dolphinfish caught by the recreational sector ranges from 15%–40% (Rudershausen et al. 2019). For Puerto Rico and the U.S. Virgin Islands (USVI), additional fisheries information from the recreational sector for dolphinfish and wahoo would be needed to evaluate the quantitative biological benefits and costs of a particular size or bag limit. As such, the analysis in this amendment uses Puerto Rico data as a proxy and/or is qualitative.

Assessment of Economic Effects

Allowing unlimited harvest of undersized dolphinfish and wahoo could reduce the number of female fish that reach maturity and reproduce, which could have adverse indirect economic effects if the size of the dolphinfish and wahoo populations decrease. Similarly, allowing unlimited harvest of dolphinfish and wahoo by recreational anglers could decrease the population sizes. The preferred alternatives for establishing size limits and recreational bag limits would be expected to result in direct economic benefits if the population size increases. Adverse economic effects could occur if commercial and recreational landings decrease because under-size fish must be returned to the water, or if the number of discarded fish that do not survive increases. If the economic benefits from increased population size are greater than the negative economic effects from reduced landings reductions and increased dead discards, then net positive economic effects would be expected. The extent of these economic effects are unknown at this time.

Assessment of Social Effects

The proposed actions described in this amendment are intended to sustain dolphinfish and wahoo resources by limiting the size and number of dolphinfish and wahoo that may be kept during fishing trips. The preferred alternatives for establishing size limits would require that anyone fishing in federal waters ensure that the dolphinfish or wahoo they catch are of an appropriate size to avoid regulatory violations. This could lead to detrimental social effects in the near-term as fishermen adjust to the new fishing rules. However, the size limits would be expected to better sustain local dolphinfish and wahoo populations and provide for sustained fishing opportunities and associated social benefits over time. Similarly, establishing recreational bag limits could have negative, short-term social effects because the number of dolphinfish or wahoo that could be kept would now be limited. But longer-term benefits could occur through increased fishing opportunities for recreational participants over time.

Assessment of Effects on Participants in Fisheries Conducted in Adjacent Areas Under the Authority of Another Fishery Management Council

The actions in this amendment would apply to fishing conducted in federal waters off Puerto Rico, St. Croix, and St. Thomas/St. John. Fishery participants who fish for dolphinfish and wahoo in U.S. Caribbean federal waters (e.g., during annual fishing tournaments) would be required to comply with the proposed size limits and recreational bag limits. Additionally, fishermen targeting other species (e.g., highly migratory species) in U.S. Caribbean federal waters for which dolphinfish and wahoo are bycatch species would need to comply with the new regulations, if implemented.

Assessment of Effects on Safety at Sea

Amendment 3 is not expected to result in direct impacts to safety at sea, as the actions do not significantly affect current fishing practices.

Chapter 1. Introduction

1.1 What Actions are Being Proposed?

At the August 2022 meeting, the Caribbean Fishery Management Council (Council) requested staff prepare an amendment to the Puerto Rico, St. Croix, and St. Thomas/St. John Fishery Management Plans (FMP) to develop additional management measures for select pelagic stocks and stock complexes. At the December 2022 meeting, the Council discussed potentially establishing recreational bag limits, commercial trip limits, commercial size limits and/or recreational size limits for [dolphinsfish](#) (*Coryphaena hippurus*) and/or [wahoo](#) (*Acanthocybium solandri*) in the U.S. Virgin Islands (USVI) and for pelagic stocks¹ in Puerto Rico. Ultimately, the Council decided to amend each of the FMPs to address management measures for only dolphinsfish and wahoo (April 2023 Council meeting).

Amendment 3 to each of the Puerto Rico, St. Croix, and St. Thomas/St. John FMPs would establish minimum size limits and recreational bag limits for dolphinsfish and wahoo in federal waters around each island management area.

1.2 Why is the Council Considering Action?

Dolphinsfish and wahoo are new to federal fisheries management under the Puerto Rico, St. Croix, and St. Thomas/St. John FMPs, which were implemented on October 13, 2022. During FMP development, the Council recognized the economic importance of these fast-growing, short-lived pelagic species to the region and included them for management, even though, given their migratory nature, they are exposed to harvest pressure across a wide area of the Atlantic Ocean. Each FMP established annual catch limits (ACL), annual catch targets (ACT), and accountability measures (AM) for dolphinsfish and wahoo, but did not establish other management measures often used to limit harvest or effort such as size limits, recreational bag limits, or commercial trip limits.

The Council is considering establishing minimum size limits for dolphinsfish and wahoo for all fishing in federal waters (commercial and recreational sectors) because of the potential for small-sized (i.e., juvenile) individuals to be caught year-round and the annual influx of Sargassum in the region, which attracts these species and acts as a fish aggregating device (FAD).² Although there currently is not a large market for the smaller-sized fish, the Council recognizes that a fishery could develop in the future and would like to be proactive on management of these

¹ Pelagic stocks managed under the Puerto Rico FMP that were originally identified by the Council for consideration of additional management measures included: dolphinsfish, pompano dolphinsfish, wahoo, king mackerel, cero mackerel, little tunny, and blackfin tuna. Pompano dolphinsfish is not included in the measures in this amendment.

² [Fish aggregating devices](#) are floating objects that are designed and strategically placed to attract pelagic fish.

species. Protecting smaller-sized fish increases the potential for these fish to enter the fishery and to have enough time to reproduce.

The Council is also considering establishing recreational bag limits as this would help regulate the harvest of dolphinfish and wahoo in federal waters by the recreational sector, for which catch and effort information are either limited or not available. Recreational ACLs were established for dolphinfish and wahoo under the Puerto Rico FMP, but the [Marine Recreational Information Program](#) that collected recreational fisheries statistics for Puerto Rico was suspended in 2017 and has not resumed to date. Additionally, the National Marine Fishery Service's (NMFS) [National Saltwater Angler Registry](#) compiles a list of recreational anglers, and while it is mandatory for recreational anglers in Puerto Rico and the USVI, compliance is low. Some information is available from recreational fishing tournaments from Puerto Rico and the USVI, but are likely an under representation of the number of anglers that target dolphinfish or wahoo. Thus, the number of recreational anglers and the amount of dolphinfish or wahoo that they catch are largely unknown for the region. Setting a daily bag limit for this sector in both Puerto Rico and the USVI would reduce the chance of overfishing the resource, while allowing anglers access to the fishery.

Actions to establish commercial trip limits for dolphinfish and wahoo were considered (Appendix A), but since the commercial landings available for the stocks have been and continue to be below the corresponding ACL, the Council determined that additional harvest constraints are not needed at this time and thus removed the commercial trip limit actions from detailed analysis.

1.2.1 Statement of Purpose and Need

The purpose of Amendment 3 is to establish size limits and recreational bag limits for dolphinfish and wahoo under the Puerto Rico FMP, the St. Croix FMP and the St. Thomas/St. John FMP.

The need for Amendment 3 is to develop conservation and management measures for dolphinfish and wahoo stocks in Puerto Rico and the USVI to ensure undersized individuals have adequate time to mature and reproduce and to take a precautionary approach to management to protect against overfishing for resources with limited management structure.

1.3 Where Will the Action Have an Effect?

Under the Puerto Rico, St. Croix, and St. Thomas/St. John FMPs, the Council is responsible for managing fishery resources, including dolphinfish and wahoo, in federal waters (Figure 1.1). Federal waters around Puerto Rico extend 9-200 nautical miles (17-370 kilometers) from the shoreline to the outer boundary of the exclusive economic zone (EEZ) around Puerto Rico. Federal waters around St. Croix and St. Thomas/St. John extend 3-200 nautical miles (6-370 kilometers) from the shoreline of the respective island or island group to the outer boundary of the EEZ around those islands.

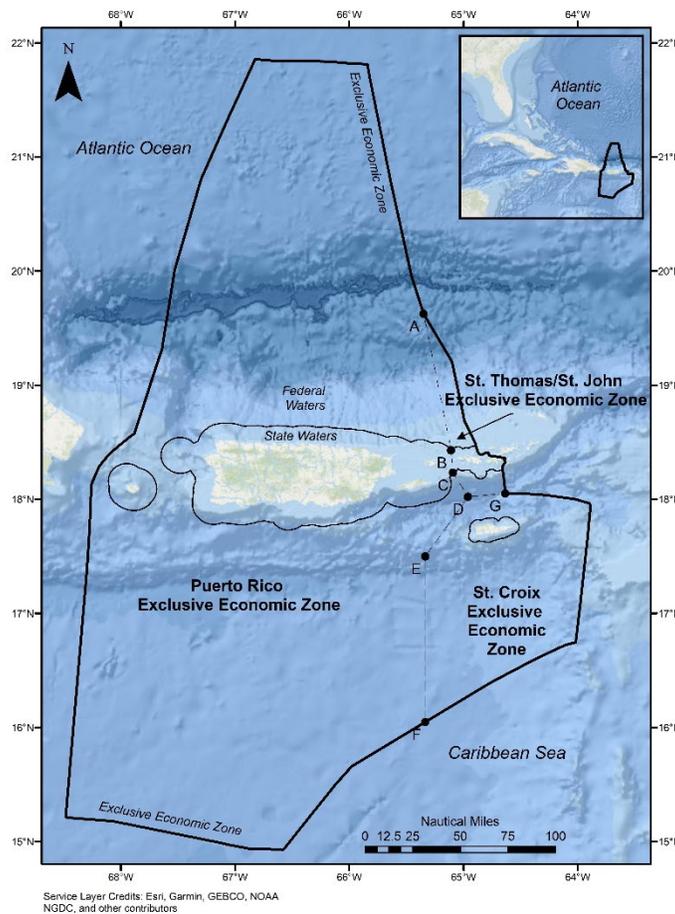


Figure 1.1. U.S. Caribbean region with boundaries between the Puerto Rico, St. Croix, and St. Thomas/St. John management areas.

1.4 History of Federal Fisheries Management

The **Puerto Rico FMP** (CFMC 2019a), the **St. Croix FMP** (CFMC 2019b) and the **St. Thomas/St. John FMP** (CFMC 2019c) established management measures for federal waters around each island or island group. The FMPs identified species to be managed in federal waters and if those species would be managed as a single stock or in a stock complex; specified management reference points for the stocks and stock complexes; updated accountability measures; described essential fish habitat for managed species; and updated FMP framework procedures. The FMPs were effective on October 13, 2022 ([87 FR 56204](#)). Management measures applicable to dolphinfish and wahoo under the FMPs include:

- Finfish in or from the EEZ around Puerto Rico, St. Croix, and St. Thomas/St. John must be maintained with head and fins intact³ ([50 CFR 622.10\(a\)](#));
- ACLs and ACTs were specified for dolphinfish and wahoo ([50 CFR 622.440\(b\)](#), [50 CFR 622.480\(b\)](#) and [50 CFR 622.515\(b\)](#));
- AMs were specified for the pelagic species new to management, including dolphinfish and wahoo: At or near the beginning the fishing year, landings will be evaluated relative to the ACT for the stock based on a moving multi-year average of landings. If NMFS estimates that landings have exceeded the ACT, NMFS in consultation with the Council will determine appropriate corrective action ([50 CFR 622.440\(b\)\(7\)](#), [50 CFR 622.480\(b\)\(3\)](#) and [50 CFR 622.515\(b\)\(3\)](#)); and
- Seasonal area closures applicable to all fishing, which includes dolphinfish and wahoo:
 - From December 1 through the last day of February, fishing is prohibited in Abrir La Sierra Bank west of Puerto Rico ([50 CFR 622.439\(a\)\(1\)](#));
 - From December 1 through the last day of February, fishing is prohibited in those parts of Tourmaline Bank that are in the EEZ around Puerto Rico ([50 CFR 622.439\(a\)\(2\)](#));
 - From March 1 through June 30, fishing is prohibited in those parts of the mutton snapper spawning aggregation area that are in the EEZ around St. Croix ([50 CFR 622.479\(a\)\(1\)](#));
 - From December 1 through the last day of February, fishing is prohibited in the red hind spawning aggregation area east of St. Croix ([50 CFR 622.479\(a\)\(2\)](#));
 - From February 1 through April 30, no person may fish for or possess any species of fish, except highly migratory species, in or from Grammanik Bank ([50 CFR 622.514\(a\)\(1\)](#));
 - Fishing for any species is prohibited year-round in those parts of the Hind Bank Marine Conservation District that are in the EEZ around St. Thomas ([50 CFR 622.514\(a\)\(2\)](#)).

³ There are exceptions for “bait” and consumption at sea.

Amendment 1 (CFMC 2022) to the Puerto Rico, St. Croix, and St. Thomas/St. John FMPs prohibited the use of buoy gear for those fishing recreationally in federal waters around management area. For those fishing commercially in federal waters around Puerto Rico, St. Croix, and St. Thomas/St. John, the amendment modified the definition of buoy gear by increasing the maximum number of hooks allowed between the buoy and the terminal end from 10 to 25. Amendment 1 was effective on August 21, 2023 ([88 FR 46692](#)).

Amendment 2 to the Puerto Rico, St. Croix, and St. Thomas/St. John FMPs (in preparation) would prohibit the use of trawl gear (bottom and mid-water trawls), and certain types of drift net gear (gillnets, trammel nets, and purse seines) in U.S. Caribbean federal waters.

Chapter 2. Proposed Actions

2.1 Action 1: Establish new management measures for dolphinfish in federal waters around Puerto Rico

2.1.1 Action 1(a). Establish a minimum size limit for dolphinfish applicable to all fishing (commercial and recreational)

Alternative 1. No Action. There are no minimum size limits for the commercial or recreational harvest of dolphinfish in federal waters around Puerto Rico.

Alternative 2. Establish a 20” fork length (FL) minimum size limit for the commercial and recreational harvest of dolphinfish in federal waters around Puerto Rico.

Alternative 3 (Preferred). Establish a 24” FL minimum size limit for the commercial and recreational harvest of dolphinfish in federal waters around Puerto Rico.

Discussion and Comparison of Alternatives

Currently, dolphinfish is not managed with a minimum size limit in federal waters around Puerto Rico (**Alternative 1**) and fishermen can catch and remove all sizes of dolphinfish. **Alternative 2** would establish a 20” FL size limit, which corresponds to the size at which approximately 50% of females are mature (i.e., capable of reproducing).⁴ **Preferred Alternative 3** would establish a 24” FL size limit, which corresponds to the size at which approximately all females are mature. Compared to **Alternative 1**, **Alternative 2** and **Preferred Alternative 3** would be expected to result in direct biological, economic, and social benefits commensurate with anticipated population improvements. However, the establishment of a minimum size limit would also be expected to result in adverse short-term social and economic effects due to potential decreases in commercial and recreational dolphinfish landings and increases in regulatory discards.⁵ Testimony from Puerto Rico’s Department of Natural and Environmental Resources (DNER) staff noted that the number of under sized dolphinfish brought in during fishing tournaments has increased in recent years (August 2023 Council meeting). Even though the socio-economic costs could be greater under **Preferred Alternative 3**, this alternative would help managers reduce fishing pressure on the species, especially due to the lack of recreational landings information and the aggregating nature of dolphinfish on Sargassum habitat and fish aggregating devices (FAD) (Merten et al. 2023).

⁴ Perez, R.N. and Y. Sadovy. 1991. <http://proceedings.gcfi.org/proceedings/preliminary-data-on-landing-records-and-reproductive-biology-of-coryphaena-hippurus-l-in-puerto-rico/>

⁵ Fish that are caught but discarded because regulations do not allow fishermen to retain the fish; for example, fishermen may be required to discard fish under a certain size or of a specific species.

Analyses conducted using the Southeast Fisheries Science Center’s (SEFSC) Trip Interview Program (TIP) length and weight data from dolphinfish harvested by the commercial sector found that the proposed size limits under both **Alternative 2** and **Preferred Alternative 3** would likely reduce the commercial landings of dolphinfish by less than 1% (Appendix B1, Table 1.1) because only a small proportion of dolphinfish harvested are less than 20” FL or 24” FL. Analyses conducted using length data collected during the Marine Recreational Fishery Statistics Survey (MRFSS) of recreational anglers found that the predicted reduction in harvest for dolphinfish in federal waters would be less than 2% under **Alternative 2** and approximately 15% under **Preferred Alternative 3** (Appendix B2, Table 2.1).⁶

2.1.2 Action 1(b). Establish a recreational bag limit for dolphinfish

Alternative 1. No Action. There is no recreational bag limit for dolphinfish in federal waters around Puerto Rico.

Alternative 2. Establish a recreational bag limit in federal waters around Puerto Rico of 10 dolphinfish per person per day, not to exceed 30 dolphinfish per vessel per day, whichever is less.

Alternative 3 (Preferred). Establish a recreational bag limit in federal waters around Puerto Rico of 5 dolphinfish per person per day, not to exceed 15 dolphinfish per vessel per day, whichever is less.

Discussion and Comparison of Alternatives

Currently, dolphinfish is not managed with a recreational bag limit in federal waters around Puerto Rico (**Alternative 1**) and anglers can keep all dolphinfish caught. **Alternative 2** would establish a daily bag limit of 10 per person/30 per vessel, which would be compatible with regulations that apply in territorial waters around Puerto Rico established by Puerto Rico’s DNER.⁷ Compared to **Alternative 1**, **Alternative 2** could result in a greater amount of dolphinfish available (i.e., more dolphinfish would be left in the water) if recreational fishermen regularly catch and keep more than 10 dolphinfish per day. Because the bag limit under **Alternative 2** would be compatible with state regulations, this alternative would have the greatest benefit for enforcement agencies. **Preferred Alternative 3** proposes a daily bag limit of 5 per person/15 per vessel, which is a more restrictive bag limit than **Alternative 2** and **Alternative 1**, and would be expected to result in a greater amount of fish left in the water. **Alternative 2** and **Preferred Alternative 3** would be expected to result in direct biological, economic, and social benefits commensurate with anticipated population improvements. However, the establishment of a recreational bag limit could also be expected to result in adverse

⁶ Results are based on the assumption that the size of dolphinfish landed by recreational anglers in federal waters has not changed since the MRFSS length data were collected in 2000-2017.

⁷ During the December 2023 Council meeting, the DNER representative mentioned that the DNER was considering reducing their recreational bag limit in state waters, which could be compatible with **Preferred Alternative 3**.

short-term social and economic effects due to the associated increase in discards, especially if recreational anglers catch and release smaller fish while trying to harvest larger fish to retain subject to the bag limit. **Preferred Alternative 3** would result in more conservative management for dolphinfish when compared to **Alternatives 2** and **1**, but could result in greater costs to the recreational sector. **Preferred Alternative 3** would help managers account for the lack of recent (2017 and later) recreational landings information, and the aggregating nature of this species on Sargassum habitat and FADs (Merten et al. 2023).

Analyses conducted using catch and effort data collected during the MRFSS⁸ found that the majority of recreational anglers harvested only one dolphinfish per trip (Appendix B3, Figure 3.3) and that the predicted reduction in harvest for dolphinfish in federal waters would be approximately 3% under **Alternative 2** and 15% under **Preferred Alternative 3** (Appendix B3, Table 3.1).⁹ A study of the north coast of Puerto Rico reported that several trips resulted in zero dolphinfish catch; charter vessels averaged 3.4 dolphinfish per trip and recreational vessels averaged 3.7 dolphinfish per trip (Merten et al. 2023). Even though the MRFSS data is less recent than the Merten et al. (2023) study, the effects analysis in this document used the MRFSS data because it was for a longer period and included all coasts of Puerto Rico.

2.2 Action 2: Establish new management measures for wahoo in federal waters around Puerto Rico

2.2.1 Action 2(a). Establish a minimum size limit for wahoo applicable to all fishing (commercial and recreational)

Alternative 1. No Action. There are no minimum size limits for the commercial or recreational harvest of wahoo in federal waters around Puerto Rico.

Alternative 2 (Preferred). Establish a 32” FL minimum size limit for commercial or recreational harvest of wahoo in federal waters around Puerto Rico.

Alternative 3. Establish a 40” FL minimum size limit for commercial or recreational harvest of wahoo in federal waters around Puerto Rico.

Discussion and Comparison of Alternatives

Currently, wahoo is not managed with a minimum size limit in federal waters around Puerto Rico (**Alternative 1**) and fishers can catch and remove all sizes of wahoo. **Preferred Alternative 2** would establish a 32” FL size limit, which corresponds to the size at which

⁸ The only recreational catch data from the U.S. Caribbean was collected in Puerto Rico, via MRFSS. MRFSS later became the Marine Recreational Information Program, which for Puerto Rico, did not differ from the MRFSS.

⁹ These results assume that fishing behavior and landings from 2000-2017 MRFSS data correspond with the current fishing behavior and landings of recreational anglers in federal waters.

approximately 25% of females are mature (i.e., capable of reproducing).¹⁰ **Alternative 3** would establish and 40" FL size limit, which corresponds to the size at which approximately all females are mature. Compared to **Alternative 1**, **Preferred Alternative 2** and **Alternative 3** would be expected to result in direct biological/ecological, economic, and social benefits commensurate with anticipated population improvements. However, the establishment of a minimum size limit would also be expected to result in adverse short-term social and economic effects due to potential decreases in commercial and recreational dolphinfish landings and increases in regulatory discards. Public testimony during the August 2023 Council meeting noted that smaller wahoo (~ 32" FL) will often swallow the bait and tackle whole, and recreational fishermen have to cut the line to release the fish. If the larger size limit (**Alternative 3**) was selected, then these smaller sized wahoo that have swallowed the tackle whole would likely be returned as dead discards. It was noted that the majority of the wahoo caught by recreational fishermen are smaller than 40 inches; as such, **Alternative 3** would result in a greater number of fish being discarded with a low survival rate, which in turn could negatively affect recreational fishing for this species. Even though **Alternative 3** would provide greater benefits to the wahoo population, the more conservative management under **Preferred Alternative 2** would still provide some benefit to the population compared to **Alternative 1**, but would provide greater benefits to the recreational sector (i.e., socio-economic effects) than **Alternative 3**.

Analyses conducted using the SEFSC's TIP length and weight data from wahoo harvested by the commercial sector found that the proposed size limits under both **Preferred Alternative 2** and **Alternative 3** would likely reduce the commercial landings of wahoo by 12% and 38%, respectively (Appendix B4, Table 4.1). Analyses conducted using the MRFSS of recreational anglers found that the predicted reduction in harvest for wahoo would be approximately 33% under **Preferred Alternative 2** and 76% under **Alternative 3** (Appendix B2, Table 2.2).¹¹

2.2.2 Action 2(b). Establish a recreational bag limit for wahoo

Alternative 1. No Action. There is no recreational bag limit for wahoo in federal waters around Puerto Rico.

Alternative 2 (Preferred). Establish a recreational bag limit in federal waters around Puerto Rico of 5 wahoo per person per day, not to exceed 10 wahoo per vessel per day, whichever is less.

Alternative 3. Establish a recreational bag limit in federal waters around Puerto Rico of 2 wahoo per person per day, not to exceed 6 wahoo per vessel per day, whichever is less.

¹⁰ Figuerola-Fernandez et al. 2008. <https://www.drna.pr.gov/historico/oficinas/arn/recursosvivientes/negociado-de-pesca-y-vida-silvestre/laboratorio-de-investigaciones-pesqueras-1/publicaciones/Informe%20Final%20F48%20revisado.pdf>

¹¹ Results are based on the assumption that the size of wahoo landed by recreational anglers has not changed since the MRFSS length data were collected in 2000-2017.

Discussion and Comparison of Alternatives

Currently, wahoo is not managed with a recreational bag limit in federal waters around Puerto Rico (**Alternative 1**) and anglers can keep all wahoo caught. **Preferred Alternative 2** would establish a daily bag limit of 5 per person/10 per vessel per day, which would be compatible with regulations that apply in territorial waters around Puerto Rico. Compared to **Alternative 1**, **Preferred Alternative 2** could result in a greater amount of wahoo available (i.e., more wahoo would be left in the water) if recreational fishermen regularly catch and keep more than 5 wahoo per day. Because the bag limit under **Preferred Alternative 2** would be compatible with state regulations, this alternative would have the greatest benefit for enforcement agencies.

Alternative 3 proposes a daily bag limit of 2 wahoo per person/6 per vessel, which is a more restrictive bag limit than **Preferred Alternative 2** and **Alternative 1**, and would be expected to result in a greater amount of fish left in the water. **Preferred Alternative 2** and **Alternative 3** would be expected to result in direct biological, economic, and social benefits commensurate with anticipated population improvements. However, the establishment of a recreational bag limit could also be expected to result in adverse short-term social and economic effects due to the associated increase in discards, especially if recreational anglers catch and release smaller fish while trying to harvest larger fish to retain subject to the bag limit. In light of the lack of recent (2017 and later) recreational landings information, and due to the aggregating nature of this species on Sargassum habitat (Merten et al. 2023), **Alternative 3** could result in more wahoo returned to the water, which would be a more conservative option for managing the stock when compared to **Preferred Alternative 2** and **Alternative 1**. However, the socio-economic and administrative effects under **Preferred Alternative 2** would be greater than **Alternative 3**.

Analyses conducted using catch and effort data collected during the MRFSS, found that the majority of recreational anglers harvested only one wahoo per trip (Appendix B3, Figure 3.4) and that the predicted reduction in harvest for wahoo in federal waters would be less than 2% under **Preferred Alternative 2** and approximately 10% under **Alternative 3** (Appendix B3, Table 3.2).¹² A study of the north coast of Puerto Rico reported that the majority of trips resulted in zero wahoo catch; the average wahoo per trip for all vessels (commercial, charter, and recreational vessels) was 0.11 wahoo per trip (Merten et al. 2023). Even though the MFRSS data is less recent than the Merten et al. (2023) study, the effects analysis in this document used the MFRSS data because it was for a longer period and included all coasts of Puerto Rico.

¹² These results assume that fishing behavior and landings from 2000-2017 MRFSS data correspond with the current fishing behavior and landings of recreational anglers in federal waters.

2.3 Action 3: Establish new management measures for dolphinfish in federal waters around St. Croix

2.3.1 Action 3(a). Establish a minimum size limit for dolphinfish applicable to all fishing (commercial and recreational)

Alternative 1. No Action. There are no minimum size limits for the commercial or recreational harvest of dolphinfish in federal waters around St. Croix.

Alternative 2. Establish a 20” FL minimum size limit for the commercial or recreational harvest of dolphinfish in federal waters around St. Croix.

Alternative 3 (Preferred). Establish a 24” FL minimum size limit for the commercial or recreational harvest of dolphinfish in federal waters around St. Croix.

Discussion and Comparison of Alternatives

Dolphinfish is currently not managed with minimum size limits in federal waters around St. Croix (**Alternative 1**) and all sizes of dolphinfish can be caught and removed from the fishery. **Alternative 2** would establish a 20” FL size limit, which corresponds to the size at which approximately 50% of females are mature (i.e., capable of reproducing).¹³ **Preferred Alternative 3** would establish a 24” FL size limit, which corresponds to the size at which approximately all females are mature. Compared to **Alternative 1**, **Alternative 2** and **Preferred Alternative 3** would be expected to result in direct biological/ecological, economic, and social benefits commensurate with anticipated population improvements. However, the establishment of a minimum size limit would also be expected to result in adverse short-term social and economic effects due to potential decreases in commercial and recreational dolphinfish landings and increases in regulatory discards. Even though the socio-economic costs could be greater under **Preferred Alternative 3**, this alternative would help managers reduce fishing pressure on the species, especially due to the lack of recreational landings information and the aggregating nature of dolphinfish on Sargassum habitat and FADs (Merten et al. 2023).

Analyses conducted using the SEFSC’s TIP length and weight data from dolphinfish harvested by the commercial sector found that the proposed size limits under both **Alternative 2** and **Preferred Alternative 3** would likely reduce the commercial landings of dolphinfish by less than 5% (Appendix B1, Table 1.2) because dolphinfish that were harvested that were less than 20” FL or 24” FL were small fish with low weights. Recreational data are not available for St. Croix; therefore, analysis of the proposed size limits was not conducted. If the recreational length data from Puerto Rico are used as a proxy for St. Croix, then the predicted reduction in

¹³ Perez, R.N. and Y. Sadovy. 1991. <http://proceedings.gcfi.org/proceedings/preliminary-data-on-landing-records-and-reproductive-biology-of-coryphaena-hippurus-l-in-puerto-rico/>

harvest for dolphinfish in federal waters would be expected to be less than 2% under **Alternative 2** and approximately 15% under **Preferred Alternative 3** (Appendix B2, Table 2.1).

2.3.2 Action 3(b). Establish a recreational bag limit for dolphinfish

Alternative 1. No Action. There is no recreational bag limit for dolphinfish in federal waters around St. Croix.

Alternative 2 (Preferred). Establish a recreational bag limit in federal waters around St. Croix of 10 dolphinfish per person per day, not to exceed 32 dolphinfish per vessel per day, whichever is less.

Alternative 3. Establish a recreational bag limit in federal waters around St. Croix of 5 dolphinfish per person per day, not to exceed 15 dolphinfish per vessel per day, whichever is less.

Discussion and Comparison of Alternatives

Currently, dolphinfish is not managed with a recreational bag limit in federal waters around St. Croix (**Alternative 1**) and anglers can keep all dolphinfish caught. **Preferred Alternative 2** would establish a daily bag limit of 10 per person/32 per vessel, which would be compatible with new regulations established by the U.S. Virgin Islands' (USVI) Department of Planning and Natural Resources (DPNR) that apply to territorial waters off St. Croix. The new DPNR regulations have not been implemented at the time this amendment was prepared. Compared to **Alternative 1**, **Preferred Alternative 2** could result in a greater amount of dolphinfish available (i.e., more dolphinfish would be left in the water) if recreational fishermen regularly catch and keep more than 10 dolphinfish per day. Because the bag limit under **Preferred Alternative 2** would be compatible with state regulations, this alternative would have the greatest benefit for enforcement agencies. **Alternative 3** proposes a more restrictive bag limit compared to **Preferred Alternative 2** and **Alternative 1**, which would be expected to result in a greater amount of fish left in the water. **Preferred Alternative 2** and **Alternative 3** would be expected to result in direct biological, economic, and social benefits commensurate with anticipated population improvements. However, the establishment of a recreational bag limit could also be expected to result in adverse short-term social and economic effects due to the associated increase in discards, especially if recreational anglers catch and release smaller fish while trying to harvest larger fish to retain subject to the bag limit. In light of the lack recreational landings information, and due to the aggregating nature of this species on Sargassum habitat (Merten et al. 2023), **Alternative 3** could result in more dolphinfish returned to the water, which would be a more conservative option for managing the stock when compared to **Preferred Alternative 2** and **Alternative 1**. However, the socio-economic and administrative effects under **Preferred Alternative 2** would be greater than **Alternative 3**.

At the time this amendment was prepared, recreational data were not available for St. Croix. However, the proposed recreational bag limits for dolphinfish that would be allowed per angler or per vessel per day were developed through the Council process, including input from each District Advisory Panel (DAP) and the public, and are expected to best represent catch and effort levels that could occur under current fishing practices. For the minimum size limit action (Action 3(a)), the Puerto Rico recreational length data of dolphinfish were used as a proxy for St. Croix because it is expected that the size of fish throughout U.S. Caribbean waters would be similar. However, for recreational catch and effort data (e.g., the number of recreational anglers and methods used when fishing) are likely very different among the islands, and therefore analysis of the proposed recreational bag limits was not conducted.

2.4 Action 4: Establish new management measures for wahoo in federal waters around St. Croix

2.4.1 Action 4(a). Establish a minimum size limit for wahoo applicable to all fishing (commercial and recreational)

Alternative 1. No Action. There are no minimum size limits for the commercial or recreational harvest of wahoo in federal waters around St. Croix.

Alternative 2 (Preferred). Establish a 32” FL minimum size limit for the commercial or recreational harvest of wahoo in federal waters around St. Croix.

Alternative 3. Establish a 40” FL minimum size limit for the commercial or recreational harvest of wahoo in federal waters around St. Croix.

Discussion and Comparison of Alternatives

Wahoo is currently not managed with minimum size limits in federal waters around St. Croix (**Alternative 1**) and all sizes of wahoo can be caught and removed from the fishery. **Preferred Alternative 2** would establish a 32” FL size limit, which corresponds to the size at which approximately 25% of females are mature (i.e., capable of reproducing).¹⁴ **Alternative 3** would establish a 40” FL size limit, which corresponds to the size at which approximately all females are mature. Compared to **Alternative 1**, **Preferred Alternative 2** and **Alternative 3** would be expected to result in direct biological/ecological, economic, and social benefits commensurate with anticipated population improvements. However, the establishment of a minimum size limit would also be expected to result in adverse short-term social and economic effects due to potential decreases in commercial and recreational dolphinfish landings and increases in regulatory discards. Public testimony during the August 2023 Council meeting noted that

¹⁴ Figuerola-Fernandez et al. 2008. <https://www.drna.pr.gov/historico/oficinas/arn/recursosvivientes/negociado-de-pesca-y-vida-silvestre/laboratorio-de-investigaciones-pesqueras-1/publicaciones/Informe%20Final%20F48%20revisado.pdf>

smaller wahoo (~ 32" FL) will often swallow the bait and tackle whole, and recreational fishermen have to cut the line to release the fish. If the larger size limit (**Alternative 3**) was selected, then these smaller sized wahoo that have swallowed the tackle whole would likely be returned as dead discards. It was noted that the majority of the wahoo caught by recreational fishermen are smaller than 40 inches; as such, **Alternative 3** would result in a greater number of fish being discarded with a low survival rate, which in turn could negatively affect recreational fishing for this species. Even though **Alternative 3** would provide greater benefits to the wahoo population, the more conservative management under **Preferred Alternative 2** would still provide some benefit to the population compared to **Alternative 1**, but would provide greater benefits to the recreational sector (i.e., socio-economic effects) than **Alternative 3**.

Analyses conducted using the SEFSC's TIP length and weight data from wahoo harvested by the commercial sector found that the proposed size limits under both **Preferred Alternative 2** and **Alternative 3** would likely reduce the commercial landings of wahoo by 2% and 45%, respectively (Appendix B4, Table 4.2). Recreational data are not available for St. Croix; therefore, analysis of the proposed size limits was not conducted. If the recreational length data from Puerto Rico are used as a proxy for St. Croix, then the predicted reduction in harvest for wahoo in federal waters would be approximately 33% under **Preferred Alternative 2** and 76% under **Alternative 3** (Appendix B2, Table 2.2).

2.4.2 Action 4(b). Establish a recreational bag limit for wahoo

Alternative 1. No Action. There is no recreational bag limit for wahoo in federal waters around St. Croix.

Alternative 2. Establish a recreational bag limit in federal waters around St. Croix of 4 wahoo per person per day, not to exceed 20 wahoo per vessel per day, whichever is less.

Alternative 3 (Preferred). Establish a recreational bag limit in federal waters around St. Croix of 2 wahoo per person per day, not to exceed 10 wahoo per vessel per day, whichever is less.

Discussion and Comparison of Alternatives

Currently, wahoo is not managed with a recreational bag limit in federal waters around St. Croix (**Alternative 1**) and anglers can keep all wahoo caught. **Alternative 2** would establish a daily bag limit of 4 per person/20 per vessel, which would be compatible with new regulations established by the USVI's DPNR that apply in territorial waters around St. Croix. The new DPNR regulations have not been implemented at the time this amendment was prepared. Compared to **Alternative 1**, **Alternative 2** could result in a greater amount of wahoo available (i.e., more wahoo would be left in the water) if recreational fishermen regularly catch and keep more than 4 wahoo per day. Because the bag limit under **Alternative 2** would be compatible with state regulations, this alternative would have the greatest benefit for enforcement agencies. **Preferred Alternative 3** proposes a more restrictive bag limit compared to **Alternative 2** and

Alternative 1, which would be expected to result in a greater amount of fish left in the water. **Alternative 2** and **Preferred Alternative 3** would be expected to result in direct biological, economic, and social benefits commensurate with anticipated population improvements. However, the establishment of a recreational bag limit could also be expected to result in adverse short-term social and economic effects due to the associated increase in discards, especially if recreational anglers catch and release smaller fish while trying to harvest larger fish to retain subject to the bag limit. Public testimony during the August 2023 Council meeting noted that due to the deep water so close to shore, that wahoo are caught in territorial waters as well as federal waters, so compatibility with DPNR regulations would be beneficial. However, some Cruzan fishermen travel north and fish the North Drop off St. Thomas, so compatibility of federal regulations with St. Thomas/St. John would also be beneficial. **Preferred Alternative 3** would result in more conservative management for wahoo when compared to **Alternatives 2** and **1**, and would be compatible with the preferred alternative for wahoo selected for St. Thomas/St. John, but could result in greater costs to the recreational sector. **Preferred Alternative 3** would help managers account for the lack of recreational landings information, and the aggregating nature of this species on Sargassum habitat and FADs (Merten et al. 2023).

At the time this amendment was prepared, recreational data were not available for St. Croix. However, the proposed recreational bag limits for wahoo that would be allowed per angler or per vessel per day were developed through the Council process, including input from each DAP and the public, and are expected to best represent catch and effort levels that could occur under current fishing practices. For the minimum size limit action (Action 4(a)), the Puerto Rico recreational length data of wahoo were used as a proxy for St. Croix because it is expected that the size of fish throughout U.S. Caribbean waters would be similar. However, for recreational catch and effort data (e.g., the number of recreational anglers and methods used when fishing) are likely very different among the islands, and therefore analysis of the proposed recreational bag limits was not conducted.

2.5 Action 5: Establish new management measures for dolphinfish in federal waters around St. Thomas and St. John

2.5.1 Action 5(a). Establish a minimum size limit for dolphinfish applicable to all fishing (commercial and recreational)

Alternative 1. No Action. There are no minimum size limits for the commercial or recreational harvest of dolphinfish in federal waters around St. Thomas/St. John.

Alternative 2. Establish a 20” FL minimum size limit for the commercial or recreational harvest of dolphinfish in federal waters around St. Thomas/St. John.

Alternative 3 (Preferred). Establish a 24” FL minimum size limit for the commercial or recreational harvest of dolphinfish in federal waters around St. Thomas/St. John.

Discussion and Comparison of Alternatives

Dolphinfish is currently not managed with minimum size limits in federal waters around St. Thomas/St. John (**Alternative 1**) and all sizes of dolphinfish can be caught and removed from the fishery. **Alternative 2** would establish a 20” FL size limit, which corresponds to the size at which approximately 50% of females are mature (i.e., capable of reproducing).¹⁵ **Alternative 3** would establish a 24” FL size limit, which corresponds to the size at which approximately all females are mature. Compared to **Alternative 1**, **Alternative 2** and **Preferred Alternative 3** would be expected to result in direct biological/ecological, economic, and social benefits commensurate with anticipated population improvements. However, the establishment of a minimum size limit would also be expected to result in adverse short-term social and economic effects due to potential decreases in commercial and recreational dolphinfish landings and increases in regulatory discards. Even though the socio-economic costs could be greater under **Preferred Alternative 3**, this alternative would help managers reduce fishing pressure on the species, especially due to the lack of recreational landings information and the aggregating nature of dolphinfish on Sargassum habitat and FADs (Merten et al. 2023).

Analyses conducted using the SEFSC’s TIP length and weight data from dolphinfish harvested by the commercial sector found that the proposed size limits under both **Alternative 2** and **Preferred Alternative 3** would likely reduce the commercial landings of dolphinfish by less than 1% (Appendix B1, Table 1.3). Recreational data are not available for St. Thomas/St. John; therefore, analysis of the proposed size limits was not conducted. If the recreational length data from Puerto Rico are used as a proxy for St. Thomas/St. John, then the predicted reduction in harvest for dolphinfish in federal waters would be expected to be less than 2% under **Alternative 2** and approximately 15% under **Preferred Alternative 3** (Appendix B2, Table 2.1).

¹⁵ Perez, R.N. and Y. Sadovy. 1991. <http://proceedings.gcfi.org/proceedings/preliminary-data-on-landing-records-and-reproductive-biology-of-coryphaena-hippurus-l-in-puerto-rico/>

2.5.2 Action 5(b). Establish a recreational bag limit for dolphinfish

Alternative 1. No Action. There is no recreational bag limit for dolphinfish in federal waters around St. Thomas/St. John.

Alternative 2 (Preferred). Establish a recreational bag limit in federal waters around St. Thomas/St. John of 10 dolphinfish per person per day, not to exceed 32 dolphinfish per vessel per day, whichever is less.

Alternative 3. Establish a recreational bag limit in federal waters around St. Thomas/St. John of 5 dolphinfish per person per day, not to exceed 15 dolphinfish per vessel per day, whichever is less.

Discussion and Comparison of Alternatives

Currently, dolphinfish is not managed with a recreational bag limit in federal waters around St. Thomas/St. John (**Alternative 1**) and anglers can keep all dolphinfish caught. **Preferred Alternative 2** would establish a daily bag limit of 10 per person/32 per vessel, which would be compatible with new regulations established by the USVI's DPNR that apply in territorial waters around St. Thomas/St. John. The new DPNR regulations have not been implemented at the time this amendment was prepared. Compared to **Alternative 1**, **Preferred Alternative 2** could result in a greater amount of dolphinfish available (i.e., more dolphinfish would be left in the water) if recreational fishermen regularly catch and keep more than 10 dolphinfish per day. Because the bag limit under **Preferred Alternative 2** would be compatible with state regulations, this alternative would have the greatest benefit for enforcement agencies. **Alternative 3** proposes a more restrictive bag limit compared to **Preferred Alternative 2** and **Alternative 1**, which would be expected to result in a greater amount of fish left in the water. **Preferred Alternative 2** and **Alternative 3** would be expected to result in direct biological, economic, and social benefits commensurate with anticipated population improvements. However, the establishment of a recreational bag limit could also be expected to result in adverse short-term social and economic effects due to the associated increase in discards, especially if recreational anglers catch and release smaller fish while trying to harvest larger fish to retain subject to the bag limit. In light of the lack recreational landings information, and due to the aggregating nature of this species on Sargassum habitat (Merten et al. 2023), **Alternative 3** could result in more dolphinfish returned to the water, which would be a more conservative option for managing the stock when compared to **Preferred Alternative 2** and **Alternative 1**. However, the socio-economic and administrative effects under **Preferred Alternative 2** would be greater than **Alternative 3**.

At the time this amendment was prepared, recreational data were not available for St. Thomas/St. John. However, the proposed recreational bag limits for dolphinfish that would be allowed per angler or per vessel per day were developed through the Council process, including input from each DAP and the public, and are expected to best represent catch and effort levels that could

occur under current fishing practices. For the minimum size limit action (Action 5(a)), the Puerto Rico recreational length data of dolphinfish were used as a proxy for St. Thomas/St. John because it is expected that the size of fish throughout U.S. Caribbean waters would be similar. However, for recreational catch and effort data (e.g., the number of recreational anglers and methods used when fishing) are likely very different among the islands, and therefore analysis of the proposed recreational bag limits was not conducted.

2.6 Action 6: Establish new management measures for wahoo in federal waters around St. Thomas and St. John

2.6.1 Action 6(a). Establish a minimum size limit for wahoo applicable to all fishing (commercial and recreational)

Alternative 1. No Action. There are no minimum size limits for the commercial or recreational harvest of wahoo in federal waters around St. Thomas/St. John.

Alternative 2 (Preferred). Establish a 32” FL minimum size limit for the commercial or recreational harvest of wahoo in federal waters.

Alternative 3. Establish a 40” FL minimum size limit for the commercial or recreational harvest of wahoo in federal waters.

Discussion and Comparison of Alternatives

Wahoo is currently not managed with minimum size limits in federal waters around St. Thomas/St. John (**Alternative 1**) and all sizes of wahoo can be caught and removed from the fishery. **Preferred Alternative 2** would establish and 32” FL size limit, which corresponds to the size at which approximately 25% of females are mature (i.e., capable of reproducing).¹⁶ **Alternative 3** would establish and 40” FL size limit, which corresponds to the size at which approximately all females are mature. Compared to **Alternative 1**, **Preferred Alternative 2** and **Alternative 3** would be expected to result in direct biological/ecological, economic, and social benefits commensurate with anticipated population improvements. However, the establishment of a minimum size limit would also be expected to result in adverse short-term social and economic effects due to potential decreases in commercial and recreational dolphinfish landings and increases in regulatory discards.

Analyses conducted using the SEFSC’s TIP length and weight data from wahoo harvested by the commercial sector found that the proposed size limits under both **Preferred Alternative 2** and **Alternative 3** would likely reduce the commercial landings of wahoo by 12% and 38%,

¹⁶ Figuerola-Fernandez et al. 2008. <https://www.drna.pr.gov/historico/oficinas/arn/recursosvivientes/negociado-de-pesca-y-vida-silvestre/laboratorio-de-investigaciones-pesqueras-1/publicaciones/Informe%20Final%20F48%20revisado.pdf>

respectively (Appendix B3, Table 3.1). Recreational data are not available for St. Thomas/St. John; therefore, analysis of the proposed size limits was not conducted. If the recreational length data from Puerto Rico are used as a proxy for St. Thomas/St. John, then the predicted reduction in harvest for wahoo in federal waters would be approximately 33% under **Preferred Alternative 2** and 76% under **Alternative 3** (Appendix B2, Table 2.3). Public testimony during the August 2023 Council meeting noted that smaller wahoo (~ 32" FL) will often swallow the bait and tackle whole, and recreational fishermen have to cut the line to release the fish. If the larger size limit (**Alternative 3**) was selected, then these smaller sized wahoo that have swallowed the tackle whole would likely be returned as dead discards. It was noted that the majority of the wahoo caught by recreational fishermen are smaller than 40 inches; as such, **Alternative 3** would result in a greater number of fish being discarded with a low survival rate, which in turn could negatively affect recreational fishing for this species. Even though **Alternative 3** would provide greater benefits to the wahoo population more conservative management, **Preferred Alternative 2** would still provide some benefit to the population compared to **Alternative 1**, but would provide greater benefits to the recreational sector (i.e., socio-economic effects) than **Alternative 3**.

2.6.2 Action 6(b). Establish a recreational bag limit for wahoo

Alternative 1. No Action. There is no recreational bag limit for wahoo in federal waters around St. Thomas/St. John.

Alternative 2. Establish a recreational bag limit in federal waters around St. Thomas/St. John of 4 wahoo per person per day, not to exceed 20 wahoo per vessel per day, whichever is less.

Alternative 3 (Preferred). Establish a recreational bag limit in federal waters around St. Thomas/St. John of 2 wahoo per person per day, not to exceed 10 wahoo per vessel per day, whichever is less.

Discussion and Comparison of Alternatives

Currently, wahoo is not managed with a recreational bag limit in federal waters around St. Thomas/St. John (**Alternative 1**) and anglers can keep all wahoo caught. **Alternative 2** would establish a daily bag limit of 4 per person/20 per vessel, which would be compatible with new regulations at the state level, which are pending implementation from the USVI DPNR that apply in territorial waters around St. Thomas/St. John. Compared to **Alternative 1**, **Alternative 2** could result in a greater amount of wahoo available (i.e., more wahoo would be left in the water) if recreational fishermen regularly catch and keep more than 4 wahoo per day. Because the bag limit under **Alternative 2** would be compatible with state regulations (once implemented), this alternative would have the greatest benefit for enforcement agencies.

Preferred Alternative 3 proposes a more restrictive bag limit compared to **Alternative 2** and **Alternative 1**, which would be expected to result in a greater amount of fish left in the water. **Alternative 2** and **Preferred Alternative 3** would be expected to result in direct biological,

economic, and social benefits commensurate with anticipated population improvements. However, the establishment of a recreational bag limit could also be expected to result in adverse short-term social and economic effects due to the associated increase in discards, especially if recreational anglers catch and release smaller fish while trying to harvest larger fish to retain subject to the bag limit. Public testimony from St. Thomas/St. John fishermen during the August 2023 Council meeting noted that any wahoo caught in territorial waters is incidental catch; that wahoo are located off the shelf, which is all in federal waters. So compatibility with the DPNR regulations would not be as much of a problem. **Preferred Alternative 3** would result in more conservative management for wahoo when compared to **Alternatives 2 and 1**, and would be compatible with the preferred alternative for wahoo selected for St. Croix, but could result in greater costs to the recreational sector. **Preferred Alternative 3** would help managers account for the lack of recreational landings information, the majority of which likely occur in federal waters, and the aggregating nature of this species on Sargassum habitat and FADs (Merten et al. 2023).

At the time this amendment was prepared, recreational data were not available for St. Thomas/St. John. However, the proposed recreational bag limits for wahoo that would be allowed per angler or per vessel per day were developed through the Council process, including input from each DAP and the public, and are expected to best represent catch and effort levels that could occur under current fishing practices. For the minimum size limit action (Action 6(a)), the Puerto Rico recreational length data of wahoo were used as a proxy for St. Thomas/St. John because it is expected that the size of fish throughout U.S. Caribbean waters would be similar. However, for recreational catch and effort data (e.g., the number of recreational anglers and methods used when fishing) are likely very different among the islands, and therefore analysis of the proposed recreational bag limits was not conducted.

Chapter 3. Affected Environment

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

3.1 Description of the 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 (Figure 3.1.1), both of which separate the Caribbean Sea from the western central Atlantic Ocean. The U.S. Caribbean exclusive economic zone (EEZ) covers an area of approximately 75,687 square miles (mi²) (196,029 square kilometers [km²]).

3.1.1 Puerto Rico

Federal waters around Puerto Rico extend seaward from 9 nautical miles (17 km) from shore to the offshore boundary of the U.S. Caribbean EEZ, which covers approximately 65,368 mi² (169,303 km²). The island of Puerto Rico is almost rectangular in shape, approximately 110 by 35 mi (177 by 56 km), and its coast measures approximately 700 mi (1,227 km) in linear extent, including the adjacent inhabited islands of Vieques and Culebra as well as various other isolated islands without permanent populations including Mona, Monito, and Desecheo. The Mona Passage separates Puerto Rico from Hispaniola to the west and is about 75 mi (120 km) wide and more than 3,300 feet (ft) (1,000 meters [m]) deep. The Puerto Rico Trench borders the northern coast and is 28,000 ft (8,500 m) deep, and to the south the sea bottom descends to the 16,400 ft (5,000 m) deep Venezuelan Basin of the Caribbean Sea. To the east, Puerto Rico shares the shallow-water shelf platform with St. Thomas/St. John, which extends east towards the British Virgin Islands.

Moored surface and submerged fish aggregating devices (FAD) been deployed in waters around Puerto Rico by the Department of Natural and Environmental Resources (DNER), which are used by the recreational, charter, and commercial fishing sectors to target tunas, billfish, dolphinfish, mackerel, wahoo, and triggerfish using rod and reel, trolling, or spearfishing gear. Currently there are 9 surface and 18 submerged moored FADs along the north coast of Puerto Rico from Fajardo in the east to Arecibo in the west (Figure 3.1). The 18 submerged FADs are located off San Juan and were deployed after Hurricanes Maria and Irma and several vessel

strikes damaged many of the previously deployed surface FADs. They are moored in water depths ranging from 600-1,200 m with buoys 20 m below the surface.

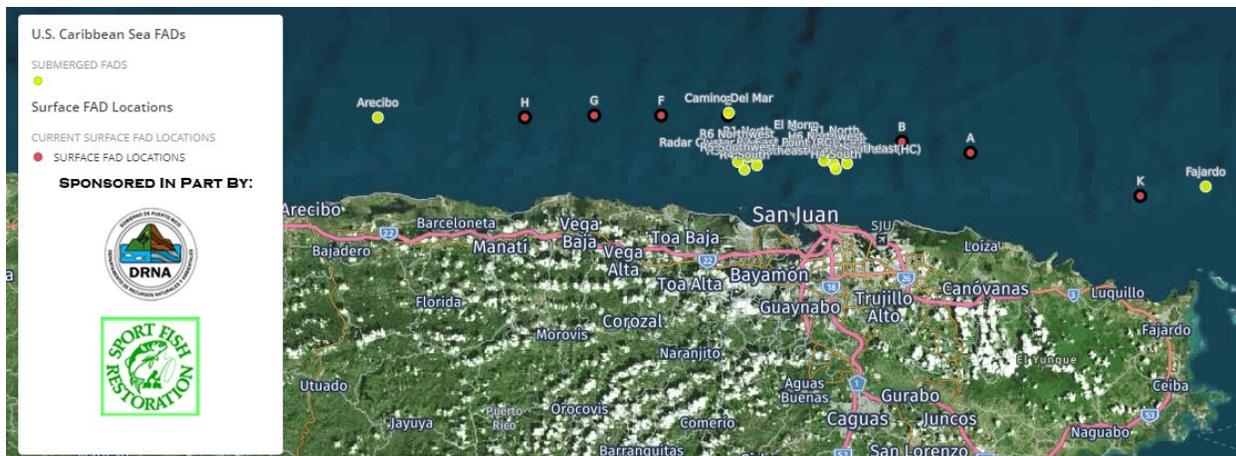


Figure 3.1.1. Location of surface (red) and moored (yellow) FADs off the north coast of Puerto Rico.

Source: <https://prfadsystem.org/fad-posiciones/>

3.1.2 St. Croix and St. Thomas/St. John

Federal waters around St. Croix and St. Thomas/St. John extend seaward from 3 nautical miles (5.6 km) from shore to the offshore boundary of the U.S. Caribbean EEZ, which covers approximately 9,216 mi² (23,870 km²) and 1,103 mi² (2,856 km²), respectively. St. Croix is located about 46 mi (74 km) south of St. Thomas/St. John and lies on a different geological platform. St. Croix is separated from St. Thomas/St. John by a 2.5 mi (4 km) deep trench. The St. Croix shelf is much narrower and shallower than that of the northern islands, with an approximate area of 99 nautical miles (nm)² (343 km²). Most of the shelf area is less than 80 ft (24.4 m) deep.

The islands of St. Thomas/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/St. John is about 8 mi (12.9 km) wide on the south and 20 mi (32.2 km) wide on the north with an approximate area of 510 nm² (1751 km²). Most of the shelf area is greater than 80 ft (24.4 m) deep.

There are two well-known game fishing (e.g., billfish, tuna, wahoo and dolphinfish) areas off St. Thomas: the North Drop, about 20 miles north of St. Thomas, and the South Drop, 8 miles south of St. Thomas. Migrating schools of small fish gather in these areas, which attracts the

larger pelagic species and fishermen troll back and forth across the 50-100 fathom depth contour. The deep-water drop off is closer to the shore in St. Croix when compared to Puerto Rico and St. Thomas/St. John, and fishermen who are trolling¹⁷ for game fish (e.g., billfish, tuna, wahoo and dolphinfish) across the 50-100 fathom depth contour can do so without having to travel as far.

Moored surface and submerged FADs are deployed in waters around St. Croix (Figure 3.1.2) and St. Thomas (Figure 3.1.3) by the Department of Planning and Natural Resources (DPNR), used by the recreational, charter, and commercial fishing sectors to target tunas, billfish, dolphinfish, mackerel, wahoo, and triggerfish using rod and reel, trolling, or spearfishing gear. FAD designs in the USVI consist of either surface buoys or buoys that are submerged 50 ft below the surface. The two moored FADs positioned off St. Croix were lost to the 2017 hurricanes, one of which was redeployed in 2020, but then lost to unidentified causes. Moored FADs positioned off St. Thomas were deployed until 2021. Different FADs were lost between 2017 and 2021, to hurricanes (2017), tropical storms (2019), and other unidentified causes (2021), resulting in the need to re-permit and re-develop the USVI moored FAD program. The USVI moored FAD program is undergoing re-development as they identify new partners and contractors to assist in moored FAD development and deployment, and secure the needed permits to cover future deployments. The DPNR's Division of Fish and Wildlife (DFW) collects voluntary data on recreational catches through the USVI [Recreational Fishing Report Form](#) that allows anglers to indicate if they were fishing at FADs. Information on the USVI's FAD program, including FAD coordinates, can be found at <https://coastalanglermag.com/usvi-fish-aggregating-device-fad-program/>.

¹⁷ Trolling is a fishing method where a baited fishing line is dragged through the water behind a moving boat.

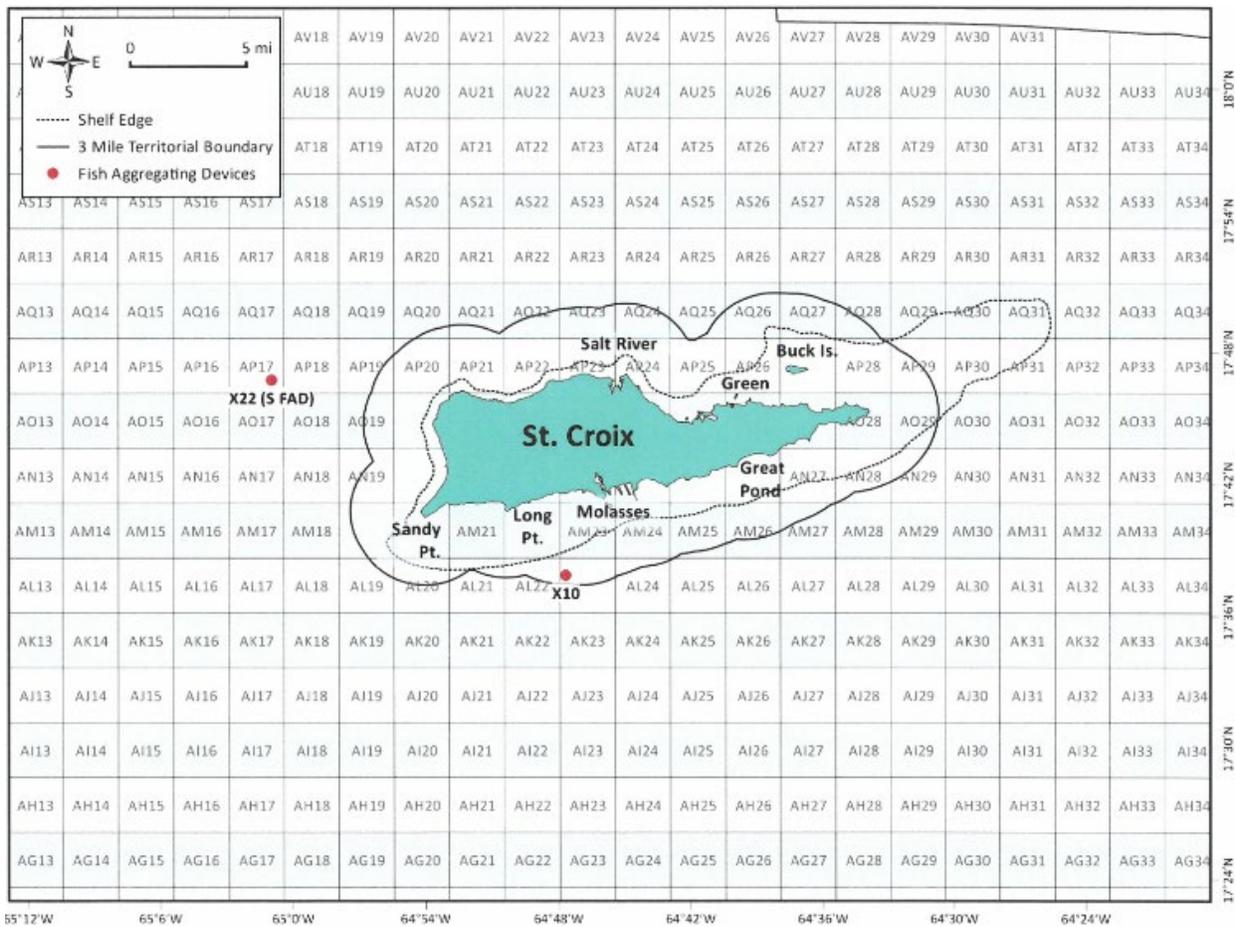


Figure 3.1.2. St. Croix fishing area map used to report catch with FAD locations denoted by the red circles.

Source: <https://www.usvifishinglicense.org/fish-aggregating-devices>

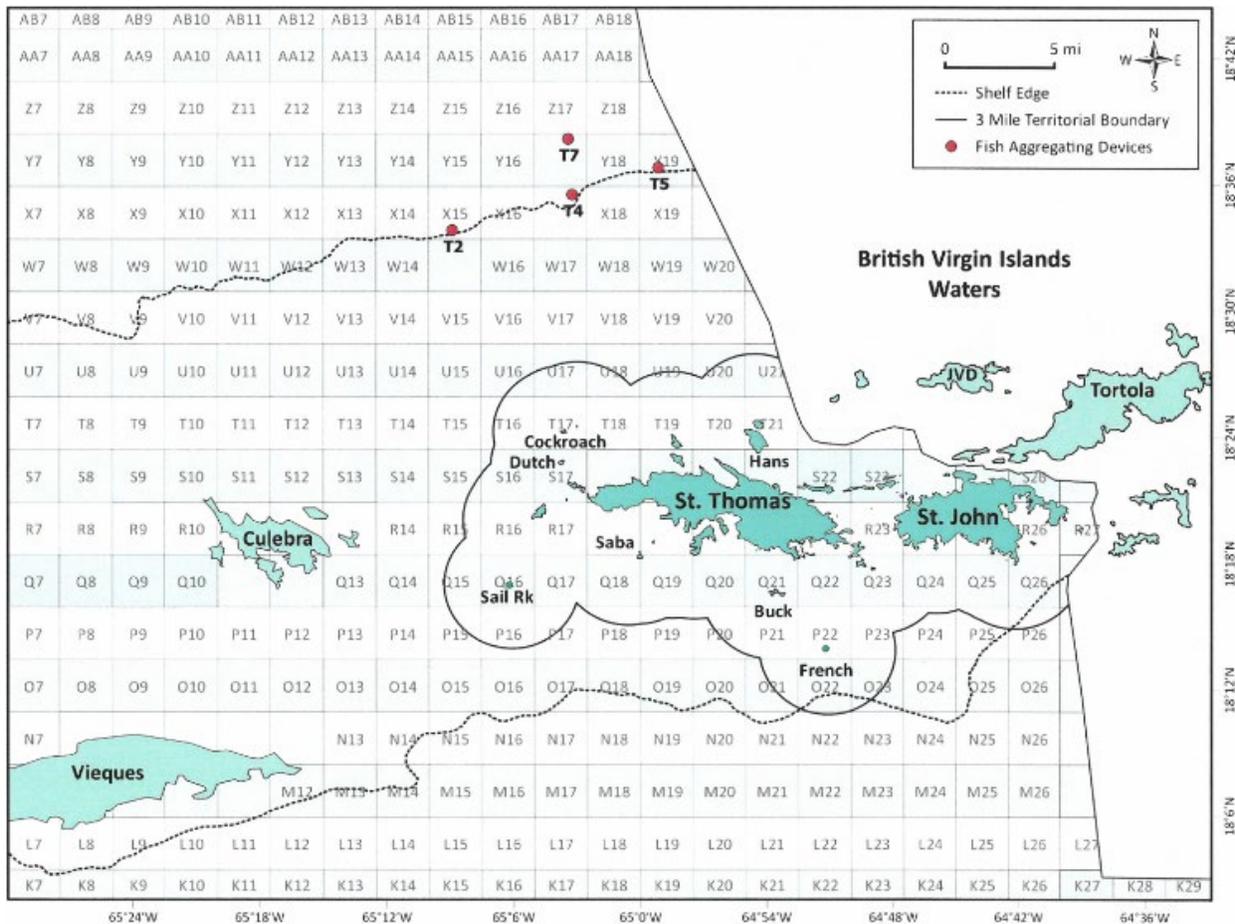


Figure 3.1.3. St. Thomas/St. John fishing area map used to report catch with FAD device locations denoted by the red circles. Note: FAD T12 (18.1701N, -64.991416W) to the South is missing from this map.

Source: <https://www.usvifishinglicense.org/fish-aggregating-devices>

3.1.3 Habitat and Essential Fish Habitat (EFH)

Information on the habitat utilized by dolphinfish and wahoo in the U.S. Caribbean is included in Appendix I of the Puerto Rico, St. Croix, and St. Thomas/St. John FMPs and incorporated here by reference.

Dolphinfish and wahoo are migratory pelagic species occurring in tropical and subtropical waters worldwide. They are found near the surface around natural and artificial floating objects, including Sargassum (in the Atlantic and Caribbean). The floating objects and vegetation create an environment where dolphinfish and wahoo can feed and shelter during various life stages. Dolphinfish and wahoo also occur near non-moving objects on the ocean surface, such as FADs. Johns et al. (2020) described a population of Sargassum that occurs in the tropical Atlantic that

seasonally flourishes due to habitat with more sunlight, warmer temperatures, and higher nutrients available when compared to the Sargassum population in the North Atlantic.

Essential Fish Habitat (EFH)

EFH is defined in the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) as “those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity” (16 U.S. C. 1802(10)). EFH for dolphinfish and wahoo as described in each FMP 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]).

3.2 Description of the Biological and Ecological Environments

The Puerto Rico FMP, St. Croix FMP, and St. Thomas/St. John FMP include a description of the biological and ecological environments for the species managed in federal waters around the respective island/island group, including dolphinfish and wahoo. These are incorporated herein by reference and summarized below.

3.2.1 Description of the Species

The species directly affected by actions proposed in this amendment include dolphinfish (*Coryphaena hippurus*) and wahoo (*Acanthocybium solandri*). Both are coastal migratory pelagic species occurring in tropical and subtropical waters worldwide.

3.2.1.1 Dolphinfish

In the western Atlantic, dolphinfish are distributed from Nova Scotia to Brazil, including Bermuda, the Gulf of Mexico, and the greater Caribbean region. Adult dolphinfish are usually found in open water, while juveniles are found with floating seagrass and marine debris and occasionally in estuaries and harbors. Dolphinfish eat a wide variety of species, including small pelagic fish, juvenile tuna, billfish, jacks, and pompano, and pelagic larvae of nearshore, bottom-living species. They also eat invertebrates such as cephalopods, mysids, and jellyfish. Large tuna, rough-toothed dolphinfish, marlin, sailfish, swordfish, and sharks feed on dolphinfish, particularly juveniles.

Oxenford and Hunte (1986) proposed migration circuits for dolphinfish off the northern and southern coasts of Puerto Rico and around the USVI. One stock is located southeast, and the other northwest, of Puerto Rico and the Virgin Islands. Previous studies showed that dolphinfish abundance in Puerto Rico peaks from November to January and again, albeit to a lesser degree,

from April to June (Pérez and Sadovy 1996). Similarly, dolphinfish abundance in the USVI has a large peak in April–May with a smaller peak observed in November.

In a study off Puerto Rico (Rivera and Appeldoorn 2000), the lengths and weights of dolphinfish from the south coast (381-1479 mm fork length [FL] and 0.70-25.00 kg) were broader than that from the north coast (475-1283 mm FL and 1.25-18.50 kg). From the total sample, 55 were male and 115 were female and males were slightly larger than females (males: 630-1479 mm FL and 2.50-25.00 kg; females: 381-1283 mm FL and 0.07-19.75 kg). The linear growth rate the combined samples was 2.52 mm FL/day, with no significant differences observed for sex or coast. On average, dolphinfish that were 110–150 days grew 3.3 mm FL/day, 170–220 days grew 2.9 mm FL/day, and those 230–270 days grew 2.1 mm FL/day. When comparing size of dolphinfish from the north and south coasts of Puerto Rico, the authors note that there is an influx of smaller sized fish in April on the southern coast, which likely represent a new cohort of dolphinfish rather than a separate stock. In addition, genetic studies conducted by Merten et al. (2015) showed low population differentiation of dolphinfish throughout the western central Atlantic.

3.2.1.2 Wahoo

In the western Atlantic, wahoo are distributed from New York to Colombia, including Bermuda, the Bahamas, the Gulf of Mexico, and the Caribbean. Wahoo typically occur far offshore, inhabit waters around reef edges and walls, and may be attracted to oceanic frontal zones and temperature discontinuities. Wahoo mainly feed on squid and fish, including frigate mackerel, butterfish, porcupine fish, and round herring. They generally compete with tuna for the same kind of food, but can feed on larger prey. A number of predators such as sharks and large tuna that share their habitat feed on young wahoo.

In studies off Florida and the northern Bahamas, wahoo sizes ranged from 24.7 to 77 in (628 to 1956 mm) FL (McBride et al. 2008). Males were smaller than females, with the largest male at 72.3 pounds (lbs) (32.8 kg) and the largest female are 101.4 lbs (46.0 kg) and the maximum age was 9.3 years. Reported size and age at 50% maturity for female wahoo were 36.4 in (925 mm) FL and 0.64 years, respectively, with peak spawning in the summer (Maki Jenkins and McBride 2009).

Theisen et al. (2008) indicated that a worldwide stock for wahoo consisted of a single globally distributed population and Garber et al. (2005) found no genetic heterogeneity for wahoo in the western central Atlantic.

3.2.1.3 Stock Status of Dolphinfish and Wahoo

Currently, the Southeast Fisheries Science Center (SEFSC) lacks sufficient information to characterize the status of dolphinfish or wahoo. The [2022 Report to Congress on the Status of U.S. Fisheries](#) indicates that the dolphinfish and wahoo stocks in Puerto Rico, St. Croix and St. Thomas/St. John are not undergoing overfishing and the overfished status are unknown. Dolphinfish and wahoo are listed as species of “least concern” under the [International Union for Conservation of Nature Red List](#), i.e., species that have a low risk of extinction.

3.2.2 Bycatch

Fishermen sometimes catch and discard animals they do not want, cannot sell, or are not allowed to keep. This is collectively known as “[bycatch](#).” Bycatch can be fish species (either targeted or non-targeted), but also includes other animals such as dolphins, whales, sea turtles, and seabirds that become hooked or entangled in fishing gear. Bycatch is an ecological and economic issue because the animals that are discarded often die and cannot reproduce, affecting marine ecosystems. Under the Magnuson-Stevens Act, bycatch is defined as fish that are harvested in a fishery, but that are not sold or kept for personal use, and includes both economic and regulatory discards. Economic discards are fish that are discarded because they are of undesirable size, sex, or quality, or for other economic reasons. Regulatory discards are fish that are caught but discarded because regulations do not allow fishermen to retain the fish.

The Puerto Rico, St. Croix, and St. Thomas/St. John FMPs each include a bycatch practicability analysis for the species managed under each FMP. 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. Croix, or St. Thomas/St. John compared to other regions. What little bycatch that does occur from hook-and-line fishing is generally confined to regulatory discards (e.g., undersized yellowtail snapper), species known for ciguatera (e.g., barracuda), or species managed under Atlantic Highly Migratory Species (HMS) regulations (e.g., sharks).

The actions in this amendment could potentially increase the amount of dolphinfish and wahoo bycatch in the Puerto Rico, St. Croix, and St. Thomas/St. John fisheries. However, analysis from the Marine Recreational Fishery Statistics Survey (MRFSS) conducted in Puerto Rico from 2000-2017, found that the majority of recreational anglers harvested only one dolphinfish or wahoo per trip (>60% and 75%, respectively; Appendix B3) and that the mean FL caught were greater than the minimum size limits proposed for dolphinfish and between the minimum size limits proposed for wahoo (Appendix B2). Analysis from the commercial landings data found that the proposed size limits for dolphinfish would have a negligible impact (reduction in landings; Appendix B1), but more of an impact for wahoo (Appendix B4). Although recreational data were not available for St. Croix or St. Thomas/St. John at the time this

amendment was prepared, the proposed recreational bag limits for dolphinfish and for wahoo that would be allowed per angler or per vessel per day were developed through the Council process, including input from each District Advisory Panel and the public, and are expected to best represent catch and effort levels that could occur under current fishing practices. Therefore, the proposed actions are not be expected to result in a significant increase in dolphinfish or wahoo discards.

Currently, the SEFSC lacks sufficient information to characterize the status of dolphinfish or wahoo, or to evaluate the potential usefulness of the proposed management alternatives. Additionally, discard mortality rates for dolphinfish and wahoo are not available for the U.S. Caribbean region. Rudershausen et al. (2019) reported a dolphinfish discard mortality rate of 24.8% for the recreational hook-and-line sector along the U.S. East Coast, Gulf of Mexico, and the Bahamas. The study did not include individuals tagged off Puerto Rico or the USVI. Results from that study suggest that alternative management strategies such as (1) mandatory retention of hook-traumatized individuals, regardless of size, contributing towards a bag limit; (2) educating fishers on the use of circle hooks; or (3) modifying fishing practices to reduce rates of deep hooking (in the gills, stomach/esophagus, eyes, and roof of the mouth) may be more effective solutions to reduce discard mortality for dolphinfish than minimum size limits or recreational bag limits.

Since the amount of bycatch from the fisheries targeting dolphinfish (see Table 3.4.4) and wahoo (see Table 3.4.9) are minimal and not expected to change under this amendment, little to no effects to mammals or birds would be expected from the proposed actions.

3.2.3 Protected Species

Within the U.S. Caribbean, some species and their habitats are protected under the Marine Mammal Protection Act, the Endangered Species Act (ESA), or both. Information on these two laws is available on the National Marine Fisheries Service (NMFS) Office of Protected Resources website.¹⁸

NMFS completed a biological opinion on September 21, 2020, which evaluated the impacts of the Puerto Rico, St. Croix, and St. Thomas/St. John fisheries on ESA-listed species (Table 3.2.1) and designated critical habitat that occur in the U.S. Caribbean region (NMFS 2020). In the biological opinion, NMFS determined that the authorization of the fisheries is not likely to adversely affect: sperm, sei, and fin whales, the Northwest Atlantic distinct population segment (DPS) of loggerhead sea turtle, leatherback sea turtle, giant manta ray, or critical habitat of green, hawksbill, or leatherback sea turtles. The biological opinion also determined that the authorization of the fisheries is not likely to jeopardize the continued existence of: the North and

¹⁸ <https://www.fisheries.noaa.gov/protecting-marine-life>

South Atlantic DPSs of green sea turtle, hawksbill sea turtle, Nassau grouper, oceanic whitetip shark, Central and Southwest Atlantic DPS of scalloped hammerhead shark, elkhorn coral, staghorn coral, rough cactus coral, pillar coral, lobed star coral, mountainous star coral, or boulder star coral, or result in the destruction or adverse modification of designated *Acropora* critical habitat.¹⁹

Table 3.2.1. ESA-listed species in the U.S. Caribbean region that were evaluated under the 2020 biological opinion for the Puerto Rico, St. Croix, and St. Thomas/St. John fisheries.

Common Name	Species Name	Status	Determination
Sei whale	<i>Balaenoptera borealis</i>	Endangered	NLAA
Sperm whale	<i>Physeter macrocephalus</i>	Endangered	NLAA
Fin whale	<i>Balaenoptera physalus</i>	Endangered	NLAA
Loggerhead sea turtle Northwest Atlantic DPS	<i>Caretta caretta</i>	Threatened	NLAA
Leatherback sea turtle	<i>Dermodochelys coriacea</i>	Endangered	NLAA
Giant manta ray	<i>Manta birostris</i>	Threatened	NLAA
Green sea turtle North Atlantic DPS	<i>Chelonia mydas</i>	Threatened	NLJ
Green sea turtle South Atlantic DPS	<i>Chelonia mydas</i>	Threatened	NLJ
Hawksbill sea turtle	<i>Eretmodochelys imbricata</i>	Endangered	NLJ
Nassau grouper	<i>Epinephelus striatus</i>	Threatened	NLJ
Oceanic whitetip shark	<i>Carcharhinus longimanus</i>	Threatened	NLJ
Scalloped hammerhead shark (Central and Southwest Atlantic DPS)	<i>Sphyrna lewini</i>	Threatened	NLJ
Elkhorn coral	<i>Acropora palmata</i>	Threatened	NLJ
Staghorn coral	<i>Acropora cervicornis</i>	Threatened	NLJ
Rough cactus coral	<i>Mycetophyllia ferox</i>	Threatened	NLJ
Pillar coral	<i>Dendrogyra cylindrus</i>	Threatened	NLJ
Lobed star coral	<i>Orbicella annularis</i>	Threatened	NLJ
Mountainous star coral	<i>Orbicella faveolata</i>	Threatened	NLJ
Boulder star coral	<i>Orbicella franksi</i>	Threatened	NLJ

NLAA = not likely to adversely affect

NLJ = not likely to jeopardize the continued existence

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

On August 9, 2023, NMFS published a final rule designating critical habitat for *Orbicella annularis*, *O. faveolata*, *O. franksi*, *Dendrogyra cylindrus*, and *Mycetophyllia ferox* (88 FR

¹⁹ Designated critical habitat of *Acropora* corals in Puerto Rico and the USVI extended from the mean low water line seaward to the 98 foot (30 meter) depth contour (73 FR 72209), the majority of which occur in state waters.

54026). A final rule to designate critical habitat for Nassau grouper published on January 2, 2024 (89 FR 126), and on February 14, 2024, NMFS published a final rule to list the queen conch as threatened under the ESA (89 FR 11208). Additionally, a proposed rule to designate critical habitat for six DPSs of the green sea turtle published on July 19, 2023 (88 FR 46572). Section 7 conference and consultation plans were developed for these rules to ensure NMFS' ESA Section 7 responsibilities are addressed with respect to existing FMPs and their implementing regulations. NMFS is drafting an amended biological opinion to address the newly-listed queen conch and the coral and Nassau grouper critical habitats.

3.3 Description of the Pelagic Fish Component of the Puerto Rico, St. Croix, and St. Thomas and St. John Fisheries

Fisheries of the U.S. Caribbean region provide food, livelihood, and income. The region's fisheries (federal and state) can be divided into commercial, recreational, and subsistence sectors. Commercial fishermen pursue multiple species using multiple gear types and are characterized as "artisanal" because their fishing vessels tend to be less than 45 ft (13.7 m) long, have small crews, yield small revenues (when compared to revenues from commercial fishing in the continental U.S.), and the marine resources they harvest have a small seafood supply chain. The Puerto Rico FMP, St. Croix FMP and St. Thomas/St. John FMP contain a comprehensive description of the respective fisheries occurring in federal waters, which are incorporated herein by reference.

3.3.1 Puerto Rico

In Puerto Rico, commercial landings are available from self-reported fishermen logbooks, which are adjusted using a coast-specific expansion factor determined by Puerto Rico's DNER Fisheries Research Laboratory based on intercept sampling of commercial fishermen. Commercial fishermen primarily use hook-and-line gear to target coastal migratory species such as dolphinfish and wahoo (Agar and Shivlani 2016). Of the fishermen who use hook-and-line gear, 59% stated they primarily fish in Commonwealth waters (shoreline out to 9 nautical miles), 39% fish in both federal and Commonwealth waters, and less than 2% fish solely in federal waters (9-200 nautical miles) (Agar and Shivlani 2016). In Puerto Rico, there are two-dolphinfish seasons: October through March for the northern population and March to June for the southern population (Rodríguez-Ferrer et al. 2006). In the 2019 Fisheries of the United States (NMFS 2021), dolphinfish accounted for 8% and wahoo for 1% of the total commercial landings for finfish species in Puerto Rico.

According to the most recent census conducted in Puerto Rico, there were approximately 837 active commercial fishermen in 2018 (Shivlani 2022). In 2019²⁰, 196 commercial fishermen reported landings of dolphinfish (5.6% of the total adjusted landings²¹ for that year) and 107 reported landings of wahoo (0.9% of the total adjusted landings for that year) (Table 3.3.1). Currently, there are approximately 1,200 active commercial fishermen combined for the full time, part time, beginner, and lifetime categories (DNER pers. comm. April 2023). For those commercial fishermen that reported landings of dolphinfish and wahoo, the majority are reported from federal waters (Tables 3.3.2 and 3.3.3).

Table 3.3.1. Number of commercial fishermen that reported their catch and the adjusted landings each year from 2010-2019 for all species combined (total), dolphinfish, and wahoo in Puerto Rico.

Year*	Total Fishers Reporting	Total Landings (Adjusted)	Fishers Reporting Dolphinfish	Dolphinfish Landings (Adjusted)	Fishers Reporting Wahoo	Wahoo Landings (Adjusted)
2010	604	2,816,090	116	176,168	34	14,944
2011	694	2,057,216	168	144,892	78	17,414
2012	749	2,742,281	183	237,778	97	26,487
2013	798	1,892,770	168	111,141	102	17,150
2014	854	2,330,619	185	110,601	111	16,789
2015	830	2,370,452	210	128,382	99	17,002
2016	811	2,369,476	181	116,615	99	20,558
2017	760	1,770,882	159	76,733	69	11,396
2018	720	2,408,744	171	107,596	93	18,763
2019	800	2,466,947	196	139,163	107	21,489

²⁰ At the this amendment was prepared, the most recent and complete year of commercial landings available for Puerto Rico was from 2019.

²¹ Puerto Rico landings are adjusted using an expansion factor determined by Department of Natural and Environmental Resources staff at the Fisheries Research Laboratory, which is based on intercept sampling of commercial fishermen.

Table 3.3.2. Percentage of commercial landings of dolphinfish in Puerto Rico reported from state (0-9 nautical miles from shore), federal (9-200 nautical miles from shore), or unknown waters from the most recent 5-years available.

Year	State	Federal	Unknown
2015	30.4	50.7	18.9
2016	40.3	54.7	5.1
2017	55.4	43.6	1.0
2018	43.0	53.3	3.7
2019	49.9	48.0	2.1
Average	43.8	50.0	6.2

Table 3.3.3. Percentage of commercial landings of wahoo in Puerto Rico reported from state (0-9 nautical miles from shore), federal (9-200 nautical miles from shore), or unknown waters from the most recent 5-years available.

Year	State	Federal	Unknown
2015	29.6	57.1	13.4
2016	50.8	41.7	7.5
2017	54.5	42.7	2.8
2018	44.7	46.2	9.1
2019	40.1	58.1	1.9
Average	43.9	49.1	6.9

On average, the majority of commercial landings of dolphinfish and wahoo are reported off the west coast²² of Puerto Rico (Tables 3.3.4 and 3.3.5). For both species, the smallest portion of commercial landings are reported off the east coast²³, which correspondingly has the smallest population of hook-and-line fishermen in Puerto Rico (Agar and Shivilani 2016). The north coast had the second highest percentage of the dolphinfish and wahoo commercial landings, which corresponds to the location of the surface and moored FADs (see Figure 3.1.1).

Table 3.3.4. Percentage of commercial landings of dolphinfish in Puerto Rico by coast for the most recent 5-years available.

Year	North	East	South	West
2015	34.8	6.1	15.4	43.7
2016	36.6	4.0	13.9	45.5
2017	41.1	1.4	20.4	36.8
2018	25.7	3.8	31.1	39.0
2019	43.1	1.3	14.8	40.8
Average	36.3	3.3	19.1	41.2

Table 3.3.5. Percentage of commercial landings of wahoo in Puerto Rico by coast for the most recent 5-years available.

Year	North	East	South	West
2015	29.6	7.0	10.8	52.6
2016	29.3	8.3	11.7	50.7
2017	26.9	3.8	9.7	59.6
2018	12.5	5.7	17.2	64.5
2019	34.8	1.2	9.0	55.0
Average	26.6	5.2	11.7	56.5

²² The western region spans the municipalities of Cabo Rojo to Aguadilla.

²³ The eastern region runs from the municipalities of Fajardo to Maunabo, including the islands of Vieques and Culebra.

Dolphinfish and wahoo are landed by commercial fishermen in Puerto Rico year-round, with peak landings for dolphinfish occurring in October through February (Figure 3.3.1), and for wahoo in October through December (Figure 3.3.2). Length data from the SEFSC’s Trip Interview Program (TIP) from years 2017-2019, showed that the majority of dolphinfish caught by commercial fishermen around Puerto Rico ranged from 30-39 inches FL (Appendix B1, Figure 1.1) and for wahoo were less than 32 inches FL (Appendix B4, Figure 4.1).

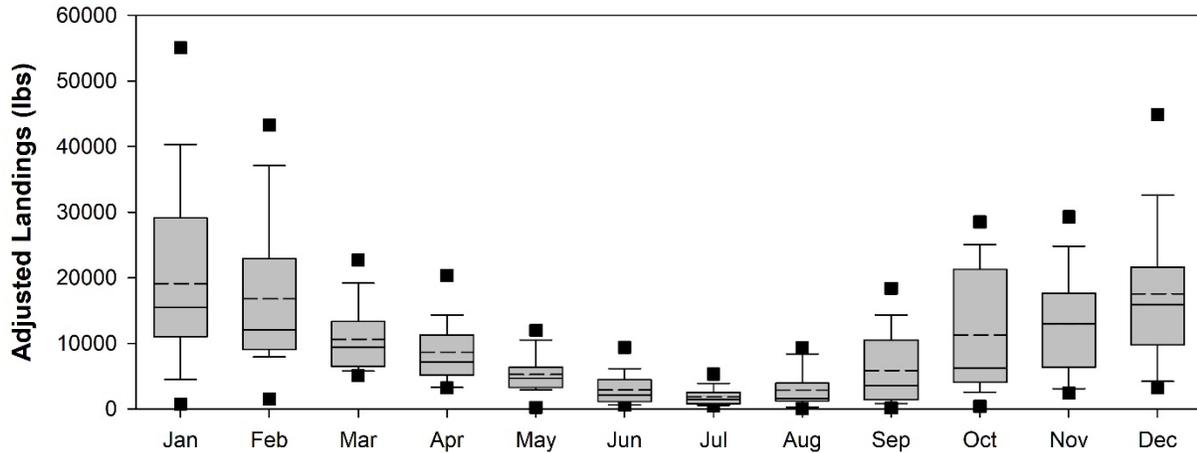


Figure 3.3.1. Range of commercial landings (adjusted) of dolphinfish each month in Puerto Rico from 2000-2019. The black squares represent the 5th (bottom) and 95th (top) percentiles.

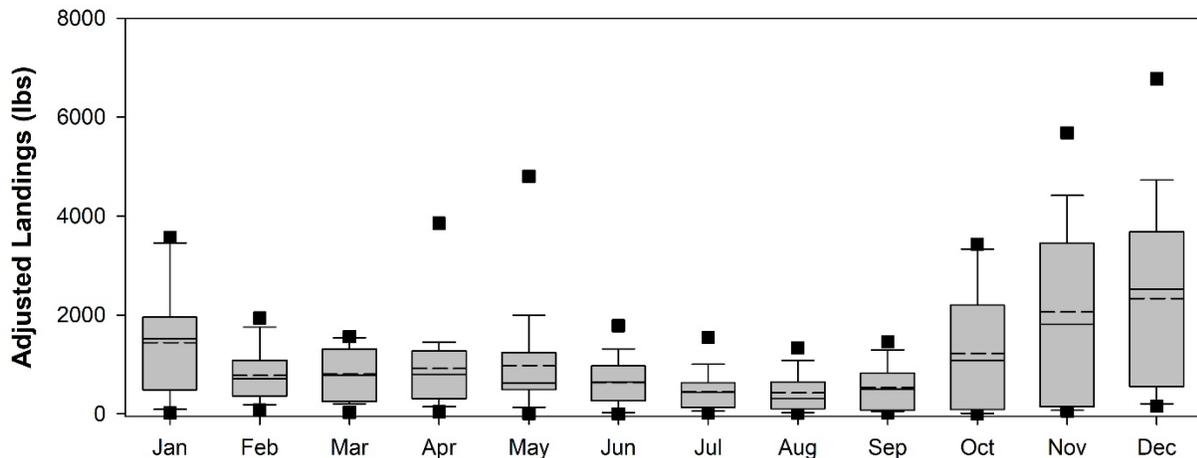


Figure 3.3.2. Range of commercial landings (adjusted) of wahoo each month in Puerto Rico from 2000-2019. The black squares represent the 5th (bottom) and 95th (top) percentiles.

Recreational fishing holds social, economic, and cultural importance for residents and visitors and provides food, livelihood, income, and other benefits to residents of Puerto Rico and USVI. Recreational fishermen frequently target the same species as commercial fishermen and use similar gear to harvest those fish, but are not allowed to sell their catch. Puerto Rico statutes include a provision for mandatory licensing of recreational fishermen, but the licensing requirement has not been implemented to date.

Currently, few data are available for recreational fishing activities in Puerto Rico. The Marine Recreational Information Program (MRIP) was suspended in 2017 and has not resumed to date. For 2016, MRIP estimated that there were 124,674 recreational anglers in Puerto Rico. Recreational catch data collected for 2000-2017, included length measurements from 4,067 dolphinfish and 467 wahoo (Appendix B2). Approximately half of those measurements (2,267 and 282, respectively) were collected from angler trips occurring in federal waters. The mean FL of dolphinfish harvested in federal waters was 30.9 inches and for wahoo was 36.6 inches. A total of 1,935 dolphinfish angler trips and 445 wahoo angler trips were intercepted during 2000-2017, of which 930 dolphinfish trips and 248 wahoo trips occurred in federal waters (Appendix B3).

In Puerto Rico, tournaments are an important part of the recreational fishing activities. Before regulations (i.e., bag limits) for dolphinfish were implemented by DNER in Puerto Rico state waters in 2005, catches of 50 or more fish per boat per day were observed, with high numbers of immature fish and females landed. Following the 2005 regulations, the tournaments encouraged fishermen to land bigger fish, which reduced the tendency to land immature fish. Dolphinfish, great barracuda, wahoo, and tunas are the most often observed bycatch species during the tournaments.

From 2014-2018, 39 dolphinfish tournaments were monitored by DNER staff. Participation ranged from 704-979 anglers (average of 866 anglers per year) and the total weight recorded for all years was 64,155 lbs (29,100 kilograms [kg]) (average of 12,831 lbs/year [5,820 kg/year]) caught over 49 fishing days (Rodríguez-Ferrer and Rodríguez-Ferrer 2018). A comparison of commercial and recreational fishing in Puerto Rico from 2000-2003, found that commercial fishermen landed more dolphinfish by weight, but smaller sized fish (16-43 inches [414-1100 mm] FL) than both the recreational fishermen (28-43 inches [700-1100 mm] FL) and tournament fishermen (31-45 inches [800-1149 mm] FL) (Rodríguez-Ferrer et al. 2006).

Two 3-day wahoo tournaments are held in Puerto Rico each year during wahoo season - October to February (Rodríguez-Ferrer and Rodríguez-Ferrer 2018). From 2014-2016, tournament participation ranged from 168-284, with an average of 208 anglers per tournament. Total weight of wahoo recorded during the three year period (nine days total) was 3,662 lbs (1,661 kg).

3.3.2 St. Croix and St. Thomas and St. John

In the USVI, commercial landings are available from self-reported fishermen logbooks, which are assumed to be fully reported and thus correction factors are not used. The USVI commercial fisheries in St. Croix and St. Thomas/St. John are small, artisanal fisheries that primarily catch benthic, coastal pelagic, and deep-water pelagic fish, spiny lobster, and queen conch (Kojis et al. 2017). The fisheries are operated almost exclusively from small boats and the fishermen market the daily catch themselves. The shelf surrounding St. Croix is smaller than the shelf around St. Thomas/St. John, so deeper water is closer to shore and, therefore, pelagic fish are more accessible to the island's small boat fishery.

Dolphinfish and wahoo are harvested by more than half of the surveyed commercial fishermen on St. Croix and were ranked third in importance of generating revenue and by about a quarter of the surveyed commercial fishermen on St. Thomas/St. John who ranked them fourth in importance of generating revenue (Kojis et al. 2017). Most commercial fishermen fish year-round, but a few fish from October to May for dolphinfish and other migratory pelagic fish (Kojis et al. 2017). In the USVI, dolphinfish landings have a primary peak in the spring and a secondary peak in the fall and wahoo landings have a single peak in fall/winter (Toller et al. 2005). In the [2019 Fisheries of the United States](#), dolphinfish accounted for 6% and wahoo for 3% of the total commercial landings for finfish species in the USVI.

In 2022, there were 141 registered fishermen on St. Croix, of which 67 (48%) were active (DPNR DFW Fisheries Bureau Chief, pers. comm.).²⁴ In St. Croix, annual commercial landings of dolphinfish and wahoo represent 4-19% and 1-8%, respectively, of the total commercial landings reported each year (Table 3.3.6), and the majority of commercial landings of dolphinfish (Table 3.3.7) and wahoo (Table 3.3.8) are reported from federal waters. Dolphinfish and wahoo commercial landings are reported year-round, with peak landings for dolphinfish occurring in January through May (Figure 3.3.4), and for wahoo in October and November (Figure 3.3.5). Lengths from the SEFSC's TIP data for years 2017-2019, showed that the majority of dolphinfish caught by commercial fishermen around St. Croix were less than 20 inches FL (Appendix B1, Figure 1.2) and for wahoo were less than 32 inches FL (Appendix B4, Figure 4.2). In St. Croix, the majority of the commercial landings (lbs) reported for dolphinfish and wahoo from years 2012-2021²⁵ were for handline gear (95.9% and 93.1%, respectively).

²⁴ Active fishermen have at least one commercial trip over the 12 month fishing year.

²⁵ USVI commercial catch forms were modified in mid-2011 to report landings by species instead of species group and by more specific gear type.

Table 3.3.6. Number of commercial fishermen that reported their catch and reported landings each year from 2000-2021 for all species combined (total), dolphinfish, and wahoo in St. Croix, USVI.

Year	Total Fishers Reporting	Total Landings	Fishers Reporting Dolphinfish	Dolphinfish Landings	Fishers Reporting Wahoo	Wahoo Landings
2000	154	806,265	30	43,853	22	10,815
2001	176	1,005,260	46	57,639	39	20,419
2002	175	1,114,532	55	75,020	37	13,584
2003	170	994,843	40	70,058	31	22,326
2004	155	1,035,333	36	52,346	21	19,614
2005	145	1,150,490	37	42,820	27	21,213
2006	139	1,339,263	31	79,573	22	17,219
2007	145	1,227,034	30	65,902	22	17,711
2008	132	1,038,850	38	63,079	22	12,371
2009	131	941,382	35	66,699	20	11,206
2010	126	720,893	30	52,894	23	13,762
2011	158	645,020	28	45,600	23	5,997
2012	86	511,745	22	35,036	12	8,765
2013	78	469,896	14	35,776	17	24,515
2014	62	398,856	12	63,994	6	29,105
2015	59	379,839	15	52,813	8	27,144
2016	74	433,874	28	56,033	14	35,523
2017	65	389,504	17	73,362	13	28,439
2018	44	107,333	14	11,766	8	5,515
2019	49	114,983	13	6,075	12	4,290
2020	52	258,747	12	20,693	8	15,103
2021	59	302,173	21	29,352	16	25,023

Table 3.3.7. Percentage of commercial landings of dolphinfish in St. Croix reported from state (0-3 nautical miles from shore), federal (3-200 nautical miles from shore), or unknown waters for the most recent 5-years available.

Year	State	Federal	Unknown
2017	1.9	97.3	0.8
2018	5.0	95.0	0.0
2019	7.6	61.3	31.1
2020	0.0	91.9	8.0
2021	1.9	97.9	0.2
Average	3.3	88.7	8.0

Table 3.3.8. Percentage of commercial landings of wahoo in St. Croix reported from state (0-3 nautical miles from shore), federal (3-200 nautical miles from shore), or unknown waters for the most recent 5-years available.

Year	State	Federal	Unknown
2017	2.9	96.8	0.3
2018	2.3	97.7	0.0
2019	15.1	75.5	9.4
2020	0.5	93.3	6.2
2021	2.5	97.1	0.4
Average	4.7	92.1	3.3

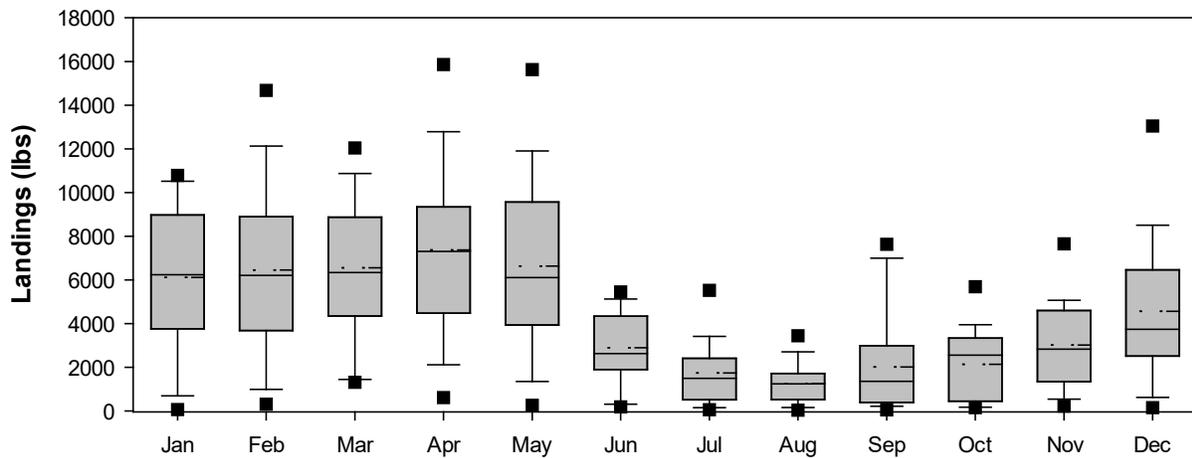


Figure 3.3.4. Range of commercial landings of dolphinfish each month in St. Croix from 2000-2021. The black squares represent the 5th (bottom) and 95th (top) percentiles.

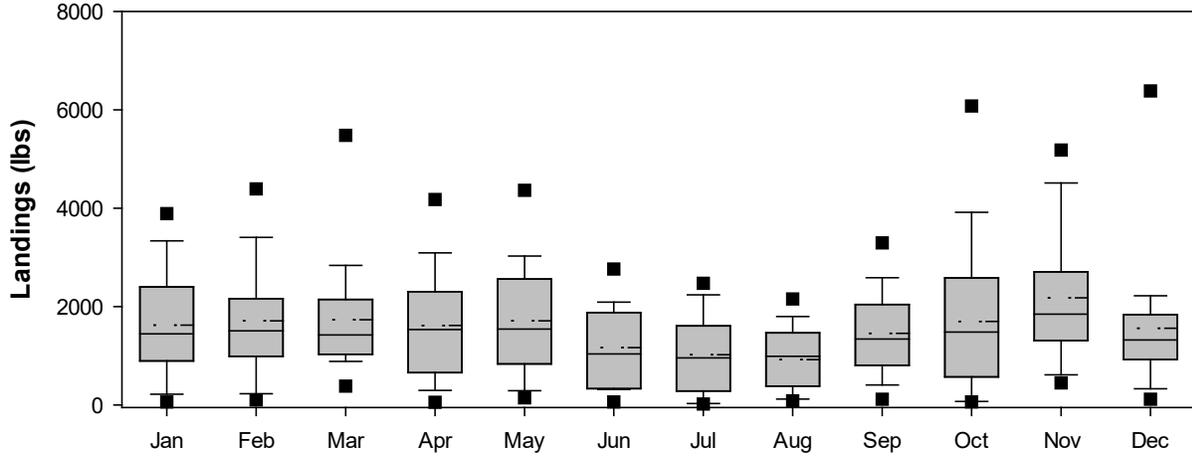


Figure 3.3.5. Range of commercial landings of wahoo each month in St. Croix from 2000-2021. The black squares represent the 5th (bottom) and 95th (top) percentiles.

In 2022, there were 126 registered fishermen on St. Thomas/St. John, of which 92 (73%) were active (DPNR DFW Fisheries Bureau Chief, pers. comm.). In St. Thomas/St. John, annual commercial landings of dolphinfish and wahoo represent 0-4% and 0-2%, respectively, of the total commercial landings reported each year (Table 3.3.9), and the majority of commercial landings of dolphinfish (Table 3.3.10) and wahoo (Table 3.3.11) are reported in federal waters. Dolphinfish and wahoo commercial landings are reported-round, with peak landings for dolphinfish occurring in March through May (Figure 3.3.12) and for wahoo in November through January (Figure 3.3.13). Lengths from the SEFSC’s TIP data for years 2017-2019, showed that the majority of dolphinfish caught by commercial fishermen around St. Thomas/St. John were 26 to 34 inches FL (Appendix B1, Figure 1.3). There were only 17 wahoo length samples recorded, all of which were greater than 40 inches FL (Appendix B4). In St. Thomas/St. John, the majority of the commercial landings (lbs) reported for dolphinfish from years 2012-2021²⁶ were for rod and reel (63.8%), unknown hook-and-line (16.1%), and handline (15.8%) gear. For wahoo, the majority of landings during the same period were reported for rod and reel (65.2%), unknown hook-and-line (16.5%), and hook-and-line with power winch (9.4%) gear.

²⁶ USVI commercial catch forms were modified in mid-2011 to report landings by species instead of species group and by more specific gear type.

Table 3.3.9. Number of commercial fishermen that reported their catch and reported landings each year from 2000-2021 for all species combined (total), dolphinfish, and wahoo in St. Thomas/St. John, USVI.

Year	Total Fishers Reporting	Total Landings	Fishers Reporting Dolphinfish	Dolphinfish Landings	Fishers Reporting Wahoo	Wahoo Landings
2000	121	617,874	15	4,639	9	3,125
2001	139	755,248	19	10,360	13	5,671
2002	122	819,132	21	14,405	16	4,759
2003	121	812,436	17	7,777	9	3,355
2004	116	801,710	17	6,929	11	6,671
2005	105	743,436	10	1,824	7	6,515
2006	106	789,822	8	4,340	6	3,623
2007	105	708,638	13	7,647	8	1,517
2008	102	690,480	15	6,904	10	1,631
2009	107	709,118	17	7,915	9	3,716
2010	91	641,748	13	4,711	8	5,472
2011	143	468,755	8	2,569	5	5,931
2012	75	392,581	12	1,833	6	3,372
2013	67	348,272	15	8,590	6	3,953
2014	72	414,511	9	5,748	7	4,424
2015	65	394,075	15	8,272	8	3,964
2016	65	433,055	17	12,911	12	5,429
2017	65	346,010	14	5,831	7	2,561
2018	67	346,801	13	8,189	8	3,715
2019	71	342,224	13	12,696	4	785
2020	71	325,421	8	990	4	650
2021	64	307,383	12	4,211	5	763

Table 3.3.10. Percentage of commercial landings of dolphinfish in St. Thomas/St. John reported from state (0-3 nautical miles from shore) or federal (3-200 nautical miles from shore) waters for the most recent 5-years available.

Year	State	Federal
2017	1.1	98.9
2018	2.5	97.5
2019	1.0	99.0
2020	4.7	95.3
2021	7.2	92.8
Average	3.3	96.7

Table 3.3.11. Percentage of commercial landings of wahoo in St. Thomas/St. John reported from state (0-3 nautical miles from shore) or federal (3-200 nautical miles from shore) waters for the most recent 5-years available.

Year	State	Federal
2017	1.1	98.9
2018	1.9	98.1
2019	3.8	96.2
2020	2.6	97.4
2021	0.0	100.0
Average	1.9	98.1

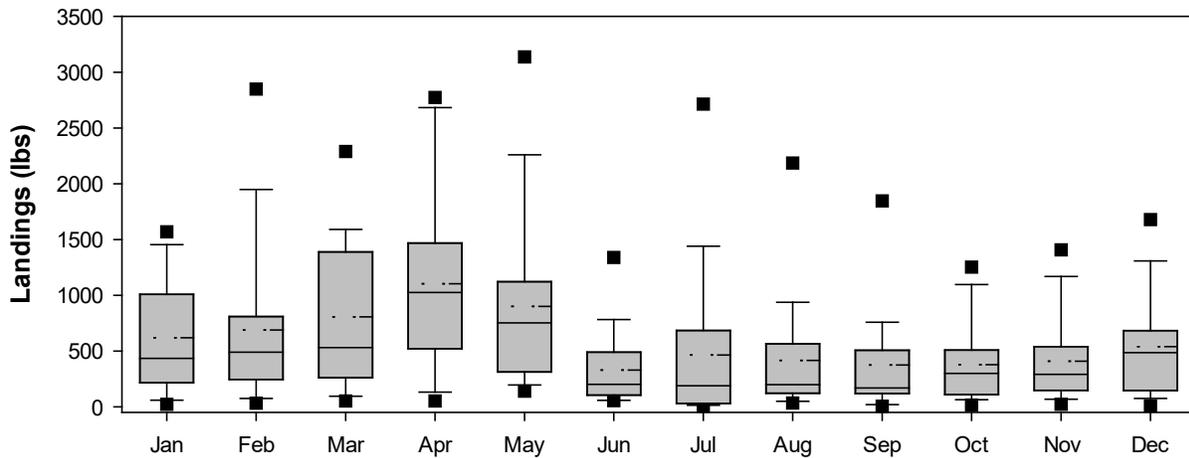


Figure 3.3.12. Range of commercial landings of dolphinfish each month in St. Thomas/St. John from 2000-2021. The black squares represent the 5th (bottom) and 95th (top) percentiles.

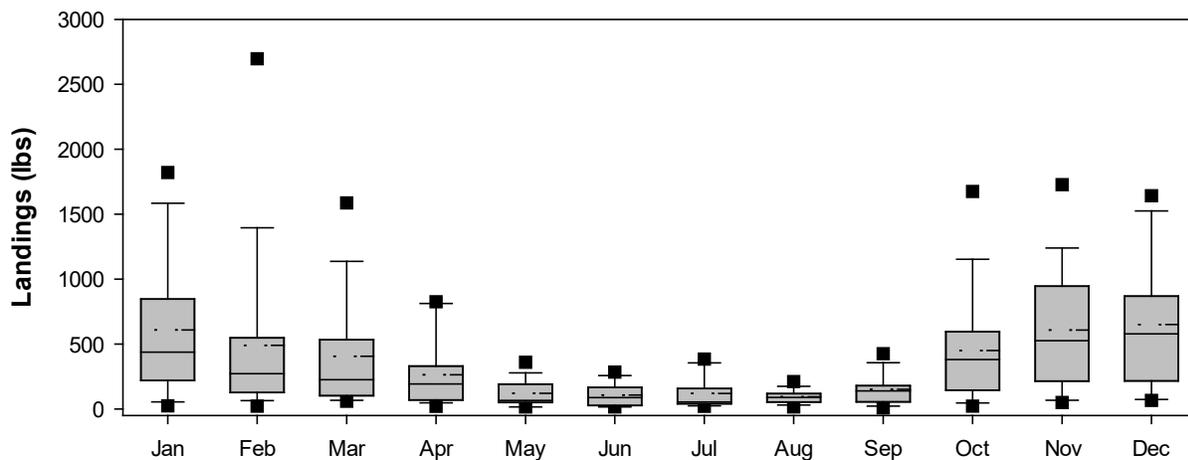


Figure 3.3.13. Range of commercial landings of wahoo each month in St. Thomas/St. John from 2000-2021. The black squares represent the 5th (bottom) and 95th (top) percentiles.

As in Puerto Rico, information on recreational fishing in the USVI is very limited. A survey of recreational fishermen found that three broad types of fishing occur in the USVI: (1) big game fishing on large vessels (>9 meters) that primarily target billfish; (2) private boat fishing conducted on smaller boats that target reef fish and offshore pelagic fish; and (3) fishing from shore, primarily targeting reef fish (Kojis and Tobias 2016). Most recreational fishing uses hook-and-line gear types such as plastic spool (Yo-Yo reel) or rod and reel. On St. Thomas/St. John, a higher number of fishermen participated in offshore and inshore trolling (65% and 61%, respectively) than on St. Croix (55% and 42%, respectively), methods primarily used to catch tuna, mackerel, dolphinfish and jacks.

Dolphinfish, wahoo, and billfish tournaments occur during the spring and summer migrations of the pelagic species. Fourteen percent of the USVI recreational fishermen surveyed participated in fishing tournaments (Kojis and Tobias 2016). Toller et al. (2005) identified five types of sportfishing tournaments in the USVI: shore-based handline, boat-based handline, offshore coastal pelagic, offshore pelagic, and marlin. Of those tournaments, landings from 2000 to 2005 on St. Thomas were dominated by dolphinfish, barracuda, and wahoo and on St. Croix by dolphinfish and wahoo (Toller et al. 2005).

The DPNR recently approved regulations for recreational fishing that include a combined bag limit for recreational catch of dolphinfish and wahoo in state waters around St. Croix and St. Thomas/St. John. The regulations, which have not been implemented at the time this amendment was prepared, set a combined recreational catch limit of no more than 10 dolphinfish or wahoo, per person, per day, not to exceed 32 per vessel per day, and not to exceed 4 wahoo per person, per day, or 20 wahoo per vessel, per day.

In the USVI, declines in reef fish stocks prompted managers to encourage commercial fishermen to shift fishing effort towards seasonal stocks (i.e. dolphinfish, wahoo, and tuna) (Toller et al. 2005). If USVI reef fish stocks should continue to decline, it can be predicted that commercial effort will progressively shift towards pelagic resources. Therefore, managers must be aware of the potential for conflict between commercial and recreational fishermen over the shared resources.

3.3.3 Other Fisheries that Capture Dolphinfish and Wahoo

The [2022 Stock Assessment and Fishery Evaluation \(SAFE\) Report](#) summarizes the most recent condition of Atlantic HMS stocks and includes information from the latest stock assessment data and recommendations and resolutions from the International Commission for the Conservation of Atlantic Tunas.

The pelagic longline fishery for HMS is a multi-species fishery that primarily targets swordfish, bigeye tuna, and yellowfin tuna, but also includes dolphinfish and wahoo. From 2017-2021, the pelagic longline fishery caught and kept an average of 23,865 dolphinfish and 983 wahoo per year (Table 5.22 in the [2022 SAFE Report](#)). Discards during the same period averaged 561 per year for dolphinfish and 99 per year for wahoo. Table 6.12 in the 2022 SAFE shows a declining trend in the average number of dolphinfish and wahoo caught and kept by the pelagic longline fishery, with a 39% decline for dolphinfish and a 81% decline for wahoo since 1997-1999.

Commercial handgear include handlines, harpoons, rod and reel, buoy gear, and bandit gear and are used to fish for HMS on private vessels, charter vessels, and headboat vessels. Pounds by dressed weight of dolphinfish and wahoo reported for buoy gear from 2017-2021 averaged 336 lbs and 90 lbs, respectively (Table 5.31 in the [2022 SAFE Report](#)).

The average number of dolphinfish caught by the rod and reel fishery as reported in the Large Pelagics Survey, which ranges from Maine to Virginia, from 2017-2019 was 6,913; the average number of wahoo was 87 (Table 6.22 in the [2022 SAFE Report](#)). During the same period, and average 415 dolphinfish and 3 wahoo were released (Table 6.23 in the [2022 SAFE Report](#)).

3.4 Description of the Economic Environment

3.4.1 Puerto Rico

3.4.1.1 The Commercial Sector

As is well documented, the nature of the Puerto Rican commercial fishing industry is one of multiple gear types with multiple species being harvested. In a recent study of the Puerto Rican fishery, Shivlani (2022) noted that 837 fishermen reported landings in 2018. More than three-

quarters of interviewed fishermen (687 surveyed fishermen in total) identified themselves as full-time with almost 90% reporting that they had fished year-round. On average, fishermen reported making 3.6 trips per week. Just under 85% of the interviewed fishermen reported fishing exclusively in territorial waters (i.e., < nine nautical miles from shore) while another 12.1% reported fishing in both territorial and federal waters. Finally, 4.4% of the interviewed fishermen stated that they fished only in federal waters in 2018.

The relatively low percentage of interviewed fishermen reporting fishing activities in federal waters may be due, in part, to the relatively small platforms from which they operate. Shivilani (2022) found that the average length of vessel was just over 20 feet with 97% of the vessels falling in the 10 to 29.9-foot range.

Based on trip ticket data, 2019 landings by the commercial sector totaled about 2.5 million lbs valued at about \$12.0 million. This equates to about \$4.88 per pound. Shivilani (2022) found that 39% of the respondents in his survey target (at least on occasion) offshore fish. Dolphinfish and wahoo are two components of this offshore fishery as well as the commercial fishing sector in general and Matos-Caraballo and Agar (2011) found hook-and-line to be the most efficient gear to commercially catch fish like dolphinfish and Agar and Shivilani (2016), in a survey of hook-and-line fishermen, found that 42% of the participants in the study targeted dolphinfish and wahoo.

3.4.1.1.1 The Commercial Dolphinfish Fishery

Reported landings of dolphinfish in Puerto Rico averaged almost 135,000 lbs annually during the 2010-2019 period and ranged from a low of 76,733 lbs in 2017 to a high of 237,780 lbs in 2012. The annual value of these landings during the ten-year period averaged \$408,927 based on an annual dockside price of \$3.12 per pound, which tended to increase during the period of analysis.²⁷

Some of the increase in price during the ten-year period ending in 2019 reflects inflation. The adjusted price (i.e., adjusted for inflation to 2022 dollars based on the BEA Implicit Price Deflator) increased from an average of \$3.26 per pound during 2010-2012 to \$4.53 during 2017-2019 which indicates a significant increase in price per pound even after adjusting for inflation (Table 3.4.1).

²⁷ Commercial dolphinfish landings of 139,164 pounds in 2019 represented about 5.6% of the 2.5 million pound total commercial landings. The 2019 reported dolphinfish price of \$4.22 is about 15% less than the average price of all commercial landings (\$4.88). Given the lower dolphinfish price vis-à-vis the overall price, the 2019 value of dolphinfish landings (\$586,956) as a percent of total seafood landings (\$12.0 million) was only 4.9%.

Table 3.4.1. Reported commercial landings of dolphinfish (pounds, value, and price) landed in Puerto Rico, 2010-2019.

Year	Pounds	Value (\$)	Price (\$/Lb.)	Adjusted Value (\$) ^a	Adjusted Price (\$/Lb.)
2010	176,168	445,182	2.53	595,307	3.38
2011	144,890	339,561	2.34	445,513	3.07
2012	237,780	616,455	2.59	792,506	3.33
2013	111,140	277,402	2.50	350,467	3.15
2014	110,603	352,212	3.18	437,974	3.96
2015	128,383	403,375	3.14	497,629	3.88
2016	116,616	380,224	3.26	462,417	3.97
2017	76,733	277,117	3.61	330,321	4.30
2018	107,596	410,790	3.82	478,731	4.45
2019	139,164	586,956	4.22	672,952	4.84
Avg.	134,907	408,927	3.12	506,382	3.83

^a Values and prices were converted to 2022 dollars using the BEA Implicit Price Deflator (GDP Deflator by Year).

Source: SERO 2023

The percentage of commercial harvest of dolphinfish by jurisdiction (i.e., state versus federal waters), based on weight, is presented in Table 3.3.2. The value of dolphinfish landings by jurisdiction in which catch was reported (Table 3.4.2), evaluated on a percentage basis, closely mirrors that of poundage indicating that the price differential between dolphinfish caught in state waters and dolphinfish caught in federal waters is minor. The adjusted value (i.e., converted to 2022 dollars based on the BEA Implicit Price Deflator) of dolphinfish reported to be caught in federal waters during 2015-2019, averaging \$247,727 annually, exceeded the average annual catch reported from state waters (\$212,213) by about seven percentage points. The percentage of dolphinfish harvested from ‘unknown waters’ was about six percent with the adjusted value averaging \$28,470 during the five-year period ending in 2019. Some unknown amount of this can likely be assigned to federal waters.

Table 3.4.2. Adjusted values and percentages of commercial landings of dolphinfish in Puerto Rico reported from state (0-9 nautical miles from shore), federal (9-200 nautical miles from shore) and unknown waters, 2015-2019.

Year	State Waters		Federal Waters		Unknown Waters	
	Adjusted ^a Value (\$)	%	Adjusted Value (\$)	%	Adjusted Value (\$)	%
2015	156,797	31.5	247,232	49.7	93,601	18.8
2016	182,578	39.5	259,604	56.1	20,235	4.4
2017	193,418	58.6	134,179	40.6	2,725	0.8
2018	201,269	42.0	264,291	55.2	13,169	2.8
2019	327,001	48.6	333,328	49.5	12,623	1.9
Avg.	212,213	43.4	247,727	50.7	28,470	5.8

^a Values were converted to 2022 dollars using the BEA Implicit Price Deflator (GDP Deflator by Year).

Source: SERO 2023

Premised on the assumption that underreporting of landings in Puerto Rico is the result of fishers underreporting harvests on their respective submitted trip tickets rather than a sizeable number of commercial fishermen not submitting trip tickets, one can evaluate the number of Puerto Rican commercial fisherman harvesting dolphinfish, trips that resulted in the harvest of dolphinfish, and relevant catch (pounds and revenues) per fisherman and trip (Table 3.4.3). During the 2010-2019 period, the number of fishers reporting the harvest of dolphinfish fluctuated from a low of 116 (2010) to a high of 210 (2015) with the ten-year average equaling 174. The number of trips where dolphinfish was harvested ranged from less than 700 (2017) to more than 1,400 (2015 and 2019) with the ten-year average equaling 1,154. Revenues from the harvest of dolphinfish (adjusted to 2022 dollars) averaged \$2,980 per year among those fishers reporting the harvest of dolphinfish while adjusted revenues per trip during the ten-year period averaged \$453.

Table 3.4.3. Number of fishers, trips, and landings per fisher and trip (pounds and value) for commercial fishers of Puerto Rico who reported landings of dolphinfish, 2010-2019.

Year	Number of Fishers	Number of Trips	Trips Per Fisher	Lbs. Per Fisher	Lbs. Per Trip	Adjusted Revenues Per Fisher ^a	Adjusted Revenues per Trip
2010	116	756	6.5	1,582	233	5,132	787
2011	168	1,382	8.2	862	105	2,652	322
2012	183	1,367	7.5	1,299	174	4,331	580
2013	168	1,065	6.3	662	104	2,086	329
2014	185	1,176	6.4	598	94	2,367	372
2015	210	1,409	6.7	611	91	2,370	353
2016	181	1,149	6.3	644	101	2,555	402
2017	159	686	4.3	483	112	2,077	482
2018	171	1,145	6.7	629	94	2,800	418

Year	Number of Fishers	Number of Trips	Trips Per Fisher	Lbs. Per Fisher	Lbs. Per Trip	Adjusted Revenues Per Fisher ^a	Adjusted Revenues per Trip
2019	196	1,405	7.2	710	99	3,433	479
Avg.	174	1,154	6.6	802	121	2,980	453

^a Values (revenues) were converted to 2022 dollars using the BEA Implicit Price Deflator (GDP Deflator by Year).
Source: SERO 2023

Since 2015, dolphinfish was reportedly landed from an average of 1,154 trips per year (see Table 3.4.3). About 45% of these trips, or an average of 516 trips per year during 2015-2019, were reported to have occurred in federal waters.²⁸ The trips reporting the harvest of dolphinfish from federal waters also reported the harvest of other species including wahoo, snappers, and tunas (Table 3.4.4). Expressed on a weight basis, dolphinfish contributed almost three-quarters (i.e., 73.6%) of the total poundage taken by trips in federal waters that reported the harvest of dolphinfish (i.e., 57,276 lbs out of a total 77,806 lbs). The contribution of dolphinfish to the value of catch was somewhat less (i.e., 69.6%) due to the lower per pound dolphinfish price vis-à-vis some of the other species landed in conjunction with dolphinfish.

Based on an average of 516 trips annually during 2015-2019 (i.e., those trips in federal waters where dolphinfish was reported to be harvested), the catch per trip averaged 151 lbs with dolphinfish accounting for 111 lbs of this total. The adjusted value per trip (i.e., expressed in 2022 dollars based on the BEA Implicit Price Deflator) averaged \$685 with the adjusted dolphinfish revenues per trip averaging \$477.

Table 3.4.4. Pounds and value of dolphinfish that was reported to be harvested in federal waters and the pounds and value of co-occurring species that were also harvested on these trips, 2015-2019 annual averages.

Species	Pounds	Value (\$)	Adjusted Value (\$)
Dolphinfish	57,276	208,774	246,145
Wahoo	5,740	20,883	24,621
Silk Snapper	5,384	28,999	34,190
Queen Snapper	4,529	26,874	31,685
Blackfin Tuna	1,325	2,899	3,417
Skipjack Tuna	1,068	1,950	2,299
Tuna & Mackerel	726	3,848	4,537
Yellowfin Tuna	683	2,062	2,437
Misty Grouper	313	1,101	1,299
Cardinal Snapper	286	1,584	1,868

²⁸ The 1,159 average annual number of trips includes those in ‘unknown waters’. If these are excluded, the proportion of trips where dolphinfish were reportedly caught increases to 48% (i.e., 516 out of 1,071 trips).

Species	Pounds	Value (\$)	Adjusted Value (\$)
Little Tunny	253	378	445
King Mackerel	221	682	804
Total	77,806	300,038	353,746
Dolphinfish as % of Total	73.6%	69.6%	69.6%

^a Values were converted to 2022 dollars using the BEA Implicit Price Deflator (GDP Deflator by Year). The adjusted value of dolphinfish landings from harvests in federal waters in this table varies marginally (less than one percent) from what is given in Table 3.4.2 because values in this table were deflated by 5-year averages rather than on a year-by-year basis.

Source: SERO 2023

Landings of dolphinfish by the commercial fishers of Puerto Rico, expressed on a weight basis, vary significantly on a monthly basis with the summer months exhibiting the lowest landings Figure 3.3.1. The value of these landings (Table 3.4.5) also exhibit considerable month-to-month variation, with the lowest values, like pounds, being during the summer months. The per pound price appears largely independent of the quantity being harvested but does appear to exhibit a significant upward shift in the later six months of the year (i.e., July through December). The seasonal variation in commercial harvests likely represents, at least in part, the migratory nature of dolphinfish with harvests in a given region varying in relation to the abundance of the stock in that region.

Table 3.4.5. Average monthly landings (pounds, value, and price) of dolphinfish by commercial fishers in Puerto Rico, 2010-2019.

Month	Pounds	Value (\$)	Price (\$/Lb.)	Adjusted Value (\$) ^a	Adjusted Price (\$/Lb.)
January	20,255	56,579	2.79	71,091	3.51
February	17,214	46,320	2.69	58,132	3.38
March	10,774	28,866	2.68	35,947	3.34
April	9,107	25,983	2.85	31,934	3.51
May	5,055	13,946	2.76	17,221	3.41
June	2,645	7,348	2.78	9,112	3.45
July	2,146	7,010	3.27	8,481	3.95
August	4,480	15,003	3.35	18,104	4.04
September	9,533	30,253	3.17	36,777	3.88
October	17,069	56,640	3.32	69,355	4.06
November	16,942	58,685	3.46	72,689	4.29
December	19,688	62,295	3.16	77,327	3.93

^a Values and prices were converted to 2022 dollars using the BEA Implicit Price Deflator (GDP Deflator by Year).
Source: SERO 2023

Large differences in dolphinfish landings by coast are noted in Section 3.3 (Table 3.3.4) and these differences, assuming seasonality differences in landings by coast, were considered as a possible explanation for the higher reported prices during the July-December period. When evaluated on a regional basis, however, a higher July-December price is indicated in all regions; especially the north coast where the average 2010-2019 January-June price equaled \$3.09 per pound compared to an average price of \$3.84 per pound during July-December. In addition, prices reported on the east and north coasts were found to be considerably higher than those observed on the south and west coasts.

3.4.1.1.2 The Commercial Wahoo Fishery

Reported wahoo landings by Puerto Rican commercial fishers averaged 18,200 lbs annually during 2010-2019 with maximum landings of 26,487 lbs occurring in 2012 (Table 3.4.6). The value of these reported landings averaged \$53,076 annually (\$65,034 when expressed in 2022 dollars based on the BEA Implicit Price Deflator). The price of the landed product increased from about \$2.00 in the early years to more than \$4.00 in 2019.²⁹ A sizeable increase in price was evident even after removing the effects of inflation. Specified in 2022 dollars, the price increased from an average of \$2.63 per pound during the earliest two years of analysis to \$4.49 during the latest two years.

Table 3.4.6. Reported commercial landings of wahoo (pounds, value, and price) landed in Puerto Rico, 2010-2019.

Year	Lbs.	Value (\$)	Price (\$/Lb.)	Adjusted Value (\$) ^a	Adjusted Price (\$/Lb.)
2010	14,944	28,199	1.89	37,708	2.52
2011	17,414	36,915	2.12	48,433	2.78
2012	26,487	63,390	2.39	81,493	3.08
2013	17,150	41,791	2.44	52,798	3.08
2014	16,789	44,666	2.66	55,541	3.31
2015	17,002	53,041	3.12	65,434	3.85
2016	20,558	69,205	3.37	84,165	4.09
2017	11,396	35,447	3.11	42,253	3.71
2018	18,789	65,841	3.50	76,731	4.08
2019	21,574	92,265	4.28	105,783	4.90
Avg.	18,210	53,076	2.89	65,034	3.54

^a Values and prices were converted to 2022 dollars using the BEA Implicit Price Deflator (GDP Deflator by Year).

Source: SERO 2023

²⁹ Commercial wahoo landings of 21,574 pounds in 2019 represented just shy of 1% of the 2.5 million pound total commercial landings. The 2019 reported wahoo price of \$4.28 is about 12% less than the average price of all commercial landings (\$4.88). Given the lower wahoo price vis-à-vis the overall price, the 2019 value of wahoo landings (\$92,265) as a percent of total seafood landings (\$12.0 million) was also less than 1%.

The percentage of commercial harvest of wahoo by jurisdiction (i.e., state versus federal waters), based on weight, is presented in Table 3.3.3. The value of wahoo harvest by jurisdiction (Table 3.4.7), evaluated on a percentage basis, closely mirrors that of poundage indicating that the price differential between wahoo caught in state waters and wahoo caught in federal waters is minor. The adjusted value (i.e., converted to 2022 dollars based on the BEA Implicit Price Deflator) of wahoo reported to be caught in federal waters during 2015-2019, averaging \$38,107 annually, exceeded the average annual catch reported from state waters (\$32,026) by about seven percentage points. The percentage of wahoo landed where jurisdiction of catch was not indicated (i.e., ‘unknown waters’) averaged about six percent with the adjusted value averaging \$4,775 annually during the five-year period ending in 2019. Some unknown amount of this can likely be assigned to federal waters.³⁰

Table 3.4.7. Adjusted values and percentages of commercial landings of wahoo in Puerto Rico reported from state (0-9 nautical miles from shore), federal (9-200 nautical miles from shore) and unknown waters, 2015-2019.

Year	State Waters		Federal Waters		Unknown Waters	
	Adjusted ^a Value (\$)	%	Adjusted Value (\$)	%	Adjusted Value (\$)	%
2015	20,182	30.8	37,543	57.4	7,715	11.8
2016	44,514	52.9	34,198	40.6	5,483	6.5
2017	21,741	51.5	19,538	46.2	974	2.3
2018	31,978	41.7	36,808	48.0	7,851	10.2
2019	41,717	39.3	62,451	58.9	1,880	1.8
Avg.	32,026	43.2	38,107	50.2	4,775	6.5

^a Values were converted to 2022 dollars using the BEA Implicit Price Deflator (GDP Deflator by Year).

Source: SERO 2023

Premised on the assumption that underreporting of landings in Puerto Rico is the result of fishers underreporting harvests on their respective submitted trip tickets rather than a sizeable number of commercial fishermen not submitting trip tickets, one can evaluate the number of Puerto Rican commercial fisherman harvesting wahoo, trips that resulted in the harvest of wahoo, and relevant catch (pounds and revenues) per fisherman and trip (Table 3.4.8). Overall, an average of 89 fishers reported landing wahoo annually between 2010 and 2019 and these fishers reported harvesting wahoo on an average of 350 trips per year. This equates to about 3.9 trips per fisher. Landings of wahoo among these 89 fishers averaged 220 lbs per year or about 55 lbs per trip. Finally adjusted revenues per fisher (i.e., converted to 2022 dollars based on the BEA Implicit Price Deflator) averaged \$753 annually during 2015-2019 or \$189 per trip.

³⁰ A comparison of the information in Table 3.4.7 with that of Table 3.4.2 indicates the proportion of the two species (i.e., dolphinfish and wahoo) caught in state and federal waters are nearly identical. This is expected since they are co-occurring species often caught on the same trip.

Table 3.4.8. Number of fishers, trips, and landings per fisher and trip (pounds and value) for commercial fishers of Puerto Rico who reported landings of wahoo, 2010-2019.

Year	Number of Fishers	Number of Trips	Trips Per Fisher	Lbs. Per Fisher	Lbs. Per Trip	Adjusted Revenues Per Fisher ^a	Adjusted Revenues per Trip
2010	34	147	4.3	440	102	1,109	256
2011	78	340	4.3	223	51	621	142
2012	97	395	4.1	273	67	840	206
2013	102	359	3.5	168	48	518	147
2014	111	414	3.7	151	41	500	134
2015	99	367	3.7	172	46	661	178
2016	99	436	4.4	208	47	850	193
2017	69	222	3.2	165	51	612	190
2018	93	376	4.0	202	50	825	204
2019	107	439	4.1	202	49	989	241
Avg.	89	350	3.9	220	55	753	189

^a Values were converted to 2022 dollars using the BEA Implicit Price Deflator (GDP Deflator by Year).

Source: SERO 2023

Since 2015, wahoo was reportedly landed from an average of about 365 trips per year (Table 3.4.9). About 48% of these trips, or an average of 177 trips per year during 2015-2019, were reported to have occurred in federal waters. The trips reporting the harvest of wahoo from federal waters also reported the harvest of many other species (Table 3.4.9) with these species being similar to species caught in conjunction with dolphinfish (Table 3.4.4). This is expected, since the harvest of these two species primarily use the same gear and tend to aggregate together.

Expressed on a weight basis, wahoo contributed about 31% of the total poundage taken by trips in federal waters that reported the harvest of wahoo (i.e., 8,857 lbs out of a total 28,651 lbs). The contribution of wahoo to the value of landings was almost identical suggesting that the average price of wahoo approximated the average price of the group of species landed in conjunction with wahoo.

Based on an average of 177 trips annually during 2015-2019 (i.e., those trips in federal waters where wahoo was reported to be harvested), the catch per trip averaged 162 lbs with wahoo accounting for 50 lbs, or a little less than a third, of this total. The adjusted value per trip (i.e., expressed in 2022 dollars based on the BEA Implicit Price Deflator) averaged \$695 with the adjusted wahoo revenues per trip averaging \$215.

Table 3.4.9. Pounds and value of wahoo that was reported to be harvested in federal waters off Puerto Rico and the pounds and value of co-occurring species that were also harvested on those trips, 2015-2019 annual averages.

Species	Pounds	Value (\$)	Adjusted Value (\$)
Wahoo	8,857	32,199	37,963
Dolphinfish	14,895	52,581	61,993
Silk Snapper	1,083	5,889	6,943
Blackfin Tuna	981	2,343	2,762
Queen Snapper	933	5,964	7,031
Skipjack Tuna	729	1,534	1,809
Yellowfin Tuna	368	1,128	1,329
Little Tunny	219	383	452
Tuna & Mackerel	182	996	1,174
King Mackerel	119	353	416
Red Hind Grouper	117	323	381
Black Snapper	113	523	617
Misty Grouper	56	259	305
Total	28,651	104,475	123,176
Wahoo as % of Total	30.9%	30.8%	30.8%

^a Values were converted to 2022 dollars using the BEA Implicit Price Deflator (GDP Deflator by Year). The adjusted value of wahoo landings from federal waters varies marginally (less than one percent) from Table 3.4.2 because values in this table were deflated by 5-year averages rather than on a year-by-year basis.

Source: SERO 2023

As was observed with dolphinfish (Table 3.4.5), there appears to be some seasonal price differences for wahoo that are independent of changes in the quantity landed, with prices spiking in October and November (Table 3.4.10). This is despite relatively high landings in these two months.

Table 3.4.10. Average monthly landings (pounds, value, and price) of wahoo by commercial fishers in Puerto Rico, 2010-2019.

Month	Pounds ^b	Value (\$)	Price (\$/Lb.)	Adjusted Value (\$) ^a	Adjusted Price (\$/Lb.)
January	2,221	6,049	2.72	7,429	3.34
February	1,153	3,219	2.79	3,936	3.41
March	1,109	3,099	2.80	3,779	3.41
April	1,319	3,662	2.78	4,500	3.41
May	783	2,064	2.63	2,520	3.22
June	614	1,757	2.86	2,156	3.51
July	529	1,475	2.79	1,783	3.37
August	512	1,554	3.04	1,897	3.71
September	629	1,939	3.08	2,381	3.78

Month	Pounds ^b	Value (\$)	Price (\$/Lb.)	Adjusted Value (\$) ^a	Adjusted Price (\$/Lb.)
October	2,010	6,691	3.33	8,131	4.04
November	3,581	11,248	3.14	13,759	3.84
December	3,592	10,046	2.80	12,394	3.45

^a Values and prices were converted to 2022 dollars using the BEA Implicit Price Deflator (GDP Deflator by Year).

^b Summing pounds across all months (18,052 lbs) will differ slightly from the aggregation of pounds in Table 3.4.6 (18,210 lbs) because there was a small amount of confidential data in monthly landings that could not be used in estimating monthly totals.

Source: SERO 2023

3.4.1.2 The Import Sector

In addition to the dolphinfish landed by the commercial fishery, Puerto Rico also imports a large amount of dolphinfish. These imports, expressed on a product weight basis, averaged 437,753 lbs annually during 2010-2019 with an associated value (expressed in 2022 dollars) averaging \$1.7 million (Table 3.4.11).³¹ Virtually all imports are reported to be frozen fillets and the NMFS conversion factor for dolphinfish fillets to whole weight is 3.33. Imports, expressed on a whole weight basis, averaged about 1.5 million lbs annually during the 2010-2021 period.

When evaluated on a whole-weight basis, Puerto Rico annual imports of dolphinfish (averaging 1.5 million lbs during 2010-2021) dominate reported commercial landings, which averaged 134,907 lbs annually during 2010-2019. However, the imported product may not compete strongly with the domestic product if separate markets³² exist for the two products. This appears to be the case given the low price of the imported product vis-à-vis domestic landings. In 2019, for example, the domestic dockside price, expressed in 2022 dollars, was \$4.84 or about three times greater than the equivalent whole-weight import price of \$1.15 per pound (i.e., \$3.84/3.33).

Table 3.4.11. Reported annual Puerto Rico dolphinfish imports (product weight), 2010-2021.

Year	Pounds	Value (\$)	Price (\$/Lb.)	Adjusted Value (\$) ^a	Adjusted Price (\$/Lb.)
2010	553,651	1,103,789	1.99	1,476,011	2.67
2011	352,959	1,022,556	2.90	1,341,619	3.80
2012	550,222	2,033,966	3.70	2,614,840	4.75
2013	409,440	839,516	2.05	1,060,635	2.59
2014	357,886	944,954	2.64	1,175,046	3.29
2015	485,951	1,538,877	3.17	1,898,456	3.91
2016	470,232	1,631,847	3.47	1,984,604	4.22
2017	285,962	1,326,516	4.64	1,581,197	5.53
2018	545,140	2,161,978	3.97	2,519,552	4.62

³¹ More specifically, these are dolphinfish imports that arrived at the San Juan Customs District.

³² Markets are actually a continuum and there would likely be some overlap between markets.

Year	Pounds	Value (\$)	Price (\$/Lb.)	Adjusted Value (\$) ^a	Adjusted Price (\$/Lb.)
2019	617,530	2,071,881	3.36	2,375,437	3.84
2020	367,891	1,217,992	3.31	1,375,378	3.74
2021	256,675	932,193	3.63	991,934	3.86
Avg.	437,753	1,402,172	3.24	1,699,559	3.88

^a Values and prices were converted to 2022 dollars using the BEA Implicit Price Deflator (GDP Deflator by Year).

Source: SERO 2023

3.4.1.3 The Recreational Sector

The estimated number of recreational angler trips taken in Puerto Rico during 2012-2017 averaged almost 509 thousand annually and ranged from a low of 336.3 thousand in 2017 to a high of 667.6 thousand in 2015 (Table 3.4.12). The low number of trips in 2017 undoubtedly reflects, in part, the impacts of Hurricane Maria, which made landfall in Puerto Rico on September 20th of that year.

Recreational angler trips, as collected under the MRIP program, are segmented by whether the trip is from shore, private boat, or charter. Shore and private boats dominate the total number of trips with shore-based angler trips accounting for 52% of total trips and angler trips on private boats accounting for 48% of total trips.

Table 3.4.12. Estimated recreational angler trips (in thousands) in Puerto Rico by mode, 2012-2017.

Year	Shore	Charter	Private	Total
2012	140.3	1.8	208.5	350.6
2013	275.1	6.5	228.7	510.3
2014	275.6	-	258.9	534.5
2015	368.5	2.4	296.7	667.6
2016	309.5	-	344.1	653.6
2017	209.7	-	126.6	336.3
Avg. (2012-2016)	273.8	3.6	267.4	543.3
Avg. (2012-2017)	263.1	3.6	243.9	508.8

Of the estimated 543.3 thousand angler trips taken annually in Puerto Rico waters during 2012-2016, about 50% of these trips (an estimated 271 thousand annually) were reportedly taken in state ocean waters while 9.7% of the trips (52.8 thousand annually) were taken in federal ocean waters (remaining trips are inland).³³

³³ 2017 is excluded due to the very high degree of uncertainty associated with trip estimates; especially in federal waters. The program was suspended after Hurricane Maria.

Estimated number of dolphinfish harvested (i.e., not including released alive³⁴) by recreational anglers during the six-year period ending in 2017 is given in Table 3.4.13. The estimated number of dolphinfish harvested on an annual basis was 99,715.³⁵ Estimated annual recreational angler dolphinfish harvest from federal waters during 2012-2016 (76,344 fish) accounted for two-thirds of the total estimated number of dolphinfish harvested annually during the same period (114,456 fish).

Table 3.4.13. Estimated number of dolphinfish harvested (excluding released alive) by recreational anglers in Puerto Rico in total and in federal waters, 2012-2017.

Year	Total Number Harvested			Number Harvested in Federal Waters		
	Number of Fish	Lower 95% Confidence Number	Upper 95% Confidence Number	Number of Fish	Lower 95% Confidence Interval	Upper 95% Confidence Interval
2012	112,295	65,854	158,736	65,954*	26,397	105,510
2013	18,184*	6,280	30,088	12,455*	1,250	23,660
2014	85,186	40,607	129,766	61,641*	20,232	102,961
2015	72,421	33,812	111,030	32,292*	3,747	60,836
2016	284,192*	115,973	452,595	209,377*	52,202	366,552
2017	26,011*	3,426	48,595	--- ^a	---	---
Avg. (2012-2016)	114,456	---	---	76,344	---	---
Avg. (2012-2017)	99,715	---	---	76,344	---	---

* Caution is advised in using this number due to a high degree of uncertainty around the estimate.

^a Harvest from federal waters in 2017 not included due to extreme uncertainty around the estimate.

Estimated number of wahoo harvested (i.e., not including released alive) by recreational anglers during the six-year period ending in 2017 is given in Table 3.4.14. The number, as indicated, is relatively small with the average being less than 10,000 per year. Furthermore, it is advised not to use the estimated annual dolphinfish harvests from federal waters due to a very high degree of uncertainty around the estimates. Thus, they are not included here though it appears as the overwhelming majority are taken from federal waters.

³⁴ The MRIP data indicate that very few dolphinfish are released alive. In federal waters, for example, the estimated number of dolphinfish released alive during 2012-2016 averaged less than 2,000 per year.

³⁵ There is a considerable amount of uncertainty associated with the annual estimates as indicated by the large confidence intervals associated with the annual estimates. Uncertainty with the averages, however, should be somewhat less than with the individual years.

Table 3.4.14. Estimated number of wahoo harvested (excluding released alive) by recreational anglers in Puerto Rico, 2012-2017.

Year	Total Number Harvested		
	Number of Fish	Lower 95% Confidence Interval	Upper 95% Confidence Interval
2012	3,398	1,413	5,383
2013	-- ^a	-- ^a	-- ^a
2014	2,160*	115	4,204
2015	19,656*	2,204	37,109
2016	14,674*	1,933	27,414
2017	-- ^a	-- ^a	-- ^a
Avg.	9,972 ^b	--	--

* Caution is advised in using this number due to a high degree of uncertainty around the estimate.

^a Harvest for 2013 and 2017 not included due to extreme uncertainty around the estimates.

^b Average based on four years of data (i.e., 2012, 2014, 2015, and 2016).

3.4.2 St. Croix

3.4.2.1 The Commercial Dolphinfish Fishery

Reported commercial landings of dolphinfish by St. Croix commercial fishers during 2010-2021 exhibited a considerable amount of annual variability ranging from a low of 6,075 lbs in 2019 to a high of 73,362 lbs in 2014 (Table 3.4.15). Average annual landings during the twelve-year period ending in 2021 was 40,318 lbs.

Mirroring poundage, the annual value of reported St. Croix commercial dolphinfish landings varied significantly; ranging from less than \$40,000 in 2019 to more than \$500,000 in 2017 (Table 3.4.15). The value of these landings averaged \$295,882 annually during 2010-2019.³⁶ The annual per pound price of the harvested product averaged \$6.80 during 2010-2019 and gradually increased from \$6.00 in 2010 to \$7.50 in 2015 and 2016 before falling in the subsequent three years.³⁷

Much of the increase in value and price is the result of inflation. The inflation adjusted value (adjusted to 2022 dollars based on the BEA Implicit Price Deflator) of St. Croix annual commercial dolphinfish landings exhibited a more moderate increase and averaged \$369,062 during the ten-year period ending in 2019 (Table 3.4.15) with the average price, adjusted to 2022 dollars, equaling \$8.41 per pound.

³⁶ At the time of the preparation of this amendment, the latest price data for St. Croix commercial fisheries was 2019.

³⁷ For purposes of analysis, it is assumed that dolphinfish prices are being provided by the St. Croix fishers on a whole-weight basis rather than on a product-weight basis. If this is not the case, values will be overstated which would lead to an overestimation of revenues per fisher and trip.

Table 3.4.15. Reported annual commercial landings (pounds, value and price) of dolphinfish in St. Croix USVI, 2010-2021.

Year	Pounds	Value (\$)	Price (\$/Lb.)	Adjusted Value (\$) ^a	Adjusted Price (\$/Lb.)
2010	52,894	317,364	6.00	424,386	8.02
2011	45,600	281,269	6.17	369,032	8.09
2012	35,036	231,240	6.60	297,279	8.48
2013	35,776	242,205	6.77	305,999	8.55
2014	63,994	433,241	6.77	538,733	8.42
2015	52,813	396,098	7.50	488,652	9.25
2016	56,033	420,206	7.50	511,042	9.12
2017	73,362	513,534	7.00	612,129	8.34
2018	11,766	83,762	7.12	97,615	8.30
2019	6,075	39,909	6.57	45,756	7.53
2020	20,693	NA ^b	NA	NA	NA
2021	29,772	NA	NA	NA	NA
Avg.	40,318	\$295,882 ^c	\$6.80	\$369,062	\$8.41

^a Values and prices were converted to 2022 dollars using the BEA Implicit Price Deflator (GDP Deflator by Year).

^b Price data are unavailable after 2019.

^c Average values and prices are based on 2010-2019 data.

Source: SERO 2023

The number of St. Croix commercial fishers reporting dolphinfish landings averaged almost 19 during 2010-2021 and ranged from a low of 12 (2014 and 2020) to a high of 30 in 2010³⁸ (Table 3.4.16). These fishers reported harvesting dolphinfish on an average of 327 trips per year, which is equivalent to almost 18 trips per fisher.

Among the annual average of 19 fishers reporting dolphinfish landings during 2010-2021, harvests per fisher averaged 2,263 lbs of dolphinfish per year with maximum landings of 5,333 lbs occurring in 2014. Dolphinfish landings per trip averaged 140 lbs during the same period and exhibited a range of less than 100 lbs to almost 170 lbs. Revenues per fisher from the harvest of dolphinfish, expressed in 2022 dollars, averaged just over \$20,000 during the 2010-2019 period while adjusted revenues per trip averaged \$1,038.

³⁸ The average of 19 fishers reporting dolphinfish landings during 2010-2021 represents about one-quarter of the average number of fishers reporting any landings during this period (i.e., 76). See Table 3.3.6 for the annual total number of St. Croix fishers reporting landings.

Table 3.4.16. Number of fishers, trips, and landings per fisher and trip (pounds and value) for commercial fishers of St. Croix USVI who reported landings of dolphinfish, 2010-2021.

Year	Number of Fishers	Number of Trips	Trips Per Fisher	Lbs. Per Fisher	Lbs. Per Trip	Adjusted Revenues Per Fisher (\$) ^a	Adjusted Revenues per Trip (\$)
2010	30	577	19.2	1,763	92	14,146	786
2011	28	487	17.4	1,629	94	13,180	758
2012	22	315	14.3	1,593	111	13,513	944
2013	14	348	24.9	2,555	103	21,857	879
2014	12	450	37.5	5,333	142	44,894	1,197
2015	15	370	24.7	3,521	143	32,577	1,320
2016	28	378	13.5	2,001	148	18,252	1,351
2017	17	434	25.5	4,315	169	36,008	1,410
2018	14	106	7.6	840	111	6,973	921
2019	13	53	4.1	467	115	3,520	863
2020	12	148	12.3	1,724	140	NA ^b	NA
2021	21	257	12.2	1,417	116	NA	NA
Avg.	18.8	327	17.8	2,263	124	20,491	1,038

^a Values and prices were converted to 2022 dollars using the BEA Implicit Price Deflator (GDP Deflator by Year).

^b Average adjusted revenues per fisher and trip based on data from 2010 to 2019.

Source: SERO 2023

The vast majority of dolphinfish landed in recent years by commercial fishers in St. Croix, expressed on a weight basis, was reported to be taken from federal waters (Table 3.3.7). Since 2017, the annual harvest from federal waters has averaged 26,809 lbs, which represents 94.9% of the total reported dolphinfish landings of 28,250 lbs. The average annual value of commercial dolphinfish harvests from federal waters was estimated to equal \$185,100 or, \$213,508 when expressed in 2022 dollars (i.e., converted to 2022 dollars based on the BEA Implicit Price Deflator).³⁹

St. Croix commercial fishers reported harvests of dolphinfish from federal waters on an average of 183 trips per year during the 2017-2021 period. This represents about 92% of all trips reporting the harvest of dolphinfish during the same timeframe. The trips by St. Croix commercial fishers reporting the harvest of dolphinfish from federal waters also reported the harvest of many other species including wahoo, little tunny, and king mackerel (Table 3.4.17). Expressed on a weight basis, dolphinfish contributed about 55% of the total poundage taken by trips in federal waters that reported the harvest of dolphinfish (i.e., 26,809 lbs out of a total 49,034 lbs). The contribution of dolphinfish to the value of catch was approximately the same as

³⁹ For purposes of analysis, the 2020 and 2021 dolphinfish prices were assumed to equal the average of the 2018 and 2019 dolphinfish price (i.e., \$6.84 per pound).

poundage indicating that the price of dolphinfish was about the same as the aggregate price of other species taken on the trips in federal waters.⁴⁰

Based on an average of 183 trips annually during 2017-2021 (i.e., those trips in federal waters where dolphinfish was reported to be harvested), the catch per trip averaged 268 lbs with dolphinfish accounting for 146 lbs, or about 55%, of this total. The adjusted value per trip (i.e., expressed in 2022 dollars based on the BEA Implicit Price Deflator) averaged \$2,057 with the adjusted dolphinfish revenues per trip averaging \$1,151.

Table 3.4.17. Pounds and value of dolphinfish that was reported to be harvested in federal waters off St. Croix USVI and the pounds and value of co-occurring species that were also harvested on those trips, 2017-2021 annual averages.

Species	Pounds	Value (\$) ^a	Adjusted Value (\$) ^b
Dolphinfish	26,809	184,797	210,669
Wahoo	10,674	72,798	82,990
Little Tunny	7,472	47,000	53,580
King Mackerel	2,451	15,564	17,743
Tuna, Unspecified	1,246	7,888	8,993
Rainbow Runner	207	1,220	1,391
Barracuda	174	881	1,005
Total	49,034	330,149	376,371
Dolphinfish as % of Total	54.7%	56.0%	56.0%

^a The unweighted 2017-2019 prices for each of the species were used to estimate the 2017-2021 values.

^b Values and prices were converted to 2022 dollars using the BEA Implicit Price Deflator (GDP Deflator by Year).
Source: SERO 2023

3.4.2.2 The Commercial Wahoo Fishery

Reported commercial landings of wahoo by the St. Croix commercial fishing sector exhibited a significant amount of variation across years during 2010-2021 ranging from a low of 4,290 lbs in 2019 to a high of 35,523 lbs in 2016 (Table 3.4.18). The value of reported wahoo landings likewise varied significantly when examined on a yearly basis ranging from a low of \$28,614 in 2019 to a high of \$266,423 in 2016. Overall, landings averaged 18,598 lbs during the twelve-year period ending in 2021 while the value of these landings (based on data through 2019) averaged \$128,017 per year based on an average price of \$6.79 per pound.⁴¹ Expressed in 2022 dollars (i.e., converted to 2022 dollars based on the BEA Implicit Price Deflator), the value of

⁴⁰ With some notable exceptions, there were only minor differences in prices among the St. Croix finfish species.

⁴¹ For purposes of this analysis, it is assumed that wahoo prices are being provided by the St. Croix fishers on a whole-weight basis rather than on a product-weight basis. If this is not the case, values may well be overstated which would lead to an overestimation of revenues per fisher and trip.

landings averaged \$158,260 annually during the 2010-2019 period based on an adjusted price of \$8.41 per pound.

Table 3.4.18. Reported annual commercial landings (pounds, value, and price) of wahoo in St. Croix, 2010-2021.

Year	Pounds	Value (\$)	Price (\$/Lb.)	Adjusted Value (\$) ^a	Adjusted Price (\$/Lb.)
2010	13,762	82,572	6.00	110,417	8.02
2011	5,997	37,538	6.26	49,251	8.21
2012	8,765	57,847	6.60	74,367	8.48
2013	24,515	166,599	6.80	210,479	8.59
2014	29,105	197,911	6.80	246,101	8.46
2015	27,144	203,576	7.50	251,144	9.25
2016	35,523	266,423	7.50	324,016	9.12
2017	28,439	202,191	7.11	241,010	8.47
2018	5,515	36,903	6.69	43,006	7.80
2019	4,290	28,614	6.67	32,806	7.65
2020	15,103	NA ^b	NA	NA	NA
2021	25,023	NA	NA	NA	NA
Avg.	18,598	128,017 ^c	6.79	158,260	8.41

^a Values and prices were converted to 2022 dollars using the BEA Implicit Price Deflator (GDP Deflator by Year).

^b Price data are unavailable after 2019.

^c Average values and prices are based on 2010-2019 data.

Source: SERO 2023

The number of St. Croix commercial fishers reporting wahoo landings during 2010-2021 averaged about 13 and ranged from a low of 6 in 2014 to a high of 23 in 2010 as well as 2011⁴² (Table 3.4.19). These fishers reported harvesting wahoo on an average of 212 trips per year, which is equivalent to almost 19 trips per fisher.

Among the 13 fishers reporting wahoo landings during 2010-2021, harvests per fisher averaged 1,708 lbs of wahoo per year with a maximum landings of 4,850 lbs occurring in 2014. Wahoo landings per trip averaged 89 lbs during the same period and exhibited a range of less than 50 lbs to almost 123 lbs. Revenues per fisher from the harvest of wahoo, expressed in 2022 dollars, averaged almost \$15,000 during 2010-2019 while adjusted revenues per trip averaged \$711.

⁴² The average of 13.3 fishers reporting wahoo landings during 2010-2021 represents about 17% of the average number of fishers reporting any landings during this period (i.e., 76). See Table 3.3.6 for the annual total number of St. Croix fishers reporting landings.

Table 3.4.19. Number of fishers, trips, and landings per fisher and trip (pounds and value) for commercial fishers of St. Croix who reported landings of wahoo, 2010-2021.

Year	Number of Fishers	Number of Trips	Trips Per Fisher	Lbs. Per Fisher	Lbs. Per Trip	Adjusted Revenues Per Fisher (\$) ^a	Adjusted Revenues per Trip (\$)
2010	23	189	8.2	598	72.8	4,800	584
2011	23	122	5.3	260	49.2	2,141	404
2012	12	153	12.7	730	57.3	6,197	486
2013	17	361	21.2	1,442	67.9	12,381	583
2014	6	373	62.2	4,850	78.0	41,017	660
2015	8	289	36.1	3,393	93.9	31,393	869
2016	14	321	22.9	2,537	110.7	23,144	1,009
2017	13	264	20.3	2,188	107.7	18,539	913
2018	8	64	8.0	689	86.2	5,375	672
2019	12	35	2.9	358	122.6	2,733	937
2020	8	124	15.5	1,888	121.8	NA	NA
2021	16	253	15.8	1,564	98.9	NA	NA
Avg.	13.3	212.3	19.3	1,708	88.9	14,772 ^b	711

^a Values were converted to 2022 dollars using the BEA Implicit Price Deflator (GDP Deflator by Year).

^b Average adjusted annual revenues are based on 2010-2019 data.

Source: SERO 2023

The vast majority of wahoo landed in recent years by commercial fishers in St. Croix was reported to be taken from federal waters (Table 3.3.8). For the 2017-2021 period, the annual harvest from federal waters averaged 14,906 lbs, which represented 95.1% of the total reported wahoo landings of 15,674 lbs. The average annual value of commercial wahoo harvests from federal waters was estimated to equal \$101,887 or \$115,727 when expressed in 2022 dollars (i.e., converted to 2022 dollars based on the BEA Implicit Price Deflator).⁴³

An average of 137 trips reported the catch of wahoo from federal waters during 2017-2021, or about 93% of the total number of trips reporting wahoo landings. The trips by St. Croix commercial fishers reporting the harvest of wahoo from federal waters also reported the harvest of many other species including dolphinfish, little tunny, and king mackerel (Table 3.4.20). Expressed on a weight basis, wahoo contributed 36% of the total poundage taken by trips in federal waters that reported the harvest of wahoo (i.e., 14,906 lbs out of a total 41,286 lbs). The contribution of wahoo to the value of catch was approximately the same as poundage indicating that the price of wahoo was about the same as the aggregate price of other species taken on the trips in federal waters.

⁴³ For purposes of this analysis, the 2020 and 2021 wahoo prices were assumed to equal the average of the 2018 and 2019 wahoo price (i.e., \$6.68 per pound).

Based on an average of 137 trips annually during 2017-2021 (i.e., those trips in federal waters where wahoo was reported to be harvested), the catch per trip averaged 301 lbs with wahoo accounting for 109 lbs of this total. The adjusted value per trip (i.e., expressed in 2022 dollars based on the BEA Implicit Price Deflator) averaged almost \$2,300 with the adjusted wahoo revenues per trip averaging \$845.

Table 3.4.20. Pounds and value of wahoo that was reported to be harvested in federal waters off St. Croix and the pounds and value of co-occurring species that were also harvested on those trips, 2017-2021 annual averages.

Species	Pounds	Value (\$) ^a	Adjusted Value (\$) ^b
Wahoo	14,906	101,658	115,890
Dolphinfish	14,132	97,409	111,046
Little Tunny	8,248	51,879	59,142
King Mackerel	3,911	24,832	28,309
Barracuda	91	458	523
Total	41,286	276,236	314,909
Wahoo as % of Total	36.1%	36.8%	36.8%

^a The unweighted 2017-2019 prices for each of the species were used to estimate the 2017-2021 values.

^b Values and prices were converted to 2022 dollars using the BEA Implicit Price Deflator (GDP Deflator by Year).

Source: SERO 2023

3.4.3 St. Thomas and St. John

3.4.3.1 The Commercial Dolphinfish Fishery

Reported commercial landings of dolphinfish by St. Thomas/St. John commercial fishers during 2010-2021 averaged 40,318 lbs and the annual landings exhibited high amount of annual variability (Table 3.4.21). Largely mirroring poundage, the annual value of reported St. Thomas/St. John commercial dolphinfish landings varied significantly; ranging from just over \$12,000 in 2012 to almost \$84,000 in 2016. The value of these landings averaged \$45,746 annually during 2010-2019 while the per pound price of the harvested product averaged \$6.38.⁴⁴ Overall, the price increased from about \$6.00 per pound in 2010 to \$6.50 in 2015 and has changed little since then. After adjusting for inflation, the deflated per pound price, expressed in 2022 dollars, fell from about \$8.00 in 2010 to about \$7.50 in 2018-2019.

⁴⁴ At the time of the preparation of this amendment, the latest price data for St. Thomas/St. John commercial fishery was 2019. For purposes of this analysis, furthermore, it is assumed that dolphinfish prices are being provided by the St. Thomas/St. John fishers on a whole-weight basis rather than on a product-weight basis. If this is not the case, values will be overstated which would lead to an overestimation of revenues per fisher and trip.

Table 3.4.21. Reported annual commercial landings (pounds, value, and price) of dolphinfish in St. Thomas/St. John USVI, 2010-2021.

Year	Pounds	Value (\$)	Price (\$/Lb.)	Adjusted Value (\$) ^a	Adjusted Price (\$/Lb.)
2010	4,711	28,266	6.00	37,798	8.02
2011	2,569	15,779	6.14	20,702	8.06
2012	1,833	12,098	6.60	15,553	8.49
2013	8,599	53,600	6.23	67,718	7.88
2014	5,748	35,868	6.24	44,602	7.76
2015	8,272	53,767	6.50	66,330	8.02
2016	12,911	83,919	6.50	102,060	7.90
2017	5,831	38,481	6.60	45,869	7.87
2018	8,189	52,261	6.38	60,905	7.44
2019	12,696	83,425	6.57	95,939	7.56
2020	990	NA ^b	NA	NA	NA
2021	4,211	NA	NA	NA	NA
Avg.	6,380	45,746 ^c	6.38	55,748	7.90

^a Values and prices were converted to 2022 dollars using the BEA Implicit Price Deflator (GDP Deflator by Year).

^b Price data are unavailable after 2019.

^c Average values and prices are based on 2010-2019 data.

Source: SERO 2023

The number of St. Thomas/St. John commercial fishers reporting dolphinfish landings averaged about 12 annually during 2010-2021 and ranged from a low of 8 (2011 and 2020) to a high of 17 in 2016⁴⁵ (Table 3.4.22). These fishers reported harvesting dolphinfish on an average of 80 trips per year, which is equivalent to about 6.1 trips per fisher.

Among the annual average of 12 fishers reporting dolphinfish landings during 2010-2021, harvests per fisher averaged 488 lbs of dolphinfish per year with maximum landings of 977 lbs occurring in 2019 (Table 3.4.22). Dolphinfish landings per trip averaged 80 lbs during the same period and exhibited a range of less than 40 lbs in 2020 to more than 100 lbs in many years. Revenues per fisher from the harvest of dolphinfish, expressed in 2022 dollars, averaged just over \$4,200 during the 2010-2019 period while adjusted revenues per trip averaged \$671.

⁴⁵ The average of 12 fishers reporting dolphinfish landings during 2010-2021 represents about one-quarter of the average number of fishers reporting any landings during this period (i.e., 76). See Table 3.3.9 for the annual total number of St. Thomas/St. John fishers reporting landings.

Table 3.4.22. Number of fishers, trips, and landings per fisher and trip (pounds and value) for commercial fishers of St. Thomas/St. John who reported landings of dolphinfish, 2010-2021.

Year	Number of Fishers	Number of Trips	Trips Per Fisher	Lbs. Per Fisher	Lbs. Per Trip	Adjusted Revenues Per Fisher (\$) ^a	Adjusted Revenues per Trip (\$)
2010	13	63	4.8	362	75	2,907	600
2011	8	28	3.5	321	92	2,588	739
2012	12	47	3.9	153	39	1,296	331
2013	15	66	4.4	573	130	4,515	1,026
2014	9	50	5.6	639	115	4,956	892
2015	15	144	9.6	551	57	4,442	461
2016	17	183	10.8	759	71	6,004	558
2017	14	100	7.1	417	58	3,276	459
2018	13	98	7.5	630	84	4,685	621
2019	13	94	7.2	977	135	7,379	1,021
2020	8	27	3.4	124	37	NA	NA
2021	12	57	4.8	351	74	NA	NA
Avg.	12.4	79.8	6.1	488	80.5	4,203 ^b	671

^a Values were converted to 2022 dollars using the BEA Implicit Price Deflator (GDP Deflator by Year).

^b Average adjusted annual revenues are based on 2010-2019 data.

Source: SERO 2023

The vast majority of dolphinfish landed in recent years by commercial fishers in St. Thomas/St. John, expressed on a weight basis, was reported to be taken from federal waters (Table 3.3.10). Since 2017, the annual harvest from federal waters has averaged 6,235 lbs, which represents almost 98% of the total reported dolphinfish landings (6,383 lbs). The average annual value of commercial dolphinfish harvests from federal waters was estimated to equal \$40,553 or, when expressed in 2022 dollars (i.e., converted to 2022 dollars based on the BEA Implicit Price Deflator) \$46,662.⁴⁶

St. Thomas/St. John commercial fishers reported harvest of dolphinfish from federal waters on an average of 68 trips per year during the 2017-21 period. The trips by St. Thomas/St. John commercial fishers reporting the harvest of dolphinfish from federal waters also reported the harvest of many other species including yellowfin tuna, wahoo, spiny lobster, and king mackerel (Table 3.4.23). Expressed on a weight basis, dolphinfish contributed about 50% of the total poundage taken by trips in federal waters that reported the harvest of dolphinfish (i.e., 6,235 lbs out of a total 12,559 lbs). The contribution of dolphinfish to the value of catch was

⁴⁶ For purposes of analysis, the 2020 and 2021 dolphinfish prices were assumed to equal the average of the 2018 and 2019 dolphinfish price (i.e., \$6.48 per pound).

approximately the same as poundage indicating that the price of dolphinfish was about the same as the aggregate price of other species taken on the trips in federal waters.⁴⁷

Based on an average of 68 trips annually during 2017-2021 (i.e., those trips in federal waters where dolphinfish was reported to be harvested), the catch per trip averaged 185 lbs with dolphinfish accounting for 92 lbs, or about one-half of this total. The adjusted value per trip (i.e., expressed in 2022 dollars based on the BEA Implicit Price Deflator) averaged \$1,348 with the adjusted dolphinfish revenues per trip averaging \$679.

Table 3.4.23. Pounds and value of dolphinfish that was reported to be harvested in federal waters off St. Thomas/St. John and the pounds and value of co-occurring species that were also harvested on those trips, 2017-2021 annual averages.

Species	Pounds	Value (\$) ^a	Adjusted Value (\$) ^b
Dolphinfish	6,235	40,525	46,198
Unclassified Tuna	1,976	11,696	13,323
Yellowfin Tuna	1,553	9,785	11,155
Wahoo	1,070	7,027	8,011
Spiny Lobster	433	3,887	4,431
Herrings	221	1,104	1,259
King Mackerel	208	1,231	1,404
Red Hind Grouper	191	1,115	1,271
Yellowtail Snapper	158	967	1,102
Blue Runner	116	699	797
Red Grouper	110	659	751
Queen Triggerfish	88	505	576
Skipjack Tuna	70	427	487
Blackfin Tuna	66	410	467
Rainbow Runner	66	391	446
Total	12,559	80,428	91,688
Dolphinfish as % of Total	49.6	50.4	50.4

^a The unweighted 2017-2019 prices for each of the species were used to estimate the 2017-2021 values. In a few instances, prices were not provided and other years or species were used in lieu of the missing prices.

^b Values and prices were converted to 2022 dollars using the BEA Implicit Price Deflator (GDP Deflator by Year).
Source: SERO 2023

⁴⁷ With some notable exceptions, there were only minor differences in prices among the different St. Thomas/St. John finfish species.

3.4.3.2 The Commercial Wahoo Fishery

Reported commercial landings of wahoo by the St. Thomas/St. John commercial fishing sector exhibited a significant amount of variation across years during 2010-2021 with the annual landings ranging from a low of 650 lbs in 2020 to a high of almost 6,000 lbs in 2011 (Table 3.4.24). The value of reported wahoo landings likewise varied significantly when examined on a yearly basis ranging from a low of \$5,236 in 2019 to a high of almost \$37,000 in 2016. Overall, landings averaged 3,418 lbs during the twelve-year period ending in 2021 while the value of these landings (based on data through 2019) averaged \$25,329 per year based on an average price of \$6.44 per pound.⁴⁸ Expressed in 2022 dollars (i.e., converted to 2022 dollars based on the BEA Implicit Price Deflator), the value of landings averaged \$31,750 annually during the 2010-2019 period based on an adjusted price of \$7.97 per pound.

Table 3.4.24. Reported annual commercial landings (pounds, value, and price) of wahoo in St. Thomas/St. John USVI, 2010-2021.

Year	Pounds	Value (\$)	Price (\$/Lb.)	Adjusted Value (\$) ^a	Adjusted Price (\$/Lb.)
2010	5,472	32,882	6.01	43,971	8.04
2011	5,931	36,703	6.19	48,155	8.12
2012	3,372	22,256	6.60	28,612	8.49
2013	3,953	24,664	6.24	31,160	7.88
2014	4,424	27,604	6.24	34,325	7.76
2015	3,964	26,760	6.75	33,013	8.33
2016	5,429	36,649	6.75	44,571	8.21
2017	2,561	16,472	6.43	19,634	7.67
2018	3,715	24,061	6.48	28,040	7.55
2019	785	5,236	6.67	6,021	7.67
2020	650	NA ^b	NA	NA	NA
2021	763	NA	NA	NA	NA
Avg.	3,418	25,329 ^c	6.44	31,750	7.97

^a Values and prices were converted to 2022 dollars using the BEA Implicit Price Deflator (GDP Deflator by Year).

^b Price data are unavailable after 2019.

^c Average values and prices are based on 2010-2019 data.

The number of St. Thomas/St. John commercial fishers reporting wahoo landings during 2010-2021 averaged between six and seven and ranged from a low of 4 in 2019 and 2020 to a high of

⁴⁸ For purposes of this analysis, it is assumed that wahoo prices are being provided by the St. Thomas and St. John fishers on a whole-weight basis rather than on a product-weight basis. If this is not the case, values may well be overstated which would lead to an overestimation of revenues per fisher and trip.

12 in 2016 ⁴⁹ (Table 3.4.25). These fishers reported harvesting wahoo on an average of 38 trips per year, which is equivalent to about 5.5 trips per fisher.

Among the six to seven fishers reporting wahoo landings during 2010-2021, harvests per fisher averaged 501 lbs of wahoo per year with a maximum landings of 1,186 lbs in 2011. Wahoo landings per trip averaged 92 lbs during the same period and exhibited a range of less than 40 lbs to more than 200 lbs. Revenues per fisher from the harvest of wahoo, expressed in 2022 dollars, averaged almost \$4,565 during 2010-2019 while adjusted revenues per trip averaged \$825.

Table 3.4.25. Number of fishers, trips, and landings per fisher and trip (pounds and value) for commercial fishers of St. Thomas/St. John who reported landings of wahoo, 2010-2021.

Year	Number of Fishers	Number of Trips	Trips Per Fisher	Lbs. Per Fisher	Lbs. Per Trip	Adjusted Revenues Per Fisher (\$) ^a	Adjusted Revenues per Trip (\$)
2010	8	44	5.5	684	124	5,496	999
2011	5	26	5.2	1,186	228	9,631	1,852
2012	6	30	5.0	562	112	4,769	954
2013	6	37	6.2	659	107	5,193	842
2014	7	34	4.9	632	130	4,904	1,010
2015	8	63	7.9	496	63	4,127	524
2016	12	86	7.2	452	63	3,714	518
2017	7	32	4.6	366	80	2,805	614
2018	8	41	5.1	464	91	3,505	684
2019	4	24	6.0	196	33	1,505	251
2020	4	16	4.0	163	41	NA	NA
2021	5	22	4.4	153	35	NA	NA
Avg.	6.5	37.9	5.5	501	92	4,565 ^b	825

^a Values were converted to 2022 dollars using the BEA Implicit Price Deflator (GDP Deflator by Year).

^b Average adjusted annual revenues are based on 2010-2019 data.

Source: SERO 2023

The vast majority of wahoo landed in recent years by commercial fishers in St. Thomas/St. John was reported to be taken from federal waters (Table 3.3.11). For the 2017-2021 period, the annual harvest from federal waters averaged 1,666 lbs, which represented 98% of the total reported wahoo landings of 1,695 lbs. The average annual value of commercial wahoo harvests from federal waters was estimated to equal \$10,824 or \$12,565 when expressed in 2022 dollars (i.e., converted to 2022 dollars based on the BEA Implicit Price Deflator).⁵⁰

⁴⁹ The average of 6.5 fishers reporting wahoo landings during 2010-2021 represents less than 10% of the average number of fishers reporting any landings during this period (i.e., 76). See Table 3.3.9 for the annual total number of St. Thomas/St. John fishers reporting landings.

⁵⁰ For purposes of analysis, the 2020 and 2021 wahoo prices were assumed to equal the average of the 2018 and 2019 wahoo price (i.e., \$6.57 per pound).

An average of 26 trips reported the catch of wahoo from federal waters of St. Thomas/St. John during 2017-2021, or about 96% of the total number of trips reporting wahoo landings. The trips by St. Thomas/St. John commercial fishers reporting the harvest of wahoo from federal waters also reported the harvest of many other species including dolphinfish, little tunny, and king mackerel (Table 3.4.26). Expressed on a weight basis, wahoo contributed 44% of the total poundage taken by trips in federal waters that reported the harvest of wahoo (i.e., 1,666 lbs out of a total 3,742 lbs). The contribution of wahoo to the value of catch was approximately the same as poundage indicating that the price of wahoo was about the same as the aggregate price of other species taken on the trips in federal waters.

Based on an average of 26 trips annually during 2017-2021 (i.e., those trips in federal waters where wahoo was reported to be harvested), the catch per trip averaged 144 lbs with wahoo accounting for 64 lbs of this total. The adjusted value per trip (i.e., expressed in 2022 dollars based on the BEA Implicit Price Deflator) averaged almost \$1,055 with the adjusted wahoo revenues per trip averaging \$480.

Table 3.4.26. Pounds and value of wahoo that was reported to be harvested in federal waters off St. Thomas/St. John USVI and the pounds and value of co-occurring species that were also harvested on those trips, 2017-2021 annual averages.

Species	Pounds	Value (\$) ^a	Adjusted Value (\$) ^b
Wahoo	1,666	10,946	12,478
Dolphinfish	1,192	7,749	8,834
Unspecified Tuna	383	2,266	2,583
Yellowfin Tuna	306	1,928	2,198
King Mackerel	70	413	471
Rainbow Runner	66	393	448
Skipjack Tuna	59	360	410
Total	3,742	24,055	27,422
Wahoo as % of Total	44.5%	45.5%	45.5%

^a The unweighted 2017-2019 prices for each of the species were used to estimate the 2017-2021 values. In a few instances, prices were not provided and other years or species were used in lieu of the missing prices.

^b Values and prices were converted to 2022 dollars using the BEA Implicit Price Deflator (GDP Deflator by Year).
Source: SERO 2023

3.5 Description of the Social Environment

The following text describes select social aspects of the dolphinfish and wahoo fisheries of Puerto Rico and the USVI. Recent landings data are used to identify communities from which the species are harvested by the commercial sector, and various secondary source materials provide insight into recreational pursuit of the species around the islands. The principal intent of the section is to provide sufficient descriptive context for regulatory effects analysis in Chapter

4. In keeping with Executive Orders that call for examination of environmental equity and justice issues in the context of federal regulatory actions, the section also identifies social vulnerabilities among island communities where commercial and recreational fishing activities are of known importance. Readers are referred to an extensive base of literature regarding the social environment associated with commercial/artisanal, recreational, and consumption-oriented fishing around Puerto Rico—encapsulated in the new island-based FMP (CFMC 2019a), and in recent amendments, such as that regulating use of buoy gear in the federal jurisdiction waters of the U.S. Caribbean (CFMC 2022).

3.5.1 Puerto Rico

Pursuit of living marine resources is an important aspect of society in contemporary Puerto Rico—a natural outcome of life in a region where the Atlantic Ocean is continually in view and where its azure waters have provided a source of food, income, and enjoyment to islanders for so many generations. The contemporary importance of seafood is amplified in this setting—and especially in *municipios* where residents are most deeply engaged in commercial/artisanal marine fisheries—since these county-level administrative units are by far the most impoverished in the nation (cf. Cheatham and Roy 2022; U.S. Census Bureau 2023). While Puerto Rico’s small-scale commercial/artisanal fishing fleets have long provided seafood for distribution in markets and among families and communities around the Commonwealth, persons who do not possess commercial licenses or permits have also harvested, consumed, and informally shared, bartered, or otherwise transacted seafood in the same social settings over time. Indeed, as discussed by Napolitano et al. (2019), small societies of residents were pursuing and consuming marine resources around what is now called Puerto Rico as early as 4,700 years before present.

Meanwhile, the concept and practice of fishing primarily for recreational purposes is at once relatively new and also important here, and in this context invites questions about the motivations of those involved. For purposes of this analysis, we rely on the Magnuson-Stevens Act’s definition of “recreational fishing,” to mean fishing for sport or pleasure 16 U.S.C. § 1802(37). This is also consistent with the definitional logic offered by Puerto Rico’s DNER (2013) in its final report of the Puerto Rico Marine Recreational Fisheries Statistics Program. While definition in the report holds that recreational anglers prioritize the sport and relaxation dimensions of fishing, it is important to note that the authors also assert that living marine resources captured via the recreational approach and at recreational tournaments around Puerto Rico: (a) very typically are kept for consumption, (b) are in some cases sold illegally without a commercial license, and (c) are very rarely released (cf. DNER 2013; Rodriguez-Ferrer, pers. comm., 2023). Of note here, recent discussions with fishery managers working in Puerto Rico indicate increasing rates of illegal/difficult to enforce sale of fish by tournament participants and unregistered charter vessel operators active in certain island regions. As such, the definition of recreational fishing is somewhat blurred here, underscoring the observable

importance of seafood and its consumption and transaction in this island setting (see also discussion of “subsistence fishing” around Puerto Rico, as discussed in CFMC 2019a).

3.5.1.1 Key Social Aspects of Commercial/Artisanal Dolphinfish and Wahoo Fishing: Puerto Rico

The commercial fisheries of Puerto Rico are characteristically artisanal in nature. That is, most harvesters use and maintain relatively small vessels, employ few crew members, and use a variety of gear types suited to a shifting suite of target species over the course of a given year (Agar et al. 2020, Agar and Shivlani 2016). Like successful fishing everywhere, knowledge of the target species, ecological cues of their presence, and effective means of capture are key elements of success. Such knowledge is often transferred between generations of island residents (Garcia-Quijano 2009), as are navigational skills, the ability to maintain vessels and engines, and other core aspects of fishing-associated work on the ocean. Tourism-generated demand provides extensive opportunity for sale of seafood to restaurants and resorts around Puerto Rico. However, like many small-scale fisheries around the world, island harvesters often supplement fishing income with that generated through other forms of work (Agar et al. 2022; Agar and Shivlani 2016; Valle-Esquivel et al. 2011).

As discussed by Agar and Shivlani (2016) and at the outset of this amendment, most commercial/artisanal pursuit of dolphinfish (*dorado*) and wahoo (*peto*) occurs in Puerto Rico territorial waters, with fewer participants fishing for the species in both federal and territorial waters, and very few solely in federal waters. Patterns in the geographic distribution of landings are also notable and suggest some regional specialization in pelagic fishing activities. This is indicated in Figure 3.5.1 below, which depicts those island municipalities registering the greatest extent of landings from the federal waters component of Puerto Rico’s dolphinfish and wahoo fishing grounds during the period 2016 through 2020.⁵¹ A single graphic depicting combined dolphinfish and wahoo landings is provided here since the same principal communities are identified when landings for each species are considered separately. The highest percentage of landings of the two species occurred in the municipalities of Rincon, Lajas, and Arecibo during the period, with smaller proportions consistently accruing to seven additional municipalities. Of note here from a sociodemographic perspective, the percentage of persons in poverty residing in each of the three principal landings communities during 2020—40.9% in Rincon, 59.8% in Lajas, and 47% in Arecibo—far exceed the national rate of 11.4% during the same census year (U.S. Census Bureau 2020).

⁵¹ With the caveat that 2020 data are preliminary in nature.

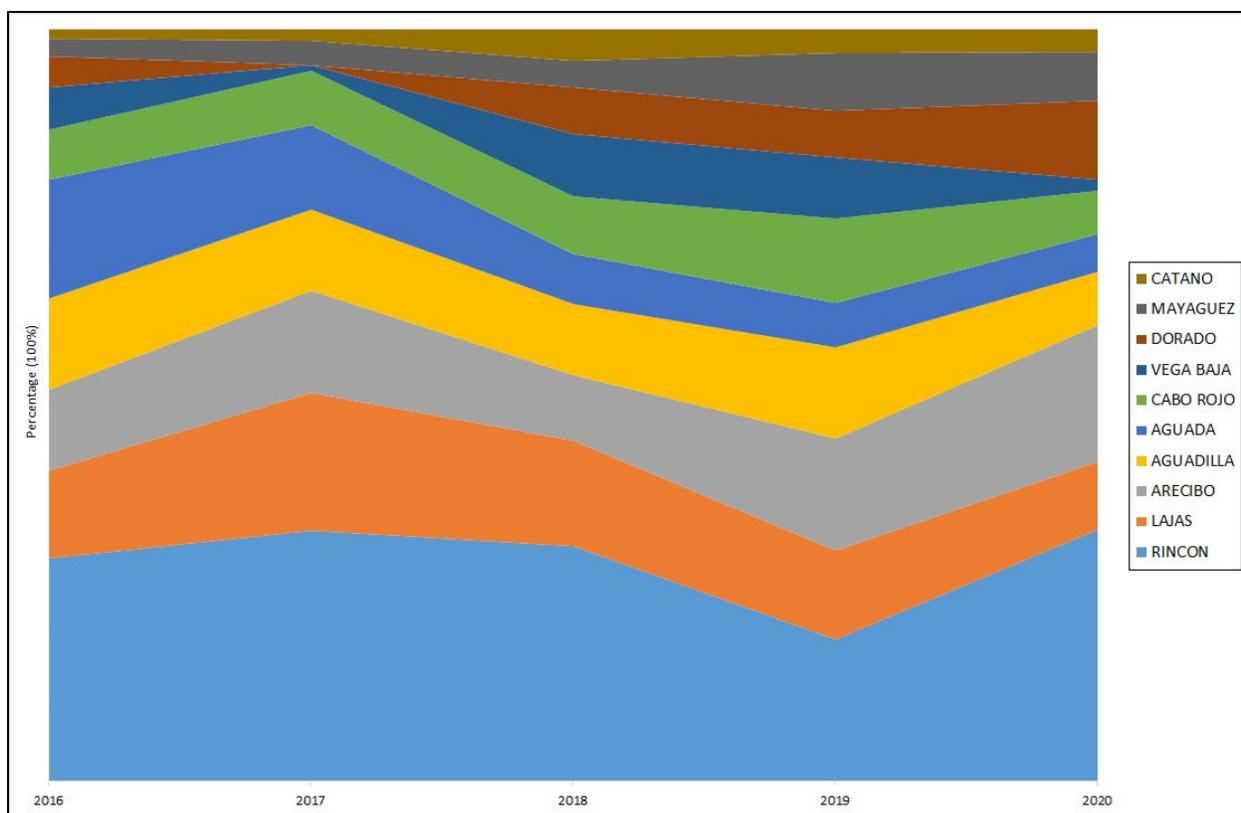


Figure 3.5.1. Puerto Rico municipios where commercial landings of dolphinfish and wahoo were documented during the period 2016 through 2020.

Source: SEFSC, Community ALS File, June 2023

3.5.1.2 Key Social Aspects of Recreational Dolphinfish and Wahoo Fishing: Puerto Rico

As discussed in the final report of the Puerto Rico Marine Recreational Fishing Statistics Survey Program (DNER 2013), the Puerto Rico DNER monitored recreational fishing activities around the island region between 1999 and 2013, with a directed focus on competitive tournaments, for-hire fishing operations, and visiting and resident anglers in general. The authors note that roughly 25 major tournaments were convened during each year of the monitoring period by 12 fishing clubs and marinas around the island.⁵² Pelagic-focused tournaments were most popular, with blue marlin- and dolphinfish-focused tournaments particularly so.⁵³ Notably, dolphinfish constituted the greatest volume-in-weight of all fish landed at pelagic tournaments, and was also the principal bycatch species landed at such tournaments during the period (DNER 2013). A total of 37 dolphinfish tournaments were held between 2009 and 2013, involving 4,081 anglers and 1,406 fishing vessels overall. Harkening again to the importance of seafood and to mixed

⁵² The formation and perpetuation of fishing clubs around Puerto Rico are inherently social processes that speak both to the popularity of fishing and the camaraderie it can engender within and across island communities.

⁵³ The 70th San Juan International Billfish Tournament occurred during summer 2023.

and fluid motives for engaging in fishing activities around Puerto Rico, the authors assert that “most dolphinfish landed during tournaments [of the period] was sold, despite [the fact that] most fishermen are aware that to buy or sell fish caught recreationally is illegal.” With specific regard to wahoo, six wahoo-focused tournaments were organized by a single fishing club along the south coast of Puerto Rico during the period 2009 through 2013, with 1,185 anglers and 298 fishing vessels involved in total. A single tournament targeting both wahoo and dolphinfish was held during the same period (DNER 2013).

Of note from a resource management perspective, Rodríguez -Ferrer et al. (2006) describe tournaments occurring around Puerto Rico between 2000 and 2003. The authors assert that recreational fishing regulations established by the Commonwealth altered the manner in which club-sponsored events were conducted at the time, including dolphinfish-specific competitions. That is, when the Commonwealth established a territory-wide limit of five dolphinfish per recreational angler (20 fish per vessel) in 2005, tournament organizers stopped awarding prizes to persons landing the most fish and instead championed those capturing the largest specimens. This reportedly encouraged a then-emerging trend wherein certain clubs were requiring that only dolphinfish of sufficient size could qualify for review by tournament judges (Rodríguez-Ferrer et al. (2006). These authors also describe illegal sale of dolphinfish by tournament participants of the day.

With regard to charter (for-hire) operations monitored by DNER between 2009 and 2013, it is notable that dolphinfish again constituted the greatest percentage of landings-by-weight of all species captured, and that no dolphinfish releases were documented during the period. The authors state that most charter operations around Puerto Rico accommodate visitors from other parts of the nation and world, though some also serve local clientele (DNER 2013). For-hire operations are widely distributed around Puerto Rico, with some 47 businesses reportedly active in 2018, based mostly in harbors around San Juan and along the island’s northeast and southwest coastlines (CFMC 2019a). The pandemic-focused research of Agar et al. (2022) also indicates approximately 50 for-hire fishing operations around Puerto Rico. Large charter vessels operating in federal jurisdiction waters typically target highly migratory pelagics such as the marlins and tunas, with dolphinfish and wahoo often captured incidentally (CFMC 2019a). During 2017, 405 persons held permits to capture highly migratory species on a recreational basis around Puerto Rico (CFMC 2019a).

Finally, in order to document catch and effort on the part of persons fishing on recreational basis from privately owned vessels, the DNER (2013) conducted between 600 and 1,000 access point interviews during each year of the 2009 through 2013 monitoring period. Capture of dolphinfish by this fleet far surpassed that of all other species during each year monitored, and release of fish on the part of anglers involved in this mode of fishing is “quite rare,” indicating again the

questionability of attributing purely recreational motives to pelagic fishing around Puerto Rico (DNER 2013).

3.5.2 The U.S. Virgin Islands: St. Croix, St. Thomas, and St. John

As for other Leeward Islands, the islands now known as St. Thomas, St. John, and St. Croix were occupied by small marine resource dependent societies at least 3,500 years before present (Baumgardt 2009; Dreyfus 1994). Such engagement continued over subsequent centuries, as persons of African, West Indian, French, and Danish descent arrived and established small agriculture- and fishing-oriented communities around the island chain (Olwig 1993; Rogozinski 1994; IAI 2006, 2007). Today, relatively few—some 260—of the 87,146 residents enumerated across the USVI during the 2020 census are directly engaged in marine fisheries (Kojis et al. 2017). Yet the harvest, transaction, and consumption of living marine resources—including dolphinfish, wahoo, and other pelagic species—continue to be of great social and dietary importance here (cf. Agar et al. 2022; Agar et al. 2020; CFMC 2019b,c; Valdes-Pizzini et al. 2010; Stoffle et al. 2009; IAI 2006, 2007). In straightforward terms, seafood harvested from territorial and federal jurisdiction waters around the USVI constitutes an important part of local diets in a context of extensive regional poverty (U.S. Census Bureau 2022).

3.5.2.1 Key Social Aspects of Commercial/Artisanal Dolphinfish and Wahoo Fishing: USVI

Very similar to the situation around Puerto Rico, contemporary commercial fishing operations around the USVI tend to be artisanal in nature. That is, (a) vessels are small and fishing trips are generally short-lived, (b) harvesters typically sell their catch at local markets while also retaining a portion for consumption by family and friends in various social settings (Kojis et al. 2017; IAI 2006, 2007), and (c) many fishery participants supplement fishing income with other forms of employment during certain parts of the year (Agar et al. 2022, Agar and Shivlani 2016).

As per the fishery census conducted by Kojis et al. (2017), and discussed at the outset of this amendment, dolphinfish and wahoo are regularly targeted by about 25% of artisanal participants residing on St. Thomas/St. John, and by more than 50% of those residing on St. Croix. When defined as a target species unit, dolphinfish/wahoo was deemed by study participants in both island areas to be the third most important target species both overall and in terms of its capacity to generate revenue. The authors report that longline gear was not used to harvest dolphinfish or wahoo anywhere in the USVI during the most recent fishery census year, and that the two species are captured exclusively by trolling with hook and line gear, including both handlines and rods and reels. This approach is perennially common around the islands, with 83.5% of surveyed participants trolling for the species in 2011 (Kojis and Quinn 2011), and with 85.2% so engaged in 2016 (Kojis et al. 2017).

Table 3.5.1 provides additional summary information regarding the pursuit of dolphinfish and wahoo by local participants during 2016. As indicated by the number of hours fished for the species during any given trip, dolphinfish and wahoo are pursued with somewhat greater intensity by persons operating from St. Thomas/St. John than those operating from St. Croix. This may relate to the reported tendency of the latter group to prioritize consumption of bottomfish species above pelagics, and the tendency of the former to transact dolphinfish and wahoo to buyers at restaurants and resorts around St. Thomas (Stoffle, pers. comm., June 2023).

Table 3.5.1. Use of hook-and-line gear to harvest dolphinfish and wahoo resources in the USVI.*

Gear Type	Location	N**	Number/% Owning Gear	# Using Gear < 3 Miles	# Using Gear > 3 Miles (only)	# Using Gear in Both Zones	Mean Units Owned	Mean Hrs. Fished per Trip
Handlines	St. Thomas/St. John	82	69/84.1%	35	2	30	1.4	6.2
Handlines	St. Croix	109	100/91.7%	42	3	51	1.8	5.3
Rods and Reels	St. Thomas/St. John	82	43/52.4%	15	2	21	6.9	5.1
Rods and Reels	St. Croix	109	39/35.8%	12	2	25	5.9	4.3

*From Kojis et al. (2017).

** N = number of research participants responding to questions about the gear.

The vast majority of dolphinfish/wahoo landings deriving from commercial/artisanal fishing activities in federal jurisdiction waters surrounding the USVI during 2021 accrued primarily to participants in the Southwest District of St. Croix, followed by the those operating from the Northside and East End Districts of St. Thomas, and from the Sion Farm District of St. Croix (Figure 3.5.2). Of note from a sociodemographic perspective, the total population figure for the Southwest District of St. Croix diminished by 22.1% between the 2010 and 2020 census counts, with the figure for the Northside District of St. Thomas declining by 11.5% during the same period. Such dramatic changes are reflective of the fact that the USVI population in total fell more precipitously than any other U.S. territory between the last two counts undertaken by the U.S. Census Bureau (Virgin Islands Consortium 2021). Recent rates of poverty across the USVI are also inordinately high, as described in a variety of sources, including the U.S. Census Bureau (2022).

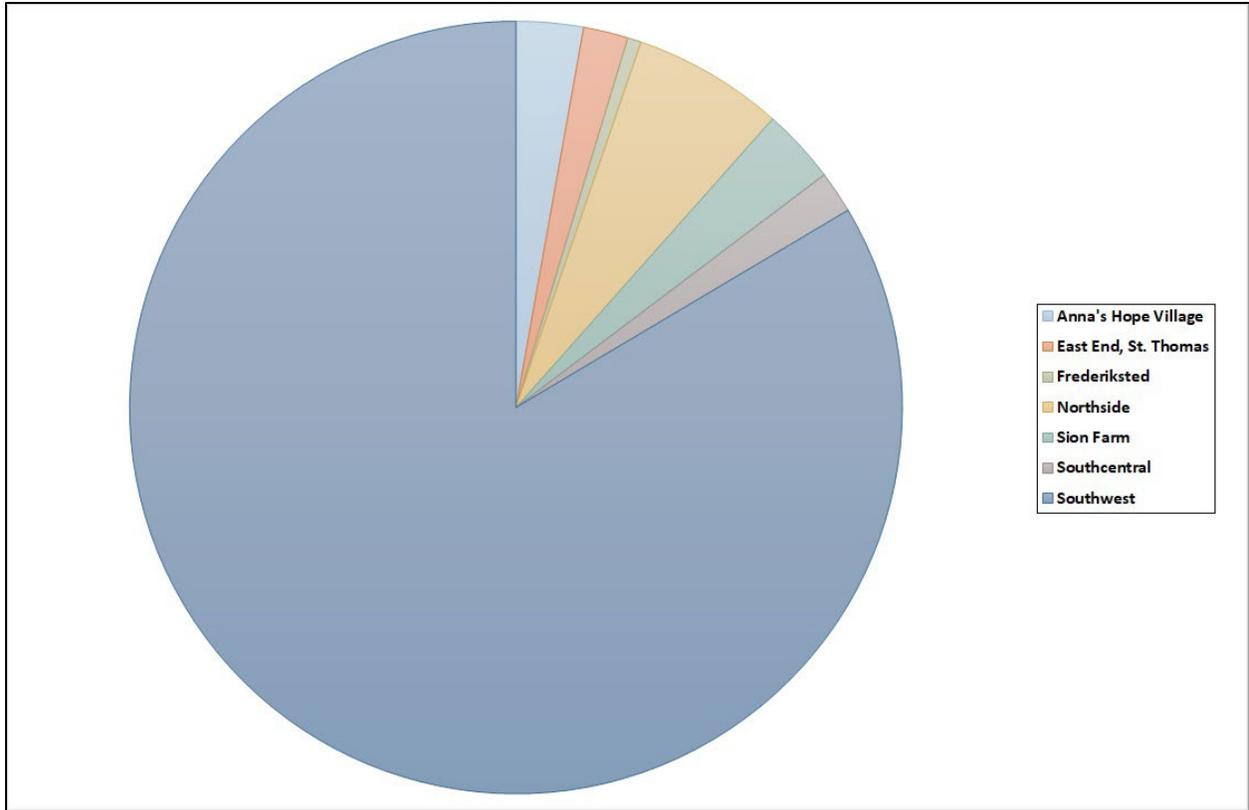


Figure 3.5.2. Districts where commercial dolphinfish and wahoo landings from federal waters around the USVI occurred during 2021.

Source: SEFSC, Community ALS File, June 2023

3.5.5.2 Key Social Aspects of Recreational Dolphinfish and Wahoo Fishing: USVI

As is the case for Puerto Rico, recent data regarding recreation-oriented fishing activities around the USVI is both limited in nature and difficult to parse from fishing undertaken with the intent of generating income. In this case, the most recent and pertinent information is available in Kojis and Tobias (2016) and in Freeman et al. (2017). The latter source describes the results of a creel survey conducted with non-commercial anglers, for-hire captains, and tournament participants around the three islands during 2016 and 2017. Among the key points discussed in study findings is that “very low” rates of recreational activity were documented during the course of the research effort, and that “in the USVI, as in many small scale fisheries, it can be challenging to distinguish between commercial and recreational fishers” with “many charter operations also hold[ing] commercial fishing licenses, which allow them to sell their catch” (Freeman et al. 2017). Meanwhile, Kojis and Tobias (2016) assert that of the 378 boat owners who responded to a 2014 survey regarding recreational fishing in the USVI, 75% reported fishing primarily for food and 43% considered themselves subsistence specialists. These sources, coupled with information provided through discourse with active fishermen in the islands, indicate that any form of non-commercial fishing undertaken in the islands: (a) very

typically involves consumption of the captured resources, (b) very rarely involves the catch-and-release approach undertaken by many recreational anglers elsewhere in the nation,⁵⁴ and (c) can often contrarily involve sale of marine resources in local markets in a context of limited enforcement capacity.

Challenges related to the definition of recreational fishing and assessment of related motivations aside, Freeman et al. (2017) describe the activities of persons whose motivations to fish around the USVI ostensibly prioritize sport and relaxation, with pertinent information recovered through structured interviews with anglers and documentation of catch at various well-used harbors and vessel ramps around the island districts. The research effort also involved monitoring of the six fishing tournaments that were held around the islands during the study period, and a series of interviews with island-based charter operators. As described by the authors, “85 recreational trip (38 private and 47 charter) surveys were completed in 2017 under the operational sampling design on St. Thomas,” with “105 recreational trip (67 private and 38 charter) surveys completed on St. Croix.” Two charter trip interviews were conducted on St. John (Freeman et al. 2017).

With regard to the species addressed by this amendment, for-hire and private recreational interviewees on both St. Thomas and St. Croix collectively reported dolphinfish landings at the greatest volumes-by-weight of all species landed during the course of study. Wahoo was ranked third in terms of landings in pounds whole weight on St. Thomas and second on St. Croix. Overall landings of the species were minimal, however, with a total of 306 lbs of dolphinfish and 116 lbs of wahoo landed by study participants on St. Thomas, and 580 lbs of dolphinfish and 296 lbs of wahoo landed by participants around St. Croix. The vast majority of poundage was landed by the sampled charter operators. Such notably small volumes of fish are in keeping with the authors’ summary observation that a limited amount of recreational fishing was occurring in the USVI during the study period. The number of documented trips was greatest during the period January through March and lowest during June and July (Freeman et al. 2017).

Of note from a demographic perspective, 47% of St. Thomas interviewees participating in the Freeman et al. (2017) study reported that they had been born on the island, while 39% reported their place of birth as the U.S. mainland. Some 30% of St. Croix interviewees claimed the island as their place of birth, while 58% reported having been born on the U.S. mainland. Only three native islanders who were interviewed during the study reported having been born on an island other than where the interview was conducted, suggesting strong sociocultural affinity between the vast majority of native-born research participants and the island where their lives began.

⁵⁴ One exception relates to the recreational pursuit of bonefish by visiting anglers, an activity that is typically led by for-hire captains and crew in suitable, usually shallow nearshore habitats around the islands. Given the (bony) nature of this species, it is very typically is released after capture (Stoffle, pers. comm., 2023).

3.5.3 Environmental Equity and Justice Considerations

Executive Order 12898 (Environmental Justice) was established in 1994 to require that federal actions be undertaken in a manner that identifies and avoids adverse human health and/or social and economic effects among low-income and minority groups and populations around the nation and its territories. Federal regulatory decisions must be undertaken in ways that ensure no individuals or populations are excluded, denied the benefits of, or are subjected to discrimination due to race, color, or nation of origin. Of relevance in the context of marine fisheries, federal agencies are further required to collect, maintain, and analyze data regarding patterns of consumption of fish and wildlife among persons who rely on such foods for purposes of subsistence. Established in 2021, *Executive Order 13985* calls for human equity in the context of federal decision-making and policy actions. Titled “Advancing Racial Equity and Support for Underserved Communities through the Federal Government,” the new order requires that federal policies and programs are designed and undertaken in a manner that delivers resources and benefits equitably to all citizens, including members of historically underserved communities. Here, the phrase “underserved communities” refers to populations and persons that have been systematically denied full and equitable opportunity to participate in economic, social, and civic aspects of life in the nation. Finally, *Executive Order 14008*, established in 2021, calls on agencies to make the achievement of environmental justice part of their missions “by developing programs, policies, and activities that address disproportionately high and adverse human health, environmental, climate-related and/or other cumulative impacts on disadvantaged communities, as well as the accompanying economic challenges of such impacts.”

Various data are available to indicate environmental justice issues among minority and low-income populations and/or indigenous communities potentially affected by federal regulatory and other actions. Census data, such as that capturing community-specific rates of poverty, number of households maintained by single females, number of households with children under the age of five, rates of crime, and rates of unemployment, exemplify the types of information of value for identification and analysis of community-level vulnerabilities (Jacob et al. 2013; Jepson and Colburn 2013). As provided in the following figures, three composite indices—poverty, population composition, and personal disruption—are applied to indicate relative degrees of vulnerability among municipalities and districts in the U.S. Caribbean where residents are engaged in the territorial and federally managed fisheries discussed in this amendment. Mean standardized community vulnerability reference points for each island region are provided along the y-axis in the graphics, with means for the vulnerability measures and threshold standard deviations depicted along the x-axis. Scores exceeding the 0.5 standard deviation level indicate vulnerability to regulatory and other sources of social change. The measures used to calculate the Personal Disruption index depicted in this section incorporate percentages of unemployed persons, persons with no high school diploma, persons in poverty, and separated females. The Population Composition measures incorporate percentages of unemployed persons, single female heads of household, persons who speak English less than well, and persons of

various ethnic backgrounds. Finally, the Poverty measures incorporate percentages of persons receiving public assistance income, families below the poverty level, persons in poverty over the age of 65, and persons in poverty under the age of 18.

As depicted in Figure 3.5.3 below, multiple Puerto Rico municipalities involved in artisanal dolphinfish/wahoo harvest exceed the 0.5 standard deviation (std. dev.) threshold for multiple vulnerability indices, with Lajas exceeding the one std. dev. threshold for personal disruption and poverty, and Mayaguez exceeding the same threshold for personal disruption. Certain USVI districts of interest also exceed the established vulnerability thresholds (Figure 3.5.4), with Frederiksted and Southcentral Districts on St. Croix exceeding the one std. dev. threshold for multiple indices, and Southwest District (also on St. Croix) exceeding the 0.5 std. dev. thresholds for poverty and personal disruption.

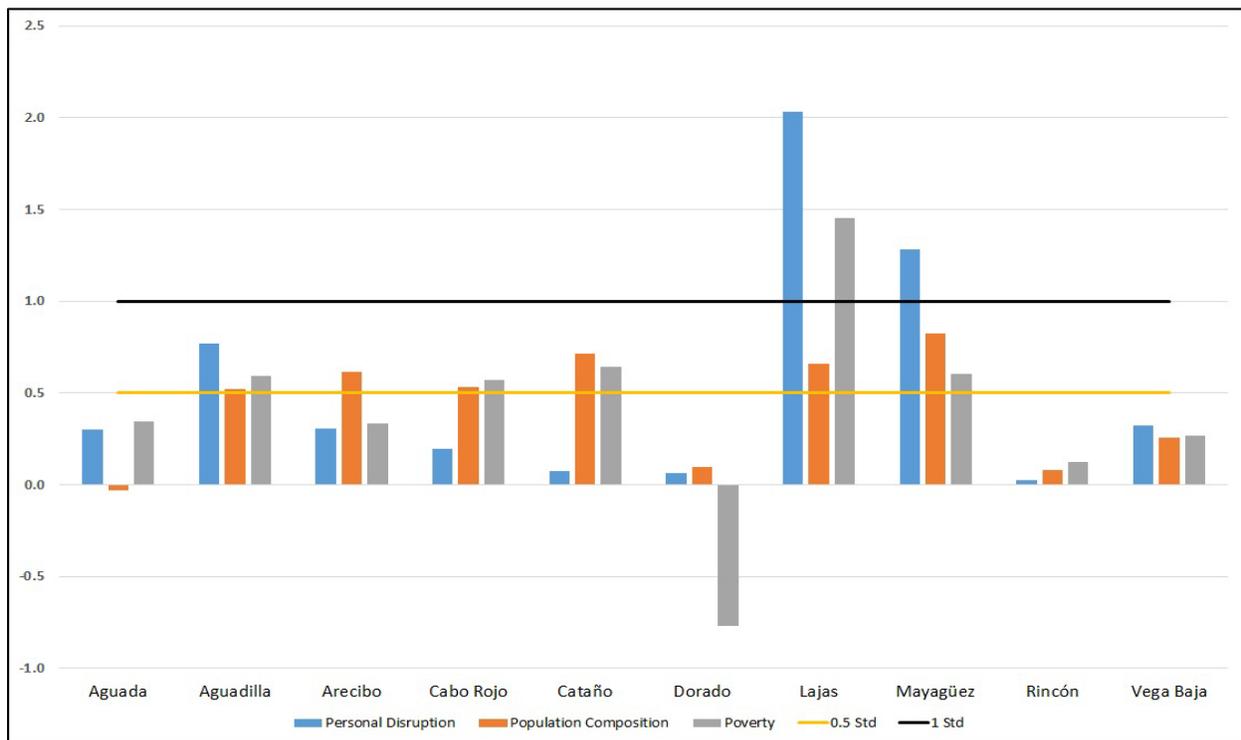


Figure 3.5.3. Social vulnerability indices for Puerto Rico municipalities most extensively involved in harvest of dolphinfish/wahoo: 2016-2020.

Source: SERO/SEFSC CSVI database, June 2023.

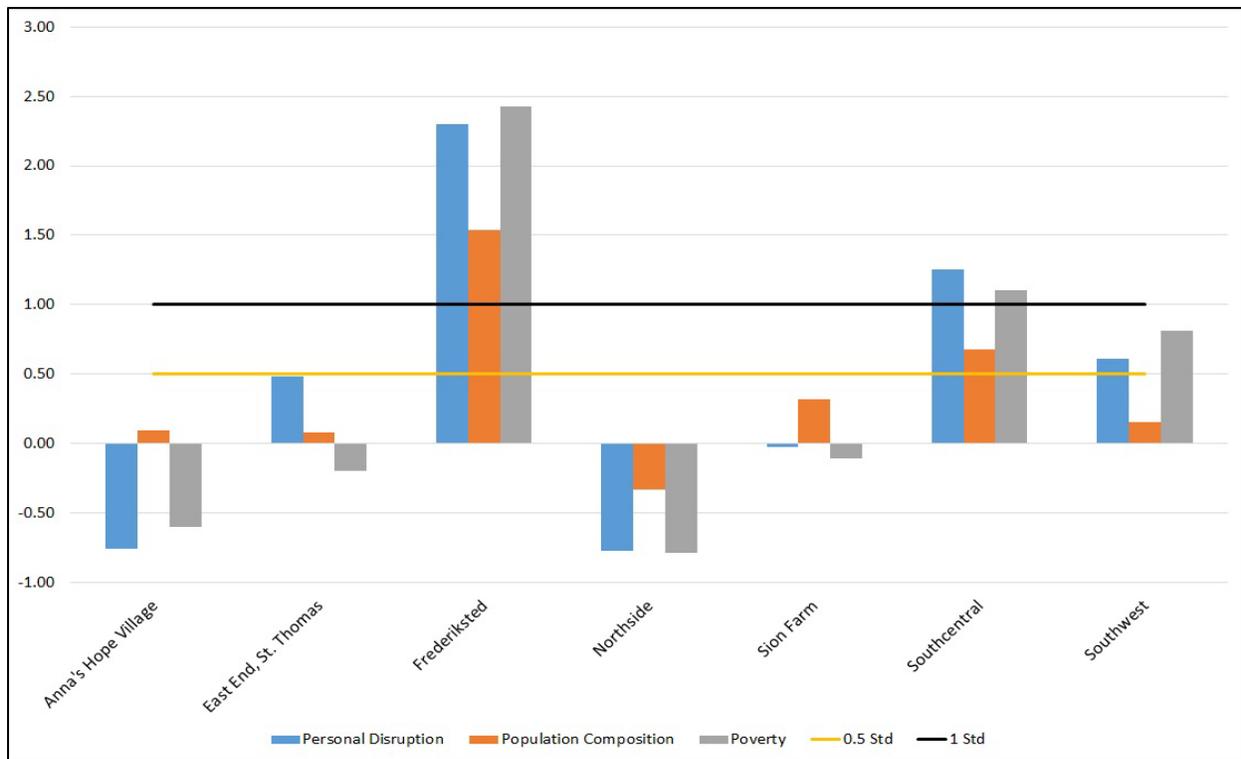


Figure 3.5.4. Social vulnerability indices for USVI districts most extensively involved in harvest of dolphinfish/wahoo: 2021.

Source: SERO/SEFSC CSVI database, June 2023.

3.6 Description of the Administrative Environment

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

3.6.1 Federal Fishery Management

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

The Caribbean Fishery Management Council (Council) is responsible for the conservation and management of fishery stocks within federal waters surrounding Puerto Rico, St. Croix, and St. Thomas/St. John. The Council consists of seven voting members: four members appointed by the Secretary of Commerce, at least one of whom is appointed from each of the

Commonwealth of Puerto Rico and the USVI; the principal officials with marine fishery management responsibility for Puerto Rico and the USVI designated by their Governors; and NMFS' Southeast Region Regional Administrator.

The public is involved in the fishery management process through participation at public meetings, on advisory panels and through council meetings that, with few exceptions for discussing personnel matters, are open to the public. The regulatory process is in accordance with the Administrative Procedure Act, in the form of “notice and comment” rulemaking, which provides extensive opportunity for public scrutiny and comment, and requires consideration of and response to those comments.

3.6.2 Puerto Rico and the 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. 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 state agency is the primary administrative body with respect to the state's natural resources, all states cooperate with numerous state and federal regulatory agencies when managing marine resources.

3.6.2.1 Commonwealth of Puerto Rico

The Commonwealth of Puerto Rico has jurisdiction over fisheries in state waters extending up to 9 nautical miles from shore. Those fisheries are managed by Puerto Rico's [Department of Natural and Environmental Resources](#) per Puerto Rico Law 278 of November 29, 1998 as amended, known as Puerto Rico's Fisheries Law. 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. Puerto Rico Regulations 7949, implemented in 2010, is the current regulatory mechanism for management of fishery resources in Puerto Rico state waters as well as for those resources and areas with shared jurisdiction with the U.S. government through the Council.

3.6.2.2 U.S. Virgin Islands

The USVI's [Department of Planning and Natural Resources](#) is responsible for the conservation and management of USVI fisheries and enforcement of boating and fishing regulations in state waters (0-3 nautical miles from shore) and the [Division of Fish and Wildlife](#) 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.

Chapter 4. Environmental Effects

This amendment includes the same management measure considerations for each Fishery Management Plan (FMP). To reduce repetition within this chapter, the environmental effects are discussed by management measure and species rather than by island, management measure, and species.

4.1 Establish a size limit for dolphinfish in federal waters around Puerto Rico (Action 1a), St. Croix (Action 3a), and St. Thomas/St. John (Action 5a)

Summary of Management Alternatives

Puerto Rico, St. Croix, and St. Thomas/St. John

Alternative 1. No Action. There are no minimum size limits for the commercial or recreational harvest of dolphinfish in federal waters around Puerto Rico, St. Croix, or St. Thomas/St. John.

Alternative 2. Establish a 20” fork length minimum size limit for the commercial and recreational harvest of dolphinfish in federal waters around Puerto Rico, St. Croix, or St. Thomas/St. John.

Alternative 3 (Preferred for Puerto Rico, St. Croix, St. Thomas/St. John). Establish a 24” fork length minimum size limit for the commercial and recreational harvest of dolphinfish in federal waters around Puerto Rico, St. Croix, or St. Thomas/St. John.

4.1.1 Effects on the Physical Environment

Most fishery interactions with the physical environment are caused by fishing gear and vessel anchors. Actions 1a, 3a, and 5a would establish minimum size limits for dolphinfish in federal waters around Puerto Rico, St. Croix, and St. Thomas/St. John, respectively. The proposed size limits are not expected to change the fishing methods (e.g., drift fishing versus anchoring), gear type or amount used (e.g., hook-and line gear), or level of fishing effort (e.g., hours/days fished) for the fisheries that target dolphinfish. Therefore, these actions would have no additional impacts to the bottom when compared with **Alternative 1**, and no physical effects are expected from **Alternative 2** or **Preferred Alternative 3**. **Alternative 2** and **Preferred Alternative 3** would also not be expected to have any effects on essential fish habitat (EFH) designated for dolphinfish.

4.1.2 Effects on the Biological/Ecological Environment

Biological benefits would be expected to be greater under **Preferred Alternative 3** and **Alternative 2** compared with **Alternative 1**, because they would reduce the amount of dolphinfish removed by commercial fishermen (up to 5% reduction in commercial landings; see Appendix B1) or recreational anglers (up to 14.5% reduction in harvest; see Appendix B2). About 3% of the dolphinfish caught by commercial fishermen are less than 20” fork length (FL)

and approximately 24% are less than 24" FL (Appendix B1, Figure 1.1). Commercial landings are reported in total weight (pounds) not by number of fish caught, so the exact number of fish that would remain in the population each year under the proposed size limit alternatives is unknown. For recreational fishing, the average FL of dolphinfish intercepted was 30.9", and so the biological benefit under the proposed alternatives would likely be similar to the status quo (**Alternative 1**), since anglers are generally catching dolphinfish larger than the proposed size limits (Appendices B1 and B2).

Preferred Alternative 3 implements the largest minimum size limit and would provide the greatest benefit in the form of retaining spawning potential, but may result in a redirection of harvest to larger fish and increase in bycatch of smaller-sized fish. That reduction of larger, older fish is not likely to lower recruitment for dolphinfish since they are a fast-growing species and capable of reproducing at sizes less than 20" FL. The bycatch mortality for dolphinfish that would be returned to the water is unknown at this time, as no limits are currently in place (**Alternative 1**).

Overall, implementing a minimum size limit would reduce mortality of smaller (generally female) dolphinfish, thereby enhancing spawning potential and the supply of gametes (especially eggs), and ultimately increasing yield-per-recruit from the stock (assuming discard mortality is low). Additionally, a minimum size limit reduces the likelihood of recruitment overfishing that might otherwise lead to a stock level below maximum yield. Therefore, the goal of this amendment is to set a size limit to increase the number of juveniles that can reach sexual maturity. As mentioned previously, the proposed alternatives are not expected to change the current operation of the Puerto Rico, St. Croix, or St. Thomas/St. John fisheries that target dolphinfish, and so no change to the existing level of risk to Endangered Species Act (ESA)-listed species from these actions is anticipated.

4.1.3 Effects on the Economic Environment

Alternative 1 would not change commercial or recreational fishing practices or dolphinfish harvests in the exclusive economic zone (EEZ) around Puerto Rico, St. Croix, or St. Thomas/St. John, and would not be expected to result in direct economic effects. However, the continued commercial and recreational dolphinfish harvests without minimum size limits would result in unrestricted removal of undersized fish, which could adversely affect the local dolphinfish population by allowing fewer female fish to reach maturity and reproduce. Potential adverse indirect economic effects that would result from **Alternative 1** would be commensurate with the negative impacts on the dolphinfish population.

Alternative 2 and **Preferred Alternative 3** would be expected to result in beneficial impacts to the local dolphinfish population by reducing the removal of undersized fish. Therefore, **Alternative 2** and **Preferred Alternative 3** would be expected to result in direct economic

benefits commensurate with anticipated population improvements. However, the establishment of a minimum size limit would be expected to result in adverse economic effects due to estimated decreases in commercial and recreational dolphinfish landings and increases in discards.

For the Puerto Rico commercial sector, **Alternative 2** and **Preferred Alternative 3** are each expected to result in less than a 1% reduction in commercial dolphinfish landings (Appendix B1, Table 1.1) and in a commensurate decrease in commercial revenues. Based on Table 3.4.2, between 2015 and 2019, the value of commercial landings (\$2022) of dolphinfish from federal waters around Puerto Rico averaged \$247,727. The value of commercial dolphinfish landings from unknown waters averaged \$28,470 during the same period. Although it is unlikely that all of the commercial dolphinfish landings recorded as harvested from unknown waters would be from state waters or federal waters, assigning the totality of these landings to either state waters or federal waters would provide lower and upper bounds for the value of dolphinfish landed in the EEZ, respectively. Therefore, the lower and upper bounds for the 2015-2019 average value of commercial dolphinfish landings from the EEZ around Puerto Rico are estimated at \$247,727 and \$276,197 ($\$247,727 + \$28,470$), respectively. Based on these lower and upper bounds estimates, **Alternative 2** and **Preferred Alternative 3** are each expected to result in a loss in annual commercial revenue ranging from less than \$2,477 ($\$247,727 * 0.01$) to less than \$2,762 ($\$276,197 * 0.01$). In addition to losses in commercial revenues, reductions in commercial landings could be expected to result in decreases in producer surplus to commercial fishermen and in consumer surplus to seafood consumers. However, given the relatively small reduction in commercial landings of dolphinfish from the EEZ around Puerto Rico estimated to result from **Alternative 2** and **Preferred Alternative 3**, these alternatives would not be expected to result in any measurable decrease in producer surplus or in consumer surplus.

For the Puerto Rico recreational sector, **Alternative 2** and **Preferred Alternative 3** would reduce recreational landings of dolphinfish by 1.3% and 14.5%, respectively (Appendix B2, Table 2.1). Based on Table 3.4.13, the number of dolphinfish harvested by recreational anglers in federal waters around Puerto Rico averaged 76,344 fish between 2012 and 2016. Therefore, in numbers of fish, **Alternative 2** and **Preferred Alternative 3** are expected to reduce recreational dolphinfish landings by 992 ($76,344 * 0.013$) fish and 11,070 ($76,344 * 0.145$) fish, respectively. Economic effects expected to be associated with reductions in recreational landings could be evaluated based on estimated decreases in consumer surplus to recreational anglers. Due to the lack of information relative to the consumer surplus per recreationally caught dolphinfish in Puerto Rico, decreases in consumer surplus expected to result from **Alternative 2** and **Preferred Alternative 3** cannot be quantified. It can be inferred that, **Preferred Alternative 3**, which would result in a greater reduction in recreational dolphinfish harvests relative to **Alternative 1**, would be expected to result in a larger decrease in consumer surplus than **Alternative 2**. Economic effects expected to result from **Alternative 2** and **Preferred**

Alternative 3 could also potentially include decreases in producer surplus to for-hire operators if the alternatives result in decreases in for-hire trips targeting dolphinfish (target trips). However, reductions in producer surplus, if any, cannot be quantified due to the lack of data on for-hire target trips in Puerto Rico.

For the St. Croix commercial sector, **Alternative 2** is expected to result in a 3.9% reduction in commercial dolphinfish landings (Appendix B1, Table 1.2) and in a commensurate decrease in commercial revenues. **Preferred Alternative 3** is expected to result in a 5.0% reduction in commercial dolphinfish landings (Appendix B1, Table 1.2) and in a commensurate decrease in commercial revenues.

Between 2017 and 2021, commercial landings of dolphinfish from federal waters around St. Croix averaged 26,809 pounds (lbs) valued at \$210,669 (\$2022) (Table 3.4.17). Based on these estimates, **Alternative 2** is expected to result in an annual reduction in commercial dolphinfish landings estimated at 1,046 lbs ($26,809 \times 0.039$) and an associated annual decrease in commercial revenue valued at \$8,216 ($\$210,669 \times 0.039$). For **Preferred Alternative 3**, the annual reduction in commercial dolphinfish landings and the associated annual decrease in commercial revenue are estimated at 1,340 lbs ($26,809 \times 0.05$) and \$10,533 ($\$210,669 \times 0.05$), respectively. In addition to losses in commercial revenues, reductions in commercial landings could be expected to result in decreases in producer surplus to commercial fishermen and in consumer surplus to seafood consumers. However, given the relatively small monetary value associated with the estimated reduction in commercial landings of dolphinfish from the EEZ around St. Croix, **Alternative 2** and **Preferred Alternative 3** would be expected to result in limited, if any, decreases in producer surplus or in consumer surplus.

For the St. Croix recreational sector, **Alternative 2** and **Preferred Alternative 3** would reduce recreational landings of dolphinfish by 1.3% and 14.5%, respectively (based on the predicted decrease in Puerto Rico in Appendix B2, Table 2.1). As discussed in Section 3.5.5.2, Freeman et al. (2017) reported 580 lbs of recreationally caught dolphinfish around St. Croix. It is noted that this estimate is likely not representative of the total recreational landings of dolphinfish around St. Croix. Nevertheless, based on this estimate, **Alternative 2** and **Preferred Alternative 3** would reduce recreational landings of dolphinfish by 8 lbs (580×0.013) and 84 lbs (580×0.145), respectively. Economic effects expected to be associated with reductions in recreational landings could be evaluated based on estimated decreases in consumer surplus to recreational anglers. Due to the lack of information relative to the consumer surplus per recreationally caught dolphinfish in St. Croix, decreases in consumer surplus expected to result from **Alternative 2** and **Preferred Alternative 3** cannot be quantified. It can only be stated that, **Preferred Alternative 3**, which would result in a greater reduction in recreational dolphinfish harvests relative to **Alternative 1**, would be expected to result in a larger decrease in consumer surplus than **Alternative 2**. Economic effects expected to result from **Alternative 2** and **Preferred**

Alternative 3 could also potentially include decreases in producer surplus to for-hire operators if the alternatives result in decreases in for-hire trips targeting dolphinfish (target trips). However, reductions in producer surplus, if any, cannot be quantified due to the lack of data on for-hire target trips in St. Croix.

For the St. Thomas/St. John commercial sector, **Alternative 2** and **Preferred Alternative 3** are each expected to result in a less than 1.0% reduction in commercial dolphinfish landings (Appendix B1, Table 1.3) and in commensurate decreases in commercial revenues. Between 2017 and 2021, commercial landings of dolphinfish from federal waters around St. Thomas/St. John averaged 6,235 lbs valued at \$46,198 (\$2022) (Table 3.4.23). Based on these estimates, **Alternative 2** and **Preferred Alternative 3** are each expected to result in an annual reduction in commercial dolphinfish landings estimated at 62 lbs ($6,235 \times 0.01$) and an associated annual decrease in commercial revenue valued at \$461 ($\$46,198 \times 0.01$), respectively. In addition to losses in commercial revenues, reductions in commercial landings could be expected to result in decreases in producer surplus to commercial fishermen and in consumer surplus to seafood consumers. However, given the relatively small monetary value associated with the estimated reduction in commercial landings of dolphinfish from the EEZ around St. Thomas/St. John, **Alternative 2** and **Preferred Alternative 3** would be expected to result in limited, if any, decreases in producer surplus or in consumer surplus.

For the St. Thomas/St. John recreational sector, **Alternative 2** and **Preferred Alternative 3** would reduce recreational landings of dolphinfish by 1.3% and 14.5%, respectively (based on the predicted decrease in Puerto Rico in Appendix B2, Table 2.1). As discussed in Section 3.5.5.2, Freeman et al. (2017) reported 306 lbs of recreationally caught dolphinfish around St. Thomas/St. John. It is noted that this estimate is likely not representative of the total recreational landings of dolphinfish around St. Thomas/St. John. Nevertheless, based on this estimate, **Alternative 2** and **Preferred Alternative 3** would reduce recreational landings of dolphinfish by 4 lbs (306×0.013) and 44 lbs (306×0.145), respectively. Economic effects expected to be associated with reductions in recreational landings could be evaluated based on estimated decreases in consumer surplus to recreational anglers. Due to the lack of information relative to the consumer surplus per recreationally caught dolphinfish in St. Thomas/St. John, decreases in consumer surplus expected to result from **Alternative 2** and **Preferred Alternative 3** cannot be quantified. It can be only be stated that, **Preferred Alternative 3**, which would result in a greater reduction in recreational dolphinfish harvests relative to **Alternative 1**, would be expected to result in a larger decrease in consumer surplus than **Alternative 2**. Economic effects expected to result from **Alternative 2** and **Preferred Alternative 3** could also potentially include decreases in producer surplus to for-hire operators if the alternatives result in decreases in for-hire trips targeting dolphinfish (target trips). However, reductions in producer surplus, if any, cannot be quantified due to the lack of data on for-hire target trips in St. Thomas/St. John.

Overall, net economic effects expected to result from **Preferred Alternative 3** for all three islands would be determined by the difference between the economic benefits expected to result from improving the population by leaving more undersized fish in the water and the adverse economic effects associated with the reductions in commercial and recreational landings of dolphinfish. If the economic benefits from improvements to the dolphinfish population exceed the negative economic effects expected to result from landings reductions, then **Preferred Alternative 3** would be expected to result in net positive economic effects. Otherwise, the net economic effects expected from **Preferred Alternative 3** would be negative. The net economic effects expected to result from **Alternative 2** would be determined in a similar manner. The magnitude of the expected improvements to the dolphinfish population and associated net economic effects would be determined by the extent to which commercial fishermen and recreational anglers fishing in the EEZ around Puerto Rico, St. Croix, and St. Thomas/St. John, respectively, comply with the proposed size limit and by the effectiveness of its enforcement on the water. Because there is no size limit for dolphinfish caught within Puerto Rico or U.S. Virgin Islands (USVI) state waters, only on-the-water enforcement in the EEZ would ascertain compliance with the proposed size limit.

4.1.4 Effects on the Social Environment

The proposed actions described in this amendment are intended to sustain resources and fisheries around the U.S. Caribbean by potentially altering the nature of allowable fishing opportunities through regulation of the size and number of fish that may be taken. For purposes of analysis in this and the subsequent social effects subsections, examples of social effects potentially following from such regulations include, but are not limited to, shifts in existing patterns of: (a) consumption, sharing, sale, and bartering resources among individuals, families, and communities; (b) ocean-based employment and recreation involving the subject species; (c) accumulation and use of ecological knowledge in the context of fishing; and (d) establishment and/or maintenance of social relationships among persons who pursue and utilize the species.

Alternative 1 for Actions 1a, 3a, and 5a would not would generate no new constraints on fishing opportunity or social effects among participants. Because minimum size limits reduce the number of dolphinfish that allowably may be harvested, both **Alternative 2** and **Preferred Alternative 3** would alter the current extent of opportunity to harvest dolphinfish around Puerto Rico, St. Croix, or St. Thomas/St. John, respectively. **Preferred Alternative 3** would generate the relatively greatest level of constraint on commercial/artisanal fleets, for-hire operators, and recreational (non-commercial) participants who wish to retain their catch in each island region, and thus the greatest probability for generating detrimental social effects in the near-term. However, insofar as **Preferred Alternative 3** functions as expected to better sustain regional dolphinfish populations than does **Alternative 2**, it would enhance the potential for more sustained fishing opportunities and associated social benefits over time. Such benefits include enhanced potential for future generations of participants to pursue this popular species for

economic gain, for harvest and consumption in familial and community settings, and for fishing-specific recreation. Of note, **Alternatives 2 and 3 (Preferred)** would both require that participants who seek to retain captured fish ensure these are of an appropriate size—so as to avoid regulatory violation.

With specific regard to participants active in the commercial/artisanal sector of the regional dolphinfish fisheries, social effects logically are most likely to occur in areas where the species are most extensively landed. Thus, in probabilistic terms, and as indicated in Section 3.5 of this amendment, social effects are most likely to be experienced in the Rincon, Lajas, and Arecibo municipios of Puerto Rico, in the Southwest District of St. Croix, and in the Northside and East End Districts of St. Thomas. Further, based on available social indicators data, persons in certain municipios and island districts from which dolphinfish are pursued for commercial/artisanal purposes may be particularly vulnerable to any detrimental social effects potentially following from new regulations. These areas include, but are not limited to, the Lajas and Mayaguez municipios of Puerto Rico, and the Frederiksted and Southcentral Districts of the USVI.

4.1.5 Effects on the Administrative Environment

Administrative effects are expected from creating, administering, and enforcing regulations. **Alternative 2** and **Preferred Alternative 3** would have greater administrative burden when compared to **Alternative 1** as they would require new regulations for those fishing for dolphinfish in federal waters. These two alternatives would also have a greater enforcement burden through additional time and labor requirements likely accruing to officers assigned with regional enforcement duties, which would lessen in time as knowledge increases in the community related to the new regulations. Additionally, the proposed alternatives would create minor administrative burden related to creating and distributing education and outreach materials.

4.2 Establish a size limit for wahoo in federal waters around Puerto Rico (Action 2a), St. Croix (Action 4a), and St. Thomas/St. John (Action 6a)

Summary of Management Alternatives

Puerto Rico, St. Croix, and St. Thomas/St. John

Alternative 1. No Action. There are no minimum size limits for the commercial or recreational harvest of wahoo in federal waters around Puerto Rico, St. Croix, or St. Thomas/St. John.

Alternative 2 (Preferred for Puerto Rico, St. Croix and St. Thomas/St. John). Establish a 32" fork length minimum size limit for commercial or recreational harvest of wahoo in federal waters around Puerto Rico, St. Croix, or St. Thomas/St. John.

Alternative 3. Establish a 40" fork length minimum size limit for commercial or recreational harvest of wahoo in federal waters around Puerto Rico, St. Croix, or St. Thomas/St. John.

4.2.1 Effects on the Physical Environment

The proposed size limits are not expected to change the fishing methods (e.g., drift fishing versus anchoring), gear type or amount used (e.g., hook-and line gear), or level of fishing effort (e.g., hours/days fished for the fisheries that target wahoo). Therefore, these actions would have no additional impacts to the bottom when compared with **Alternative 1**, and no physical effects are expected from **Preferred Alternative 2** or **Alternative 3**. **Preferred Alternative 2** and **Alternative 3** would also not be expected to have any effects on EFH designated for wahoo.

4.2.2 Effects on the Biological/Ecological Environment

Biological benefits would be expected to be greater under **Alternative 3** and **Preferred Alternative 2** compared with **Alternative 1**, because they would reduce the amount of wahoo removed by commercial fishermen (up to 37.7% reduction in commercial landings; see Appendix B4) or recreational anglers (up to 75.9% reduction in harvest; see Appendix B2).

About 40% of the wahoo caught by commercial fishermen are less than 32" FL (Appendix B4, Figure 4.1). Commercial landings are reported in total weight (pounds) not by number of fish caught, so the exact number of fish that would remain in the population each year under the proposed size limit alternatives is unknown. For recreational fishing, the average FL of wahoo intercepted was 36.6 inches, and so the biological benefit under the **Preferred Alternative 2** would likely be similar to **Alternative 1**, since anglers are generally catching wahoo larger than the proposed size limit (Appendices B2 and B4).

Alternative 3 proposes the largest minimum size limit and would provide the greatest benefit in the form of retaining spawning potential, but may result in a redirection of harvest to larger fish and increase in bycatch of smaller-sized fish. That reduction of larger, older fish is not likely to

lower recruitment for wahoo since they are a fast-growing species and capable of reproducing at sizes less than 20” fork length. The bycatch mortality for wahoo that would be returned to the water is unknown at this time, as no limits are currently in place (**Alternative 1**).

Overall, implementing a minimum size limit would reduce mortality of smaller (generally female) wahoo, thereby enhancing spawning potential and the supply of gametes (especially eggs), and ultimately increasing yield-per-recruit from the stock (assuming discard mortality is low). Additionally, a minimum size limit reduces the likelihood of recruitment overfishing that might otherwise lead to a stock level below maximum yield. Therefore, the goal of this action is to set a size limit to increase the number of juveniles that can reach sexual maturity. However, the proposed alternatives are not expected to change the current operation of the Puerto Rico, St. Croix, or St. Thomas/St. John fisheries that target wahoo, and so no change to the existing level of risk to ESA-listed species from these actions is anticipated.

4.2.3 Effects on the Economic Environment

Alternative 1 would not affect commercial or recreational fishing practices or wahoo harvests in the EEZ around Puerto Rico, St. Croix, or St. Thomas/St. John, respectively, and would not be expected to result in direct economic effects. However, the continued commercial and recreational wahoo harvests without minimum size limits would permit the unrestricted removal of undersized fish, which could adversely impact the local wahoo population by allowing fewer female fish to reach maturity and reproduce. Potential adverse indirect economic effects that would result from **Alternative 1** would be commensurate with the negative impacts on the wahoo population.

Preferred Alternative 2 and **Alternative 3** would be expected to result in beneficial impacts to the local wahoo population by reducing the removal of undersized fish. Therefore, **Preferred Alternative 2** and **Alternative 3** would be expected to result in direct economic benefits commensurate with anticipated population improvements. However, the establishment of a minimum size limit would be expected to result in adverse economic effects due to estimated decreases in commercial and recreational wahoo landings and increases in discards.

For the Puerto Rico commercial sector, **Preferred Alternative 2** is expected to result in a 11.9% reduction in commercial wahoo landings (Appendix B4, Table 4.1) and in a commensurate decrease in commercial revenues. **Alternative 3** is expected to result in a 37.7% reduction in commercial wahoo landings (Appendix B4, Table 4.1) and in a proportional decrease in commercial revenues. Based on Table 3.4.7, between 2015 and 2019, the value of commercial landings of wahoo from federal waters around Puerto Rico averaged \$38,107 (\$2022). The value of commercial wahoo landings from unknown waters averaged \$4,775 during the same period. Although it is unlikely that all of the commercial wahoo landings recorded as harvested from unknown waters would be from state waters or federal waters, assigning the totality of these

landings to either state waters or federal waters would respectively provide lower and upper bounds for the value of wahoo landed in the EEZ. Therefore, the lower and upper bounds for the 2015-2019 average value of commercial wahoo landings from the EEZ around Puerto Rico are estimated at \$38,107 and \$42,882 ($\$38,107 + \$4,775$), respectively.

Based on these lower and upper bounds estimates, **Preferred Alternative 2** is expected to result in a loss in annual commercial revenue ranging from \$4,535 ($\$38,107 \times 0.119$) to \$5,103 ($\$42,882 \times 0.119$). **Alternative 3** is expected to result in a loss in annual commercial revenue ranging from \$14,366 ($\$38,107 \times 0.377$) to \$16,167 ($\$42,882 \times 0.377$). In addition to losses in commercial revenues, reductions in commercial landings could be expected to result in decreases in producer surplus to commercial fishermen and in consumer surplus to seafood consumers. Given the lack of data relative to the proportion of commercial revenues that would be considered as producer surplus and relative to the price elasticity of demand for wahoo, decreases in producer surplus to commercial fishermen and in consumer surplus to seafood buyers cannot be quantified. However, the relatively small monetary values of expected reductions in commercial landings of wahoo from the EEZ around Puerto Rico estimated to result from **Preferred Alternative 2** and **Alternative 3** suggest that decreases in producer surplus and in consumer surplus would be minimal.

For the Puerto Rico recreational sector, **Preferred Alternative 2** and **Alternative 3** would reduce recreational landings of wahoo by 32.6% and 75.9%, respectively (Appendix B2, Table 2.2). Based on Table 3.4.14, the number of wahoo harvested by recreational anglers in federal waters around Puerto Rico averaged 9,972 fish (average based on four years of data, i.e., 2012, 2014, 2015, and 2016). Therefore, in numbers of fish, **Preferred Alternative 2** and **Alternative 3** are expected to reduce recreational wahoo landings by 3,251 ($9,972 \times 0.326$) fish and 7,569 ($9,972 \times 0.759$) fish, respectively. Economic effects expected to be associated with reductions in recreational landings could be evaluated based on estimated decreases in consumer surplus to recreational anglers. Due to the lack of data relative to consumer surplus measures per recreationally caught wahoo in Puerto Rico, decreases in consumer surplus expected to result from **Preferred Alternative 2** and **Alternative 3** cannot be quantified. It can be inferred that, **Alternative 3**, which would result in a greater reduction in recreational wahoo harvests relative to **Alternative 1**, would be expected to result in a larger decrease in consumer surplus than **Preferred Alternative 2**. Economic effects expected to result from **Preferred Alternative 2** and **Alternative 3** could also potentially include decreases in producer surplus to for-hire operators if the alternatives result in decreases in for-hire trips targeting wahoo (target trips). However, reductions in producer surplus, if any, cannot be quantified due to the lack of data on for-hire target trips in Puerto Rico.

For the St. Croix commercial sector, **Preferred Alternative 2** is expected to result in a 2.2% reduction in commercial wahoo landings (Appendix B4, Table 4.2) and in a commensurate

decrease in commercial revenues. **Alternative 3** is expected to result in a 44.6% reduction in commercial wahoo landings (Appendix B4, Table 4.2) and in a proportional decrease in commercial revenues. Based on Table 3.4.20, between 2017 and 2021, commercial landings and value of wahoo from federal waters around St. Croix averaged 14,906 lbs and \$115,890 (\$2022), respectively. Therefore, **Preferred Alternative 2** is expected to result in annual decreases in commercial landings and revenue estimated at 328 lbs ($14,906 \times 0.022$) and \$2,550 ($\$115,890 \times 0.022$). **Alternative 3** is expected to result in annual decreases in commercial landings and revenue estimated at 6,648 lbs ($14,906 \times 0.446$) and \$51,687 ($\$115,890 \times 0.446$), respectively. In addition to losses in commercial revenues, reductions in commercial landings could be expected to result in decreases in producer surplus to commercial fishermen and in consumer surplus to seafood consumers. Given the lack of data relative to the proportion of commercial revenues that would be considered as producer surplus and relative to the price elasticity of demand for wahoo, decreases in producer surplus to commercial fishermen and in consumer surplus to seafood buyers cannot be quantified.

For the St. Croix recreational sector, **Preferred Alternative 2** and **Alternative 3** would reduce recreational landings of wahoo by 32.6% and 75.9%, respectively (based on predicted decreases in Puerto Rico in Appendix B2, Table 2.2). As discussed in Section 3.5.5.2, Freeman et al. (2017) reported 296 lbs of recreationally caught wahoo around St. Croix. It is noted that this estimate is likely not representative of the total recreational landings of wahoo around St. Croix. Nevertheless, based on this estimate, **Preferred Alternative 2** and **Alternative 3** would reduce recreational landings of wahoo by 97 lbs (296×0.326) and 225 lbs (296×0.759), respectively. Economic effects expected to be associated with reductions in recreational landings could be evaluated based on estimated decreases in consumer surplus to recreational anglers. Due to the lack of data relative to consumer surplus measures per recreationally caught wahoo in St. Croix, decreases in consumer surplus expected to result from **Preferred Alternative 2** and **Alternative 3** cannot be quantified. It can only be stated that **Alternative 3**, which would result in a greater reduction in recreational wahoo harvests relative to **Alternative 1**, would be expected to result in a larger decrease in consumer surplus than **Alternative 2**. Economic effects expected to result from **Preferred Alternative 2** and **Alternative 3** could also potentially include decreases in producer surplus to for-hire operators if the alternatives result in decreases in for-hire trips targeting wahoo (target trips). However, reductions in producer surplus, if any, cannot be quantified due to the unavailability of data on for-hire target trips in St. Croix.

For the St. Thomas/St. John commercial sector, **Preferred Alternative 2** is expected to result in a 11.9% reduction in commercial wahoo landings (based on predicted reductions in Puerto Rico in Appendix B4, Table 4.1) and in a commensurate decrease in commercial revenues. **Alternative 3** is expected to result in a 37.7% reduction in commercial wahoo landings (Appendix B4, Table 4.1) and in a proportionate decrease in commercial revenues. Based on

Table 3.4.26, between 2017 and 2021, commercial landings and value of wahoo from federal waters around St. Thomas/St. John averaged 1,666 lbs and \$12,478 (\$2022), respectively.

Therefore, **Preferred Alternative 2** is expected to result in annual decreases in commercial landings and revenue estimated at 198 lbs ($1,666 \times 0.119$) and \$1,485 ($\$12,478 \times 0.119$).

Alternative 3 is expected to result in annual decreases in commercial landings and revenue estimated at 628 lbs ($1,666 \times 0.377$) and \$4,704 ($\$12,478 \times 0.377$), respectively. In addition to losses in commercial revenues, reductions in commercial landings could be expected to result in decreases in producer surplus to commercial fishermen and in consumer surplus to seafood consumers. Given the lack of data relative to the proportion of commercial revenues that would be considered as producer surplus and relative to the price elasticity of demand for wahoo, decreases in producer surplus to commercial fishermen and in consumer surplus to seafood buyers cannot be quantified.

For the St. Thomas/St. John recreational sector, **Preferred Alternative 2** and **Alternative 3** would reduce recreational landings of wahoo by 32.6% and 75.9%, respectively (based on predicted decreases in Puerto Rico in Appendix B2, Table 2.2). As discussed in Section 3.5.5.2, Freeman et al. (2017) reported 116 lbs of recreationally caught wahoo around St. Thomas/St. John. It is noted that this estimate is likely not representative of the total recreational landings of wahoo around St. Thomas/St. John. Nevertheless, based on this estimate, **Preferred Alternative 2** and **Alternative 3** would reduce recreational landings of wahoo by 38 lbs (116×0.326) and 88 lbs (116×0.759), respectively. Economic effects expected to be associated with reductions in recreational landings could be evaluated based on estimated decreases in consumer surplus to recreational anglers. Due to the lack of data relative to consumer surplus measures per recreationally caught wahoo in St. Thomas/St. John, decreases in consumer surplus expected to result from **Preferred Alternative 2** and **Alternative 3** cannot be quantified. It can only be stated that **Alternative 3**, which would result in a greater reduction in recreational wahoo harvests relative to **Alternative 1**, would be expected to result in a larger decrease in consumer surplus than **Preferred Alternative 2**. Economic effects expected to result from **Preferred Alternative 2** and **Alternative 3** could also potentially include decreases in producer surplus to for-hire operators if the alternatives result in decreases in for-hire trips targeting wahoo (target trips). However, reductions in producer surplus, if any, cannot be quantified due to the unavailability of data on for-hire target trips in St. Thomas/St. John.

Overall, net economic effects expected to result from **Preferred Alternative 2** would be determined by the difference between the economic benefits expected to result from improving the population by leaving more undersized fish in the water and the adverse economic effects associated with the reductions in commercial and recreational landings of wahoo. If the economic benefits from improvements to the wahoo population exceed the negative economic effects expected to result from landings reductions, then **Preferred Alternative 2** would be

expected to result in net positive economic effects. Otherwise, the net economic effects expected from **Preferred Alternative 2** would be negative. The net economic effects expected to result from **Alternative 3** would be determined similarly. The magnitude of the expected improvements to the wahoo population and associated net economic effects would be determined by the extent to which commercial fishermen and recreational anglers fishing in the EEZ around Puerto Rico, St. Croix, and St. Thomas/St. John comply with the proposed size limit and by the effectiveness of its enforcement. Because there is no size limit for wahoo caught within Puerto Rico or USVI state waters, only on-the-water enforcement in the EEZ would ascertain compliance with the proposed size limit.

4.2.4 Effects on the Social Environment

While **Alternative 1** would not change current regulations for the wahoo (*peto*), which do not specify a minimum size limit in federal waters around the U.S. Caribbean, **Alternatives 2 and 3** would specify minimum allowable size limits for the species and thereby introduce new constraints on fishing opportunity among participants in each sector and island region. Size limits would also require measurement of “threshold” fish by local commercial/artisanal, for-hire, and recreational (non-commercial) participants who seek to retain their catch. Because **Preferred Alternative 2** specifies the relatively smallest size of fish that can allowably be retained by participants in each island region, this alternative minimizes the potential for constrained harvest opportunities and thus minimizes the near-term likelihood of detrimental social effects among participants who seek to retain their catch. However, insofar as the more stringent conservation measures specified by **Alternative 3** would function to better sustain wahoo populations than those specified by **Preferred Alternative 2**, the preferred alternative bears relatively less potential for sustaining fishing opportunities and related social benefits over the course of time. As such, **Preferred Alternative 2** appears to strike a balance between maximized fishing opportunities and minimized detrimental social effects in the near-term, and heightened potential for enhanced fishing opportunities and related social benefits over time.

4.2.5 Effects on the Administrative Environment

Preferred Alternative 2 and **Alternative 3** would have greater administrative burden when compared to **Alternative 1** as they would require new regulations for those fishing for wahoo in federal waters. **Preferred Alternative 2** and **Alternative 3** would likely result in additional time and labor requirements accruing to officers assigned with regional enforcement duties, which would lessen in time as knowledge increases in the community related to the new regulations. Additionally, the proposed alternatives would create minor administrative burden related to creating and distributing education and outreach materials.

4.3 Establish a recreational bag limit for dolphinfish in federal waters around Puerto Rico (Action 1b), St. Croix (Action 3b), and St. Thomas/St. John (Action 5b)

Summary of Management Alternatives

Puerto Rico

Alternative 1. No Action. There is no recreational bag limit for dolphinfish in federal waters around Puerto Rico.

Alternative 2. Establish a recreational bag limit in federal waters of 10 dolphinfish per person per day, not to exceed 30 dolphinfish per vessel per day, whichever is less.

Alternative 3 (Preferred for Puerto Rico). Establish a recreational bag limit in federal waters of 5 dolphinfish per person per day, not to exceed 15 dolphinfish per vessel per day, whichever is less.

St. Croix and St. Thomas/St. John

Alternative 1. No Action. There is no minimum size limit for the commercial or recreational harvest of dolphinfish in federal waters around St. Croix or St. Thomas/St. John.

Alternative 2 (Preferred for St. Croix and St. Thomas/St. John). Establish a recreational bag limit in federal waters of 10 dolphinfish per person per day, not to exceed 32 dolphinfish per vessel per day, whichever is less.

Alternative 3. Establish a recreational bag limit in federal waters of 5 dolphinfish per person per day, not to exceed 15 dolphinfish per vessel per day, whichever is less.

4.3.1 Effects on the Physical Environment

The proposed bag limits are not expected to change the fishing methods for dolphinfish (e.g., drift fishing versus anchoring), gear type or amount used (e.g., hook-and line gear), or recreational fishing effort (i.e., number of fishing trips that happens within a place/time), but may indirectly change the level of recreational fishing effort (by for example, affecting how much an angler wants to fish for the species and thus the demand for trips and effort). Therefore, these actions would have no additional impacts to the bottom when compared with **Alternative 1**, and no physical effects are expected from **Alternative 2** or **Preferred Alternative 3** for Puerto Rico and from **Preferred Alternative 2** and **Alternative 3** for St. Croix and St. Thomas/St. John. The action alternatives would also not be expected to have any effects on EFH designated for dolphinfish.

4.3.2 Effects on the Biological/Ecological Environment

Biological benefits would be expected to be greater under the action alternatives compared with **Alternative 1**, because they would reduce the amount of dolphinfish that can be retained per person/vessel per day. Under **Alternative 1**, all dolphinfish caught can be retained. Recreational information collected from 2000-2017 for Puerto Rico shows that the majority of recreational trips in federal waters only reported one dolphinfish per day (see Appendix B3), so

the expected benefits under the proposed alternatives would be nominal. For Puerto Rico, biological benefits would be greater under **Preferred Alternative 3**, a 14.62% reduction in harvest, than under **Alternative 2**, a 3.11% reduction in harvest, because more fish would be left in the water. Again, the magnitude of that benefit depends on catch rates increasing from previously reported levels. Similarly, for St. Croix and St. Thomas/St. John, biological benefits would be greater under **Alternative 3** than under **Preferred Alternative 2**. However, recreational information such as the number of dolphinfish caught per person per day in federal waters is not available for the USVI, so the magnitude of the benefit is unknown.

Bycatch mortality for dolphinfish in federal waters is not known at this time, but could be greatest under **Alternative 3** (preferred for Puerto Rico), then **Alternative 2** (preferred for St. Croix and St. Thomas/St. John), then **Alternative 1** if anglers start to catch more fish per day when compared to the recreational bag limit, or become more selective with the dolphinfish they keep (e.g., keep larger fish). However, no changes to fishing activities or behavior are anticipated under these actions, so no changes in bycatch are expected. Moreover, additional impacts to ESA-listed species in the region above what was considered in 2020 Biological Opinion are not expected because anglers are unlikely to modify fishing gear (e.g., increase the number of hooks or lines) or methods (e.g., fishing location or vessel anchoring). In summary, no significant adverse impacts on endangered or threatened species are anticipated because of this action; nor are any adverse impacts on essential fish habitats or habitat areas of particular concern including corals, sea grasses, or other habitat types expected because of this action.

Overall, in light of the data limitations in the region, the more conservative management option under the preferred alternatives when compared to the status quo should increase the sustainability of the dolphinfish populations in Puerto Rico and the USVI.

4.3.3 Effects on the Economic Environment

Action 1(b). Puerto Rico

Alternative 1 would not affect recreational fishing practices or dolphinfish harvests in the EEZ around Puerto Rico and would not be expected to result in direct economic effects. However, continuing to allow the unrestricted harvest of recreationally caught dolphinfish could result in the removal of too many fish, thereby negatively affecting the local dolphinfish population. Potential adverse indirect economic effects that would result from **Alternative 1** would be commensurate with the negative impacts on the dolphinfish population.

Alternative 2 and **Preferred Alternative 3** would be expected to result in positive impacts to the local dolphinfish population by limiting the removal of fish. Therefore, **Alternative 2** and **Preferred Alternative 3** would be expected to result in direct economic benefits commensurate with anticipated population improvements. However, the establishment of a recreational bag

limit could also be expected to result in adverse economic effects due to the associated increase in discards, especially if recreational anglers participate in highgrading, i.e., catching and releasing fish while trying to harvest larger fish.

Alternative 2 and **Preferred Alternative 3** are expected to reduce the harvest of recreationally caught dolphinfish in the EEZ around Puerto Rico by 3.11% and 14.62%, respectively (Appendix B3, Table 3.1). Based on Table 3.4.13, the number of dolphinfish harvested by recreational anglers in federal waters around Puerto Rico averaged 76,344 fish between 2012 and 2016. Therefore, in numbers of fish, **Alternative 2** and **Preferred Alternative 3** are expected to reduce recreational dolphinfish landings by 2,374 ($76,344 \times 0.0311$) fish and 11,161 ($76,344 \times 0.1462$) fish, respectively. Economic effects expected to be associated with reductions in recreationally caught dolphinfish could be evaluated based on estimated decreases in consumer surplus to recreational anglers. However, the lack of data relative to the consumer surplus per recreationally caught dolphinfish in Puerto Rico precludes the quantitative evaluation of decreases in consumer surplus expected to result from **Alternative 2** and **Preferred Alternative 3**. It can nevertheless be inferred that, **Preferred Alternative 3**, which would result in a greater reduction in recreational dolphinfish harvests relative to **Alternative 1**, would be expected to result in a larger decrease in consumer surplus than **Alternative 2**.

Net economic effects expected to result from **Preferred Alternative 3** would be determined by the difference between the economic benefits expected to result from improving the population by restricting dolphinfish removals and the adverse economic effects associated with the reductions in recreational landings of dolphinfish and with the expected increases in discards. If the economic benefits from expected improvements to the local dolphinfish population exceed the negative economic effects expected to result from recreational landings reductions and increased discards, then **Preferred Alternative 3** would be expected to result in net positive economic effects. Otherwise, the net economic effects expected from **Preferred Alternative 3** would be negative. Net economic effects expected to result from **Alternative 2** would be determined in a similar manner. The magnitude of the expected improvements to the local dolphinfish population and associated net economic effects would be determined by the extent to which recreational anglers fishing in the EEZ around Puerto Rico comply with the proposed bag limit and by the effectiveness of its enforcement.

Action 3(b) St. Croix and Action 5(b) St. Thomas/St. John

Alternative 1 would not affect recreational fishing practices or dolphinfish harvests in the EEZ around St. Croix or St. Thomas/St. John and would not be expected to result in direct economic effects. However, continuing to allow the unrestricted harvest of recreationally caught dolphinfish could result in the removal of too many fish, thereby negatively affecting the local dolphinfish population. Potential adverse indirect economic effects that would result from **Alternative 1** would be commensurate with the negative impacts on the dolphinfish population.

Preferred Alternative 2 and **Alternative 3** would be expected to result in positive impacts to the local dolphinfish population by limiting the removal of fish. Therefore, **Preferred Alternative 2** and **Alternative 3** would be expected to result in direct economic benefits commensurate with anticipated population improvements. However, the establishment of a recreational bag limit could also be expected to result in adverse economic effects due to the associated increase in discards, especially if recreational anglers participate in highgrading, i.e., catching and releasing fish while trying to harvest larger fish.

Preferred Alternative 2 and **Alternative 3** are expected to reduce the harvest of recreationally caught dolphinfish in the EEZ around St. Croix and St. Thomas/St. John by 3.11% and 14.62%, respectively (based on the predicted decreases in Puerto Rico in Appendix B3, Table 3.1). As discussed in Section 3.5.5.2, Freeman et al. (2017) reported 580 lbs of recreationally caught dolphinfish around St. Croix and 306 lbs of recreationally caught dolphinfish around St. Thomas/St. John. It is noted that this estimate is likely not representative of the total recreational landings of dolphinfish around St. Croix or St. Thomas/St. John. Nevertheless, based on this estimate, **Preferred Alternative 2** and **Alternative 3** would reduce recreational landings of dolphinfish by 18 lbs (580×0.0311) and 85 lbs (580×0.1462) for St. Croix and by 10 lbs (306×0.0311) and 45 lbs (306×0.1462) for St. Thomas/St. John, respectively. Economic effects expected to be associated with reductions in recreationally caught dolphinfish could be evaluated based on estimated decreases in consumer surplus to recreational anglers. However, the lack of data relative to the consumer surplus per recreationally caught dolphinfish in St. Croix and St. Thomas/St. John precludes the quantitative evaluation of decreases in consumer surplus expected to result from **Preferred Alternative 2** and **Alternative 3**. It can however be inferred that, **Alternative 3**, which would result in a greater reduction in recreational dolphinfish harvests relative to **Alternative 1**, would be expected to result in a larger decrease in consumer surplus than **Alternative 2**.

Net economic effects expected to result from **Preferred Alternative 2** would be determined by the difference between the economic benefits expected to result from improving the population by restricting dolphinfish removals and the adverse economic effects associated with the reductions in recreational landings of dolphinfish and with the expected increases in discards. If economic benefits from expected improvements to the local dolphinfish population exceed the negative economic effects expected to result from recreational landings reductions and increased discards, then **Preferred Alternative 2** would be expected to result in net positive economic effects. Otherwise, the net economic effects expected from **Preferred Alternative 2** would be negative. Net economic effects expected to result from **Alternative 3** would be based on a similar evaluation.

The magnitude of the expected improvements to the local dolphinfish population and associated net economic effects would be determined by the extent to which recreational anglers fishing in the EEZ around St. Croix and St. Thomas/St. John comply with the proposed bag limit and by the effectiveness of its enforcement. Because **Preferred Alternative 2** would establish a bag limit compatible with regulations expected to be established by the USVI's Department of Planning and Natural Resources (DPNR), its enforcement is expected to be easier and more effective. However, **Alternative 3** would establish a more restrictive bag limit than planned DPNR regulations. Therefore, under **Alternative 3**, only on-the-water enforcement in the EEZ would ascertain compliance with the proposed recreational bag limit.

4.3.4 Effects on the Social Environment

Alternative 1 for proposed **Actions 1b, 3b, and 5b** would not impose trip-specific bag limits on the number of dolphinfish that may allowably be retained by recreational (non-commercial) participants around Puerto Rico or recreational and commercial/artisanal participants around the USVI. As such, this alternative would not alter status quo fishing opportunities, nor would it generate new social effects. This is unlike the case for **Alternative 2** and **Preferred Alternative 3** (for management of the resource in the federal waters of Puerto Rico), both of which specify trip-specific limitations on the number of dolphinfish that may harvested by recreational (non-commercial) participants active in that ocean zone. In the Puerto Rico case, **Preferred Alternative 3** recommends relatively more stringent conservation measures than does **Alternative 2**, and thus relatively more constrained fishing opportunities and potential for detrimental social effects in the near-term, but with the enhanced possibility of long-term stock enhancement and related potential for increased fishing opportunities and social benefits among recreational participants over time. This is unlike the situation for the federal waters around St. Croix and St. Thomas/St. John, since **Preferred Alternative 2** for those ocean zones specifies that a relatively larger number of dolphinfish may be retained by commercial/artisanal and recreational participants than does **Alternative 3**. This suggests Caribbean Fishery Management Council (Council) interest in maximizing fishing opportunities and avoiding detrimental social effects in the near-term, but with less emphasis on long-term outcomes potentially following from implementation of relatively more stringent conservation measures. Of note, implementation of any of the action alternatives regions would likely call for relatively more enforcement-related time and effort than would the no-action **Alternative 1**.

4.3.5 Effects on the Administrative Environment

Alternative 2 (preferred for St. Croix and St. Thomas/St. John) and **Alternative 3** (preferred for Puerto Rico) would have greater administrative burden when compared to **Alternative 1** as they would require new regulations for those fishing for dolphinfish in federal waters. The proposed alternatives would create minor administrative burden related to creating and distributing education and outreach materials. For Puerto Rico, **Alternative 2** would implement a bag limit

compatible with regulations established by Puerto Rico's Department of Natural and Environmental Resources (DNER), its enforcement is expected to be straightforward. However, **Preferred Alternative 3** would establish a more restrictive bag limit than current DNER regulations. Therefore, under **Preferred Alternative 3**, only on-the-water enforcement in the EEZ would ascertain compliance with the proposed recreational bag limit. For St. Croix and St. Thomas/St. John, **Preferred Alternative 2** would implement a bag limit compatible with regulations expected to be established by the USVI's DPNR, its enforcement is expected to be easier and more effective. However, **Alternative 3** would establish a more restrictive bag limit than planned DPNR regulations. Therefore, under **Alternative 3**, only on-the-water enforcement in the EEZ would ascertain compliance with the proposed recreational bag limit.

4.4 Establish a recreational bag limit for wahoo in federal waters around Puerto Rico (Action 2b), St. Croix (Action 4b), and St. Thomas/St. John (Action 6b)

Summary of Management Alternatives

Puerto Rico

Alternative 1. No Action. There is no recreational bag limit for wahoo in federal waters around Puerto Rico.

Alternative 2 (Preferred for Puerto Rico). Establish a recreational bag limit in federal waters around Puerto Rico of 5 wahoo per person per day, not to exceed 10 wahoo per vessel per day, whichever is less.

Alternative 3. Establish a recreational bag limit in federal waters around Puerto Rico of 2 wahoo per person per day, not to exceed 6 wahoo per vessel per day, whichever is less.

St. Croix and St. Thomas/St. John

Alternative 1. No Action. There is no recreational bag limit for wahoo in federal waters around St. Croix or St. Thomas/St. John.

Alternative 2. Establish a recreational bag limit in federal waters of 4 wahoo per person per day, not to exceed 20 wahoo per vessel per day, whichever is less.

Alternative 3 (Preferred for St. Croix and St. Thomas/St. John). Establish a recreational bag limit in federal waters of 2 wahoo per person per day, not to exceed 10 wahoo per vessel per day, whichever is less.

4.4.1 Effects on the Physical Environment

The proposed bag limits are not expected to change the fishing methods (e.g., drift fishing versus anchoring), gear type or amount used (e.g., hook-and line gear), or level of fishing effort (e.g., hours/days fished) for the fisheries that target wahoo. Therefore, these actions would have no additional impacts to the bottom when compared with **Alternative 1**, and no physical effects are expected from **Preferred Alternative 2** or **Alternative 3** for Puerto Rico and from **Alternative 2** and **Preferred Alternative 3** for St. Croix and St. Thomas/St. John. The action alternatives would also not be expected to have any effects on EFH designated for wahoo.

4.4.2 Effects on the Biological/Ecological Environment

Biological benefits would be expected to be greater under the action alternatives compared with **Alternative 1**, because they would reduce the amount of wahoo that can be retained per person/vessel per day. Under **Alternative 1**, all wahoo caught can be retained. However, recreational information collected from 2000-2017 for Puerto Rico shows that the majority of recreational trips in federal waters only reported one wahoo per day (see Appendix B3), so the expected benefits under the proposed alternatives would be nominal. For Puerto Rico, biological benefits would be greater under **Alternative 3**, a 9.56% reduction in harvest, than under **Preferred Alternative 2**, a 1.38% reduction in harvest, because more fish would be left in the

water. Again, the magnitude of that benefit depends on catch rates increasing from previously reported levels. Similarly, for St. Croix and St. Thomas/St. John, biological benefits would be greater under **Preferred Alternative 3** than under **Alternative 2**. However, recreational information such as the number of wahoo caught per person per day in federal waters is not available for the USVI, so the magnitude of the benefit is unknown.

Bycatch mortality for wahoo in federal waters is not known at this time, but could be greatest under **Alternative 3** (preferred for St. Croix and St. Thomas/St. John), then **Alternative 2** (preferred for Puerto Rico), then **Alternative 1** if anglers start to catch more fish per day when compared to the recreational bag limit, or become more selective with the wahoo they keep (e.g., keep larger fish). However, no changes to fishing activities or behavior are anticipated under these actions, so no changes in bycatch are expected. Moreover, additional impacts to ESA-listed species in the region above what was considered in 2020 Biological Opinion are not expected because anglers are unlikely to modify fishing gear (e.g., increase the number of hooks or lines) or methods (e.g., fishing location or vessel anchoring).

Overall, in light of the data limitations in the region, the more conservative management option under the preferred alternatives when compared to the status quo should increase the sustainability of the wahoo populations in Puerto Rico and the USVI.

4.4.3 Effects on the Economic Environment

Action 2(b). Puerto Rico

Alternative 1 would not affect recreational fishing practices or wahoo harvests in the EEZ around Puerto Rico and would not be expected to result in direct economic effects. However, continuing to allow the unrestricted harvest of recreationally caught wahoo could result in the removal of too many fish, thereby negatively affecting the local wahoo population. Potential adverse indirect economic effects that would result from **Alternative 1** would be commensurate with the negative impacts on the wahoo population.

Preferred Alternative 2 and **Alternative 3** would be expected to result in positive impacts to the local wahoo population by limiting the removal of fish. Therefore, **Preferred Alternative 2** and **Alternative 3** would be expected to result in direct economic benefits commensurate with anticipated population improvements. However, the establishment of a recreational bag limit could also be expected to result in adverse economic effects due to the associated increase in discards, especially if recreational anglers participate in highgrading, i.e., catching and releasing fish while trying to harvest larger fish.

Preferred Alternative 2 and **Alternative 3** are expected to reduce the harvest of recreationally caught wahoo in the EEZ around Puerto Rico by 1.38% and 9.56%, respectively (Appendix B3,

Table 3.2). Based on Table 3.4.14, the number of wahoo harvested by recreational anglers in federal waters around Puerto Rico averaged 9,972 fish (average based on four years of data, i.e., 2012, 2014, 2015, and 2016). Therefore, in numbers of fish, **Preferred Alternative 2** and **Alternative 3** are expected to reduce recreational wahoo landings by 138 ($9,972 \times 0.0138$) fish and 953 ($9,972 \times 0.0956$) fish, respectively. Economic effects expected to be associated with reductions in recreationally caught wahoo could be evaluated based on estimated decreases in consumer surplus to recreational anglers. However, the lack of data relative to the consumer surplus per recreationally caught wahoo in Puerto Rico precludes the quantitative evaluation of decreases in consumer surplus expected to result from **Preferred Alternative 2** and **Alternative 3**. It can be inferred that, **Alternative 3**, which would result in a greater reduction in recreational wahoo harvests relative to **Alternative 1**, would be expected to result in a larger decrease in consumer surplus than **Alternative 2**.

Net economic effects expected to result from **Preferred Alternative 2** would be determined by the difference between the economic benefits expected to result from improving the population by restricting wahoo removals and the adverse economic effects associated with the reductions in recreational landings of wahoo and with the expected increases in discards. If economic benefits from expected improvements to the local wahoo population exceed the negative economic effects expected to result from recreational landings reductions and increased discards, then **Preferred Alternative 2** would be expected to result in net positive economic effects. Otherwise, the net economic effects expected from **Preferred Alternative 2** would be negative. Net economic effects expected to result from **Alternative 3** would be based on a similar evaluation.

The magnitude of the expected improvements to the local wahoo population and associated net economic effects would be determined by the extent to which recreational anglers fishing in the EEZ around Puerto Rico comply with the proposed bag limit and by the effectiveness of its enforcement.

Action 4(b) St. Croix and Action 6(b) St. Thomas/St. John

Alternative 1 would not affect recreational fishing practices or wahoo harvests in the EEZ around St. Croix or St. Thomas/St. John and would not be expected to result in direct economic effects. However, continuing to allow the unrestricted harvest of recreationally caught wahoo could result in the removal of too many fish, thereby negatively affecting the local wahoo population. Potential adverse indirect economic effects that would result from **Alternative 1** would be commensurate with the negative impacts on the wahoo population.

Alternative 2 and **Preferred Alternative 3** would be expected to result in positive impacts to the local wahoo population by limiting the removal of fish. Therefore, **Alternative 2** and **Preferred Alternative 3** would be expected to result in direct economic benefits commensurate

with anticipated population improvements. However, the establishment of a recreational bag limit could also be expected to result in adverse economic effects due to the associated increase in discards, especially if recreational anglers participate in highgrading, i.e., catching and releasing fish while trying to harvest larger fish.

The extent to which **Alternative 2** and **Preferred Alternative 3** are expected to reduce the harvest of recreationally caught wahoo in the EEZ around St. Croix and St. Thomas/St. John is unknown at this time. Therefore, economic effects expected to be associated with reductions in recreationally caught wahoo, which could be evaluated based on estimated decreases in consumer surplus to recreational anglers, cannot be quantified. However, it can be inferred that the more restrictive alternative (**Preferred Alternative 3**), which would result in a greater reduction in recreational wahoo harvests relative to **Alternative 1**, would be expected to result in a larger decrease in consumer surplus than **Alternative 2**.

Net economic effects expected to result from **Preferred Alternative 3** would be determined by the difference between the economic benefits expected to result from improving the population by restricting wahoo removals and the adverse economic effects associated with the reductions in recreational landings of wahoo and with the expected increases in discards. If economic benefits from expected improvements to the local wahoo population exceed the negative economic effects expected to result from recreational landings reductions and increased discards, then **Preferred Alternative 3** would be expected to result in net positive economic effects. Otherwise, the net economic effects expected from **Preferred Alternative 2** would be negative. Net economic effects expected to result from **Alternative 2** would be based on a similar evaluation.

The magnitude of the expected improvements to the local wahoo population and associated net economic effects would be determined by the extent to which recreational anglers fishing in the EEZ around St. Croix and St. Thomas/St. John comply with the proposed bag limit and by the effectiveness of its enforcement.

4.4.4 Effects on the Social Environment

Preferred Alternative 2 and **Alternative 3** for Puerto Rico would diminish existing fishing opportunities for recreationalists, and thereby likely incur certain detrimental social effects. Such constraints and resultant near-term effects would be most extensive under the conservation measures specified in **Alternative 3**, while **Preferred Alternative 2** would allow for a greater number of retainable fish and thus relatively greater levels of fishing opportunity and related social benefits in the near-term. Long-term benefits potentially following from the strictures specified in **Alternative 3** receive relatively less emphasis in the case of Puerto Rico. Relatively stricter measures are called for under **Preferred Alternative 3** for St. Croix, and St. Thomas/St. John. This alternative presents the potential for diminished recreational fishing opportunities and

elevated potential for detrimental social effects in the near-term, but with relatively greater emphasis on the potential for biological and social benefits to accrue over time. Finally, each of the action alternatives specified for both Puerto Rico and the USVI would likely require additional time and effort on the part of officers responsible for enforcing prospective limitations on numbers of fish that may be retained by recreational participants active in the federal waters around both Puerto Rico and the USVI.

4.4.5 Effects on the Administrative Environment

Alternative 2 (preferred for Puerto Rico) and **Alternative 3** (preferred for St. Croix and St. Thomas/St. John) would have greater administrative burden when compared to **Alternative 1** as they would require new regulations for those fishing for wahoo in federal waters. The proposed alternatives would create minor administrative burden related to creating and distributing education and outreach materials. For Puerto Rico, **Preferred Alternative 2** would implement a bag limit compatible with regulations established by Puerto Rico's DNER, its enforcement is expected to be easier and more effective. However, **Alternative 3** would establish a more restrictive bag limit than current DNER regulations. Therefore, under **Alternative 3**, only on-the-water enforcement in the EEZ would ascertain compliance with the proposed recreational bag limit.. For St. Croix and St. Thomas/St. John, **Alternative 2** would implement a bag limit compatible with regulations expected to be established by the USVI's DPNR, its enforcement is expected to be easier and more effective. However, **Preferred Alternative 3** would establish a more restrictive bag limit than planned DPNR regulations. Therefore, under **Preferred Alternative 3**, only on-the-water enforcement in the EEZ would ascertain compliance with the proposed recreational bag limit, which could be difficult to prove if the catch were from state or federal waters.

4.5 Cumulative Effects Analysis

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

1. The area in which the effects of the proposed action will occur - The affected area of this proposed action encompasses the state and federal waters of the U.S. Caribbean and includes the communities of Puerto Rico, St. Croix, St. Thomas/St. John that fish for dolphinfish and wahoo. For more information about the area in which the effects of this proposed action will occur, please see Chapter 3, Affected Environment, which describes these resources as well as other relevant features of the human environment.

2. The impacts that are expected in that area from the proposed action - The proposed action would establish size limits and recreational bag limits for dolphinfish and wahoo under each of the Puerto Rico, St. Croix, and St. Thomas/St. John FMPs. Dolphinfish and wahoo are new to federal fisheries management under the FMPs, which were implemented on October 13, 2022.

As discussed in Sections 4.1 and 4.2, establishing size limits for dolphinfish and wahoo based on size at maturity would be expected to provide biological benefits to the species through the protection of the smaller-sized fish, but may redirect harvest to larger-sized fish and increase in bycatch of smaller-sized fish. Bycatch mortality is unknown at this time, as size limits are not in place, but would be expected to be minimal based on analysis of data available at the time this amendment was prepared (see Appendix B). Economic and social benefits would be expected commensurate with anticipated population benefits, but adverse economic effects could occur due to estimated decreases in commercial and recreational dolphinfish landings. This action would require that fishermen who target dolphinfish and wahoo are aware of and comply with the new regulations, and could add additional outreach and labor requirements for administrative staff and enforcement officers.

As discussed in Sections 4.3 and 4.4, establishing recreational bag limits for dolphinfish and wahoo would be expected to provide biological benefits to the species through the limitation on the number of fish that could be removed by recreational fishermen. Bycatch mortality is unknown at this time, but could increase if fishermen become more selective and keep larger fish. Economic and social benefits would be expected commensurate with anticipated biological benefits, but adverse economic effects could occur if recreational anglers spend more time trying

to harvest larger fish. Adverse social effects could as fishermen adjust from open access fishing opportunities of the stocks to complying more stringent conservation measures. Short-term administrative impacts would also be expected as managers and enforcement staff increase the amount of time updating regulations, outreach efforts, and compliance.

The proposed action could result in greater negative social and economic effects for the recreational sector, when compared to the commercial sector, as it would transition from unlimited access to the stocks to access that is limited on the number of dolphinfish and wahoo that could be harvested daily and the size of fish that could be retained. The commercial sector would only be required to comply with the proposed size limit regulations. At the time of the preparation of this amendment, recreational landings information, including catch and effort estimations, are not available for the U.S. Caribbean region. As such, estimating the magnitude of the impacts to the recreational sector from the proposed regulations was not attempted.

As mentioned in Section 3.3.4, dolphinfish and wahoo are caught as commercial bycatch in Atlantic Highly Migratory Species (HMS) fisheries. The U.S. pelagic longline fleet, which targets swordfish and bigeye and yellowfin tuna ([NFMS 2022](#)), represents a small fraction of the international pelagic longline fleet. Of the 23 Caribbean countries that reported commercial landings of dolphinfish from 2014-2018, Puerto Rico and the USVI landings were and 15th and 17th, respectively (Merten et al. 2022). HMS Commercial Caribbean Small Boat (CCSB) permit holders also catch dolphinfish and wahoo as bycatch. As of January 2024, 70 CCSB permits were active.⁵⁵ The proposed action could affect HMS fishermen that operate in U.S. Caribbean federal waters who catch dolphinfish and wahoo as bycatch as they would need to comply with the proposed size limits.

3. Other past, present and reasonably foreseeable future actions that have or are expected to have impacts in the area

Other fishery related actions

The Puerto Rico, St. Croix, and St. Thomas/St. John FMPs, implemented in 2022, added dolphinfish and wahoo for management and specified annual catch limits (ACL), annual catch targets (ACT), and accountability measures (AM) for these species. For each species, annual monitoring compares the ACTs to available landings data.⁵⁶ The cumulative effects analysis (CEA) included in each FMP found that these newly managed pelagic stocks have been and continue to be targeted by both commercial and recreational fishermen and assumed that any impacts would be minimal, as future landings would be expected to remain similar to landings reported before the species were managed (i.e., ACTs and ACLs would likely not be exceeded and AMs not triggered).

⁵⁵ <https://www.fisheries.noaa.gov/southeast/resources-fishing/frequent-freedom-information-act-requests-southeast-region>

⁵⁶ As recreational landings information are not available for the U.S. Caribbean region, the commercial ACT and ACL for dolphinfish or wahoo under Puerto Rico FMP is the applicable ACT and ACL for all fishing for each stock. For the USVI, the ACLs specified are applicable to all fishing for each stock.

Amendment 1 to each FMP, implemented in 2023, prohibited the use of buoy gear for recreational fishermen and increased the number of hooks allowed between the buoy and the terminal end from 10 to 25 for commercial fishermen who use the gear in federal waters. The CEA stated that fishing with buoy gear is a specialized fishing method used by commercial fishermen who target deep-water reef fish (e.g., snapper and grouper species) and that it is unlikely to be used by recreational fishermen. Following Amendment 1, the proposed action would impose further fishing limitations to the recreational sector in federal waters. However, no recreational fishing information is available for the U.S. Caribbean at this time and data from previous collection programs was not specified to gear type, so the impact of these combined actions is difficult to determine. Although the modification to the buoy gear definition applies to the commercial harvest of dolphinfish and wahoo under each FMP, these species are not typically harvested with buoy gear (see Table 3.2.1 in Amendment 1 and Section 3.3 of this document); therefore, any cumulative effects from this action and Amendment 1 would be expected to negligible.

Amendment 2 to each FMP (in preparation) would prohibit the use of trawl gear (bottom and mid-water trawls) trammel nets, and purse seines and restrict the use of gillnets in U.S. Caribbean federal waters. Again, dolphinfish and wahoo are not targeted by commercial or recreational fishermen with these gear types, but the modifications on the use of these gear types in federal waters could minimize any bycatch of the species that may occur from their use.

The Council has discussed potential actions to modify the red hind seasonal closure management area off St. Croix to allow for fishing of pelagic fish and to develop a federal permits program for the U.S. Caribbean. These potential actions could impose additional regulations on fishermen who target dolphinfish and wahoo and would build on the regulations proposed in this action, but those are still to be determined and will be considered as the discussions continue and documents are developed. Documents and presentations presented during Council meetings are available on the Council's website.⁵⁷

Non-fishery related actions

Actions affecting the U.S. Caribbean fisheries (e.g. climate change, hurricanes, COVID-19 public health crisis) were included in the CEAs for the FMPs, Amendment 1, and Amendment 2 and are incorporated by reference.

Dolphinfish and wahoo are migratory species throughout the Caribbean and Atlantic basins, and climate-related impacts to their distribution may already be occurring (Merten et al. 2023) or may occur in the future. However, at this time, the level of impacts associated with these shifts cannot be quantified nor the time frame in which these impacts could occur. Merten et al. (2016) suggested that exchanges of dolphinfish occur annually between fisheries of the United States

⁵⁷ <https://www.caribbeanfmc.com/meeting-documents>

and Caribbean. Merten et al. (2022) found that social and environmental processes (e.g., fish aggregating device [FAD] programs and Sargassum blooms⁵⁸) lead to an increase of juvenile dolphinfish caught throughout the Caribbean region. Public comments during Council meetings following presentations on the Dolphinfish Research Program were supportive of management actions that protected juvenile dolphinfish that are caught on or around FADs or in Sargassum lines. The size and frequency of Sargassum mats in the tropical Atlantic is likely linked extreme climate events (<https://www.climate.gov/>), and though they are a nuisance when washed close to shore, they provide food, protection, and habitat for dolphinfish and wahoo. As described in Section 3.1.3, the annual formation and growth of the new tropical Sargassum population is not limited to river discharges or upwelling events like the northern population (Johns et al. 2020), meaning that for the U.S. Caribbean, Sargassum blooms may become much more frequent and abundant, and with that, the number of juvenile dolphinfish and wahoo in federal waters off Puerto Rico, St. Croix, and St. Thomas/St. John may also increase. 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.

4. The impacts or expected impacts from these other actions - Cumulative effects from managing fishery resources in the U.S. Caribbean have been analyzed in previous actions, listed in part three of this section. They include detailed analysis of the Puerto Rico, St. Croix, and St. Thomas/St. John fisheries, effects on non-targeted and protected species, and habitats in the U.S. Caribbean. The effects of this action would be expected to be positive in the long term, as they ultimately act to conserve regional dolphinfish and wahoo stocks at a level that would allow the maximum benefits in yield and fishing opportunities to be achieved. Some short-term, minor negative impacts on the social and economic environments could occur as fishermen adjust their fishing methods to comply with the new regulations.

5. The overall impact that can be expected if the individual impacts are allowed to accumulate - Cumulative effects resulting from establishing size limits and recreational bag limits for dolphinfish and wahoo in federal waters, in combination with other past, present, and reasonably foreseeable future actions, would be expected to be minimal in each island management area.

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. Similarly, no significant cumulative effects would be expected

⁵⁸ Sargassum is listed as essential fish habitat for juvenile, adult, and larval life stages of dolphinfish and wahoo under the Puerto Rico, St. Croix, and St. Thomas/St. John fishery management plans.

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

6. Summary - The proposed action is not expected to have significant effects to the physical, biological, 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 the National Marine Fisheries Service, individual state programs, stock assessments (as available), 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. This RIR analyzes the impacts this action would be expected to have on the dolphinfish and wahoo fisheries in Puerto Rico, St. Croix and, St. Thomas/St. John.

5.2 Problems and Objectives

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

5.3 Description of Fisheries

Descriptions of the dolphinfish and wahoo fisheries in Puerto Rico, St. Croix and, St. Thomas/St. John are provided in Section 3.3.

5.4 Impacts of Management Measures

5.4.1 Establish a size limit for dolphinfish in federal waters around Puerto Rico (Action 1(a)), St. Croix (Action 3(a)), and St. Thomas/St. John (Action 5(a))

Detailed analyses of the economic effects expected to result from this action is provided in Section 4.1.3. The following discussion summarizes the expected economic effects of the preferred alternatives.

For the commercial or recreational harvest of dolphinfish in federal waters around Puerto Rico (Action 1(a)), St. Croix (Action 3(a)) and St. Thomas/St. John (Action 5(a)), **Preferred Alternatives 3** would establish a 24” fork length (FL) size limit and would be expected to result in beneficial impacts to the local dolphinfish population by reducing the removal of undersized fish.

Therefore, **Preferred Alternatives 3** would each be expected to result in direct economic benefits commensurate with anticipated population improvements. However, **Preferred Alternatives 3** are each also expected to result in adverse economic effects due to estimated decreases in commercial and recreational dolphinfish landings and increases in discards in Puerto Rico, St. Croix and St. Thomas/St. John.

Action 1(a). Puerto Rico

Preferred Alternative 3 is expected to result in an annual loss in commercial revenue ranging from less than \$2,477 (\$2022) to less than \$2,762 (\$2022). Decreases in producer surplus to commercial fishermen and in consumer surplus to seafood consumers, which could also result from **Preferred Alternative 3**, cannot be quantified due to the unavailability of data. **Preferred Alternative 3** is expected to reduce recreational dolphinfish landings by 11,070 fish. Due to the lack of information relative to the consumer surplus per recreationally caught dolphinfish in Puerto Rico, decreases in consumer surplus expected to result from **Preferred Alternative 3** cannot be quantified. Net economic effects expected to result from **Preferred Alternative 3** would be positive if the economic benefits expected from improvements to the local dolphinfish population in the exclusive economic zone (EEZ) around Puerto Rico exceed the negative economic effects expected to result from dolphinfish landings reductions. Otherwise, the net economic effects expected from **Preferred Alternative 3** would be negative.

Action 3(a). St. Croix

Preferred Alternative 3 is expected to result in an annual loss in commercial revenue estimated at \$10,533 (\$2022). Decreases in producer surplus to commercial fishermen and in consumer surplus to seafood consumers, which could also result from **Preferred Alternative 3**, cannot be quantified due to the unavailability of data. **Preferred Alternative 3** would reduce recreational landings of dolphinfish by 84 pounds (lbs). Due to the lack of information relative to the consumer surplus per recreationally caught dolphinfish in St. Croix, decreases in consumer surplus expected to result from **Preferred Alternative 3** cannot be quantified. Net economic effects expected to result from **Preferred Alternative 3** would be positive if the economic benefits expected from improvements to the local dolphinfish population in the EEZ around St. Croix exceed the negative economic effects expected to result from dolphinfish landings reductions. Otherwise, the net economic effects expected from **Preferred Alternative 3** would be negative.

Action 5(a). St. Thomas and St. John

Preferred Alternative 3 is expected to result in an annual decrease in commercial revenue valued at \$461 (\$2022). Decreases in producer surplus to commercial fishermen and in consumer surplus to seafood consumers, which could also result from **Preferred Alternative 3**, cannot be quantified due to the unavailability of data. **Preferred Alternative 3** would reduce

recreational landings of dolphinfish by 44 lbs. Due to the lack of information relative to the consumer surplus per recreationally caught dolphinfish in St. Thomas/St. John, decreases in consumer surplus expected to result from **Preferred Alternative 3** cannot be quantified. Net economic effects expected to result from **Preferred Alternative 3** would be positive if the economic benefits expected from improvements to the local dolphinfish population in the EEZ around St. Thomas/St. John exceed the negative economic effects expected to result from dolphinfish landings reductions. Otherwise, the net economic effects expected from **Preferred Alternative 3** would be negative.

5.4.2 Establish a size limit for wahoo in federal waters around Puerto Rico (Action 2(a)), St. Croix (Action 4(a)), and St. Thomas/St. John (Action 6(a))

Detailed analyses of the economic effects expected to result from this action is provided in Section 4.2.3. The following discussion summarizes the expected economic effects of the preferred alternatives.

For the commercial or recreational harvest of wahoo in federal waters around Puerto Rico (Action 2(a)), St. Croix (Action 4(a)) and St. Thomas/St. John (Action 6(a)), **Preferred Alternatives 2** would establish a 32" FL size limit and would be expected to result in beneficial impacts to the local wahoo population by reducing the removal of undersized fish. Therefore, **Preferred Alternatives 2** would each be expected to result in direct economic benefits commensurate with anticipated population improvements. However, **Preferred Alternatives 2** are also each expected to result in adverse economic effects due to estimated decreases in commercial and recreational wahoo landings and increases in discards in Puerto Rico, St. Croix and St. Thomas/St. John.

Action 2(a). Puerto Rico

Preferred Alternative 2 is expected to result in a loss in annual commercial revenue ranging from \$4,535 (\$2022) to \$5,103 (\$2022). Decreases in producer surplus to commercial fishermen and in consumer surplus to seafood consumers, which could also result from **Preferred Alternative 2**, cannot be quantified due to the unavailability of data. **Preferred Alternative 2** is expected to reduce recreational wahoo landings by 3,251 fish. Due to the lack of information relative to the consumer surplus per recreationally caught wahoo in Puerto Rico, decreases in consumer surplus expected to result from **Preferred Alternative 2** cannot be quantified. Net economic effects expected to result from **Preferred Alternative 2** would be positive if the economic benefits expected from improvements to the local wahoo population in the EEZ around Puerto Rico exceed the negative economic effects expected to result from wahoo landings reductions. Otherwise, the net economic effects expected from **Preferred Alternative 2** would be negative.

Action 4(a). St. Croix

Preferred Alternative 2 is expected to result in annual decreases in commercial revenue estimated at \$2,550 (\$2022). Decreases in producer surplus to commercial fishermen and in consumer surplus to seafood consumers, which could also result from **Preferred Alternative 2**, cannot be quantified due to the unavailability of data. **Preferred Alternative 2** would reduce recreational landings of wahoo by 97 lbs. Due to the lack of information relative to the consumer surplus per recreationally caught wahoo in St. Croix, decreases in consumer surplus expected to result from **Preferred Alternative 2** cannot be quantified. Net economic effects expected to result from **Preferred Alternative 2** would be positive if the economic benefits expected from improvements to the local wahoo population in the EEZ around St. Croix exceed the negative economic effects expected to result from wahoo landings reductions. Otherwise, the net economic effects expected from **Preferred Alternative 2** would be negative.

Action 6(a). St. Thomas and St. John

Preferred Alternative 2 is expected to result in an annual decrease in commercial revenue estimated at \$1,485 (\$2022). Decreases in producer surplus to commercial fishermen and in consumer surplus to seafood consumers, which could also result from **Preferred Alternative 2**, cannot be quantified due to the unavailability of data. **Preferred Alternative 2** would reduce recreational landings of wahoo by 38 lbs. Due to the lack of information relative to the consumer surplus per recreationally caught wahoo in St. Thomas/St. John, decreases in consumer surplus expected to result from **Preferred Alternative 2** cannot be quantified. Net economic effects expected to result from **Preferred Alternative 2** would be positive if the economic benefits expected from improvements to the local wahoo population in the EEZ around St. Thomas/St. John exceed the negative economic effects expected to result from wahoo landings reductions. Otherwise, the net economic effects expected from **Preferred Alternative 2** would be negative.

5.4.3 Establish a recreational bag limit for dolphinfish in federal waters around Puerto Rico (Action 1(b)), St. Croix (Action 3(b)), and St. Thomas/St. John (Action 5(b))

Detailed analyses of the economic effects expected to result from this action is provided in Section 4.3.3. The following discussion summarizes the expected economic effects of the preferred alternatives.

Preferred Alternative 3 (Action 1(b)) would establish a recreational bag limit in federal waters around Puerto Rico of 5 dolphinfish per person per day, not to exceed 15 dolphinfish per vessel per day, whichever is less. **Preferred Alternatives 2** would establish a recreational bag limit in federal waters around St. Croix (Action 3(b)) and around St. Thomas/St. John (Action 5(b)) of 10 dolphinfish per person per day, not to exceed 32 dolphinfish per vessel per day, whichever is

less. Therefore, **Preferred Alternative 3** and **Preferred Alternatives 2** would be expected to result in beneficial impacts to the local dolphinfish population by limiting the removal of fish and in direct economic benefits commensurate with anticipated population improvements in Puerto Rico, St. Croix and, St. Thomas/St. John. However, the establishment of a recreational bag limit could also be expected to result in adverse economic effects due to the associated increase in discards, especially if recreational anglers participate in high grading, i.e., catching and releasing fish while trying to harvest larger fish.

Action 1(b). Puerto Rico

Preferred Alternative 3 are expected to reduce the harvest of recreationally caught dolphinfish in the EEZ around Puerto Rico by 11,161 fish. Due to the lack of information relative to the consumer surplus per recreationally caught dolphinfish in Puerto Rico, decreases in consumer surplus expected to result from **Preferred Alternative 3** cannot be quantified. Net economic effects expected to result from **Preferred Alternative 3** would be positive if the economic benefits expected from improvements to the local dolphinfish population in the EEZ around Puerto Rico exceed the negative economic effects expected to result from dolphinfish landings reductions. Otherwise, the net economic effects expected from **Preferred Alternative 3** would be negative.

Action 3(b). St. Croix

Preferred Alternative 2 is expected to reduce the harvest of recreationally caught dolphinfish in the EEZ around St. Croix by 18 lbs. Due to the lack of information relative to the consumer surplus per recreationally caught dolphinfish in St. Croix, decreases in consumer surplus expected to result from **Preferred Alternative 2** cannot be quantified. Net economic effects expected to result from **Preferred Alternative 2** would be positive if the economic benefits expected from improvements to the local dolphinfish population in the EEZ around St. Croix exceed the negative economic effects expected to result from dolphinfish landings reductions. Otherwise, the net economic effects expected from **Preferred Alternative 2** would be negative.

Action 5(b). St. Thomas and St. John

Preferred Alternative 2 is expected to reduce the harvest of recreationally caught dolphinfish in the EEZ around St. Thomas/St. John by 10 lbs. Due to the lack of information relative to the consumer surplus per recreationally caught dolphinfish in St. Thomas/St. John, decreases in consumer surplus expected to result from **Preferred Alternative 2** cannot be quantified. Net economic effects expected to result from **Preferred Alternative 2** would be positive if the economic benefits expected from improvements to the local dolphinfish population in the EEZ around St. Thomas/St. John exceed the negative economic effects expected to result from dolphinfish landings reductions. Otherwise, the net economic effects expected from **Preferred Alternative 2** would be negative.

5.4.4 Establish a recreational bag limit for wahoo in federal waters around Puerto Rico (Action 2(b)), St. Croix (Action 4(b)), and St. Thomas/St. John (Action 6(b))

Detailed analyses of the economic effects expected to result from this action is provided in Section 4.4.3. The following discussion summarizes the expected economic effects of the preferred alternatives.

Preferred Alternative 2 (Action 2(b)) would establish a recreational bag limit in federal waters around Puerto Rico of 5 wahoo per person per day, not to exceed 10 wahoo per vessel per day, whichever is less. **Preferred Alternatives 3** would establish a recreational bag limit in federal waters around St. Croix (Action 4(b)) and St. Thomas/St. John (Action 6(b)) of 2 wahoo per person per day, not to exceed 10 wahoo per vessel per day, whichever is less. **Preferred Alternative 2** and **Preferred Alternatives 3** would be expected to result in improvements to the local wahoo population by limiting the removal of fish and in direct economic benefits commensurate with anticipated population improvements in Puerto Rico, St. Croix and, St. Thomas/St. John. However, the establishment of a recreational bag limit could also be expected to result in adverse economic effects due to the associated increase in discards, especially if recreational anglers participate in high grading, i.e., catching and releasing fish while trying to harvest larger fish.

Action 2(b). Puerto Rico

Preferred Alternative 2 is expected to reduce recreational wahoo landings by 138 fish. Due to the lack of information relative to the consumer surplus per recreationally caught wahoo in Puerto Rico, decreases in consumer surplus expected to result from **Preferred Alternative 2** cannot be quantified. Net economic effects expected to result from **Preferred Alternative 2** would be positive if the economic benefits expected from improvements to the local wahoo population in the EEZ around Puerto Rico exceed the negative economic effects expected to result from wahoo landings reductions. Otherwise, the net economic effects expected from **Preferred Alternative 2** would be negative.

Action 4(b). St. Croix

The extent to which **Preferred Alternative 3** is expected to reduce the harvest of recreationally caught wahoo in the EEZ around St. Croix is unknown at this time. Therefore, economic effects expected to be associated with reductions in recreationally caught wahoo, cannot be quantified. Net economic effects expected to result from **Preferred Alternative 3** would be positive if the economic benefits expected from improvements to the local wahoo population in the EEZ around St. Croix exceed the negative economic effects expected to result from wahoo landings

reductions. Otherwise, the net economic effects expected from **Preferred Alternative 3** would be negative.

Action 6(b). St. Thomas and St. John

The extent to which **Preferred Alternative 3** is expected to reduce the harvest of recreationally caught wahoo in the EEZ around St. Thomas/St. John is unknown at this time. Therefore, economic effects expected to be associated with reductions in recreationally caught wahoo, cannot be quantified. Net economic effects expected to result from **Preferred Alternative 3** would be positive if the economic benefits expected from improvements to the local wahoo population in the EEZ around St. Thomas/St. John exceed the negative economic effects expected to result from wahoo landings reductions. Otherwise, the net economic effects expected from **Preferred Alternative 3** would be negative.

5.5 Public and Private Costs of Regulations

The preparation, implementation, and monitoring of this or any federal action involves the expenditure of public and private resources, which can be expressed as costs associated with the regulations. Estimated costs associated with this action include:

Council costs of document preparation, meetings, public hearings, and information dissemination.....	\$37,997
NMFS administrative costs of document preparation, meetings and review	\$98,280
TOTAL	\$136,277

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 \$200 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 legal or policy issues for which centralized review would meaningfully further the President’s priorities or the principles set forth in this Executive order, as specifically authorized in a timely manner by the Administrator of the Office of Information and Regulatory Affairs in each case. Based on the information provided above, this action has been determined to not be economically significant for the purposes of E.O. 12866.

Chapter 6. Regulatory Flexibility Act Analysis

6.1 Introduction

The purpose of the Regulatory Flexibility Act (RFA) is to establish a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure such proposals are given serious consideration. The RFA does not contain any decision criteria; instead the purpose of the RFA is to inform the agency, as well as the public, of the expected economic effects of various alternatives contained in the regulatory action and to ensure the agency considers alternatives that minimize the expected economic effects on small entities while meeting the goals and objectives of the applicable statutes (e.g., the Magnuson-Stevens Fishery Conservation and Management Act [Magnuson-Stevens Act]).

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

In addition to the information provided in this section, additional information on the expected economic effects of the proposed action is included in the RIR.

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

A discussion of the reasons why action by the agency is being considered is provided in Section 1.1. The need for this proposed regulatory action is to develop conservation and management measures for dolphinfish and wahoo, which are recently added stocks to federal management in the U.S. Caribbean, to ensure undersized individuals adequate time to mature and reproduce and to take a precautionary approach to management to protect against overfishing of an unmanaged resource. The purpose of this proposed regulatory action is to establish size limits and recreational bag limits for dolphinfish and wahoo under the Puerto Rico Fishery Management Plan (FMP), the St. Croix FMP, and the St. Thomas/St. John FMP. More information about the need for and objectives of the proposed actions can be found in Chapter 1 of this document. The Magnuson-Stevens Act provides the legal basis for this proposed regulatory action.

6.3 Identification of any federal regulations that may overlap, duplicate or contradict with the proposed action

No federal regulations have been identified that may overlap, duplicate or contradict with this proposed regulatory action.

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

This proposed regulatory action would directly impact recreational and commercial fishing for dolphinfish and wahoo in the U.S. Caribbean exclusive economic zone (EEZ).

6.4.1 Recreational Fishing (Fishers and For-Hire Fishing Businesses)

Although recreational fishers (anglers) would be directly affected by the proposed regulatory action, anglers are not considered small entities as that term is defined in 5 U.S.C. 601(6), whether fishing from for-hire fishing, private or leased vessels. Therefore, estimates of the number of anglers directly affected by the proposed regulatory action and any impacts on them are not assessed here. For-hire fishing businesses would be indirectly affected by the proposed regulatory action. Because the effects on for-hire fishing businesses are indirect, they fall outside the scope of the RFA.

6.4.2 Commercial Fishing (Commercial Fishing Businesses)

The establishment of commercial minimum size limits would directly affect commercial fishing businesses in Puerto Rico, St. Croix and St. Thomas/St. John that harvest dolphinfish and/or

wahoo in federal waters of the U.S. Caribbean. For RFA purposes, the National Marine Fisheries Service (NMFS) has established a small business size standard for businesses, including their affiliates, whose primary industry is commercial fishing ([50 CFR 200.2](#)). A business primarily involved in the commercial fishing industry (North American Industrial Classification Code 11411) is classified as a small business if it is independently owned and operated, is not dominant in its field of operation (including its affiliates) and its combined annual receipts are no more than \$11 million for all of its affiliated operations worldwide. All of the following figures are expressed in 2021 dollars.

Puerto Rico

From 2017 through 2021, an annual average of 706 Puerto Rico commercial fishermen were actively fishing, and each one of these fishermen is expected to represent a unique commercial fishing business. On average, they collectively landed approximately 1.87 million pounds (lbs) of marine resources with a direct value (revenue) of about \$9.16 million from all waters (Table 6.1). The highest annual landings and direct value from their combined landings during the 5-year period were in 2019: 2.47 million lbs with a direct value of almost \$12.03 million. The average commercial fisherman during this 5-year period had annual revenue from all landings of \$12,975. None of these fishermen had annual revenue from fishing that was close to the size limit. From the above, it is concluded that all commercial fishing businesses in Puerto Rico are small.

Table 6.1. Annual number of active Puerto Rico commercial fishermen, all trips, all pounds landed and direct value of those landings, 2017 – 2021.

Year	All Active Fishermen	All Trips	All Landings (Adjusted lbs)¹	Total Direct Value
2017	760	21,891	1,770,882	\$8,436,058
2018	720	26,379	2,408,744	\$11,439,796
2019	801	30,768	2,466,947	\$12,026,782
2020	672	15,430	1,752,607	\$8,592,666
2021	578	19,032	974,569	\$5,308,058
Average	706	22,700	1,874,750	\$9,160,672

1. Reported landings in Puerto Rico are adjusted because of underreporting.

Source: NMFS SEFSC Online Southeast Fisheries Reporting System, CCL edited landings, 2017 – 2021, and BEA GDP deflator issued June 29, 2023.

Not all of Puerto Rico’s active small commercial fishing businesses harvest dolphinfish or wahoo and from federal waters. On average, 88 commercial fishermen reported annual landings of dolphinfish from the EEZ and unknown waters.⁵⁹ Hence, an annual average of 88 (12.46%)

⁵⁹ Fishermen with landings from unknown waters are included in this analysis, which may overestimate the number of small businesses impacted by the proposed rule.

of the 706 annually active small commercial fishing businesses in Puerto Rico would be directly affected by the proposed regulatory action. These 88 small commercial fishing businesses collectively harvest, on average, 45,016 lbs of dolphinfish with a direct value (ex-vessel revenue) of \$201,330 annually (Table 6.2). On average, each of these fishermen lands 510 lbs of dolphinfish with a value of \$2,283 annually. Average annual total revenue (from all landings) for each of the 88 small businesses is \$18,434 and average median revenue is \$11,914.

Table 6.2. Number of Puerto Rico fishermen who reported dolphinfish (D) landings from the EEZ and unknown waters and adjusted pounds and revenue from those landings, 2017 – 2021.

Year	Dolphinfish Fishermen	Dolphinfish Trips	Dolphinfish Adjusted Landings (lbs)	Dolphinfish Revenue	Average Dolphinfish Revenue per Dolphinfish Fisherman
2017	87	296	34,194	\$126,292	\$1,452
2018	101	587	61,354	\$256,809	\$2,543
2019	124	589	69,665	\$336,740	\$2,716
2020	58	212	36,370	\$177,959	\$3,068
2021	71	296	23,496	\$108,849	\$1,533
Average	88	396	45,016	\$201,330	\$2,283

Source: NMFS SEFSC Online Southeast Fisheries Reporting System, CCL edited landings, and BEA GDP deflator issued June 29, 2023.

On average, 48 commercial fishermen reported annual landings of wahoo from the EEZ and unknown waters. Hence, an annual average of 48 (6.80%) of Puerto Rico’s 706 active small commercial fishing businesses would be directly affected by the proposed regulatory action. These 48 small commercial fishing businesses collectively harvest, on average, 8,525 lbs of wahoo with a value of \$37,259 annually (Table 6.3).

Table 6.3. Number of Puerto Rico fishermen who reported wahoo (W) landings from the EEZ and unknown waters and adjusted pounds and direct revenues from those landings, 2017 – 2021.

Year	Wahoo Fishermen	Wahoo Trips	Wahoo Adjusted Landings (lbs)	Wahoo Revenue	Average Wahoo Revenue per Wahoo Fisherman
2017	44	98	5,187	\$19,019	\$432
2018	62	201	10,371	\$41,725	\$673
2019	66	243	12,877	\$59,085	\$895
2020	33	102	8,946	\$40,462	\$1,226
2021	37	114	5,243	\$26,005	\$703
Average	48	152	8,525	\$37,259	\$770

Source: NMFS SEFSC Online Southeast Fisheries Reporting System, CCL edited landings, and BEA GDP deflator issued June 29, 2023.

On average, each of the above 48 fishermen lands 178 lbs of wahoo with a value of \$770 annually. Average annual total revenue (from all landings) for each of the 48 small businesses was \$20,148 and average median revenue is \$13,105.

An average of 42 small commercially fishing businesses landed both dolphinfish and wahoo annually. Therefore, these 42 small businesses would be directly affected by two of the proposed actions. Average annual total revenue for one of these 42 small businesses is \$21,461 (Table 6.4). An annual average of 46 small businesses land only dolphinfish and an annual average of six land only wahoo. Average total revenue for each of the 46 small businesses that land dolphinfish and not wahoo is \$14,066, whereas average total revenue for each of the six small businesses that land wahoo and not dolphinfish is \$13,014. This total of 94 small businesses (42 + 46 + 6) represent 13.3% of the 706 active small businesses.

Table 6.4. Average annual number of Puerto Rico fishermen who reported dolphinfish and/or wahoo landings from the EEZ and unknown waters, and average percentages of dolphinfish and wahoo landed by them, 2017 — 2021.

Species Landed	Small Businesses	Average Percentage Dolphinfish Landings (lbs)	Average Percentage Wahoo Landings (lbs)	Average Total Revenue per Fisherman
Dolphinfish Only	46	29.23%	0.00%	\$14,066
Wahoo Only	6	0.00%	10.48%	\$13,014
Dolphinfish & Wahoo	42	70.67%	89.52%	\$21,461
Total	94	100.00%	100.00%	-

Source: NMFS SEFSC Online Southeast Fisheries Reporting System, CCL edited landings, and BEA GDP deflator issued June 29, 2023.

St. Croix

The weights of U.S. Virgin Islands (USVI) landings are available for years 2020 and 2021, but prices are not. Therefore, landings and prices data from 2015 through 2019 are used for estimating both the numbers of small businesses in St. Croix that would be directly affected by the proposed regulatory action and its impacts on them.

An annual average of 59 St. Croix commercial fishermen collectively landed 281,256 of marine resources with direct value of \$1.93 million from all waters from 2015 through 2019 (Table 6.5). The highest annual landings and direct value were in 2016: 417,053 lbs with a direct value of about \$3.08 million.⁶⁰ Each commercial fisherman is expected to represent a unique small commercial fishing business. Therefore, all 59 annually active commercial fishing businesses in

⁶⁰ Some revenues are missing for specific fishermen from 2017 through 2019. The relatively few missing direct revenues in 2017 through 2019 are estimated using both the average price per pound received per fisherman for the particular year and the pounds landed by the specific fisherman.

St. Croix are small. During this 5-year period, the average St. Croix commercial fisherman had annual landings of \$32,859. None of these fishermen had annual revenue from fishing that was close to the size limit. From the above, it is concluded that all commercial fishing businesses in St. Croix are small.

Table 6.5. Annual number of active St. Croix commercial fishermen, all trips, all pounds landed and direct value of those landings, 2015 – 2019.

Year	All Active Fishermen	All Trips	All Landings (lbs)	Total Direct Value ¹
2015	59	2,371	349,857	\$2,836,562
2016	75	2,489	417,053	\$3,080,652
2017	66	2,135	417,053	\$2,468,640
2018	45	804	107,333	\$653,470
2019	49	962	114,983	\$621,226
Average	59	1,752	281,256	\$1,932,110

1. Direct revenues are missing for some fishermen from 2017 through 2019. Missing revenues are estimated as the product of the average price per pound for the particular year and the weight of landings for the particular fisherman. Source: NMFS SEFSC Online Southeast Fisheries Reporting System, 2017 – 2021, and BEA GDP deflator issued June 29, 2023.

On average, 14 St. Croix commercial fishermen reported annual landings of dolphinfish from the EEZ and unknown waters from 2015 through 2019. Hence, an annual average of 14 (24%) of the 59 annually active small commercial fishing businesses in St. Croix that harvest dolphinfish would be directly affected by the proposed regulatory action. These 14 small commercial fishing businesses collectively harvest, on average, 2,281 lbs of dolphinfish with a direct value of \$302,906 (Table 6.6). On average, each of these 14 fishermen receives \$20,524 annually from landings of dolphinfish.

Table 6.6. Number of St. Croix fishermen who reported dolphinfish landings from the EEZ and unknown waters and pounds of and direct value from those landings, 2015 — 2019.

Year	Dolphinfish Fishermen	All Dolphinfish Landings (lbs)	Total Dolphinfish Revenue	Average Dolphinfish Landings (lbs) per Fisherman	Average Dolphinfish Revenue per Dolphinfish Fisherman
2015	11	38,175	\$429,116	3,470	\$39,011
2016	23	43,263	\$407,838	1,881	\$17,732
2017	16	71,963	\$556,017	4,498	\$34,751
2018	12	11,180	\$85,775	932	\$7,148
2019	9	5,611	\$35,783	623	\$3,976
Average	14	34,038	\$302,906	2,281	\$20,524

Source: NMFS SEFSC Online Southeast Fisheries Reporting System, 2017 – 2021, and BEA GDP deflator issued June 29, 2023.

There are considerable differences among these dolphinfish fishermen. The top seven of these dolphinfish fishermen account for an annual average of 96.38% of dolphinfish landings (by weight), while the bottom half account for the remaining 3.62%. The average small business among the top half has annual landings of dolphinfish of 4,703 lbs and total revenue from all landings of \$98,803, while the average small business among the bottom half has annual landings of 91 lbs of dolphinfish and annual total revenue from all landings of \$8,711 (Table 6.7).

Table 6.7. Number of top half and bottom half of small businesses that land dolphinfish by weight of landings, and their average dolphinfish landings and total revenue, 2015 – 2019.

Portion of Small Businesses	Small Businesses	Average Dolphinfish Landings (lbs) per Business	Average Total Revenue per Business
Top Half	7	4,703	\$98,803
Bottom Half	7	91	\$8,711

Source: NMFS SEFSC Online Southeast Fisheries Reporting System, 2017 – 2021, and BEA GDP deflator issued June 29, 2023.

On average, 10 St. Croix commercial fishermen reported annual landings of wahoo from the EEZ and unknown waters from 2015 through 2019. Hence, an annual average of 10 (17%) of the 59 annually active small commercial fishing businesses would be directly affected by the proposed regulatory action. The average of these 10 small commercial fishing businesses harvests 1,836 lbs of wahoo with a direct value of \$15,498 (Table 6.8).

Table 6.8. Number of St. Croix fishermen who reported wahoo landings from the EEZ and unknown waters, and pounds of and direct value from those landings, 2015 — 2019.

Year	Wahoo Fishermen	All Wahoo Landings (lbs)	Total Wahoo Revenue	Average Wahoo Landings per Fisherman	Average Wahoo Revenue per Wahoo Fisherman
2015	7	23,944	\$215,272	3,421	\$30,753
2016	12	29,400	\$264,578	2,450	\$22,048
2017	12	27,606	\$216,657	2,301	\$18,055
2018	8	5,387	\$38,850	673	\$4,856
2019	10	3,643	\$24,068	364	\$2,407
Average	10	17,996	\$151,885	1,836	\$15,498

Source: NMFS SEFSC Online Southeast Fisheries Reporting System, 2017 – 2021, and BEA GDP deflator issued June 29, 2023.

There are considerable differences among these wahoo fishermen. The top five account for an annual average of 95.44% of wahoo landings (by weight), while the bottom five account for the remaining 4.56%. The average small business among the top half has annual landings of wahoo of 3,692 lbs and total revenue from all landings of \$129,686, while the average small business among the bottom half has annual landings of 140 lbs of wahoo and annual total revenue from all landings of \$19,373 (Table 6.9). An analysis of the small businesses that harvest both dolphinfish and wahoo or just one is not included to avoid disclosure of confidential information. However, an annual average of 15 small businesses land dolphinfish and/or wahoo from the EEZ or unknown waters.

Table 6.9. Average annual number of small businesses that land wahoo from EEZ and unknown waters by weight of landings (top half and bottom half), and their average wahoo landings and total revenue, 2015 – 2019.

Portion of Small Businesses	Small Businesses	Average Wahoo Landings (lbs) per Business	Average Total Revenue per Business
Top Half	5	3,692	\$129,686
Bottom Half	5	140	\$19,373

Source: NMFS SEFSC Online Southeast Fisheries Reporting System, 2017 – 2021, and BEA GDP deflator issued June 29, 2023.

St. Thomas/St. John

The weight of USVI landings are available for years 2020 and 2021, but prices are not. Therefore, landings and prices data from 2015 through 2019 are used for estimating both the numbers of small businesses in St. Thomas/St. John that would be directly affected by the proposed regulatory action and its impacts on them.

Each commercial fisherman in St. Thomas/St. John represents a unique commercial fishing business. From 2015 through 2019, an annual average of 68 commercial fishermen were actively fishing and they collectively landed 370,668 of marine resources with direct value of about \$2.78 million from all waters (Table 6.10). Therefore, all 68 commercial fishing businesses in St. Thomas/St. John are small. The average commercial fisherman had annual revenue from all landings of \$40,922, and none of them had annual revenue from fishing that was close to the size limit. Therefore, it is concluded that all commercial fishing businesses in St. Thomas/St. John are small.

Table 6.10. Annual number of active St. Thomas/St. John commercial fishermen, trips, pounds landed and value of those landings, 2015 – 2019.

Year	All Active Fishermen	All Trips	All Landings (lbs)	Total Direct Value ¹
2015	67	2,144	389,788	\$3,005,529
2016	66	2,482	428,519	\$3,289,090
2017	65	1,918	346,010	\$2,577,069
2018	68	1,757	346,801	\$2,527,426
2019	73	1,687	342,224	\$2,497,252
Average	68	1,998	370,668	\$2,779,273

1. Direct revenues are missing for some fishermen from 2017 through 2019. Missing revenues are estimated as the product of the average price per pound for the particular year and the weight of landings for the particular fisherman. Source: NMFS SEFSC Online Southeast Fisheries Reporting System, 2017 – 2021, and BEA GDP deflator issued June 29, 2023.

On average, 12 (17.6%) of St. Thomas/St. John’s 68 active commercial fishermen reported annual landings of dolphinfish from the EEZ and unknown waters from 2015 through 2019. Hence, an annual average of 12 annually active small businesses in St. Thomas/St. John that harvest dolphinfish would be directly affected by the proposed regulatory action. The average of these small businesses harvests 741 lbs of dolphinfish with a direct value of \$5,220 annually (Table 6.11).

Table 6.11. Number of St. Thomas/St. John fishermen who reported dolphinfish landings from the EEZ and unknown waters and pounds of and direct value from those landings, 2015 — 2019.

Year	Dolphinfish Fishermen	All Dolphinfish Landings (lbs)	Total Dolphinfish Revenue	Average Dolphinfish Landings per Fisherman (lbs)	Average Dolphinfish Direct Revenue per Fisherman
2015	11	7,866	\$58,426	715	\$5,311
2016	14	10,255	\$88,357	733	\$6,311
2017	14	5,766	\$42,023	412	\$3,002
2018	11	7,985	\$54,920	726	\$4,993
2019	10	12,573	\$69,480	1,257	\$6,948
Average	12	8,889	\$62,641	741	\$5,220

Source: NMFS SEFSC Online Southeast Fisheries Reporting System, CCL edited landings, 2017 – 2021, and BEA GDP deflator issued June 29, 2023.

There are considerable differences among these St. Thomas/St. John dolphinfish fishermen. The top six by landings (lbs) of dolphinfish account for an annual average of 97.2% of dolphinfish landings (by weight), while the bottom half account for the remaining 2.8%. The average small business among the top half has annual landings of dolphinfish of 1,443 lbs and total revenue from all landings of \$27,311, while the average small business among the bottom half (seven)

has annual landings of 230 lbs of dolphinfish and annual total revenue from all landings of \$25,031 (Table 6.12).

Table 6.12. Average annual number of top half and bottom half of small businesses that land dolphinfish by weight of dolphinfish landings, their average dolphinfish landings and average total revenue per small business, 2015 – 2019.

Portion of Small Businesses	Small Businesses	Average Dolphinfish Landings (lbs) per Business	Average Total Revenue per Business
Top Half	6	1,443	\$27,311
Bottom Half	6	230	\$25,031

Source: NMFS SEFSC Online Southeast Fisheries Reporting System, 2017 – 2021, and BEA GDP deflator issued June 29, 2023.

On average, eight St. Thomas/St. John commercial fishermen reported annual landings of wahoo from the EEZ and unknown waters from 2015 through 2019. Hence, an annual average of eight (11.8%) of the 68 annually active small commercial fishing businesses in St. Croix that harvest wahoo would be directly affected by the proposed regulatory action. The average of these small commercial fishing businesses harvests 402 lbs of wahoo with a direct value of \$3,053 annually (Table 6.13).

Table 6.13. Number of St. Thomas/St. John fishermen who reported wahoo landings from the EEZ and unknown waters and pounds of and direct value from those landings, 2015 — 2019.

Year	Wahoo Fishermen	All Wahoo Landings (lbs)	Wahoo Direct Value	Average Wahoo Landings per Fisherman	Average Wahoo Direct Revenue per Fisherman
2015	8	3,876	\$29,847	485	\$3,731
2016	11	4,479	\$40,535	407	\$3,685
2017	7	2,534	\$17,996	362	\$2,571
2018	8	3,645	\$25,448	456	\$3,181
2019	4	755	\$2,178	189	\$544
Average	8	3,058	\$23,201	402	\$3,053

Source: NMFS SEFSC Online Southeast Fisheries Reporting System, CCL edited landings, 2017 – 2021, and BEA GDP deflator issued June 29, 2023.

There are considerable differences among these St. Thomas/St. John wahoo fishermen. The top four account for an annual average of 89.6% of wahoo landings (by weight), while the bottom half account for the remaining 10.4%. The average small business among the top half has annual landings of wahoo of 731 lbs and total revenue from all landings of \$31,792, while the average

small business among the bottom half (four) has annual landings of 74 lbs of wahoo and annual total revenue from all landings of \$15,659 (Table 6.14).

Table 6.14. Average annual number of top half and bottom half of small businesses that land dolphinfish by weight of wahoo landings, their average wahoo landings and average total revenue per small business, 2015 – 2019.

Portion of Small Businesses	Small Businesses	Average Wahoo Landings (lbs) per Business	Average Total Revenue per Business
Top Half	4	731	\$31,792
Bottom Half	4	74	\$15,659

Source: NMFS SEFSC Online Southeast Fisheries Reporting System, 2017 – 2021, and BEA GDP deflator issued June 29, 2023.

An analysis of the small businesses that harvest both dolphinfish and wahoo or just one is not included to avoid disclosure of confidential information. An annual average of 12 small businesses land dolphinfish and/or wahoo from the EEZ and unknown waters.

6.5 Description of the projected reporting, record-keeping and other compliance requirements of the proposed action and their impacts on small businesses

This proposed regulatory action would not impose any new reporting or record-keeping requirements on any of the small businesses that operate in Puerto Rico, St. Croix or St. Thomas/St. John. This proposed regulatory action concerns harvesting of dolphinfish and wahoo in federal waters of the U.S. Caribbean.

Actions 1 and 2 (Puerto Rico)

Action 1(a) would establish a minimum size limit for dolphinfish in federal waters around Puerto Rico, and Action 2(a) would establish a minimum size limit for wahoo in federal waters around Puerto Rico.⁶¹ Currently, there is no minimum size limit for either dolphinfish or wahoo in the EEZ off Puerto Rico. There is also no minimum size limit for either dolphinfish or wahoo in Puerto Rico waters.

Preferred Alternative 3 of Action 1(a) would set the minimum size limit for dolphinfish at 24” fork length (FL). It is estimated that Action 1(a) would reduce commercial landings of dolphinfish in Puerto Rico by less than 1% annually. **Preferred Alternative 2** of Action 2(a)

⁶¹ Actions 1(b) and 2(b) would establish a recreational bag limit for dolphinfish and wahoo, respectively.

would set the minimum size limit for wahoo at 32" FL. It is estimated that Action 2(a) would reduce commercial landings of wahoo in Puerto Rico by 11.9% annually.

As explained in the previous section, an annual average of 45,016 lbs of dolphinfish and 8,525 lbs of wahoo are harvested from the EEZ and unknown waters by 94 small businesses. A 1% reduction in dolphinfish landings from those waters would be a decrease of about 450 lbs of dolphinfish, while an 11.9% reduction in wahoo landings would be a decrease of 1,014.5 lbs.

As shown in Table 6.4, 42 (44.7% of the 94 directly affected)⁶² small businesses account, on average, for 70.67% of the dolphinfish landings and 89.52% of the wahoo landings, while 46 (48.9%) small businesses account for the remainder of the dolphinfish and another six (6.4%) account for the remainder of the wahoo landings (Table 6.15). On average, each of the 42 small businesses that harvest both dolphinfish and wahoo would have reductions less than 30 lbs (eight lbs of dolphinfish and 22 lbs of wahoo) (Table 6.16).

Table 6.15. Average annual total reductions in dolphinfish and wahoo landings of small businesses in Puerto Rico that land dolphinfish and/or wahoo from the EEZ and unknown waters.

Species Landed	Small Businesses	Total Annual Reduction in Dolphinfish Landings (lbs)	Total Annual Reduction in Wahoo Landings (lbs)	Total Annual Reduction in Landings (lbs)
Dolphinfish Only	46 (48.9%)	Less than 132	None	Less than 132
Wahoo Only	6 (6.4%)	None	106	106
Dolphinfish & Wahoo	42 (44.7%)	Less than 318	908	Less than 1,308

Table 6.16. Average annual reductions in dolphinfish and/or wahoo landings per small business directly affected by the proposed regulatory action.

Species Landed	Small Businesses	Average Reduction in Dolphinfish Landings per Business (lbs)	Average Reduction in Wahoo Landings per Business (lbs)	Total Reduction in Landings per Business (lbs)
Dolphinfish Only	46	Less than 3	None	Less than 3
Wahoo Only	6	None	18	-
Dolphinfish & Wahoo	42	Less than 8	22	Less than 30

At 2021 prices, Actions 1(a) and 2(a) would generate average annual reductions in total revenue less than about \$130 (\$33 from dolphinfish and \$97 from wahoo) to the average of the 42

⁶² Such a percentage represents a substantial number.

businesses that harvest both. Each of the 46 small businesses that harvest dolphinfish and not wahoo would have, on average, a reduction of dolphinfish landings less than about 3 lbs and revenue from those landings of less than \$13. Similarly, the average of the six small businesses that harvest wahoo and not dolphinfish would have a loss less than about 18 lbs of wahoo with a value of about \$78. To evaluate the significance of these impacts, those revenue losses are evaluated as percentage losses of total revenue as shown in Table 6.17.

The 42 small businesses that land both dolphinfish and wahoo would each have an average reduction of total revenue less than (LT) 0.6%. Each of the 48 small businesses that land dolphinfish and not wahoo would an average reduction of total revenue of 0.09%. Furthermore, the six small businesses that land wahoo and not dolphinfish would each have an average annual reduction of total revenue of 0.60%.

Table 6.17. Average annual impacts per small business that lands dolphinfish and/or wahoo, average total revenue (from all landings), and percentage of total revenue affected.

Small Businesses	Average Reduction in Dolphinfish Revenue	Average Reduction in Wahoo Revenue	Average Reduction of Total Revenue	Average Total Revenue	Percentage Reduction in Average Total Revenue
46 (48.9%)	\$12.57	\$0.00	\$12.57	\$14,066	0.09%
6 (6.4%)	\$0.00	\$77.56	\$77.56	\$13,014	0.60%
42 (44.7%)	LT \$33.28	\$96.58	LT \$129.81	\$21,461	LT 0.60%

Actions 3 and 4 (St. Croix)

Action 3(a) would establish a minimum size limit for dolphinfish in federal waters around St. Croix, and Action 4(a) would establish a minimum size limit for wahoo in federal waters around St. Croix.⁶³ Currently, there is no minimum size limit for either dolphinfish or wahoo in the EEZ off St. Croix, and there is no minimum size limit for either dolphinfish or wahoo in USVI waters.

Preferred Alternative 3 of Action 3(a) would set the minimum size limit for dolphinfish at 24” FL. It is estimated that Action 3(a) would reduce commercial landings of dolphinfish by 5% annually.

As explained in the previous section, an annual average of 34,038 lbs of dolphinfish are harvested from the EEZ and unknown waters and landed in St. Croix. Hence, **Preferred Alternative 3** of Action 3(a) would reduce annual landings of dolphinfish by 1,702 lbs (5%).

⁶³ Actions 1(b) and 2(b) would establish a recreational bag limit for dolphinfish and wahoo, respectively.

Also, as explained earlier, the top seven of the average annual 14 small businesses in St. Croix that land dolphinfish account for 96.38% of dolphinfish landings (by weight), while the bottom half account for the remaining 3.62%. Therefore, the top seven would collectively have annual losses of dolphinfish landings of 1,640 lbs, while the bottom seven would collectively lose 62 lbs of dolphinfish annually (Table 6.18). The average small business among the top seven would land about 234 lbs less of dolphinfish annually, while the average small business among the bottom seven would land about nine less pounds of dolphinfish annually.

Table 6.18. Average annual total reductions in dolphinfish landings of small businesses in St. Croix that land dolphinfish from EEZ and unknown waters, and average reduction (pounds) per small business.

Division of Dolphinfish Harvesters by Landings (lbs)	Small Businesses that Land Dolphinfish	Total Annual Reduction in Dolphinfish Landings (lbs)	Average Annual Reduction in Dolphinfish Landings per Business (lbs)
Top Half	7 (50%)	1,640	234
Bottom Half	7 (50%)	62	9
Total	14 (100%)	1,702	122

At an estimated average price of \$6.37 per pound of dolphinfish, those average annual revenue losses would be \$1,491 for the average top half business and \$57 for the average bottom half business (Table 6.19). The average small business in the top half has annual total revenue of \$98,803, while the average small business in the bottom half has annual total revenue of \$8,711. Hence, those average losses represent 1.5% of average annual total revenue for the top half small businesses and 0.7% of average annual total revenue for the bottom half of small businesses that land dolphinfish in St. Croix. The maximum average impact of Action 3(a) would be a 1.5% reduction in annual revenues for 50% of the 14 annually active commercial fishing businesses in St. Croix that land dolphinfish from the EEZ and unknown waters.

Table 6.19. Average annual total revenue of a St. Croix’s small business that lands dolphinfish from EEZ and unknown waters and average percentage reduction of that total revenue due to the proposed regulatory action.

Division of Dolphinfish Harvesters by Landings (lbs)	Small Businesses that Land Dolphinfish	Average Annual Reduction in Revenue per Business	Average Annual Total Revenue per Business	Average Percentage Loss of Revenue per Business
Top Half	7 (50%)	\$1,491	\$98,803	1.5%
Bottom Half	7 (50%)	\$57	\$8,711	0.7%

Preferred Alternative 2 of Action 4(a) would set the minimum size limit for wahoo at 32” FL and is estimated to reduce commercial landings of wahoo in St. Croix by 2.2% annually. As explained in the previous section, an annual average of 17,996 lbs of wahoo are harvested from the EEZ and unknown waters and landed in St. Croix. Hence, **Preferred Alternative 2** of Action 4(a) would reduce annual landings of wahoo by 396 lbs.

As explained earlier, the top seven of the average annual five small businesses in St. Croix that land wahoo account for 95.44% of wahoo landings (by weight), while the bottom half account for the remaining 4.56%. Therefore, the top five would collectively have annual losses of wahoo landings of 378 lbs, while the bottom five would collectively lose 18 lbs of wahoo annually (Table 6.20). The average small business among the top five would land about 76 lbs less of wahoo annually, while the average small business among the bottom five would land about four less pounds of wahoo annually.

Table 6.20. Average annual total reductions in wahoo landings (lbs) of small businesses in St. Croix that land wahoo from EEZ and unknown waters, and average reduction in wahoo landings (lbs) per business.

Division of Wahoo Harvesters by Landings (lbs)	Small Businesses that Land Wahoo	Total Annual Reduction in Wahoo Landings (lbs)	Average Reduction per Business (lbs)
Top Half	5	378	76
Bottom Half	5	18	4
Total	10	396	40

At an estimated average price of \$6.61 per pound, those average annual revenue losses would be \$502 for the average top half business and \$26 for the average bottom half business (Table 6.21). The average small business in the top half has annual total revenue of \$129,686, while the average small business in the bottom half has annual total revenue of \$19,373. Hence, those average losses represent about 0.4% of average annual total revenue for the top half small businesses and 0.1% of average annual total revenue for the bottom half of small businesses that land dolphinfish in St. Croix. The maximum average impact from Action 4(a) would be about a 0.4% reduction in annual revenues for 8.5% of the 59 annually active commercial fishing businesses in St. Croix.

Table 6.21. Average annual total revenue of a St. Croix’s small business that lands wahoo from EEZ and unknown waters and average percentage reduction of that total revenue due to the proposed regulatory action.

Division of Wahoo Harvesters by Landings (lbs)	Small Businesses that Land Wahoo	Average Annual Reduction in Revenue per Business	Average Annual Total Revenue per Business	Average Percentage Loss of Revenue
Top Half	5 (8.5%)	\$502	\$129,686	0.4%
Bottom Half	5 (8.5%)	\$26	\$19,373	0.1%

The maximum impact would be on the small businesses that harvest both dolphinfish and wahoo. The maximum average impact would be a reduction of annual total revenue of 1.9%.

Actions 5 and 6 (St. Thomas/St. John)

Action 5(a) would establish a minimum size limit for dolphinfish in federal waters around St. Thomas/St. John, and Action 6(a) would establish a minimum size limit for wahoo in federal waters around St. Thomas/St. John.⁶⁴ Currently, there is no minimum size limit for either dolphinfish or wahoo in the EEZ off St. Thomas/St. John. Also, there is no minimum size limit for either dolphinfish or wahoo in USVI waters.

Preferred Alternative 3 of Action 5(a) would set the minimum size limit for dolphinfish at 24” FL. It is estimated that Action 5(a) would reduce commercial landings of dolphinfish by less than 1% annually.

As explained in the previous section, an annual average of 8,889 lbs of dolphinfish are harvested from the EEZ and unknown waters and landed in St. Thomas/St. John. Hence, **Preferred Alternative 3** of Action 5(a) would reduce annual landings of dolphinfish by less than 89 lbs (LT 1%).

Also, as explained earlier, the top six of the average annual 12 small businesses in St. Thomas/St. John that land dolphinfish from the EEZ and unknown waters account for 97.2% of dolphinfish landings (by weight), while the bottom half account for the remaining 2.8%. Therefore, the top six would collectively have annual losses of dolphinfish landings of 87 lbs, while the bottom six would collectively lose about 2 lbs of dolphinfish annually (Table 6.22). The average small business among the top six would land about 15 lbs less of dolphinfish annually, while the average small business among the bottom six would have lose less than half a pound of dolphinfish annually.

⁶⁴ Actions 1(b) and 2(b) would establish a recreational bag limit for dolphinfish and wahoo, respectively.

Table 6.22. Average annual total reductions in dolphinfish landings of small businesses in St. Thomas/St. John that land dolphinfish from EEZ and unknown waters, and average reduction (lbs) per small business.

Division of Dolphinfish Harvesters by Landings (lbs)	Small Businesses that Land Dolphinfish	Total Annual Reduction in Dolphinfish Landings (lbs)	Average Annual Reduction in Dolphinfish Landings per Business (lbs)
Top Half	6 (50%)	87	15
Bottom Half	6 (50%)	2	LT 1
Total	12 (100%)	89	7

At an estimated average price of \$6.37 per pound of dolphinfish, those average annual revenue losses would be \$554 for the average top half business and less than \$3 for the average bottom half business (Table 6.23). The average small business in the top half has annual total revenue of \$27,311, while the average small business in the bottom half has annual total revenue of \$25,031. Hence, those average losses represent 2% of average annual total revenue for the top half small businesses and about a hundredth of a percentage of average annual total revenue for the bottom half of small businesses that land dolphinfish in St. Thomas/St. John.

Table 6.23. Average annual total revenue of a St. Thomas/St. John’s small business that lands dolphinfish from EEZ and unknown waters and average percentage reduction of that total revenue due to the proposed regulatory action.

Division of Dolphinfish Harvesters by Landings (lbs)	Small Businesses that Land Dolphinfish	Average Annual Reduction in Revenue per Business	Average Annual Total Revenue per Business	Average Percentage Loss of Revenue per Business
Top Half	6 (50%)	\$554	\$27,311	2.0%
Bottom Half	6 (50%)	\$3	\$25,031	LT 0.1%

Preferred Alternative 3 of Action 6(a) would set the minimum size limit for wahoo at 32” FL. There is insufficient information to estimate the impact of Action 6(a) on wahoo landings in St. Thomas/St. John.

Summary

The maximum average impact on small businesses in Puerto Rico would be to the 42 of 94 small businesses that harvest dolphinfish and/or wahoo in the EEZ and unknown waters. The average impact would be a reduction of average total revenue of less than 0.6%.

The maximum average impact on small businesses in St. Croix would be to businesses that harvest both dolphinfish and wahoo from the EEZ and unknown waters. The maximum average impact would be a reduction of annual total revenue of 1.9%.

The maximum average impact on small businesses in St. Thomas/St. John would be a 2% reduction in total revenue to 50% of dolphinfish fishermen.

6.6 Significant Alternatives

Puerto Rico

Two alternatives to the 24" FL minimum size limit for dolphinfish were considered but not selected. The first was the no-action alternative, so there would continue to be no minimum size limit for dolphinfish. The second considered but not selected alternative would establish a minimum size limit of 20" FL and it is estimated to have the same impact as the selected alternative, which would be a reduction in landings less than 1%.

Two alternatives to the 32" FL minimum size limit for wahoo were considered but not selected. The first was the no-action alternative, which would continue there being no minimum size limit for wahoo. The second considered but not selected alternative would establish a 40" FL minimum size limit. It would reduce wahoo landings by 37.7%, whereas the selected alternative would reduce wahoo landings by 11.9%.

St. Croix

Two alternatives to the 24" FL minimum size limit for dolphinfish were considered but not selected. The first was the no-action alternative, which would continue there being no minimum size limit for dolphinfish. The second considered but not selected alternative would establish a minimum size limit of 20" FL and reduce landings of dolphinfish by 3.9%. The selected alternative would reduce dolphinfish landings by 5.0%.

Two alternatives to the 32" FL minimum size limit for wahoo were considered but not selected. The first was the no-action alternative, which would continue there being no minimum size limit for wahoo. The second considered but not selected alternative would establish a 40" FL minimum size limit. It would reduce wahoo landings by 44.6%, whereas the selected alternative would reduce wahoo landings by 2.2%.

St. Thomas/St. John

Two alternatives to the 24" FL minimum size limit for dolphinfish were considered but not selected. The first was the no-action alternative, which would continue there being no minimum size limit for dolphinfish. The second considered but not selected alternative would establish a

minimum size limit of 20" FL and reduce landings of dolphinfish by less than 1%. The selected alternative would also reduce dolphinfish landings by less than 1%.

Two alternatives to the 32" FL minimum size limit for wahoo were considered but not selected. The first was the no-action alternative, which would continue there being no minimum size limit for wahoo. The second considered but not selected alternative would establish a 40" FL minimum size limit. There is insufficient information to estimate the impacts of the 40" FL versus 32" FL minimum size limits.

Chapter 7. List of Preparers

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

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

Name	Agency	Title
Graciela García-Moliner	CFMC	Team Co-lead / Fishery Biologist
Liajay Rivera	CFMC	Technical Assistant for Ecosystem Based Fisheries Management
Walter Keithly	CFMC	Economist
Sarah Stephenson	NMFS/SFD	Team Co-lead / Fishery Biologist
María del Mar López	NMFS/SFD	Caribbean Operations Branch Lead / Fishery Biologist
Edward Glazer	NMFS/SFD	Social Scientist
Denise Johnson	NMFS/SFD	Economist
Scott Sandorf	NMFS/SFD	Technical Writer
Michael Larkin	NMFS/SFD	Data Analyst
Dominique Lazarre	NMFS/SFD	Data Analyst
Patrick Opay	NMFS/PRD	Fishery Biologist
Refik Orhun	NMFS/SEFSC	Biologist
Juan Agar	NMFS/SEFSC	Social Scientist
Noah Silverman	NMFS/SERO	National Environmental Policy Act Regional Coordinator
Katharine Zamboni	NOAA/GC	Attorney
Matthew Walia	NOAA/OLE	Compliance Liaison

CFMC = Caribbean Fishery Management Council

NMFS = National Marine Fisheries Service,

SFD = Sustainable Fisheries Division

PRD = Protected Resources Division

SEFSC = Southeast Fisheries Science Center

SERO = Southeast Regional Office

GC = General Counsel

OLE= Office of Law Enforcement

Chapter 8. List of Agencies, Organizations, and Persons Consulted

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

Chapter 9. References

Agar, J.J. and M. Shivilani. 2016. Socio-economic study of the hook and line fishery in the Commonwealth of Puerto Rico (2014). NOAA Technical Memorandum NMFS-SEFSC-700. 34 pp. <https://repository.library.noaa.gov/view/noaa/14196>

Agar, J.J., M. Shivilani, and D. Matos-Caraballo. 2020. The aftermath of Hurricane María on Puerto Rican small-scale fisheries. *Coastal Management*. Volume 48, Number 5, pp. 378-397. <https://www.tandfonline.com/doi/full/10.1080/08920753.2020.1795967>

Agar, J., B. Stoffle, M. Shivilani, D. Matos-Caraballo, A. Mastitski, and F. Martin. 2022. One-year COVID-19 Pandemic Impacts on U.S. Caribbean Small-Scale Fisheries with a note on the Puerto Rican earthquake swarm of 2020 and 2021. NOAA Tech. Memo. NMFS-759, 34 p. <https://doi.org/10.25923/x7sp-ey87>

Baumgardt, K. 2009. Digging paradise: historical and archeological miscellany of the U.S. Virgin Islands. *The Bridge*: Vol. 32: No. 2, Article 7. <https://scholarsarchive.byu.edu/thebridge/vol32/iss2/7>

CFMC (Caribbean Fishery Management Council). 2022. Generic Amendment 1 to the Fishery Management Plans for Puerto Rico, St. Thomas and St. John, and St. Croix: Modification to the Buoy Gear Definition and Use Including Environmental Assessment, Fishery Impact Statement, Regulatory Impact Review, and Regulatory Flexibility Act Analysis. October 2022. San Juan. https://www.fisheries.noaa.gov/s3/2023-02/Generic%20Amdt.%201%20IBFMPs%20-%20Buoy%20Gear%20Amendment_Final%20508c.pdf

CFMC (Caribbean Fishery Management Council). 2019a. Comprehensive Fishery Management Plan for the Puerto Rico Exclusive Economic Zone, environmental assessment, regulatory impact review, and fishery impact statement. Caribbean Fishery Management Council, San Juan, Puerto Rico. 637 pp. <https://repository.library.noaa.gov/view/noaa/45274>

CFMC (Caribbean Fishery Management Council). 2019b. Comprehensive Fishery Management Plan for the St. Croix Exclusive Economic Zone, environmental assessment, regulatory impact review, and fishery impact statement. Caribbean Fishery Management Council, San Juan, Puerto Rico. 509 pp. <https://repository.library.noaa.gov/view/noaa/45275>

CFMC (Caribbean Fishery Management Council). 2019c. Comprehensive Fishery Management Plan for the St. Thomas/St. John Exclusive Economic Zone, environmental assessment, regulatory impact review, and fishery impact statement. Caribbean Fishery Management Council, San Juan, Puerto Rico. 507 pp. <https://repository.library.noaa.gov/view/noaa/45276>

Cheatham, A. and D. Roy. 2022. *Puerto Rico: A U.S. Territory in Crisis*. Council on Foreign Relations. <https://www.cfr.org/backgrounder/puerto-rico-us-territory-crisis#chapter-title-0-1>

DNER (Department of Natural and Environmental Resources). 2013. Puerto Rico Marine Recreational Fisheries Statistics Program - Final Report: 2009-2013. https://www.drna.pr.gov/wp-content/uploads/2022/09/DRNA_RecreationalFisheriesStatistics_2009-2013.pdf

Dreyfus, S. 1994. [Review of *The Tainos: Rise and Decline of the People Who Greeted Columbus*, by I. Rouse]. *NWIG: New West Indian Guide/Nieuwe West-Indische Gids*, 68(1/2), 144–147. <http://www.jstor.org/stable/41849586>

Figuerola-Fernandez, M., N. Pena-Alvarado, & W. Torres-Ruiz. 2008. Maturation and reproductive seasonality of the wahoo (*Acanthocybium solandri*), red-ear sardine (*Harengula humeralis*), false pilchard (*Harengula clupei*), thread herring (*Opisthonema oglinum*), crevalle jack (*Caranx hippos*), horse-eye jack (*Caranx latus*), blue runner (*Caranx crysos*), and great barracuda (*Sphyrnaena barracuda*) in Puerto Rico. In J. Velez-Arocho, E. Diaz-Velazquez, M.

Freeman, P., T. Gedamke, and C. Cook. 2017. Final Project Report: Creel Survey of Private Recreational Fishing in the U.S. Virgin Islands. November. Prepared for the NOAA Fisheries Southeast Fisheries Science Center by MER Consultants LLC. Port Salerno, Florida.

Garber, A.F., M.D. Tringali, and J.S. Franks. 2005. Population genetic and phylogeographic structure of wahoo, *Acanthocybium solandri*, from the western Atlantic and central Pacific Oceans. *Marine Biology* (Berlin) 147: 205–214. doi:10.1007/S00227-004-1533-1.

Garcia-Quijano, C.G. 2009. Managing complexity: ecological knowledge and success in Puerto Rican small-scale fisheries. *Human Organization*. Volume 68, Number 1. Published by the Society for Applied Anthropology. <https://www.jstor.org/stable/44148532>

Garcia-Perez, J. M. Berrios, & A. Rosario-Jimenez (Eds.). Aspects of the reproductive biology of recreationally important fish species in Puerto Rico. Department of Natural and Environmental Resources, Fish and Wildlife Bureau. <https://www.drna.pr.gov/historico/oficinas/arn/recursosvivos/negociado-de-pesca-y-vida-silvestre/laboratorio-de-investigaciones-pesqueras-1/publicaciones/Informe%20Final%20F48%20revisado.pdf>

IAI (Impact Assessment, Inc.). 2006. Community Profiles and Socioeconomic Evaluation of Marine Conservation Districts: St. Thomas and St. John, U.S. Virgin Islands. Glazier, E.W. and M. Jepson (authors). Prepared for the U.S. Department of Commerce, NOAA Fisheries, Southeast Fisheries Science Center under Contract WC133F-03-SE-1150. Miami.

IAI (Impact Assessment, Inc.). 2007. Community Profiles and Socioeconomic Evaluations of Marine Conservation Districts: St. Thomas and St. John, U.S. Virgin Islands. NOAA Series on U.S. Caribbean Fishing Communities. NOAA Technical Memorandum NMFS-SEFSC-557, 123 p. Agar, J.J. and B. Stoffle (editors). [NOAA Series on U.S. Caribbean Fishing Communities Community Profiles and Socioeconomic Evaluation of Marine Conservation Districts, St. Thomas and St. John, U.S. Virgin Islands](#)

Jacob, S., P. Weeks, B. Blount, and M. Jepson. 2013. Development and evaluation of social indicators of vulnerability and resiliency for fishing communities in the Gulf of Mexico. *Marine Policy* 37:86-95. <https://www.sciencedirect.com/science/article/abs/pii/S0308597X12000759>

Jepson, M. and L.L. Colburn. 2013. Development of social indicators of fishing community vulnerability and resilience in the U.S. Southeast and Northeast Regions. U.S. Dept. of Commerce, NOAA Technical Memorandum NMFS-F/SPO-129, 64 p. <https://repository.library.noaa.gov/view/noaa/4438>

Johns, E.M., R. Lumpkin, N.F. Putman, R.H. Smith, F.E. Muller-Karger, D.T. Rueda-Roa, C. Hu, M. Wang, M.T. Brooks, L.J. Gramer, and F.E. Werner. 2020. The establishment of a pelagic *Sargassum* population in the tropical Atlantic: Biological consequences of a basin-scale long distance dispersal event. *Progress in Oceanography*. 182: 27p. <https://www.sciencedirect.com/science/article/pii/S0079661120300070?via%3Dihub>

Kojis, B. L., and N. J. Quinn. 2011. Census of the Marine Commercial Fishers of the U.S. Virgin Islands. Final Report submitted to NOAA/NMFS/SEFSC, Miami, Florida. 137 pp. https://www.ncei.noaa.gov/data/oceans/coris/library/NOAA/other/census_marine_commercial_fishers_usvi_2004.pdf

Kojis, B. L., and W. J. Tobias. 2016. Survey of boat-based recreational fishers in the US Virgin Islands. Proceedings of the 13th International Coral Reef Symposium, Honolulu: pp. 170-183. <https://coralreefs.org/wp-content/uploads/2019/01/Session-21-Kojis-Tobias.pdf>

Kojis, B., N. Quinn, and J. Agar. 2017. Census of Licensed Fishers of the U.S. Virgin Islands (2016). NOAA Technical Memorandum NMFS-SEFSC-715, 160 pp. <https://repository.library.noaa.gov/view/noaa/16210>

Maki Jenkins, K.L. and R.S. McBride. 2009. Reproductive biology of wahoo, *Acanthocybium solandri*, from the Atlantic coast of Florida and the Bahamas. *Marine and Freshwater Research*. 60:893-897.

Matos-Caraballo, D., and J. Agar. 2011. Census of Active Commercial Fishermen in Puerto Rico: 2008. *Marine Fisheries Review* 73(1):13-27.

McBride, R.S., A.K. Richardson, and K.L. Maki. 2008. Age, growth, and mortality of wahoo, *Acanthocybium solandri*, from the Atlantic coast of Florida and the Bahamas. *Marine and Freshwater Research* 59, 799–807. doi:10.1071/MF08021.

Merten, W.B., N.V. Schizas, M.T. Craig, R.S. Appeldoorn, and D.L. Hammond. 2015. Genetic structure and dispersal capabilities of dolphinfish (*Coryphaena hippurus*) in the western central Atlantic. *Fish. Bull.* 113:419–429.

Merten, W.B., R. Appeldoorn, and D. Hammond. 2016. Movement dynamics of dolphinfish (*Coryphaena hippurus*) in the northeastern Caribbean Sea: Evidence of seasonal re-entry into domestic and international fisheries throughout the western central Atlantic. *Fisheries Research* 176:24-34. <https://doi.org/10.1016/j.fishres.2015.10.021>

Merten, W.B., R. Appeldoorn, A. Grove, A. Aguilar-Perera, F. Arocha, and R. Rivera. 2022. Condition of the international fisheries, catch and effort trends, and fishery data gaps for dolphinfish (*Coryphaena hippurus*) from 1950 to 2018 in the Western Central Atlantic Ocean. *Marine Policy* 143. <https://doi.org/10.1016/j.marpol.2022.105189>

Merten, W., S. Zhang, C. Hu, M. Rodrigue, R. Appeldoorn, and N. Jimenez. 2023. Increase in Dolphinfish (*Coryphaena hippurus*) Fishing Success Off the North Coast of Puerto Rico during Hurricane *Leslie*. *Caribbean Journal of Science*. 53:336–352.

Napolitano, M., R.J. Dinapoli, J.H. Stone, M.J. Levin, and S.M. Fitzpatrick. 2019. Reevaluating human colonization of the Caribbean using chronometric hygiene and Bayesian modeling. *Science Advances*. Volume 5, Number 2. <https://www.science.org/doi/10.1126/sciadv.aar7806>

NMFS (National Marine Fisheries Service). 2021. Fisheries of the United States, 2019. U.S. Department of Commerce, NOAA. <https://www.fisheries.noaa.gov/national/sustainable-fisheries/fisheries-united-states>

NMFS (National Marine Fisheries Service). 2020. Endangered Species Act Section 7 Consultation on the authorization and management of the Puerto Rico fishery under the Puerto Rico Fishery Management Plan (FMP), the St. Thomas/St. John fishery under the St. Thomas/St. John FMP, and the St. Croix fishery under the St. Croix FMP (SERO-2019-04047).

Olcott, P.G. 1999. Puerto Rico and the U.S. Virgin Islands. In *Ground Water Atlas of the United States, Alaska, Hawaii, Puerto Rico and the U.S. Virgin Islands*. USGS Rep. HA 730-N.

- Olwig, K.F. 1993. Cultural Adaptation and Resistance on St. John: Three Centuries of Afro-Caribbean Life. Gainesville: University Press of Florida.
- Oxenford, H. A. and W. Hunte. 1986. A preliminary investigation of the stock structure of the dolphinfish, *Coryphaena hippurus*, in the western central Atlantic. Fish. Bull. 84(2):451–459.
- Pérez, R. N. and Y. Sadovy. 1996. Preliminary data on the reproductive dynamics and landing records of *Coryphaena hippurus* L., in Puerto Rico. Proc. Gulf Caribb. Fish. Inst. 44:651–670.
- Pérez, R.N. and Y. Sadovy. 1991. Preliminary data on landings records and reproductive biology of *Coryphaena hippurus*, L., in Puerto Rico. Proceedings of the Gulf Caribbean Fisheries Institute, 44: 636–50. <http://proceedings.gcfi.org/proceedings/preliminary-data-on-landing-records-and-reproductive-biology-of-coryphaena-hippurus-l-in-puerto-rico/>
- Rivera, G.A., and R.S. Appeldoorn. 2000. Age and growth of dolphinfish, *Coryphaena hippurus*, off Puerto Rico. Fishery Bulletin 98(2), 345-352.
- Rodríguez-Ferrer, G. and Y. Rodríguez-Ferrer. 2018. Puerto Rico Marine Recreational Fisheries Statistics Program Final Report. Department of Natural and Environmental Resources. USFW Federal aid Project F 68, Segment 2. 24 pp.
- Rodríguez-Ferrer, G., personal communication. 2023. June. Puerto Rico Department of Natural and Environmental Resources. San Juan.
- Rodríguez-Ferrer, G., Y. Rodríguez-Ferrer, D. Matos-Caraballo, and C. Lilyestrom. 2006. Comparison of Dolphinfish (*Coryphaena hippurus*) Commercial and Recreational Fisheries in Puerto Rico during 2000-2003. Gulf Carib. Fish. Inst. 57, 20 pp. https://aquadocs.org/bitstream/handle/1834/29780/gcfi_57-23.pdf?sequence=1.
- Rogozinski, J. 1994. *A Brief History of the Caribbean - from the Arawak and the Carib to the Present*. New York: Meridian Books.
- Rudershausen, P.J., S.J. Poland, W. Merten, and J.A. Buckel. 2019. Estimating Discard Mortality for Dolphinfish in a Recreational Hook-and-Line Fishery. North American Journal of Fisheries Management. 39:1143–1154. <https://afspubs.onlinelibrary.wiley.com/doi/epdf/10.1002/nafm.10348>
- Shivlani, M. 2022. A commercial fishery census of Puerto Rico to develop a new baseline on fishery participation, markets, and infrastructure in the small-scale fishery sector. Final Report submitted to NOAA Fishers Southeast Fisheries Science Center, Miami, Florida. 46 pp.

Stoffle, B., J.R. Waters, S. Abbott-Jamieson, S. Kelley, D. Grasso, J. Freibaum, S. Koestner, N. O'Meara, S. Davis, M. Stekedee, and J. Agar. 2009. Can an Island be a Fishing Community: An Examination of St. Croix and its Fisheries. NOAA Technical Memorandum NMFS-SEFSC-593, 57p.

Theisen, T.C., B.W. Bowen, W. Lanier, and J.D. Baldwin. 2008. High connectivity on a global scale in the pelagic wahoo, *Acanthocybium solandri* (tuna family Scombridae). *Molecular Ecology* 17, 4233–4247.

Toller, W., C. O'Sullivan, and R. Gomez. 2005. Survey of Fishing Tournaments in U.S. Virgin Islands, October 1, 2000 to September 30, 2005. F-8. U.S. Virgin Islands Recreational Fishery Assessment Project: Study 1. Activity Patterns in U.S. Virgin Islands Recreational Fisheries. Job 3. Survey of Fishing Tournaments. Division of Fish and Wildlife, Frederiksted, St. Croix, USVI and Division of Fish and Wildlife, St. Thomas, USVI. December 13, 2005.

U.S. Census Bureau. 2023. Table S1701 – Poverty Status in the Past 12 Months. Puerto Rico. Available here: https://data.census.gov/profile/Puerto_Rico?g=040XX00US72

U.S. Census Bureau. 2022. 2020 Island Areas Censuses: U.S. Virgin Islands. Available here: census.gov/data/tables/2020/dec/2020-us-virgin-islands.html

U.S. Census Bureau. 2020. Puerto Rico: 2020 Census. Available here: <https://www.census.gov/library/stories/state-by-state/puerto-rico-population-change-between-census-decade.html>

Valdés-Pizzini, M., J. Agar, K. Kitner, C. Garcia Quijano, M. Tust, and F. Forrestal. 2010. Cruzan Fisheries: A Rapid Assessment of the Historical, Social, Cultural and Economic Processes that Shaped Coastal Communities' Dependence and Engagement in Fishing in the Island of St. Croix, USVI. NOAA Technical Memorandum. NMFS-SEFC-597.

Valle-Esquivel, M., M. Shivilani, D. Matos-Caraballo, and D.J. Die. 2011. Coastal fisheries of Puerto Rico. Pages 285–313 in S. Salas, R. Chuenpagdee, A. Charles and J.C. Seijo , editors. Coastal fisheries of Latin America and the Caribbean. FAO Fisheries and Aquaculture Technical Paper. No. 544. Rome, FAO.

Virgin Islands Consortium. 2021. USVI Population Drops a Stunning 18.1 Percent to 87,146 From 106,405. October 28. Available here: https://viconsortium.com/vi-top_stories/virgin-islands-usvi-population-drops-a-stunning-18-1-percent-to-87146-from-106405

Appendix A. Alternatives Considered but Eliminated from Detailed Analysis

Actions:

Establish a commercial trip limit for dolphinfish in federal waters around St. Croix.

Establish a commercial trip limit for wahoo in federal waters around St. Croix.

Establish a commercial trip limit for dolphinfish in federal waters around St. Thomas/St. John.

Establish a commercial trip limit for wahoo in federal waters around St. Thomas/St. John.

Alternative 1. No Action. There are no trip limits for the commercial harvest of dolphinfish/wahoo in federal waters.

Alternative 2. Establish a commercial trip limit of X-amount pounds of dolphinfish/wahoo per trip.

Alternative 3. Establish a commercial trip limit of X-amount pounds of dolphinfish/wahoo per trip.

Discussion: The Caribbean Fishery Management Council (Council) removed these actions in their entirety during their April 2023 meeting. The Council initially considered the actions to cap the amount of dolphinfish and wahoo harvested per trip by the commercial sector in combination with the proposed recreational bag limits for dolphinfish and wahoo to limit the number of individuals removed by the fisheries. Analyses presented during the meeting showed that the current commercial harvest levels of dolphinfish and wahoo were below the corresponding annual catch limits. In light of this, and the migratory nature of the species, the Council felt that a commercial trip limit was not needed at this time and concluded that the actions should be removed from further consideration. Additionally at this meeting, the Council requested staff add similar dolphinfish and wahoo size limit and recreational bag limit actions for federal waters around Puerto Rico, but did not request staff consider commercial trip limits for the species under the Puerto Rico Fishery Management Plan. Thus, they are not included in Amendment 3.

Appendix B. Dolphinfish and Wahoo Analyses

B.1. Dolphinfish Commercial Size Limit Analysis

Amendment 3 includes proposed management measures for dolphinfish under the Puerto Rico, St. Croix, and St. Thomas/St. John Fishery Management Plans (FMP). Specifically, size limits for dolphinfish in federal waters around Puerto Rico, St. Croix, and St. Thomas/St. John for both the commercial and recreational sectors. This analysis analyzes the size limit alternatives for the commercial sector for dolphinfish.

The commercial length data came from the Southeast Fisheries Science Center's (SEFSC) Trip Interview Program (TIP). TIP collects fish lengths and weights from harvested fish in the commercial sector. TIP data from 2010 to 2021 was provided from the SEFSC in January of 2023. A total of 1,816 dolphinfish lengths (Puerto Rico = 1,358, St. Croix = 211, and St. Thomas/St. John = 247) were collected by TIP from 2010 to 2021.

Puerto Rico

Action 1a of Amendment 3 has minimum size limit alternatives for dolphinfish in Puerto Rico. The Action 1a alternatives are no size limit, 20" fork length (FL) minimum size, and a 24" FL minimum size. Assuming recent landings are a good reflection of future landings, only data from 2017 to 2021 were used for the size limit analysis. Figure 1.1 provides the distribution of dolphinfish lengths from the TIP data for Puerto Rico from 2017 to 2021.

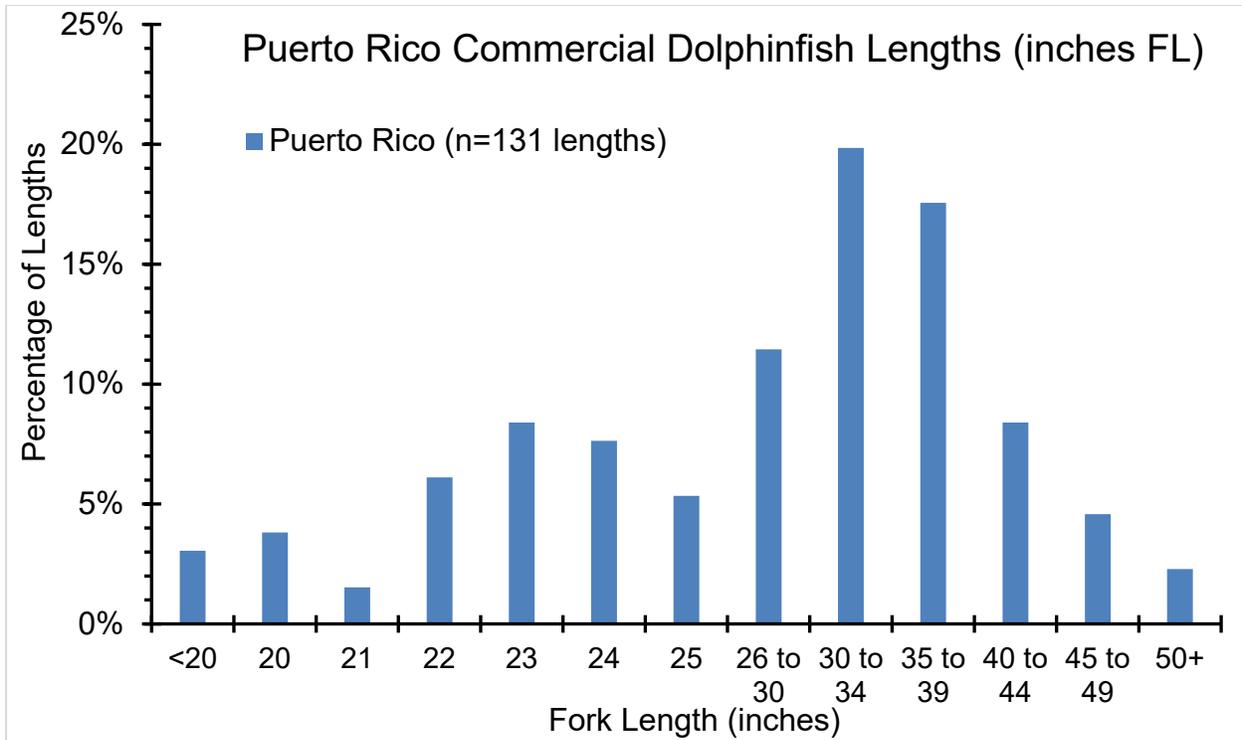


Figure 1.1. Puerto Rico dolphinfinh length distribution (in inches FL) from the commercial sector from 2017 to 2021. The data came from the Trip Intercept Program.

The commercial annual catch limit (ACL) is set in pounds so a percent reduction of landings in pounds was done to match the ACL. TIP data has both lengths and weights available for the dolphinfinh sampled, however some TIP samples only had length available. If only length was available for a dolphinfinh sample then weight estimates were generated by applying the dolphinfinh weight-length equation from Uchiyama and Boggs (2006). Percent reductions in harvest by weight were calculated by imposing 20" FL and 24" FL minimum size limits since Puerto Rico waters do not currently have a minimum size limit. This was done by assuming the harvest of dolphinfinh less than 20" FL or 24" FL would cease because these fish would be released if these size limits were implemented. Percent reductions in landings came from comparing the sum of the weight of the fish weights without the fish less than 20" FL (Alternative 2) or 24" FL (Alternative 3) to the total weight of all the fish using the equation of:

$$\text{Percent Reduction} = \frac{(\text{Adjusted Weight} - \text{Total Weight})}{\text{Total Weight}}$$

Where Adjusted Weight is the sum of the weight of all the dolphinfinh minus the weights from the dolphinfinh less than 20" FL or 24" FL, and Total Weight is the weight of all the dolphinfinh samples.

The results of the percent reduction in Puerto Rico commercial landings were very low with all of the size limit options resulting in less than 1% change to the landings (Table 1.1). This is

because there is a small proportion of dolphinfish harvested that are less than 20” FL or 24” FL. Also, the dolphinfish harvested less than 20” FL or 24” FL are small fish with low weights (mostly less than 1 pound each). Therefore, the implementation of a 20” size limit or 24” FL for the Puerto Rico commercial sector is expected to have a very low impact on the commercial landings.

Table 1.1. Estimated percent reduction for Puerto Rico dolphinfish commercial landings for the proposed minimum size limit options for Amendment 3.

Size Limit Alternatives	Percent Reduction
Alternative 1: No Minimum Size Limit (status quo)	0
Alternative 2: 20-inch Fork Length Minimum Size Limit	<1%
Alternative 3: 24-inch Fork Length Minimum Size Limit	<1%

St. Croix

Action 3a of Amendment 3 has minimum size limit alternatives for dolphinfish in St. Croix. The Action 3a alternatives are no size limit, 20” FL minimum size, and a 24” FL minimum size. Assuming recent landings are a good reflection of future landings, only data from 2017 to 2021 were used for the size limit analysis. However, there was a limited sample size with dolphinfish lengths available for only 46 fish in St. Croix from 2017 to 2021. Figure 1.2 provides the distribution of dolphinfish lengths from the TIP data for St. Croix from 2017 to 2021.

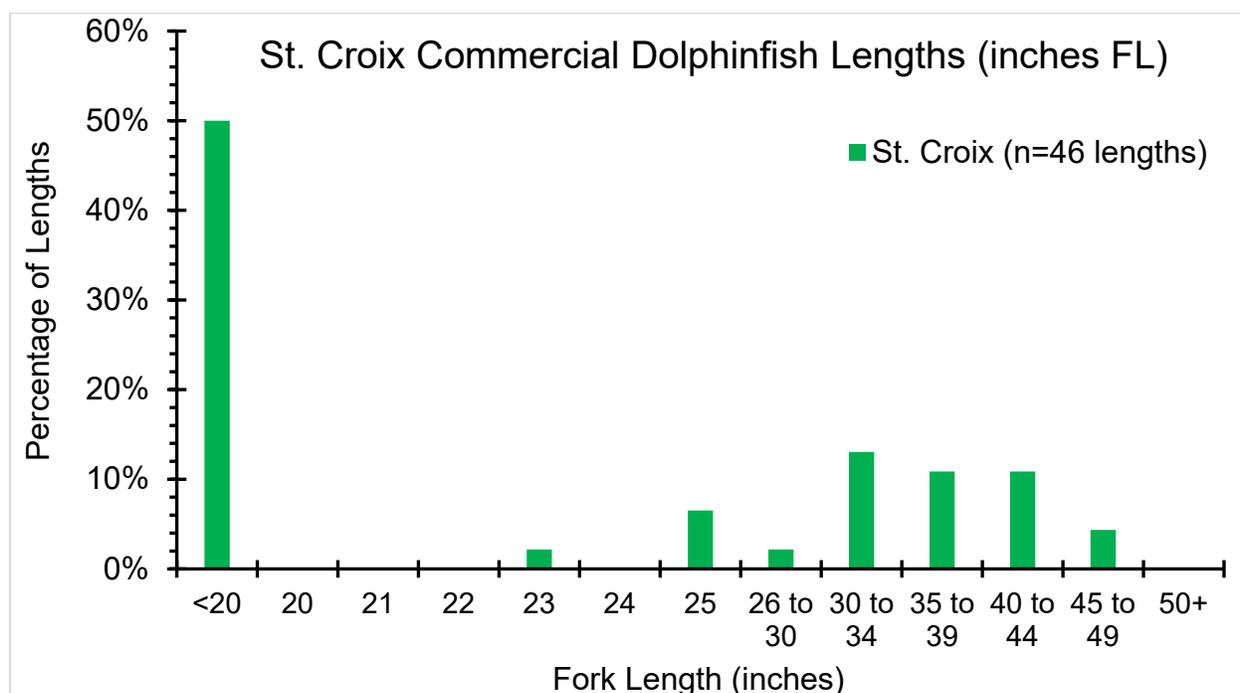


Figure 1.2. St. Croix dolphinfish length distribution (in inches fork length) from the commercial sector from 2017 to 2021. The data came from the Trip Intercept Program.

St. Croix TIP data were analyzed the same as stated earlier for the Puerto Rico size limit analysis. The results of the percent reduction in St. Croix commercial landings were low with percent reductions from 3.9 to 5.0 percent (Table 1.2). The dolphinfish that were harvested that were less than 20” FL and 24” FL are small fish with low weights (mostly less than 1 pound each), thus, having a smaller impact on the percent reduction in weight as the larger fish. The implementation of a 20” FL size limit or 24” FL for the St. Croix commercial sector is expected to have a low impact on the commercial landings.

Table 1.2. Estimated percent reduction for St. Croix dolphinfish commercial landings for the proposed minimum size limit options for Amendment 3.

Size Limit Alternatives	Percent Reduction
Alternative 1: No Minimum Size Limit (status quo)	0
Alternative 2: 20-inch Fork Length Minimum Size Limit	3.9%
Alternative 3: 24-inch Fork Length Minimum Size Limit	5.0%

St. Thomas/St. John

Action 5a of Amendment 3 has minimum size limit alternatives for dolphinfish in St Thomas/St. John. The Action 5a alternatives are no size limit, 20” FL minimum size, and a 24” FL minimum size. Assuming recent landings are a good reflection of future landings, only data from 2017 to 2021 were used for the size limit analysis. Figure 1.3 provides the distribution of dolphinfish lengths from the TIP data for St. Thomas/St. John from 2017 to 2021.

St. Thomas/St. John TIP data were analyzed the same as stated earlier for the Puerto Rico size limit analysis. The results of the percent reduction in St. Thomas/St. John commercial landings were very low with percent reductions (<1%) (Table 1.3). This is because there is a small proportion of dolphinfish harvested that are less than 20” FL or 24” FL. Also, the dolphinfish that were harvested that were less than 20” FL and 24” FL are small fish with low weights (mostly less than 1 pound each). Therefore, the implementation of a 20” FL size limit or 24” FL for the St. Thomas/St. John commercial sector is expected to have a very low impact on the commercial landings.

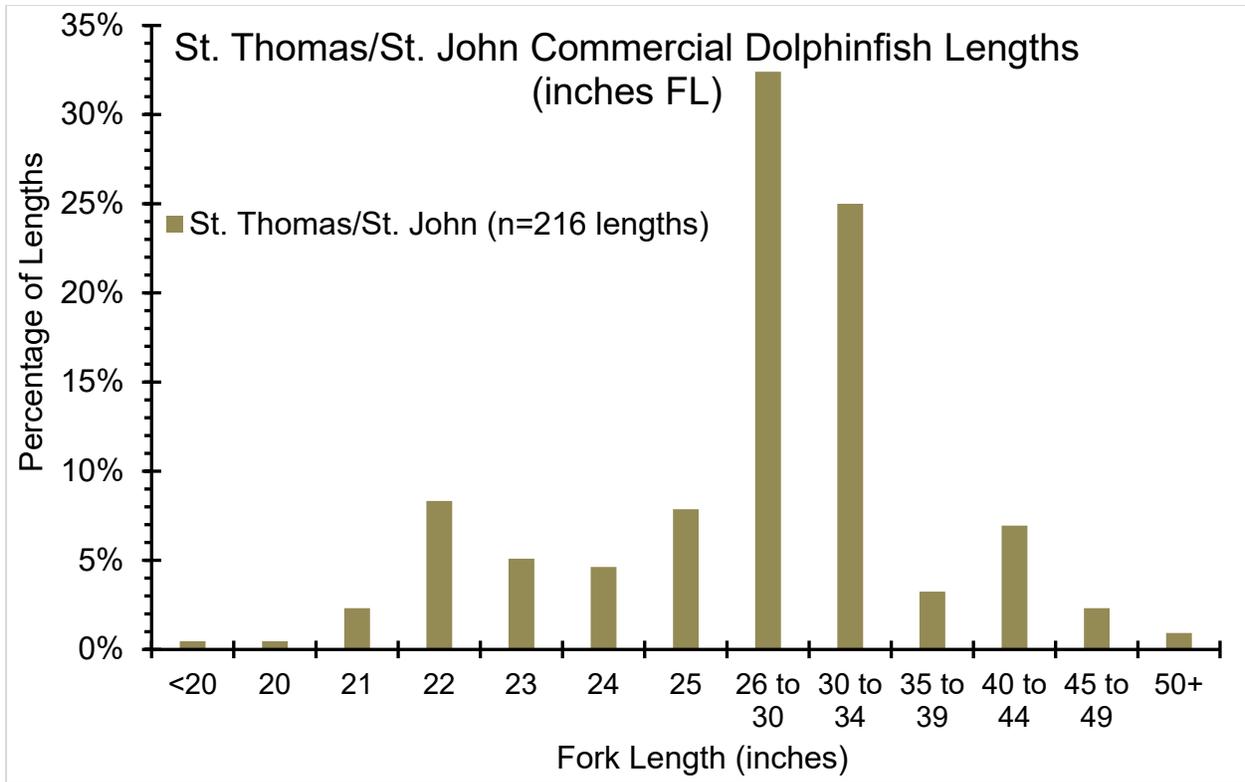


Figure 1.3. St. Thomas/St. John dolphinfinh length distribution (in inches fork length) from the commercial sector from 2017 to 2021. The data came from the Trip Intercept Program.

Table 1.3. Estimated percent reduction for St. Thomas/St. John dolphinfinh commercial landings for the proposed minimum size limit options for Amendment 3.

Size Limit Alternatives	Percent Reduction
Alternative 1: No Minimum Size Limit (status quo)	0
Alternative 2: 20-inch Fork Length Minimum Size Limit	<1%
Alternative 3: 24-inch Fork Length Minimum Size Limit	<1%

References

Uchiyama, J.H., and C.H. Boggs. 2006. Length-weight Relationships of Dolphinfinh, *Coryphaena hippurus*, and Wahoo, *Acanthocybium solandri*: Seasonal Effects of Spawning and Possible Migration in the Central North Pacific. *Marine Fisheries Review*. 68:19-29.

B.2. Dolphinfish and Wahoo Recreational Size Limit Analysis

The Caribbean Fishery Management Council (Council) is considering implementing size limits for dolphinfish (*Coryphaena hippurus*) and wahoo (*Acanthocybium solandri*) for the recreational sector in federal waters around Puerto Rico, St. Croix, and St. Thomas/St. John. Recreational catch data from the U.S. Caribbean has only been collected in Puerto Rico, via the Marine Recreational Fishery Statistics Survey (MRFSS). Dockside samplers collected catch and effort data from recreational anglers from 2000-2017, including measurements from 4,067 dolphinfish and 467 wahoo. Approximately half of these measurements were collected from angler trips occurring in federal waters, reducing the number of measurements of dolphinfish and wahoo to 2,267 and 282, respectively. These lengths were used to investigate the size distribution of dolphinfish and wahoo landed in Puerto Rico, and to quantify the potential reduction in harvest if each of the size limit alternatives are adopted.

Size Distribution and Size Limit Analysis

Tournament data from the U.S. Caribbean was reviewed, but these size data represent the targeting of larger fish, and may not be representative of fish landed during normal fishing activity. The MRFSS length data are the only available length data from the U.S. Caribbean that were collected using a randomized survey design. Boxplots were used to investigate changes in the size of harvested fish over time, using 3 year bins (**Figures 2.1** and **2.2**). Dolphinfish and wahoo have overlapping boxplots, suggesting the size of fish intercepted remained fairly stable between 2000 and 2017. Thus, measurements were aggregated with all years combined, to investigate the size distributions for each species.

The dolphinfish and wahoo length data were then plotted in 2-inch bins (**Figures 2.3** and **2.4**). The mean fork length of fish intercepted were 30.9” and 36.6” for dolphinfish and wahoo, respectively. The two proposed size limits for dolphinfish include a 20” and 24” FL minimum and 32” and 40” FL minimums for wahoo in Puerto Rico. The mean size of dolphinfish is greater than both minimum size limit alternatives, and the mean size limit of wahoo is between the minimum size limits suggested by the Council. A scalar to represent the percentage of intercepted fish that could be discarded if each size limit was imposed was calculated. The number of fish above and below each minimum fork length limit was calculated, and divided by the total number of each species that was intercepted. All lengths from the 2000 to 2017 period were used, to allow for the largest possible sample size.

The predicted reduction in harvest for dolphinfish is less than 15% for both size limit alternatives investigated (**Table 2.1**). The majority of dolphinfish intercepted in Puerto Rico between 2000 and 2017 were greater than 20” in size. Alternatively, the size limits for wahoo indicate the potential for larger reductions in harvest, with 32.6% of wahoo intercepted below the 32” minimum size limit and 75.9% of wahoo below the 40” size limit (**Table 2.2**). These results are

based on the assumption that the size of fish landed has not changed since the MRFSS length data were collected. Additionally, the use of this analysis to predict the potential impacts on harvest for St. Croix and St. Thomas/St. John would be based on an assumption that the fishing practices and size of fish landed are the same across the U.S. Caribbean.

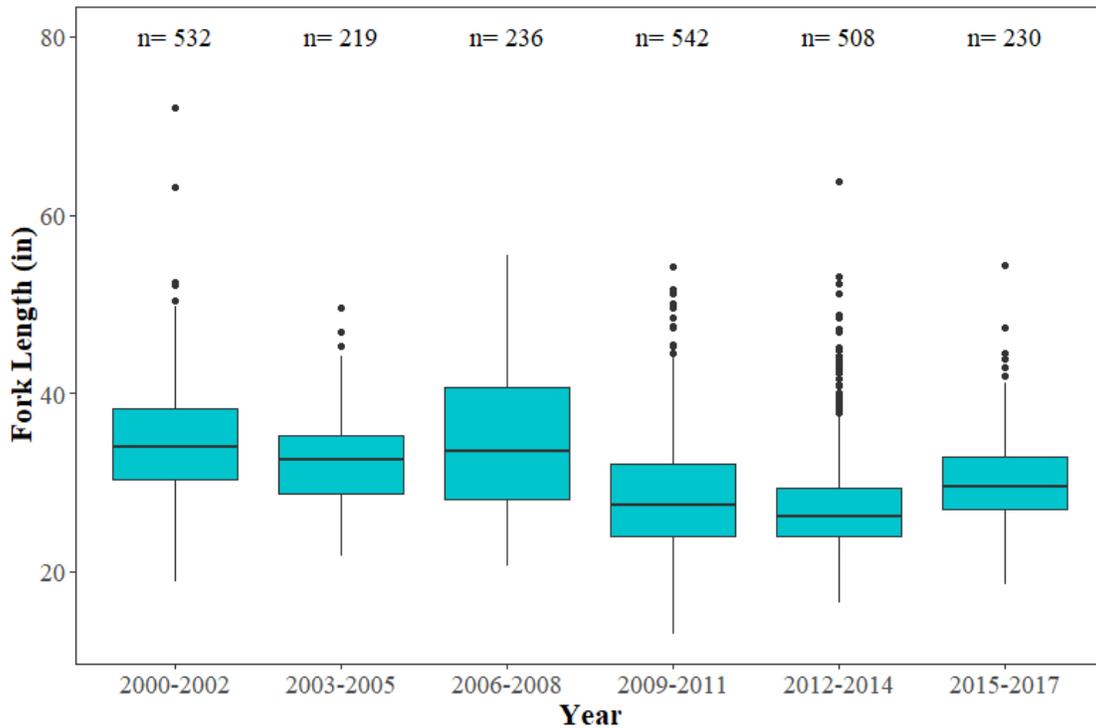


Figure 2.1. Boxplot of dolphinfish lengths caught in federal waters around Puerto Rico, lengths are binned in three year intervals.

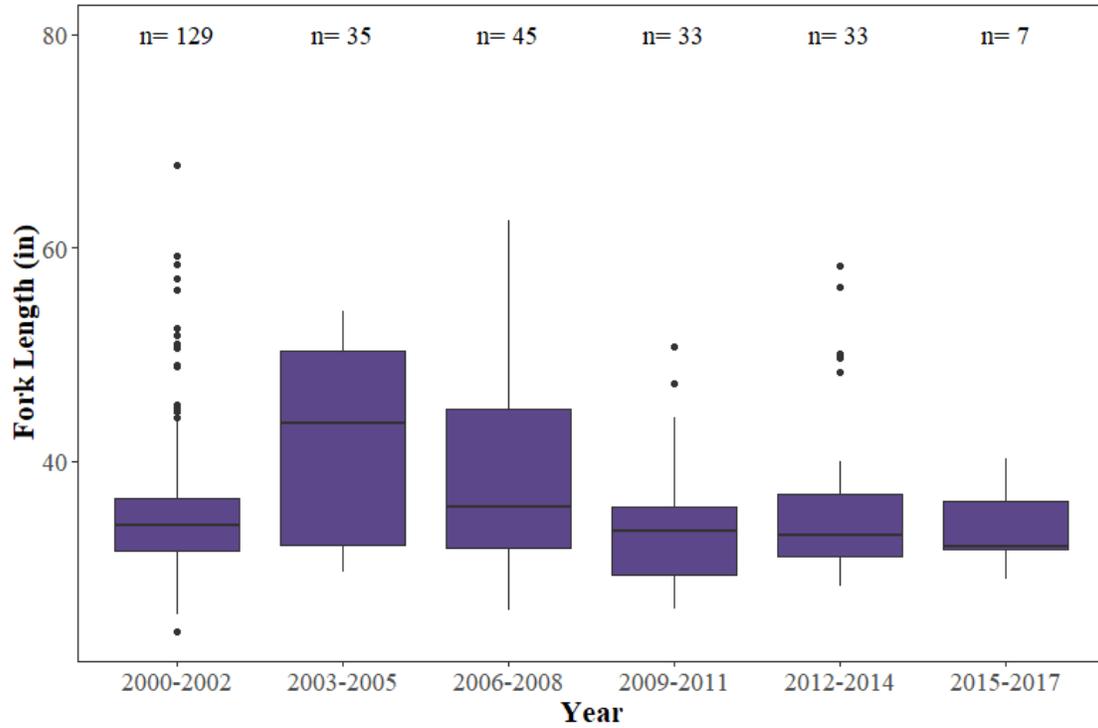


Figure 2.2. Boxplot of wahoo lengths caught in federal waters around Puerto Rico, lengths are binned in three year intervals.

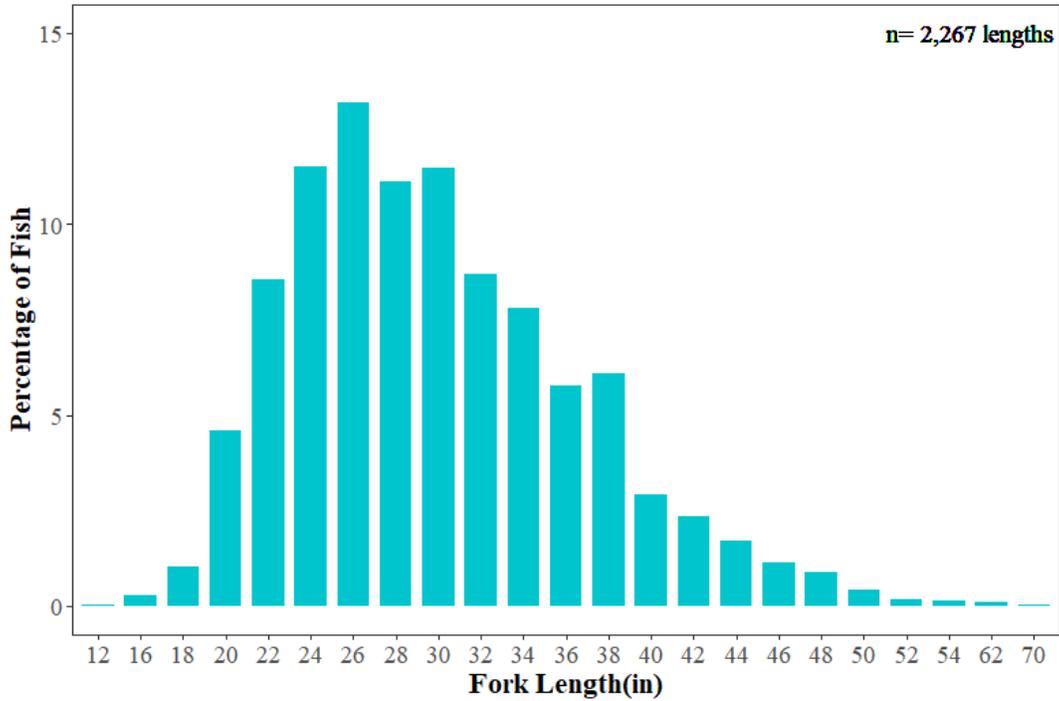


Figure 2.3. Puerto Rico dolphinfish length distribution (in inches fork length) from the recreational sector from 2000 to 2017, two-inch bins.
 Source – Marine Recreational Fisheries Statistics Survey (MRFSS).

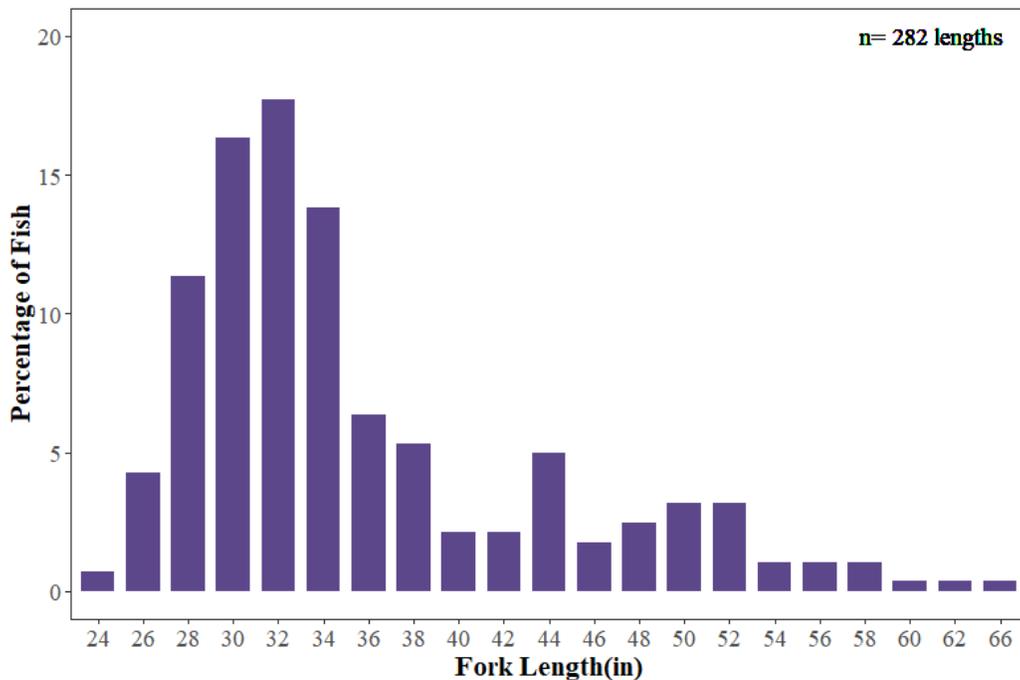


Figure 2.4. Puerto Rico wahoo length distribution (in inches fork length) from the recreational sector from 2000 to 2017, two-inch bins.
 Source – Marine Recreational Fisheries Statistics Survey (MRFSS).

Table 2.1. Dolphin size limits investigated and the projected reduction in harvest associated with each scenario.

Alternative	Dolphin Size Limit Scenarios	Projected Reduction
Alternative 1:	No Action – Do not establish a minimum size limit for the recreational harvest of dolphin in federal waters around Puerto Rico	-
Alternative 2:	Establish a 20" fork length minimum length for the recreational harvest of dolphin in federal waters around Puerto Rico	-1.3%
Alternative 3:	Establish a 24" fork length minimum length for the recreational harvest of dolphin in federal waters around Puerto Rico	-14.5%

Table 2.2. Wahoo size limits investigated and the projected reduction in harvest associated in each scenario.

Alternative	Wahoo Size Limit Scenarios	Projected Reduction
Alternative 1:	No Action – Do not establish a minimum size limit for the recreational harvest of wahoo in federal waters around Puerto Rico	-
Alternative 2:	Establish a 32" fork length minimum length for the recreational harvest of wahoo in federal waters around Puerto Rico	-32.6%
Alternative 3:	Establish a 40" fork length minimum length for the recreational harvest of wahoo in federal waters around Puerto Rico	-75.9

B.3. Dolphinfish and Wahoo Recreational Bag Limit Analysis

The Council is considering implementing recreational bag limits for dolphinfish (*Coryphaena hippurus*) and wahoo (*Acanthocybium solandri*), in the federal waters around Puerto Rico, St. Croix, and St. Thomas/St. John. The only recreational catch data from the U.S. Caribbean was collected in Puerto Rico, via MRFSS. Dockside samplers collected catch and effort data from recreational anglers from 2000-2017. A total of 1,935 dolphinfish angler trips and 445 wahoo angler trips were intercepted during that time. The data were trimmed further to represent only angler trips that identified that the majority of their fishing trip occurred in federal waters, reducing the total angler trips to 930 dolphinfish trips and 248 wahoo trips. The majority of federal waters angler trips intercepted occurred on private vessels, with only 9.6% of dolphinfish trips and 17.3% of wahoo trips occurring on charter vessels. Boxplots were used to investigate potential differences in harvest levels on private boat versus charter trips (**Figures 3.1** and **3.2**). The number of fish harvested per angler showed similar harvest patterns for dolphinfish and wahoo trips, allowing for those fishing modes to be aggregated in subsequent analyses. A bag limit analysis was conducted with the remaining data, to evaluate the potential impacts of the bag limit alternatives being considered by the Council for dolphinfish and wahoo.

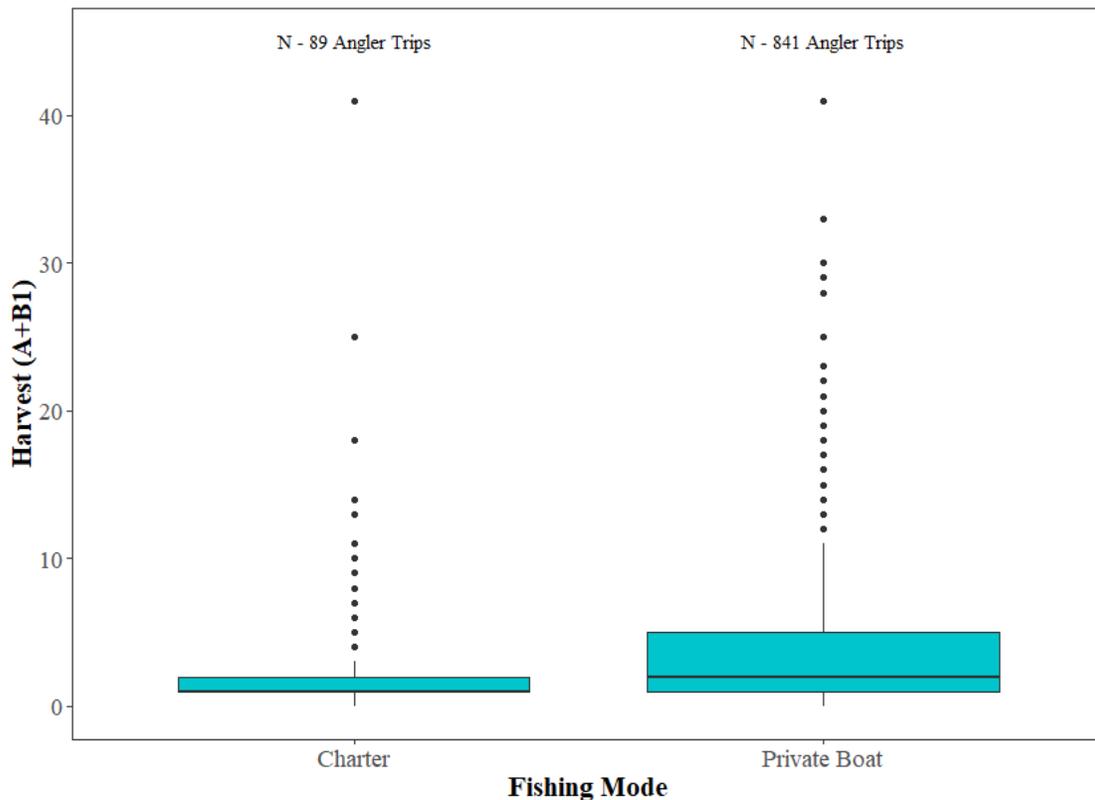


Figure 3.1. Boxplot of dolphinfish harvest (observed and reported catch) from recreational anglers intercepted after fishing in federal waters, between 2000 and 2017.

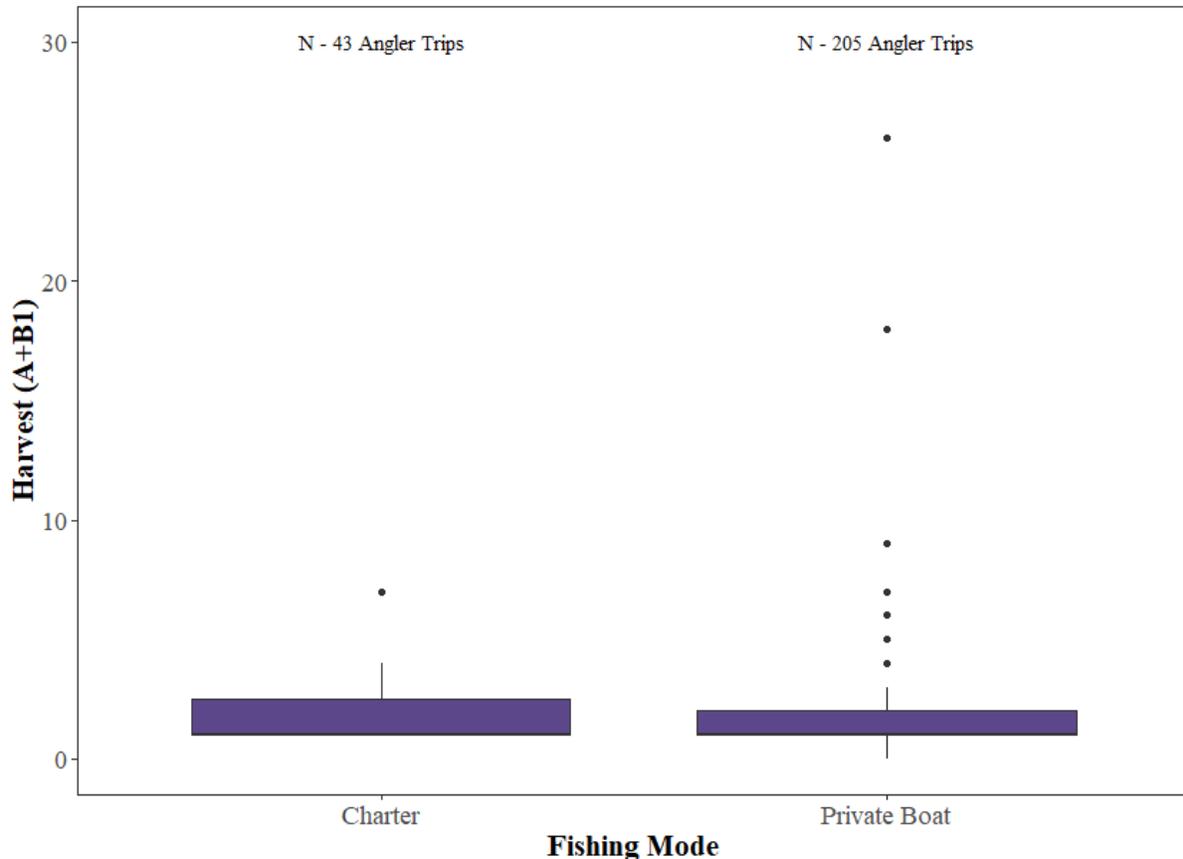


Figure 3.2. Boxplot of wahoo harvest (observed and reported catch) from recreational anglers intercepted after fishing in federal waters, between 2000 and 2017.

The harvest of recreational angler trips were investigated to determine the level of harvest per angler on trips in Puerto Rico. An adjusted per angler harvest value was calculated for each interview to account for angler interviews with grouped catch for the entire vessel being associated with only a single angler. A ratio of the number of anglers that contributed to catch was divided by the number of anglers interviewed from each vessel with grouped catch. This ratio was multiplied by the observed harvest (A) and reported catch (B1) to calculate an estimate of the total harvest for each species that accounts for all anglers contributing to the landings. The adjusted harvest per angler estimate was then calculated by dividing the adjusted total harvest for each species by the number of contributing anglers for each grouped catch interview. If all anglers from a vessel were interviewed, the harvest values were not adjusted. The distribution of harvest per angler was then plotted for each species (**Figure 3.3** and **3.4**). The majority of both dolphinfish and wahoo trips harvested only 1 fish from each species per angler. A bag limit analysis was conducted to quantify the potential reduction in harvest associated with adopting the proposed bag limits (**Tables 3.1** and **3.2**). Any angler trips with harvest levels equal to or less than the proposed person/vessel bag limit remained unmodified. For all trips that landed more than the bag limit alternative, the harvest value was replaced with the bag limit alternative. For example, if an angler harvested 20 dolphinfish, this value was replaced with 10 to

correspond with the maximum number of fish allowed under the corresponding alternative. For any trips where the vessel landed more than the vessel limit associated with each alternative, the angler catch was reduced to the max vessel limit divided by the total number of anglers on the vessel. In this scenario, if a vessel with 5 anglers landed 40 dolphinfish, the angler harvest was reduced to 8 fish per person (30 fish vessel limit/5 anglers = 6 fish maximum per person). Next, the total harvest for all trips associated with each species was summed for the original data and for each alternative. The projected reduction corresponds with the difference between the current scenario (100%) and the ratio of the sum for each alternative divided by the current scenario. The projected reductions for the most restrictive alternatives correspond with a 14.62% reduction for dolphinfish and a 9.56% reduction for wahoo. These results hinge on the assumptions that fishing behavior and landings from 2000-2017 correspond with the current harvesting behavior of recreational anglers in federal waters. These are the only recreational data available for the U.S. Caribbean, and are specific to Puerto Rico only. The potential reductions estimated here may not be appropriate proxies for St. Croix or St. Thomas/St. John.

Table 3.1. Dolphinfish bag limits investigated and projected reduction in harvest in federal waters.

Alternative	Dolphinfish Bag Limit Scenarios	Projected Reduction
Alternative 1:	No Action – Do not establish a recreational bag limit for dolphinfish in federal waters in Puerto Rico	-
Alternative 2:	Establish a recreational bag limit in federal waters of Puerto Rico 10 dolphinfish per day, not to exceed 30 dolphinfish per vessel per day, whichever is less	3.11%
Alternative 3:	Establish a recreational bag limit in federal waters around Puerto Rico of 5 dolphinfish per person day, not to exceed 15 dolphinfish per vessel per day, whichever is less	14.62%

Table 3.2. Wahoo bag limits investigated and projected reduction in harvest in federal waters.

Alternative	Wahoo Bag Limit Scenarios	Projected Reduction
Alternative 1:	No Action – Do not establish a recreational bag limit for wahoo in federal waters around Puerto Rico	-
Alternative 2:	Establish a recreational bag limit in federal waters around Puerto Rico of 5 wahoo per person per day, not to exceed 10 wahoo per vessel per day, whichever is less	1.38%
Alternative 3:	Establish a recreational bag limit in federal waters around Puerto Rico of 2 wahoo per person per day, not to exceed 6 wahoo per vessel per day, whichever is less	9.56%

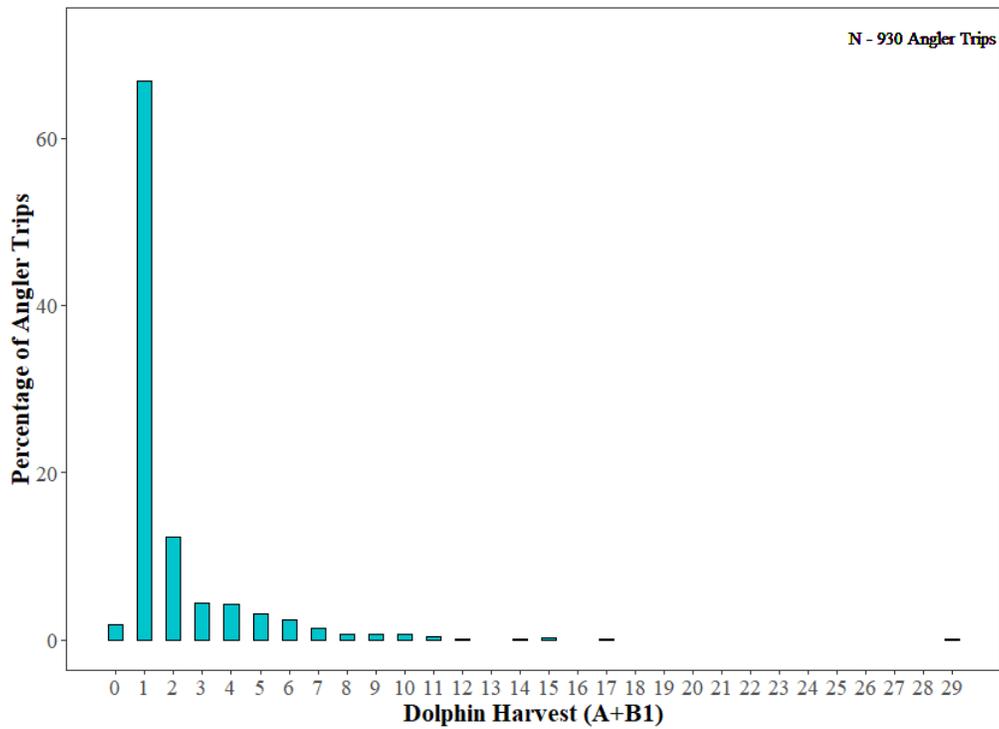


Figure 3.3. Distribution of dolphinfish harvest (observed catch + reported catch) per angler for angler trips intercepted after fishing in federal waters, between 2000 and 2017.

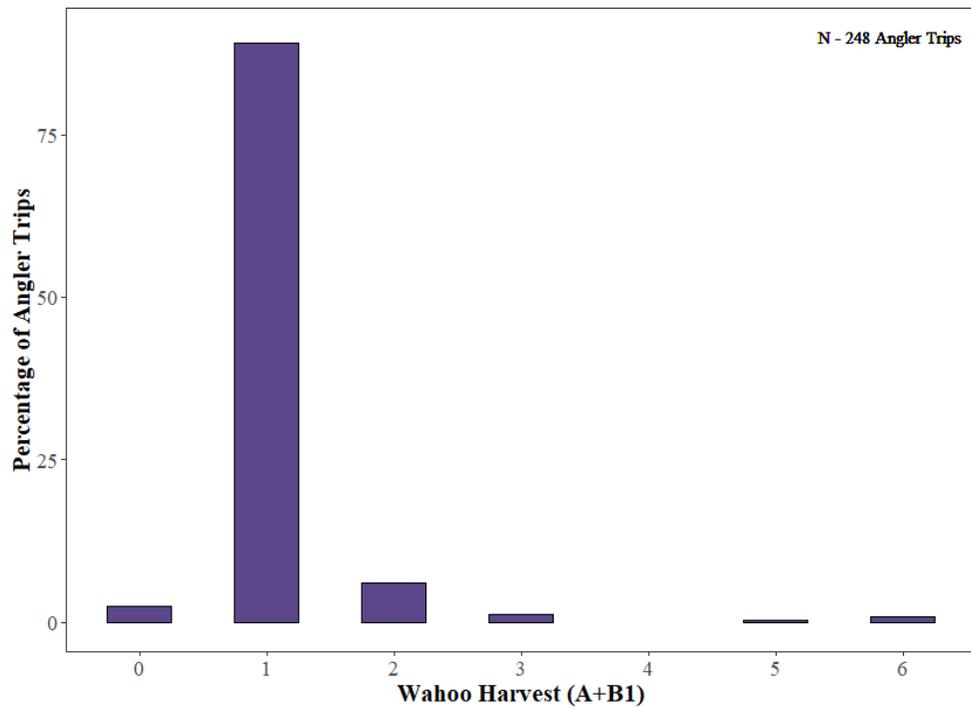


Figure 3.4. Distribution of wahoo harvest (observed catch + reported catch) per angler for angler trips intercepted after fishing in federal waters, between 2000 and 2017.

B.4. Wahoo Commercial Size Limit Analysis

Amendment 3 includes proposed management measures for wahoo under the Puerto Rico, St. Croix, and St. Thomas/St. John FMPs. Specifically, size limits for wahoo in federal waters around Puerto Rico, St. Croix, and St. Thomas/St. John for both the commercial and recreational sectors. This analysis analyzes the size limits for the commercial sector due for wahoo.

The commercial length data came from the SEFSC’s TIP. TIP collects fish lengths and weights from harvested fish in the commercial sector. TIP data from 2010 to 2021 was provided from the SEFSC in January 2023. A total of 143 wahoo lengths (Puerto Rico = 105, St. Croix = 21, and St. Thomas/St. John = 17) were collected by TIP from 2010 to 2021.

Puerto Rico

Action 2a of Amendment 3 has minimum size limit alternatives for wahoo in Puerto Rico. The Action 2a alternatives are no size limit, 32”es FL minimum size, and a 40”es FL minimum size. Due to limited samples of wahoo lengths all of the TIP data from 2010 to 2017 was used for this analysis. Figure 4.1 provides the distribution of wahoo lengths from the TIP data for Puerto Rico from 2010 to 2021.

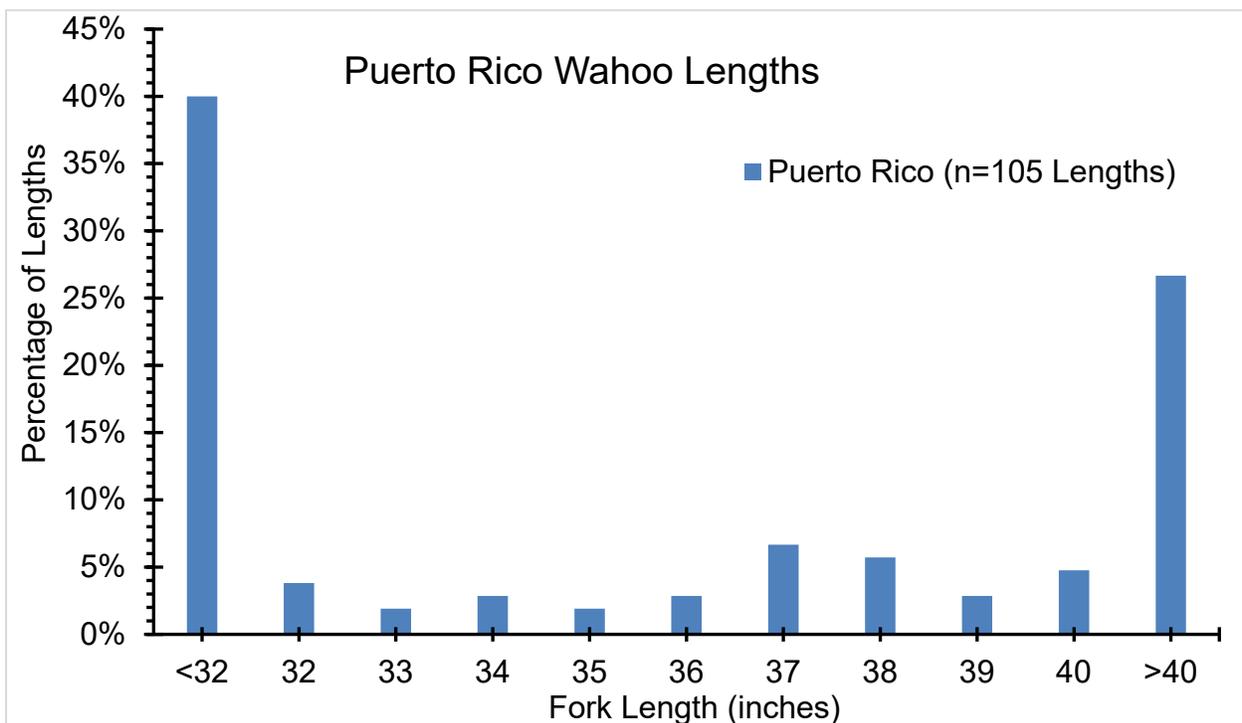


Figure 4.1. Puerto Rico wahoo length distribution (in inches fork length) from the commercial sector from 2010 to 2021. The data came from the Trip Intercept Program.

The commercial ACL is set in pounds so a percent reduction of landings in pounds was done to match the ACL. TIP data has both lengths and weights available for the wahoo sampled, however some TIP samples only had length available. If only length was available for a wahoo sample then weight estimates were generated by applying the wahoo weight-length equation from Uchiyama and Boggs (2006). Percent reductions in harvest by weight were calculated by imposing 32” and 40” FL minimum size limits since Puerto Rico waters do not currently have a minimum size limit. This was done by assuming the harvest of wahoo less than 32” or 40” FL would cease because these fish would be released if these size limits were implemented. Percent reductions in landings came from comparing the sum of the weight of the fish weights without the fish less than 32” FL (Alternative 2) or 40” FL (Alternative 3) to the total weight of all the fish using the equation of:

$$\text{Percent Reduction} = \frac{(\text{Adjusted Weight} - \text{Total Weight})}{\text{Total Weight}}$$

Where Adjusted Weight is the sum of the weight of all the wahoo minus the weights from the wahoo less than 32” FL or 40” FL, and Total Weight is the weight of all the wahoo samples.

The results of the percent reduction in Puerto Rico commercial wahoo landings from imposing a size limit were 11.9% (32” FL) and 37.7% (40” FL) (Table 4.1). This suggest that the implementation of a size limit will likely reduce the Puerto Rico wahoo commercial landings.

Table 4.1. Estimated percent reduction for Puerto Rico wahoo commercial landings for the proposed minimum size limit options for Amendment 3.

Size Limit Alternatives	Percent Reduction
Alternative 1: No Minimum Size Limit (Status Quo)	0
Alternative 2: 32-inch Fork Length Minimum Size Limit	11.9%
Alternative 3: 40-inch Fork Length Minimum Size Limit	37.7%

St. Croix

Action 4a of Amendment 3 has minimum size limit alternatives for wahoo in St. Croix. The Action 4a alternatives are no size limit, 32” FL minimum size, and a 40” FL minimum size. Due to limited samples of wahoo lengths all of the TIP data from 2010 to 2021 was used for this analysis. Figure 4.2 provides the distribution of wahoo lengths from the TIP data for St. Croix from 2010 to 2021.

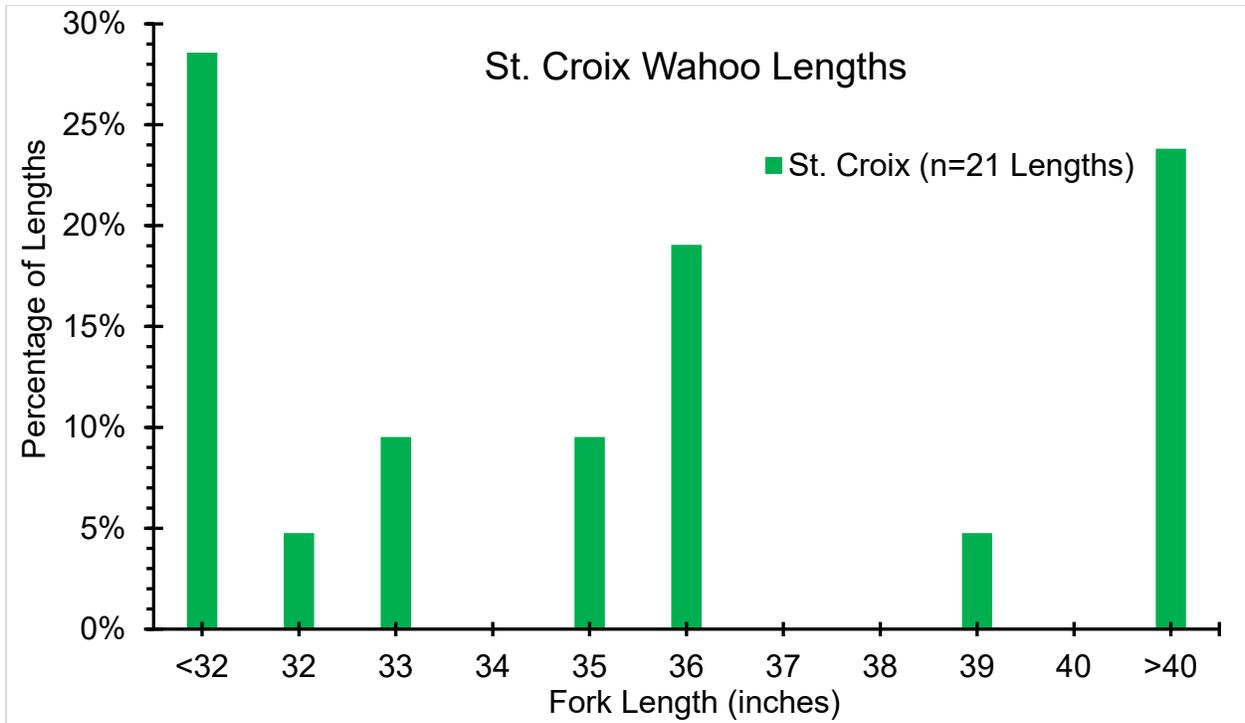


Figure 4.2. St. Croix wahoo length distribution (in inches fork length) from the commercial sector from 2010 to 2021. The data came from the Trip Intercept Program.

St. Croix TIP data were analyzed the same as stated earlier for the Puerto Rico wahoo size limit analysis. The results of the percent reduction in St. Croix commercial landings were low with percent reductions from 2.2% for the 32” FL minimum size (Table 4.2). The wahoo that were harvested that were less than 32” FL are small fish with low weights (mostly less than 5 pounds each), thus, having a smaller impact on the percent reduction in weight as the larger fish. However, the percent reduction estimated for the 40” FL minimum size limit was larger (Table 4.2). Based on this analysis, the implementation of a 40” FL size limit for the St. Croix commercial sector is expected to have an impact on the wahoo commercial landings.

Table 4.2. Estimated percent reduction for St. Croix wahoo commercial landings for the proposed minimum size limit options for Amendment 3.

Size Limit Alternatives	Percent Reduction
Alternative 1: No Minimum Size Limit (Status Quo)	0
Alternative 2: 32-inch Fork Length Minimum Size Limit	2.2%
Alternative 3: 40-inch Fork Length Minimum Size Limit	44.6%

St. Thomas/St. John

Action 6a of Amendment 3 has commercial minimum size limit alternatives for wahoo in St Thomas/St. John. The Action 6a alternatives are no size limit, 32” FL minimum size, and a 40” FL minimum size. Unfortunately, TIP has limited wahoo samples for St. Thomas/St. John. The St. Thomas/St. John TIP data from 2010 to 2021 only has 17 wahoo samples, and all of them are above 40” FL. These 17 wahoo TIP samples range from 42-56” FL with an average of 54.4” FL. Therefore, there is not an adequate range of available lengths in the St. Thomas/St. John TIP data to analyze the impact of a 32 and 40” FL minimum size limit for wahoo in St. Thomas/St. John.

References

Uchiyama, J.H., and C.H. Boggs. 2006. Length-weight Relationships of Dolphinfish, *Coryphaena hippurus*, and Wahoo, *Acanthocybium solandri*: Seasonal Effects of Spawning and Possible Migration in the Central North Pacific. *Marine Fisheries Review*. 68:19-29.

Appendix C. Other Applicable Law

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

Administrative Procedure Act (APA)

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

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

Coastal Zone Management Act (CZMA)

The CZMA of 1972 (16 U.S.C. 1451 et seq.) encourages state and federal cooperation in the development of plans that manage the use of natural coastal habitats, as well as the fish and wildlife those habitats support. When proposing an action determined to directly affect coastal resources managed under an approved coastal zone management program, NMFS is required to provide the relevant State agency with a determination that the proposed action is consistent with the enforceable policies of the approved program to the maximum extent practicable at least 90 days before taking final action. NMFS may presume State agency concurrence if the State agency’s response is not received within 60 days from receipt of the agency’s consistency determination and supporting information as required by 15 C.F.R. §930.41(a).

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

Information Quality Act (IQA)

The IQA (Public Law 106-443) effective October 1, 2002, requires the government to set standards for the quality of scientific information and statistics used and disseminated by federal agencies. Information includes any communication or representation of knowledge such as facts or data, in any medium or form, including textual, numerical, cartographic, narrative, or audiovisual forms (includes web dissemination, but not hyperlinks to information that others disseminate; does not include clearly stated opinions).

Specifically, the IQA directs the Office of Management and Budget (OMB) to issue government wide guidelines that “provide policy and procedural guidance to federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information disseminated by federal agencies.” Such guidelines have been issued, directing all federal agencies to create and disseminate agency-specific standards to: (1) ensure information quality and develop a pre-dissemination review process; (2) establish administrative mechanisms allowing affected persons to seek and obtain correction of information; and (3) report periodically to OMB on the number and nature of complaints received.

Scientific information and data are key components of fishery management plans (FMP) and amendments and the use of best available information is the second national standard under the Magnuson-Stevens Act. To be consistent with the IQA, FMPs and amendments must be based on the best information available. They should also properly reference all supporting materials and data, and be reviewed by technically competent individuals. With respect to original data generated for FMPs and amendments, it is important to ensure that the data are collected according to documented procedures or in a manner that reflects standard practices accepted by the relevant scientific and technical communities. Data will also undergo quality control prior to being used by the agency and a pre-dissemination review.

Endangered Species Act (ESA)

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

NMFS completed a biological opinion on September 21, 2020, evaluating the impacts of the Puerto Rico, St. Croix, and St. Thomas/St. John fisheries on ESA-listed species. Refer to Section 3.2.3 for additional information.

Marine Mammal Protection Act (MMPA)

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

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

NMFS has determined that fishing activities conducted under the Puerto Rico, St. Croix, and St. Thomas/St. John FMPs will have no adverse impact on marine mammals. The primary gear types used in the island-based fisheries are classified in the 2024 List of Fisheries as a Category III fishery (89 FR 12257). This classification indicates the annual mortality and serious injury of a marine mammal stock resulting from any fishery is less than or equal to one percent of the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock, while allowing that stock to reach or maintain its optimum sustainable population. This amendment does not change the list of authorized gear types in these fisheries and as such would not alter this determination.

Paperwork Reduction Act (PRA)

The PRA of 1995 (44 U.S.C. 3501 et seq.) regulates the collection of public information by federal agencies to ensure that the public is not overburdened with information requests, that the federal government's information collection procedures are efficient, and that federal agencies adhere to appropriate rules governing the confidentiality of such information. The PRA requires NMFS to obtain approval from the OMB before requesting most types of fishery information

from the public. This action does not contain a collection-of-information requirement for purposes of the PRA.

Small Business Act

The Small Business Act of 1953, as amended, Section 8(a), 15 U.S.C. 634(b)(6), 636(j), 637(a) and (d); Public Laws 95-507 and 99-661, Section 1207; and Public Laws 100-656 and 101-37 are administered by the Small Business Administration. The objectives of the act are to foster business ownership by individuals who are both socially and economically disadvantaged; and to promote the competitive viability of such firms by providing business development assistance including, but not limited to, management and technical assistance, access to capital and other forms of financial assistance, business training and counseling, and access to sole source and limited competition federal contract opportunities, to help the firms to achieve competitive viability. Because most businesses associated with fishing are considered small businesses, NMFS, in implementing regulations, must assess how those regulations will affect small businesses.

Essential Fish Habitat (EFH)

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

The areas affected by the proposed action have been identified as EFH for managed species, as described under the Puerto Rico, St. Croix, and St. Thomas/St. John FMPs. As specified in the Magnuson-Stevens Act, EFH consultation is required for federal actions, which may adversely affect EFH. Any required consultation requirements will be completed prior to implementation of any new management measures.

National Environmental Policy Act (NEPA)

The NEPA of 1969 (42 U.S.C. 4321 et seq.) requires federal agencies to consider the environmental and social consequences of proposed major actions, as well as alternatives to those actions, and to provide this information for public consideration and comment before selecting a final course of action. This document contains an Environmental Assessment to satisfy the NEPA requirements.

Executive Orders

E.O. 12630: Takings

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

E.O. 12866: Regulatory Planning and Review

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

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

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

This Executive Order mandates that each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions. Federal agency responsibilities under this Executive Order include conducting their programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons from participation in, denying persons the benefit of, or subjecting persons to discrimination under, such, programs policies, and activities, because of their race, color, or national origin. Furthermore, each federal agency responsibility set forth under this Executive

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

The actions in this amendment are not expected to negatively impact minority or low-income populations.

E.O. 12962: Recreational Fisheries

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

E.O. 13089: Coral Reef Protection

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

The Puerto Rico and St. Croix FMPs described habitats of particular concern in Puerto Rico and St. Croix for managed corals and included management measures to minimize, to the extent practicable, adverse effects caused by fishing on those habitats. There are no implications to coral reefs by the actions proposed in this amendment.

E.O. 13132: Federalism

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

No federalism issues have been identified relative to the action proposed in this amendment.

E.O. 13112: Invasive Species

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

This action will not introduce, authorize, fund, or carry out actions that are likely to cause or promote the introduction or spread of invasive species in the U.S. or elsewhere.

E.O. 13158: Marine Protected Areas (MPA)

Executive Order 13158 (May 26, 2000) requires federal agencies to consider whether their proposed action(s) will affect any area of the marine environment that has been reserved by federal, state, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural or cultural resource within the protected area.

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

Appendix D. U.S. Virgin Islands Fishing Tournaments

Several sport fishing tournaments occur in the U.S. Virgin Islands (USVI) each year. The tournaments are hosted by local fishing clubs and organizations, such as the [Virgin Islands Game Fish Club](#), [Golden Hook Fishing Club](#), [Virgin Islands for Veterans](#), and the Northside Sportfishing Club.

The USVI Department of Planning and Natural Resources [Division of Fish and Wildlife](#) serves as weighmasters at many of these tournaments. For each fish landed, staff identify the species, weigh the fish, and measure the fish length. Data are also collected on fishing effort, including fishing area, number of anglers, length of time spent fishing, gear type used, and more. Species targeted in the tournaments include coastal pelagics (e.g., Kingfish Shootout, Bastille Day Kingfish Tournament), offshore pelagics (e.g., Wahoo Windup, Dolphinfish Derby), and shallow-water gamefish and reef fish (e.g., St. Thomas Spearfishing tournament). The table below summarizes the number dolphinfish and wahoo caught in tournaments in the USVI (all data are preliminary). The number of tournaments listed represent the total number of tournaments at which dolphinfish or wahoo were caught.

In St. Croix, the Annual Dolphinfish Tournament sponsored by the Golden Hook Fishing Club requires size limits for dolphinfish of 32” (815 millimeters) and 36” for wahoo (915 millimeters). Their Annual Wahoo Tournament requires a minimum size for all wahoo caught of 32”.

Year	Number of Dolphinfish	Number of Tournaments that Caught Dolphinfish	Number of Wahoo	Number of Tournaments that Caught Wahoo
2000	91	4	18	3
2002	5	1	17	1
2003	40	4	41	5
2004	243	5	118	5
2005	23	3	1	1
2006	131	3	29	4
2007	210	4	63	3
2008	82	4	23	1
2009	54	1	17	2
2010	31	1	0	0
2011	94	3	27	2
2012	51	5	35	2
2013	53	3	5	2
2014	42	3	18	1
2015	256	4	18	2
2016	67	6	70	5
2017	62	3	1	1

Year	Number of Dolphinfish	Number of Tournaments that Caught Dolphinfish	Number of Wahoo	Number of Tournaments that Caught Wahoo
2018	20	2	37	4
2019	13	1	1	1
2020	15	1	2	1
2021	12	3	64	3
2022	30	5	25	5
2023	13	2	53	2
Total	1638	71	683	56
Average	71	3	30	2

Source: USVI Division of Fish and Wildlife, 2023