Title: Testing innovative management strategies through a FWC Experimental Hot Spot Fleet off NE Florida to reduce red snapper/snapper grouper discards and improve angler satisfaction

Principal Investigators: Kristin Foss, Jessica McCawley, Christopher Sweetman, Beverly Sauls, Chelsey Crandall, Matthew Bunting, and Luiz Barbieri.

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Project Duration: 24 months. FWC proposes this project to begin on April 1, 2024, to allow funding to be available to start the Experimental Fleet in July 2024. FWC staff will need time to purchase supplies, contract out services, and set up the program once the award is given. After the first 12 months of the project, the FWC will work with NOAA Fisheries to consider any additional changes or improvements to this program, including potential funding opportunities and an updated EFP. See timeline section below for additional details on the first 12 months of data collection.

Project Synopsis

Red snapper is an iconic and popular fishery in Florida's waters. The fishery has been classified as overfished and undergoing overfishing for decades, but the recent assessment indicates record levels of abundance. High levels of recreational fishing effort combined with short fishing seasons have increased red snapper discard mortality, which is further exacerbated by the multi-species nature of the snapper grouper fishery. To this point, discard mortality is estimated to comprise a significant percentage of the total removals for red snapper. However, the magnitude of the number of discards is poorly understood and estimates tend to have large fluctuations from one time period to the next. Therefore, there is a clear need for alternative management strategies and for better catch and discard data to inform fisheries managers.

The goals of this project are to test management strategies in the center of abundance of the Atlantic red snapper fishery that may reduce red snapper discards and other snapper grouper species, ensure opportunities for sustainable harvest, and improve angler satisfaction, which align with multiple funding priorities. To this end, FWC aims to accomplish the following objectives: 1) Collaborate with recreational anglers to collect catch and discard data within the snapper grouper fishery; 2) Recruit anglers to test a snapper grouper aggregate bag limit and its impact on reducing the magnitude of discards; 3) Allow anglers recruited for this study to harvest red snapper outside of the federal season, accompanied by a mandatory reporting requirement and provisions for validation and proof of participation; 4) Develop a unique app to record information from participants; 5) Develop an education course required for all participants; and 6) Evaluate angler satisfaction through pre- and post-participation surveys.

To accomplish these goals, FWC will solicit applications from recreational anglers who will be entered into a lottery to participate in FWC's Hot Spot Fleet. 200 participants will be selected per quarter and randomly assigned to 1 of 2 experimental groups. All participants will be required to take an educational course, hail out/hail in on FWC Hot Spot Fleet trips, report all caught and discarded fish via FWC's app, take a pre- and post-participation angler satisfaction survey, and fish a maximum of 3 times per quarter. Participants assigned to the experimental treatment group will test a 15-fish snapper grouper aggregate bag limit, be required to stop bottom fishing once the aggregate bag limit has been reached and will be allowed to harvest 3

red snapper per trip outside of the federal season under an EFP. Other participants will be assigned to the control group and will follow current federal regulations (i.e., not required to abide by the 15-fish snapper grouper aggregate bag limit and not allowed to harvest red snapper outside of the federal season). Upon return to port from a Hot Spot Fleet trip, all participants will be required to submit catch and discard data within 48 hours through the FWC app and allow for additional data collection by FWC as needed. Specific to measuring angler satisfaction, FWC social scientists will conduct pre- and post-participation surveys to evaluate their satisfaction in the proposed program and gather feedback on project components. FWC anticipates the results of this study to simultaneously test a management strategy aimed at reducing snapper grouper discards by directly involving recreational anglers, collect near real-time catch and discard data from the recreational sector, and evaluate methods to improve angler satisfaction. All of these expected results will provide critical information needed for the management of red snapper and other snapper grouper species. The lead PI for this project is Kristin Foss, and the project team includes a suite of qualified fisheries scientists and managers with decades of research and management experience in the South Atlantic region.

Project Narrative

Background

Red snapper is an iconic fishery in the southeastern U.S. and one of the most well-known and popular fisheries in Florida's waters. South Atlantic red snapper has been classified as overfished and undergoing overfishing for decades (SEDAR-15 2008, SEDAR-24 2010, SEDAR-41 2017). This fishery has been in a rebuilding plan since 2011, and the stock is expected to be rebuilt by 2044. The most recent stock assessment completed in 2021 (SEDAR-73 2021) also indicates that the South Atlantic red snapper fishery continues to be overfished and experiencing overfishing. This status is primarily driven by the truncated age composition of the stock and high recreational discards. While the last stock assessment indicates record increased abundance of red snapper, the high levels of recreational fishing effort combined with short fishing seasons have increased discard mortality.

Discard mortality is a pervasive issue that impacts stock assessments and management of the South Atlantic snapper grouper complex, including red snapper. The snapper grouper complex includes 55 bottom- and reef-dwelling fish species, including some species that are neither snappers nor groupers (e.g., triggerfish and several jack species). In some cases, (e.g., red snapper) discard mortality is estimated to comprise a significant percentage of the total (discarded plus landed fish) removals. During a harvest closure for a given species, fish must be released if caught when fishing for a different, co-occurring species that may be legally harvested. Discard mortality is estimated to range between 28.75% and 31.07% (SEDAR-73 2021) for Atlantic red snapper; however, the magnitude of the number of discards is poorly understood. South Atlantic red snapper catch and effort are currently monitored through the federal Marine Recreational Information Program (MRIP); however, estimates of the magnitude of discarded Red Snapper generated by the survey suffer from low precision and large fluctuations from one sample period to the next. For example, during the first MRIP sampling wave in 2022, MRIP estimated more than 1.2 million red snapper were discarded from the east coast of Florida between January and February (with a c.v. of 0.73), which represents more

discarded fish than were estimated over the entire remainder of that year. Given this situation, FWC has taken measures to improve recreational fisheries data collection in Florida through implementation of a specialized survey called the State Reef Fish Survey (SRFS) that runs alongside the MRIP survey, with the goal of improving data collection for private recreational fishers harvesting certain reef fish species, including red snapper. The SRFS builds off the success of the Gulf Reef Fish Survey (GRFS) that was implemented in 2015 and ultimately led to the delegation of authority from NOAA Fisheries to FWC to manage the Gulf red snapper private recreational fishery in state and federal waters adjacent to Florida's Gulf coast. SRFS provides a focus of data collection on effort, catch, and discards of recreational anglers who harvest certain reef fish species from private vessels. SRFS focuses on 13 reef fish species, including red snapper, and provides more accurate and timely estimates of recreational harvest (monthly reporting) compared to MRIP (bimonthly reporting). SRFS also provides more accurate and precise estimates of recreational harvest compared to MRIP, largely because it is a specialized survey designed to target recreational participants in the reef fish fishery and the fishing effort portion of the survey has larger sample sizes, more sophisticated sample stratification, and a shorter recall period (one month).

Limited age or length information is available to characterize private recreational dead discards, which is problematic because that information is critical for stock assessment models to function reliably. Since discard data are self-reported by the vast majority of commercial and recreational fishermen, and discarded fish are not available for length or age sampling, the estimates of the magnitude and types of fished discarded are unvalidated and highly uncertain. Fisheries managers and scientists who have reviewed the recent stock assessment agree that the continued overfishing status of Atlantic red snapper is driven primarily by high recreational discards. To reduce discard mortality and help rebuild the red snapper fishery, all parties involved in red snapper management have taken management actions. First, in 2019, the Council approved Snapper Grouper Regulatory Amendment 29 that requires anglers fishing in South Atlantic federal waters to have a descending device rigged and ready when fishing for snapper grouper species. The purpose of this rule was to help increase the survival of released reef fish. Second, the Council has started a management strategy evaluation (MSE), scheduled to be completed in 2024, for the snapper grouper fishery to find possible management options to reduce the number of released fish. The MSE is a conceptual model that will evaluate multiple strategies to determine which management options are best suited to benefit the collective snapper grouper fishery and accomplish the goals of the Council (e.g., decreasing discards, increasing harvest). Third, in 2023, the Florida Fish and Wildlife Conservation Commission (FWC) implemented a requirement for private recreational anglers fishing for reef fish off a private vessel in state waters to possess a descending device or venting tool. Additionally, this regulation requires the appropriate use of such a tool/device only if releasing a reef fish that is exhibiting symptoms of barotrauma. Many fishers remain unaware of federal gear requirements and lack confidence in properly using descending devices and venting tools. Therefore, outreach and education are critical for generating fisher buy-in, proper use of barotrauma mitigation tools and increased regulatory compliance.

Maintaining sustainable fish populations while also ensuring public access to Florida's vital marine resources is a top priority of the FWC. The heart of the fishery for red snapper in the South Atlantic region lies between Georgia and northeastern Florida between 38°N and

28°N, though it is frequently targeted as far south as Port St. Lucie, Florida and is also caught infrequently off Dade and Monroe counties (Moe 1963, Mitchell et al. 2014, Sauls et al. 2017, Sauls and Corbett 2023). The current management system for red snapper in the South Atlantic utilizes traditional tools such as single-species bag limits, size limits and short fishing seasons to remain within the allowable catch levels, and to achieve the other goals and objectives outlined in the fishery management plan. However, the current management framework is clearly not working as the South Atlantic red snapper fishery remains in a Catch-22 of too few fishing opportunities and too many discards. As abundance increases and the population expands its range, there have been growing calls to increase harvest opportunities, although federal fishery managers are obligated to prevent overfishing while the stock continues to recover. The recreational sector is currently managed with a short harvest season that has ranged from 0-9 days since 2012. However, the truncated harvest season has led to more compressed fishing effort, which has been exacerbated by progressive reductions in the duration of the season as red snapper have become more abundant and more desirable to target. This has essentially created a derby-style fishery where anglers must compete for limited access at public launch facilities, space on for-hire vessels, and room to fish on crowded reefs. The most chronic impacts have been felt in Florida, which supports the highest number of recreational fishing trips taken in the entire county (NOAA Fisheries 2022). In the first several years that the recreational season was re-opened following a moratorium in 2010-2011, less than 1,500 private boat trips were estimated to target red snapper from Florida each day that the season was open; however, this value has more than doubled in recent years since the season has been reduced to just 1-2 weekends (Sauls and Corbett 2023).

Red snapper anglers have noted an increase in red snapper abundance in recent years and have been vocal with their frustration with the short fishing seasons. For the management of any stock to be effective, there must be stakeholder buy-in to a particular management approach and that has clearly been lacking for red snapper and other snapper grouper species for years. There are many factors that influence angler satisfaction on a given fishing trip, such as catch, harvest, access, and spending time on the water with family and friends (Birdsong et al. 2021; Gundelund et al. 2022; Young et al. 2020). There are also as many factors that contribute to angler satisfaction with the management process, such as age, experience, and personal management strategy preferences (Brinson and Wallmo 2017). To this point, studies of angler behavior revealed that the shorter seasons did not proportionally reduce catches, instead promoted “derby-style fishing” and worsened perceptions of angler dissatisfaction (Powers and Anson 2016; Farmer et al. 2020). Given the continued poor stock status and increasing dissatisfaction with the management of red snapper, Florida and the entire South Atlantic region has much to gain from alternative management strategies that better distribute recreational harvest opportunities for red snapper.

Single species management has been the primary approach for federal fishery managers. However, these traditional management measures in most instances no longer effectively work to prevent or end overfishing, rebuild stocks, and optimize yield in a multi-species fishery. Often, these measures, including reduced catch limits, closed seasons, lower bag and trip limits, and reduced size limits, exacerbate the discard issues by creating regulatory discards. Due to the multi-species nature of various fisheries in the southeastern U.S., the SAFMC has used aggregate bag limits since 1991 as a management tool for select species in the

southeastern U.S. to reduce pressure on similar species that are commonly caught together. In the South Atlantic, where the snapper grouper management complex includes 55 species, there are three aggregates: the grouper/tilefish aggregate, the snapper aggregate, and the South Atlantic snapper grouper combined aggregate. Aggregate bag limits are utilized as a management tool to spread harvest among the recreational sector, achieve target levels of spawning stock recruitment, and provide protection from overfishing. Given the poor stock status of several snapper grouper species based on recent stock assessments (red snapper-SEDAR 73 2021, snowy grouper -SEDAR 36 2013, gag grouper - SEDAR 71 2021, red porgy-SEDAR 60 2020), alternative management strategies that further treat the snapper grouper fishery as a multispecies fishery are warranted for evaluation. Therefore, as part of the management strategy to be tested alongside enhanced data collection for snapper grouper catch and discards, FWC is proposing to create a comprehensive snapper grouper aggregate limit as a way to continue to allow access to these important fisheries while also testing a strategy to reduce discards. As part of the proposed methodology explained in detail below, participants testing the snapper grouper aggregate limit will be required to stop bottom fishing once they have reached their limit, effectively reducing the magnitude of discard mortality on a suite of snapper grouper species.

Purpose and Goals/Objectives

Recreational discarding within the snapper grouper fishery, especially for red snapper, is one of the most challenging data collection and management issues within the southeastern U.S. The snapper grouper fishery is essentially a multi-species fishery, with anglers routinely catching and releasing multiple species managed with different recreational seasons and limits as they target fish that that are legal to harvest. As recreational fishing effort continues to increase, placing added pressure on fish stocks, it is critical to have a clear understanding of how this multi-species fishery operates to better inform the management of the snapper grouper complex. This is especially true for Atlantic red snapper, which routinely experiences high levels of regulatory discarding due to extremely short recreational harvest seasons. However, given the high degree of uncertainty around the magnitude of recreational discards, there is a clear need for improved data to support the evaluation of alternative management strategies that may help reduce discards. The goal of this project is to test alternative management strategies that may potentially reduce waste from discarding red snapper and other managed snapper grouper species, ensure ample opportunities to participate in sustainable harvest, and improve angler satisfaction. To this end, FWC aims to accomplish the following objectives:

1) Directly collaborate with the recreational sector and collect catch and discard information at a representative scale within the snapper grouper fishery;
2) Recruit anglers to test a snapper grouper aggregate bag limit, and compare with a control group to quantify the potential impact the alternative management strategy has on reducing the magnitude of regulatory discards;
3) Allow a select number of anglers recruited for this study to harvest red snapper outside of the federal season, accompanied by a mandatory reporting requirement and

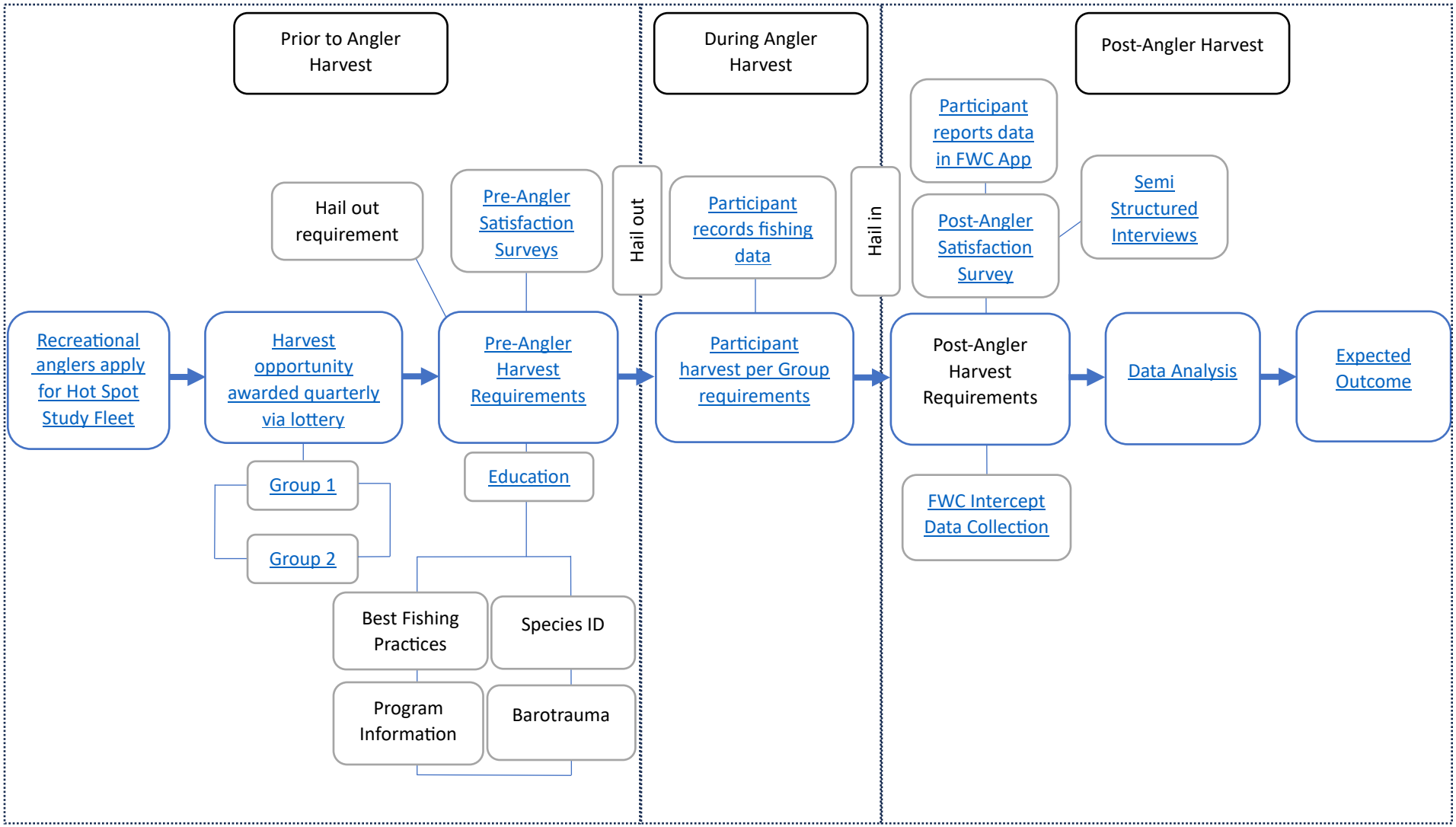
provisions for validation and proof of participation that could be used as a tool in the future;

4) Develop a unique app to record information from group participants;
5) Develop an education course required for all participants that highlights fish identification, best fishing practices, species identification, and methods to safely descend fish experiencing barotrauma; and
6) Evaluate angler satisfaction through pre- and post-participation surveys and semi-structured interviews.

This proposal also outlines FWC's plan to ensure adequate compliance tracking and fishery-dependent monitoring measures are in place and that harvest limits approved under the exempted fishing permit are not exceeded.

Project Methodology

Project Flow Chart



Project Location

The proposed project will be focused within the center of the Atlantic red snapper fishery, an area extending from the Florida/Georgia line south to Cape Canaveral (Figure 1). The boundary line for this proposal is north of Latitude 28°35.1' North in the Atlantic Ocean (due east of the NASA Vehicle Assembly Building, Cape Canaveral, FL), as illustrated in the map below. This project location will include state and federal waters, but it is expected that the majority of harvest and fishing effort will occur in federal waters. In 2022, 88% of red snapper harvested recreationally from the Atlantic coast of Florida were caught in this area (Sauls and Corbett 2023). Further, preliminary discard analyses conducted by the SEFSC indicated this area to be the 'hotspot' for red snapper fishing effort and discard mortality (SAFMC Regulatory Amendment 35 Data Report, September 2022). Because of this, additional data on catch and discards of red snapper and other snapper grouper species is clearly warranted in this 'hotspot' location. Additionally, an evaluation of alternative management strategies that simultaneously aims to reduce discards while also turning discards into landings within the 'hotspot' location would be most impactful to the Atlantic red snapper stock. FWC field offices are located throughout the region and are able to support the proposed project as needed for all data collection purposes.

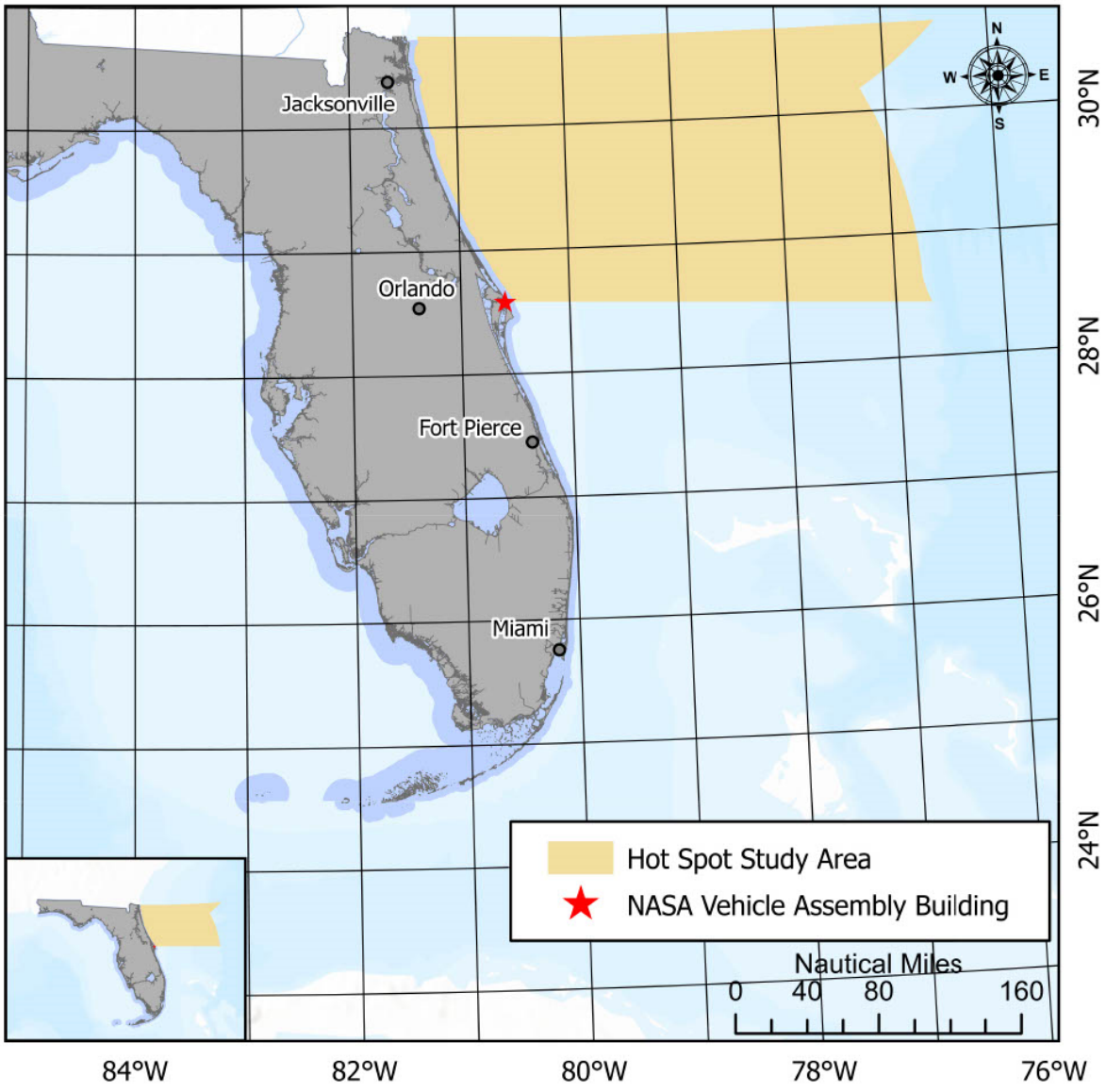


Figure 1: Map of project area.

Project Participants

This proposed project will focus on private recreational anglers fishing in the hotspot area outlined above. NOAA Fisheries estimates that approximately 97% of the dead releases of red snapper come from the recreational sector (private boat and charter boat). However, approximately 95% comes from the private boat fleet (SAFMC Regulatory Amendment 35 Data Report, September 2022). Therefore, FWC would like to focus efforts in this proposal on the recreational sector.

Snapper Grouper Aggregate Bag Limit Management Strategy

Current federal regulations in the South Atlantic provide anglers with an incentive to continue bottom fishing in order to catch daily bag limits for multiple species and groups within the snapper grouper complex. For example, anglers may harvest a maximum of 43-47 fish per day per person, depending on the time of year (Table 1). Under the alternative management strategy that FWC proposes to test during this study, anglers in the experimental treatment group would be permitted to harvest no more than 15 fish under a unique snapper grouper aggregate bag limit (see below) per person in state and federal waters. Aggregate bag limits are utilized as a management tool in the South Atlantic to spread out harvest among the recreational sector, achieve target levels of spawning stock recruitment, and provide protection from overfishing. The proposed overall aggregate limit ideally will cause anglers to hit their daily bag limit quicker, thus changing their behavior by forcing them to stop bottom fishing and potentially target other species. The proposed 15-fish snapper grouper aggregate is considerate of current stock status and catch limits for each species and is intended to test its effect on reducing discards and enhancing angler satisfaction across the entire snapper grouper fishery through a FWC Experimental Hot Spot Fleet described below.

During the Hot Spot Fleet fishing trip, each participant in the experimental treatment (i.e., Group 1) will fish for the 15-fish snapper grouper aggregate bag limit and will be able to retain up to 3 red snapper outside the federal season. Once the participant reaches the snapper grouper aggregate limit, **they must stop bottom fishing**. Participants may target other species such as coastal migratory pelagics and dolphinfish, but they will not be allowed to bottom fish for the remainder of the trip; therefore, minimizing their interaction with snapper grouper species. The expected outcome from such a management strategy would be a reduction in discards across many snapper grouper species, including red snapper.

The 15-fish snapper grouper aggregate proposed by FWC is as follows:

- Only 1 fish can be a gag, black, or scamp grouper
- Up to 2 fish can be red, yellowfin, yellowmouth, coney, graysby, red hind, or rock hind grouper
- Only 1 fish can be a red porgy, blueline tilefish, or golden tilefish
- Only 1 fish can be greater amberjack
- Up to 3 fish can be lesser amberjack, almaco jack, or banded rudderfish
- Up to 5 fish can be black sea bass
- Up to 5 fish can be gray triggerfish
- Up to 10 fish can be grunts
- Up to 10 fish can be Atlantic spadefish or bar jack
- Up to 10 fish can be porgies (red porgy excluded)
- Up to 10 can be schoolmaster, gray, lane, yellowtail, queen, silk, or blackfin snapper
- Up to 5 can be vermilion, cubera, or mutton snapper

Note: FWC is willing to modify the proposed aggregate bag limit in discussions with NOAA Fisheries.

Table 1. Maximum allowable recreational catch under current federal regulations as of November 17, 2023 and FWC's proposed snapper grouper aggregate bag limit. "Other sp." includes the species listed under the federal "South Atlantic snapper-grouper combined aggregate".

<table>
<tr><th>Bag limit per person</th><th>Jan-Mar</th><th>Apr</th><th>May-Jun</th><th>Jul-Aug</th><th>Sept</th><th>Oct-Dec</th></tr>
<tr><td>Current</td><td>44 fish, including:
1 golden tilefish
1 gr. amberjack
20 "other sp."
10 snapper
5 vermilion
7 black seabass</td><td>43 fish, including:
1 golden tilefish
20 "other sp."
10 snapper
5 vermilion
7 black seabass</td><td>47 fish, including:
3 grouper/tilefish
1 gr. Amberjack
1 red porgy
20 "other sp."
10 snapper
5 vermilion
7 black seabass</td><td colspan="3">46 fish, including:
3 grouper/tilefish
1 gr. amberjack
20 "other sp."
10 snapper
5 vermilion
7 black seabass</td></tr>
<tr><td rowspan="2">Proposed</td><td>15 fish, excluding:
Any grouper
Blueline tilefish
Red porgy</td><td>15 fish, excluding:
Any grouper
Blueline tilefish
Gr.amberjack
Red porgy</td><td>15 fish</td><td>15 fish, excluding:
Snowy grouper
Red porgy</td><td>15 fish, excluding:
Snowy grouper
Blueline tilefish
Red porgy</td><td>15 fish, excluding:
Snowy grouper
Blueline tilefish
Red porgy</td></tr>
<tr><td colspan="6"><u>15 fish aggregate bag limit</u>:
Only 1 fish can be a gag, black, or scamp grouper
Up to 2 fish can be red, yellowfin, yellowmouth, coney, graysby, red hind, or rock hind
Only 1 fish can be a red porgy, blueline tilefish, or golden tilefish
Only 1 fish can be greater amberjack
Up to 3 fish can be lesser amberjack, almaco jack, or banded rudderfish
Up to 5 fish can be black sea bass
Up to 5 fish can be gray triggerfish
Up to 10 fish can be grunts
Up to 10 fish can be Atlantic spadefish or bar jack
Up to 10 fish can be porgies (red porgy excluded)</td></tr>
</table>

	Up to 10 can be schoolmaster, gray, lane, yellowtail, queen, silk, or blackfin snapper Up to 5 can be vermilion, cubera, or mutton snapper

FWC Experimental Hot Spot Fleet

FWC proposes to create an Experimental Hot Spot Fleet, consisting of 2 experimental groups, to provide catch and discard data and test management strategies aimed at changing angler behavior and reducing discards of snapper grouper species, especially red snapper.

Eligibility

If selected in the lottery, participants must have a valid Florida recreational fishing license (or be exempt as per Chapter 379.353 F.S.) and sign up for the State Reef Fish Angler designation. Any private recreational angler that does not have a resource violation would be eligible to participate in the Experimental Hot Spot Fleet.

If selected the participants would need to agree to do the following:

- Willingness to go through a resource violation check,
- Fill out a logbook of data for the trip and then transferring this information to an app, within 48 hours of the conclusion of the trip,
- Retain a copy of the EFP on-board the vessel used for designated Experimental Fleet fishing trips,
- Have a valid Florida saltwater recreational fishing license (or be exempt) with a SRFS designation,
- Willingness to take the educational course before fishing in an experimental fleet trip,
- Willingness to take a pre- and post- participation survey and be interviewed by FWC staff after a trip,
- Willingness to work with FWC to determine which days will be fished during the quarter,
- Willingness to also do a hail out and hail in on those days in order for FWC staff to meet the vessel at the dock for sampling if needed,
- Willingness to submit to sampling of their catch by FWC biologists.

Lottery

A lottery will be used to select a total of 200 recreational anglers to participate each quarter (starting July 1, 2024). The application and lottery process will occur once every 3 months for the course of the project period. Participants would apply using the FWC's licensing system (Go Outdoors Florida). This system would be used to run the quarterly lottery to select participants. Selected participants would be screened for resource violations. Once checked for any violations, participants selected will then be randomly assigned to one of two groups. By agreeing to participate in the FWC Experimental Hot Spot Fleet, each participant will be required to have a Florida recreational fishing license (or be exempt) and sign up for State Reef Fish Survey as well as take an educational course aimed at reducing discard mortality of snapper grouper species. Participants selected for group 1 (n= 100, experimental group) will

test the 15-fish snapper grouper aggregate bag limit and be allowed to keep a bag limit of 3 red snapper during designated Experimental Fleet trips under conditions of an EFP. Participants selected for group 2 (n = 100, control group) that are not allowed to keep red snapper outside of the federal season will be given preference for selection in a future quarter if they abide by all requirements of the control group, such as taking the online educational course, filling out information about their trip, and taking the pre- and post-angler satisfaction surveys. If multiple participants are fishing together on a vessel, the vessel limit for red snapper with be limited to the number of participants multiplied by the bag limit. The requirements for this proposal will only be required on a maximum of three Hot Spot Fleet fishing trips per participant. Participants fishing outside of designated FWC Experimental Hot Spot Fleet fishing trips during their assigned quarter may fish as normal, following all applicable fishing regulations.

Hail Out/Hail In Requirement

Prior to taking an Experimental Hot Spot Fleet fishing trip, the selected participant must notify FWC 24 hours prior to a planned trip and report the date and state registration number of the vessel they intend to fish from in order to receive an authorization, which must be available to present to law enforcement if requested at-sea or at the dock. Selected participants can also elect to take their Experimental Hot Spot Fleet fishing trips on a for-hire vessel. Aboard that for-hire vessel, only participants who have been selected to participate in the program and declared they are taking a trip on the identified for-hire vessel can take red snapper (if in group 1). As the vessel with the participant onboard is returning to port, the participant must hail in and let FWC know the estimated time and location of arrival. Upon return to port, participants must report catch and discard information for all species that are interacted with via the FWC app, a dedicated FWC mobile smartphone/tablet app, within 48 hours after the date of the planned trip. Under this alternative management strategy, the participating anglers on the vessel must stop bottom fishing when the snapper grouper bag limit is reached, abide by all fishery regulations otherwise not exempted from this study, and complete a pre- and post-season survey conducted by FWC to evaluate angler satisfaction. Failure to abide by any of the rules within this proposal would result in dismissal from the program and removal from consideration for future lottery draws. The proposed FWC Experimental Hot Spot Fleet categories and associated regulations are as follows:

Group 1 – Experimental Treatment

100 people will be randomly assigned from the lottery pool and a maximum of 3 Experimental Hot Spot Fleet fishing trips targeting snapper grouper are allowed for each participant during each quarter. Anglers can choose the date/time of each trip within a quarter. During each Experimental Hot Spot Fleet fishing trip, participants are required to hail out and will be allowed to harvest 3 red snapper outside of the federal season under an Exempted Fishing Permit (EFP). Participants will be required to stop fishing for all snapper grouper species once they have reached the 15-fish snapper grouper aggregate bag limit. Anglers will be required to notify FWC when and where they plan to arrive at the dock. FWC has the right to sample the fish of the participant and interview the participant upon arrival at the dock. FWC staff will sample the catch of a subset of participants from this group. Within 48 hours of completion of a Hot Spot Fleet trip, participants are required to report the number, size, and

location, as well as other details, of all fish caught and discarded through the FWC app. As a convenience to facilitate real-time data collection study participants will be provided a waterproof, Rite in the Rain paper logbook to collect information while out on the water for placement in the app upon landing. A post trip satisfaction survey must also be completed by the participant following their final Hot Spot Fleet fishing trip of the quarter. Some of these participants may be selected for follow up interviews about angler satisfaction.

Group 2 – Control Treatment

100 people will be randomly assigned from the lottery pool and a maximum of 3 snapper grouper fishing trips are allowed for each participant during each quarter. This control group will allow FWC to evaluate whether any changes in the magnitude of discards or angler satisfaction observed in Group 1 are a result of the alternative harvest opportunity. Anglers can choose the date/time of each trip within a quarter. During each Hot Spot Fleet fishing trip, participants in Group 2 will **NOT** be allowed to harvest 3 red snapper per vessel outside of the federal season. Participants and all additional anglers with them on the vessel are **not** required to abide by the 15-fish snapper grouper aggregate bag limit and must abide by all other season and bag limits in effect at the time of the trip. Within 48 hours of completion of a Hot Spot Fleet trip, participants are required to report the number, size, and location of all fish caught and discarded through the FWC app. As a convenience to facilitate real-time data collection study participants will be provided a waterproof, Rite in the Rain paper logbook to collect information while out on the water for placement in the app upon landing. A post trip survey must also be completed by the participant following their final Hot Spot Fleet fishing trip of the quarter. Some of these participants may be selected for follow up interviews about angler satisfaction.

Participant Reporting Requirements

FWC will develop a customized, dedicated mobile smartphone/tablet app (for both iOS and Android mobile operational systems) designed specifically to address angler-based data collection for this project. Participants would be required to declare their intent to fish for snapper grouper species through the FWC mobile app no later than 24 hours prior to fishing. A vessel registration number must be provided at the time of declaration (necessary for the EFP and enforcement). Upon confirmation, a trip declaration number will be issued. This would be done through the same app. During the trip declaration the customer must provide:

- The date of the intended trip,
- The location where the trip will depart from and return to,
- An approximate departure time,
- Expected return time, and
- Accept an agreement to complete an in-person interview with an FWC Biologist, if one is present upon their return to the dock and allow them to inspect all harvested fish.

Participants in possession of red snapper must have a trip declaration number and will be required to provide this to Law Enforcement, if requested, either on or off the water, on the

date of the scheduled trip. Violators will be subject to a penalty for out of season harvest of red snapper and will be removed from the program.

Irrespective of the study group they are assigned to (i.e., experimental study groups 1 or 2), all FWC Hot Spot Experimental Fleet participants will be required to report data about their recent fishing trip within 48 hours of returning to port after their experimental fleet fishing trip. Each participant will receive a paper logbook to record information while fishing but will need to submit their catch and discard information through the FWC app after returning to port. If there is a technological error, participants may mail their data sheets to FWC, but may not declare another trip until the catch report is received.

Post-trip reporting requirements may include:

- Date of trip
- Vessel registration number (note: may need to identify these trips in MRIP and/or SRFS intercepts to avoid messing up those catch estimates)
- Location(s) and depth of fishing
- Number of additional anglers that were on board the vessel
- How long it took the participant to reach the snapper grouper aggregate bag limit
- Number of red snapper released while obtaining the SG bag limit and the size of each red snapper discarded
    - Number released alive
    - Number released dead or floating
- Other species discarded
    - Number released alive
    - Number released dead or floating
- Species composition and size of the fish kept in the SG bag limit

Dockside Validation and Catch Reporting

FWC Biologists will attempt to validate as many trips as possible during each quarter with a goal of 20% of trips validated. Biologists will arrive at a reported return location for a declared trip at the beginning of the expected return window to meet the fishing party when they arrive. Biologists will inspect all harvested fish, record the number retained by species, and collect biological data for select species (which may include lengths, weights, age structures, and genetic samples). A dockside interview will also be conducted to collect details on the trip (number of anglers, area fished, and time fished) and self-reported discards (numbers released by species, release condition, release methods used). If for any reason a vessel is not met by FWC Biologists during their expected return time, the customer will receive an alert through the FWC app notifying them that a catch report must be submitted within 48 hours. Even if no red snapper are harvested, the trip will still count towards the three Hot Spot Fleet fishing trips to eliminate potential incentive for anglers to report untruthfully.

Customers will not be eligible to declare another trip to harvest red snapper if they:

- Refuse the dockside interview,
- Do not allow an FWC Biologist to inspect all harvested fish, or

- Do not confirm the trip was taken and report harvested red snapper and other trip data within 48 hours

Education Requirement Description

Education is a vital component of the overall strategy to increase the survival of released reef fish and encourage best fishing practices for snapper grouper species. Outreach by the FWC and partners has been ongoing for many years, and FWC has experience implementing several required online training courses for anglers, including FWC's Shore-Based Shark Fishing and Skyway Fishing Pier educational courses. A required course for those participating in this proposal would help ensure the understanding of best fishing practices, species-identification, and proper use of descending devices. FWC staff will develop the education course with input from experienced anglers and conservation partners. The course will be available online through the FWC website for participants. Course content will promote best fishing practices, educate anglers on strategies to reduce discard release mortality, and teach species identification. Anglers will be required to have proof of course completion prior to fishing during their assigned quarter and group.

Implementation of this educational course will provide valuable information for partners across the Gulf and South Atlantic and will be helpful in the development of any future required trainings, such as for South Atlantic Council's Amendment 46.

Angler Satisfaction

One of the primary goals of this proposal is to explore how to improve angler satisfaction amongst the private recreational fishing community participating in the snapper grouper fishery. Specifically, two of the proposal's objectives focus on 1) directly involving private recreational anglers and 2) evaluating their satisfaction with the program and current management structure, which align with NOAA Fisheries' Program Priorities for this funding opportunity. It is essential to understand anglers' satisfaction with current red snapper populations and management compared to the alternative management strategies presented in this proposal. As such, FWC's Conservation Social Science Program, with a team of dedicated social scientists, will lead this part of the proposal.

Pre-and Post-Participation Survey

One the main objectives of this proposal and a top priority for NOAA's Notice of Federal Funding is to evaluate angler satisfaction when fishing for red snapper. This proposal aims to evaluate angler satisfaction through multiple ways including satisfaction questionnaires and semi-structured interviews.

A survey questionnaire will be developed to capture angler satisfaction prior to and after participation in the project. This will be required of all participants in both groups in this study at the start of and at the end of the quarter. The angler will receive a notification through the FWC app requesting them to complete the satisfaction survey. The pre-survey will include questions to characterize participants (e.g., demographics, past fishing experience, etc.) and their satisfaction with the red snapper fishery (e.g., regulations, stock health, etc.). The post-survey will include questions about their experiences in the program to gather feedback on

project components, such how the snapper grouper aggregate bag limit compared to current management strategies, how effective the aggregate bag limit was at reducing discards, and how it impacted their fishing experience. Additionally, feedback will be gathered on other project components, such as the educational training course and dockside intercept survey. Satisfaction questions will be repeated in the pre- and post-surveys, which will allow us to quantify any changes in satisfaction over time. There are many factors that contribute to angler satisfaction or dissatisfaction (e.g., Birdsong et al. 2021); comparison with the control group will allow us to identify whether any changes observed here are due to the different fishing treatments.

Semi-Structured Interviews

In addition, a randomly selected subset of participants in each group will be invited to participate in semi-structured interviews. This will allow an in-depth understanding of their experiences fishing each treatment, gather additional feedback about components of the project, and compliment the survey to help in understanding their satisfaction with their fishing experiences and with management.

Selected participants will be invited to participate in an in-person or telephone interview, to be scheduled at their convenience. The semi-structured interview questions will cover details about their experience in the program, their satisfaction with their fishing and with management, and request any feedback about the program and its components. Interviews will be recorded when possible (with permission of participants) and transcribed; when recording is not possible, in-depth notes will be taken.

Participant Engagement

Contributing to science and conservation have been found to be important motivations for voluntary angler data collection program participants (Crandall et al. 2018), and the clearest factor associated with voluntary angler data program success is the frequency of contact between program staff and participants (Cooke et al. 2000), with regular contact and feedback/reports associated with volunteer scientist retention (e.g., Lewandowski and Specht 2015). Throughout the program, FWC staff plans to engage with participants as described in the Outreach Strategy below, to not only ensure they are following the program's requirements, but to help the participants understand they are critical part of this research project. The information provided by participants will provide valuable insight into snapper grouper catch and discard composition, anglers' fishing behavior, and angler's overall satisfaction with the fishery and current/proposed management measures. To further encourage participants to submit their required catch reports after each trip, they will be eligible to receive potential incentives, such as circle hooks, dehookers/lip grips, custom dry fit shirt, etc. If participants have submitted all three trip reports within their quarter, they will be entered into a randomly selected drawing for fishing gear items such as fishing reels and ice coolers.

Data Analysis

Catch Analysis

Catch rates for harvested and released fish from trips that were self-reported through the FWC app and not validated will be compared with trips that FWC biologists were able to

intercept at the dock to directly observe harvested fish and interview the angler in person about their discarded catch. Statistical tests will be used to detect significant differences in the types of species and mean numbers of fish by species harvested or discarded across the two data collection methods (self-reported versus in-person interviews). Differences in the types of species reported could indicate issues with misidentification or common name nomenclature in self-reported data. Differences in mean numbers of fish would be an indication of recall bias or inaccurate reporting.

Catch rates for harvested and released fish will also be compared among the experimental and control treatment groups to evaluate the effectiveness of the 15-fish snapper grouper aggregate bag limit for reducing discards of red snapper and other snapper grouper species. Statistical tests will be used to detect significant differences in the types of species and mean numbers of fish by species harvested or discarded across the two treatment groups.

Angler Satisfaction Analysis

The software SPSS will be used to analyze the quantitative pre- and post-survey data, which will include generating descriptive statistics and testing for significant differences between the pre-and post-survey satisfaction measures.

An inductive thematic analysis will be used to analyze the interview data using the software MaxQDA. Codes will be generated from the data and then grouped into broader themes. Trustworthiness (the qualitative equivalent of validity and reliability) measures will include using a second coder in the dataset and, if possible, member checks with participants.

Description of Species to be Harvested

The federal snapper grouper complex includes the following harvestable species: Greater amberjack, lesser amberjack, black grouper, coney grouper, gag grouper, graysby grouper, misty grouper, red grouper, red hind grouper, rock hind grouper, scamp grouper, snowy grouper, wreckfish, yellowedge grouper, yellowfin grouper, yellowmouth grouper, cottonwick grunt, margate grunt, sailors choice grunt, tomtate grunt, white grunt, hogfish, almaco jack, bar jack, jolthead porgy, knobbed porgy, longspine porgy, red porgy, saucereye porgy, scup porgy, whitebone porgy, banded rudderfish, bank sea bass, black sea bass, rock sea bass, blackfin snapper, cubera snapper, gray snapper, lane snapper, mutton snapper, queen snapper, red snapper, silk snapper, vermillion snapper, yellowtail snapper, blueline tilefish, golden tilefish, sand tilefish, gray triggerfish, and ocean triggerfish. Within the proposed program and in addition to snapper grouper species listed above, anglers would also be able to harvest other species (e.g., coastal migratory pelagics, dolphinfish, etc.) within the current South Atlantic regulatory limits. Should a regulatory closure occur for any species (other than red snapper), participants will be prohibited to harvest those species. An exemption will be made for red snapper to allow for harvest outside of the federal fishing season. Harvest of red snapper outside of the federal season would require an Exempted Fishing Permit (see section below). No additional impacts on the environment, including impacts on fisheries, marine mammals, threatened or endangered species, and essential fish habitat are expected. Depending on the experimental group each participant is assigned to, on a per trip basis each participant will have harvest limits that are either the standard bag/vessel limits for each

snapper grouper species (i.e., control group) or will be required to stop bottom fishing once the snapper grouper aggregate bag limit has been reached. A description of the snapper grouper aggregate can be found above. Specific to each experimental group, the maximum number of red snapper allowed to be harvested in a given year is as follows:

Group 1

- Number of participants in 1 year: 400
- Red snapper: 3,600 landed over 1,200 angler trips in 1 year (EFP required for all participants)
- Participants will be required to stop fishing for all snapper grouper species once the proposed 15-fish snapper grouper aggregate bag limit is met.

Group 2

- Number of participants in 1 year: 400
- Red snapper: No harvest allowed outside of federal season
- Participants will fish as they normally would under current regulations. Participants are **not** required to abide by the proposed 15-fish snapper grouper aggregate bag limit.

Timeline

The figure below (Figure 2) outlines the proposed timeline over a 12-month sampling period (July 2024-June 2025).

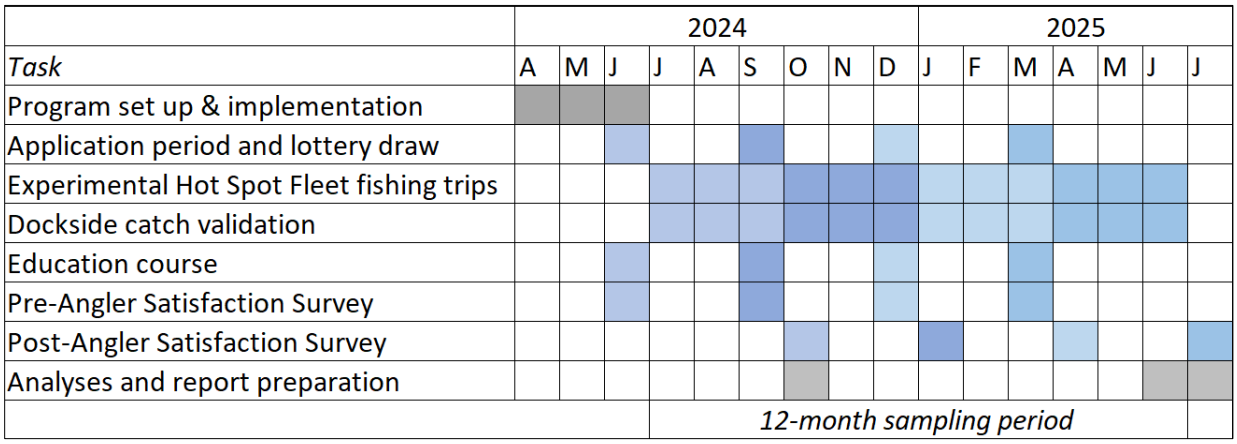


Figure 2. FWC's Experimental Hotspot Fleet Proposal Timeline. The different colors represent the Hot Spot Experimental Fleet quarters over a 12-month period. For example, 1st blue color = 1st quarter fleet, 2nd blue = 2nd quarter fleet, etc.

Expected Outcome

FWC anticipates the results of this study to simultaneously test a management strategy aimed at reducing snapper grouper discards by directly involving recreational anglers, collect catch and discard data from the recreational sector, and evaluate methods to improve angler satisfaction. All of these expected results would provide critical information needed for

management of the snapper grouper fishery, especially red snapper in the South Atlantic, which strongly aligns with NOAA Fisheries' program priorities for this funding opportunity.

Specifically, we expect to have a better understanding of catch composition (harvested and discards) for the South Atlantic snapper grouper fisheries, especially red snapper year-round. Critical information on discards, including spatial, depth, and temporal distribution rates, will provide necessary information to inform future management measures and stock assessments, including the upcoming SEDAR 90 Red Snapper Research Track and Operational Assessments.

Another expected outcome is insight into angler behavior and satisfaction. We will be able to evaluate whether angler satisfaction was improved under the experimental management strategy or current management through pre-and post-angler satisfaction surveys. The semi-structured interviews allow us to understand the anglers' experience in the program, satisfaction with their fishing, and with management. Additionally, through the educational requirement, we will gain understanding of how implementing a mandatory education requirement on a broader scale might work. Feedback on the proposal's educational training course will be used to refine course delivery and content, as well as provide a foundation for future state and federal partners to implement a similar training system.

Information will also be gained from usage of the FWC app for hail out and hail in purposes as well as reporting catch information. Mandatory reporting by recreational anglers is not currently part of the management system. This app usage will provide insight into how this might work on a broader scale if used across a large fishery. We will report on how this works, what challenges were encountered, and how people liked using the app.

Lastly, the information gained from this project will help inform future management decisions including the South Atlantic Council's Recreational Snapper Grouper Management Strategy Evaluation, Amendment 46 on Private Recreational Reporting, and any future potential recreational education requirement. Ultimately, angler awareness and participation in the program through effective engagement, outreach efforts, and the educational requirement, will help lead to enhanced angler satisfaction.

Additional deliverables may include peer-reviewed publications, presentations at scientific conferences, presentations to the South Atlantic Fishery Management Council and their Science and Statistical Committee.

Exempted Fishing Permit

This proposal will require an Exempted Fishing Permit (EFP) to allow recreational harvest of red snapper outside the current bag and season limits in Atlantic federal waters. Specifically, participants selected for the proposed program would be allowed to harvest 3 red snapper outside of the federal red snapper recreational fishing season during designated FWC Experimental Hot Spot Fleet fishing trips (with a maximum of 3 trips per angler per quarter). The duration of the proposed project where an EFP would be needed is from June 2024 through July 2025. The purpose of this EFP is to allow FWC to test alternative management strategies that may potentially reduce waste from discarding red snapper and other managed snapper grouper species, ensure ample opportunities to participate in sustainable harvest, and improve angler satisfaction. The goals of the proposed activities for which an EFP is needed are as

follows: 1) Directly collaborate with the recreational sector and collect catch and discard information at a representative scale within the snapper grouper fishery; 2) Recruit anglers to test a snapper grouper aggregate bag limit, and compare with a control group to quantify the potential impact the alternative management strategy has on reducing the magnitude of regulatory discards; 3) Allow a select number of anglers recruited for this study to harvest red snapper outside of the federal season, accompanied by a mandatory reporting requirement and provisions for validation and proof of participation that could be used as a tool in the future; 4) Develop a unique app to record information from group participants; 5) Develop an education course required for all participants that highlights fish identification, best fishing practices, species identification, and methods to safely descend fish experiencing barotrauma; and 6) Evaluate angler satisfaction through pre- and post-participation surveys and semi-structured interviews. In order to carry out the goals of the described project, which are aimed at reducing discards and obtaining better recreational catch and discard data, an EFP is needed. Across the entire duration of the proposed study, a maximum of 3,600 Atlantic red snapper would be harvested on designated Experimental Hot Spot Fleet trips by hook and line gear. This EFP would exempt anglers participating in FWC's Experimental Hot Spot Fleet from the following regulations:

- Recreational bag limit for red snapper at 50 CFR §622.187(b)(9)
- Recreational season closure for red snapper at 50 CFR §622.183(b)(5)(i)

FWC will require all participants of the Experimental Hot Spot Fleet to hold a valid saltwater recreational fishing license issued by the State of Florida (or are exempt) and have declared themselves a State Reef Fish Survey angler. This EFP will only apply to recreational anglers who apply and are selected to be a part of the FWC Experimental Hot Spot Fleet. Therefore, FWC will be able to account for and provide NOAA Fisheries with a list of participants (e.g., state license, registration of each vessel and vessel name during designated fishing trips, name of participants and contact information, etc.) to be covered under the EFP as soon as the information is available and before operations begin under the EFP. Additionally, FWC will be able to provide other required information like approximate time and places fishing will occur. Once the proposed project is complete, FWC can provide the exact number of red snapper that were harvested and exempt current regulations, but 3,600 would be the maximum number.

Contact information for the Principal Investigator, who is also the point of contact for this EFP application, are as follows: Kristin Foss, Florida Fish and Wildlife Conservation Commission, 1875 Orange Avenue East, Tallahassee, FL 32311; phone: (850) 508-8487; email: Kristin.Foss@MyFWC.com.

Outreach Strategy

FWC has a dedicated Outreach and Education Team who will develop and implement a comprehensive outreach strategy to help ensure the effectiveness of this proposal in its entirety. Stakeholder understanding and support is essential to the success of this program. An

initial outreach campaign will be conducted to raise awareness about the study's purpose and goals, and to invite stakeholders to apply to participate. This initial campaign may include emails to State Reef Fish Anglers who reside on the Atlantic coast, social media posts that will be specifically targeted to the east coast of Florida, a press release to media outlets, and direct communications with FWC partners, including nonprofits and fishing clubs. This strategy will help create a large, diverse pool of applicants.

Once the program participants have been selected, FWC staff will directly engage with the participants to ensure compliance with program requirements and to emphasize the importance of their efforts and the valuable contributions they are providing to the study. This will be accomplished through several engagement approaches. Participants will be notified they have been selected to participate through email. Upon accepting the opportunity to participate, a welcome packet may be mailed to each participant that will include a brief introduction to the study including the proposal's requirements, such as harvest opportunities, restrictions, and data reporting requirements, in addition to FWC contact information, guidelines for best fishing practices, a program decal, and information on participation incentives. The welcome packet may also be provided electronically through email with an accompanying video introducing the topics in the packet. FWC staff will record a welcome video that will introduce participants to the study, review data recording procedures, and study protocols that will be emailed to participants and posted online so participants can review at their convenience. Additionally, the required Online Education Training, outlined previously, will ensure the understanding of best fishing practices, species-identification, and proper use of descending devices for this proposal. The FWC Outreach and Education Team will develop the education course with input from experienced anglers and conservation partners.

Participants may also be emailed periodically during their selected quarter, reminding them to submit their catch reports after each trip to receive incentives. These emails may include select photos of participants and their catches, recognizing individuals who have been actively participating. The FWC may also develop a webpage to provide program updates to participants and frequently asked questions.

Once the project concludes, a second outreach campaign may be implemented, mirroring the strategy of the initial campaign by utilizing email listservs, social media platforms, press releases, and partners to disseminate the results of the study. Additionally, participants who submitted all their catch data will be entered into random-selected drawings to win fishing gear and other notable prizes. The FWC will also provide an electronic final report to all participants and will mail a signed thank you letter and recognition certificate from FWC's Division of Marine Fisheries Management Director.

Data Management Plan

Overview

All data will be managed in accordance with the FWC Technology Blueprint and standards for applications developed or maintained by vendors, staff, or consultants employed by or contracted with FWC.

Application System and Lottery

The Florida Fish and Wildlife Conservation Commission presently maintains a licensing application system and lottery system related to limited-harvest programs, such as FWC's statewide alligator hunt permit and goliath grouper limited harvest program. Upon request, FWC can provide a file to NOAA Fisheries with all applications submitted for this Experimental Hot Spot Fleet.

Recreational catch and discard data

Dockside validation data will be stored electronically using existing data entry programs utilized for angler interviews and biological samples throughout the state. All data will be stored on a central server for Structured Query Language and backed up at regular intervals. Prior to data entry, the field coordinator will review all field forms and communicate with field staff regarding any recording errors or missing fields the need to be completed. Field staff will manually enter their own data and once completed the coordinator will work with field staff to proof the electronic data for errors. Once proofing is completed, data will be corrected as needed and final QA/QC checks will be performed by the field coordinator and marked as complete. Once this is done the data will be marked as final and locked down for posterior analysis.

Data reported by participating anglers through the FWC app developed for this project will be uploaded to a central database stored on a central server and backed up daily at regular intervals. Relational data tables will be used to link participant profiles, declared trips, and self-reported trip and catch data. Dockside validation data will include unique identifiers that will allow data to be matched to individual trips reported through the app.

Pre- and Post-Season Survey Data

The survey data will be collected using the SurveyMonkey software. Once downloaded, the data will be stored in a database on FWC state computers and in the FWC cloud, as will all interview recordings, transcriptions, and codes/themes. All respondents will be assigned a code number, and any personal identifiers will be removed from each dataset.

Performance Reports and Data Sharing

Performance and financial reports will be submitted semi-annually and will include progress made on identified goals. Reports will be submitted no later than 30 days following the end of each 6-month period from the start date of the reward. Also, FWC will submit a final performance report no later than 120 days after the project end date.

As a state institution, FWC abides by Florida Sunshine Law. This law provides that any records made or received by any public agency in the course of its official business are available for inspection unless specifically exempted by the Florida Legislature.

Enforcement

Participants will be required to carry certain materials during the FWC Experimental Hot Spot fishing trips to aid with enforcement. In addition to their recreational fishing license and State Reef Fish Designation, participants will be required to have a copy of their certificate for completing the educational course, documents showing they are a part of the Experimental Fleet, and any required EFP documents. FWC staff may provide educational materials and

regular updates for FWC Law Enforcement to ensure they are familiar with the program's requirements and exemptions from current federal regulations. Additionally, program materials, including a list of participants per quarter, may be available to FWC Law Enforcement and enforcement partners.

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