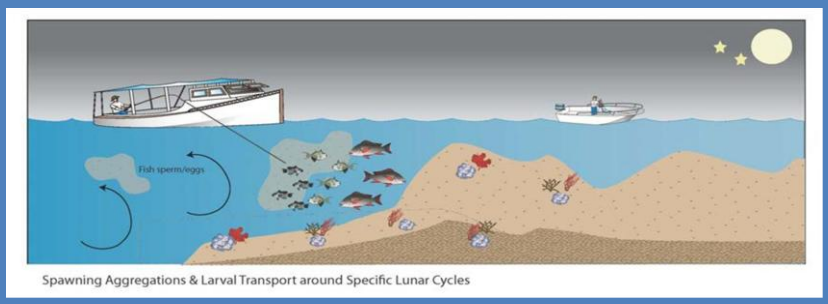
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Spawning Aggregations & Larval Transport around Specific Lunar Cycles

# Regulatory Amendment 39

## to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region

## Modifying the sunset provision for South Atlantic Spawning Special Management Zones

**Regulatory Impact Review | Regulatory Flexibility Analysis | Fishery Impact Statement**

**December 2026 Draft**

South Atlantic Fishery Management Council
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Award Number FNA15NMF4410010

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# Chapter 1. Introduction

## 1.1 What action is being proposed in this framework amendment?

The action in Regulatory Amendment 39 to the Fishery Management Plan FMP for the Snapper Grouper Fishery of the South Atlantic Region Snapper Grouper FMP would modify the sunset provision for the Cape Lookout, Devil's Hole/Georgetown Hole (Georgetown Hole), and Warsaw Hole/50 Fathom Hole (Warsaw Hole) spawning special management zones (SSMZ).

***South Atlantic Fishery Management Council***

- Responsible for conservation and management of fish stocks in the South Atlantic Region.
- Consists of 13 voting members and 4 non-voting members; voting members include 1 representative from each of the 4 South Atlantic state fishery management agencies, 8 members appointed by the Secretary of Commerce, and the Southeast Regional Administrator of NMFS.
- Responsible for developing fishery management plans and amendments under the Magnuson-Stevens Act; recommends actions to NMFS for implementation.
- Management area is from 3 to 200 nautical miles off the coasts of North Carolina, South Carolina, Georgia, and east Florida through Key West, except for Mackerel which is from New York to Florida, and Dolphin-Wahoo, which is from Maine to Florida.

## 1.2 Why is the South Atlantic Council Considering Action?

A SSMZ is a designated area with habitat characteristics, bottom topography, and currents that provide important habitat for spawning snapper grouper species. In a SSMZ, fishing for or retention of snapper grouper species would be prohibited and certain other activities (types of fishing, anchoring, etc.) would be restricted. Snapper Grouper Amendment 36 (SAFMC 2016) established five SSMZs: South Cape Lookout (North Carolina), Georgetown Hole (South Carolina), Area 51 (South Carolina), Area 53 (South Carolina), and Warsaw Hole (Florida). In addition, the amendment established a 10-year sunset provision for all SSMZs established with the exception of Area 51 and 53. The SSMZs were established to protect spawning fish and their habitat, aiming to increase recruitment of juvenile fish. The areas were chosen based on feedback from the South Atlantic Council's (Council) Marine Protected Area Expert Working Group and extensive public input from fishermen and other experts. Georgetown Hole and Warsaw Hole are also referred to as Devil's Hole and 50 Fathom Hole, respectively. For this amendment, those SSMZs will be referred to as Georgetown Hole and Warsaw Hole.

In addition, Amendment 36 included a System Management Plan for Spawning Special Management Zones report that serves as a framework for monitoring, research, outreach, administration, and evaluation of these zones, which aim to protect critical spawning habitats for snapper and grouper species. The Council also developed the System Management Plan

Workgroup. The workgroup helps the Council to evaluate protected areas based on biological protection, social and economic impacts, and compliance. The group recommends changes or modifications in the shape, location, and size of the protected areas.

Snapper Grouper Regulatory Amendment 39 will consider modifying the sunset provisions for the South Cape Lookout, Georgetown Hole, and Warsaw Hole SSMZs, considering the System Management Plan Workgroup's evaluation of the SSMZs.

## 1.3. Purpose and Need

The ***purpose*** of this framework amendment is to examine the current spawning protections provided by the established South Cape Lookout, Georgetown Hole/Devil's Hole, and Warsaw Hole/50 Fathom Hole spawning special management zones and modify the sunset provisions to allow for continued protection, research, and monitoring to occur within the areas.

The ***need*** for this framework amendment is to continue to protect spawning fish and spawning habitat in the established spawning special management zones and allow for continued research and monitoring within these areas which would contribute to achieving optimum yield and providing positive social and economic effects for snapper grouper fishermen and fishing communities.

## 1.4. Action

**Action 1.** Modify the sunset provision for the South Cape Lookout, Georgetown Hole, and Warsaw Hole spawning special management zones.

> **Option 1 (No Action).** The South Cape Lookout, Georgetown Hole, and Warsaw Hole spawning special management zones have a sunset provision of 10 years, with the management zone automatically expiring on August 2, 2027.
>
> **Option 2.** Extend the sunset provision for the South Cape Lookout, Georgetown Hole, and Warsaw Hole spawning special management zone by **7 years**, starting August 3, 2027, and ending August 2, 2034.
>
> **Preferred Option 3.** Extend the sunset provision for the South Cape Lookout, Georgetown Hole, and Warsaw Hole spawning special management zones by **10 years**, starting August 3, 2027, and ending August 2, 2037.
>
> **Option 4.** Extend the sunset provision for the South Cape Lookout, Georgetown Hole, and Warsaw Hole spawning special management zones by **20 years**, starting August 3, 2027, and ending August 2, 2047.
>
> **Option 5.** Remove the sunset provision for the South Cape Lookout, Georgetown Hole, and Warsaw Hole spawning special management zones. Removing the sunset provision would retain the South Cape Lookout, Georgetown Hole, and Warsaw Hole spawning special management zones and their applicable regulations, until further action is taken.

***NOTE:*** *The Georgetown Hole SSMZ is also referred to as Devil's Hole, each name refers to the same area with the coordinates in Table 1.4.1. The Code of Federal Regulations (50 CFR 622.183(a)(2)(iii)) refers to both names, however for the purpose of this amendment it will be referred to as Georgetown Hole. The Warsaw Hole SSMZ is also referred to as the 50 Fathom Hole, each name refers to the same area with the coordinates in Table 1.4.1. The Code of Federal Regulations (50 CFR 622.183(a)(2)(vi)) refers to both names, however for the purpose of this amendment it will be referred to as Warsaw Hole.*

Table 1.4.1. The coordinates of the South Cape Lookout**, Georgetown Hole, and Warsaw Hole** spawning special management zone**s**.

| **South Cape Lookout (North Carolina)** | | |
|---|---|---|
| **Point** | **North Latitude** | **West Longitude** |
| A | 33°53.040′ | 76°28.617′ |
| B | 33°52.019′ | 76°27.798′ |
| C | 33°49.946′ | 76°30.627′ |
| D | 33°51.041′ | 76°31.424′ |
| A | 33°53.040′ | 76°28.617′ |
| **Georgetown Hole (South Carolina)** | | |
| **Point** | **North Latitude** | **West Longitude** |
| A | 32°34.311′ | 78°34.996′ |
| B | 32°34.311′ | 78°33.220′ |
| C | 32°32.748′ | 78°33.220′ |
| D | 32°32.748′ | 78°34.996′ |
| A | 32°34.311′ | 78°34.996′ |
| **Warsaw Hole (Florida)** | | |
| **Point** | **North Latitude** | **West Longitude** |
| A | 24°22.277′ | 82°20.417′ |
| B | 24°22.277′ | 82°18.215′ |
| C | 24°20.932′ | 82°18.215′ |
| D | 24°20.932′ | 82°20.417′ |
| A | 24°22.277′ | 82°20.417′ |

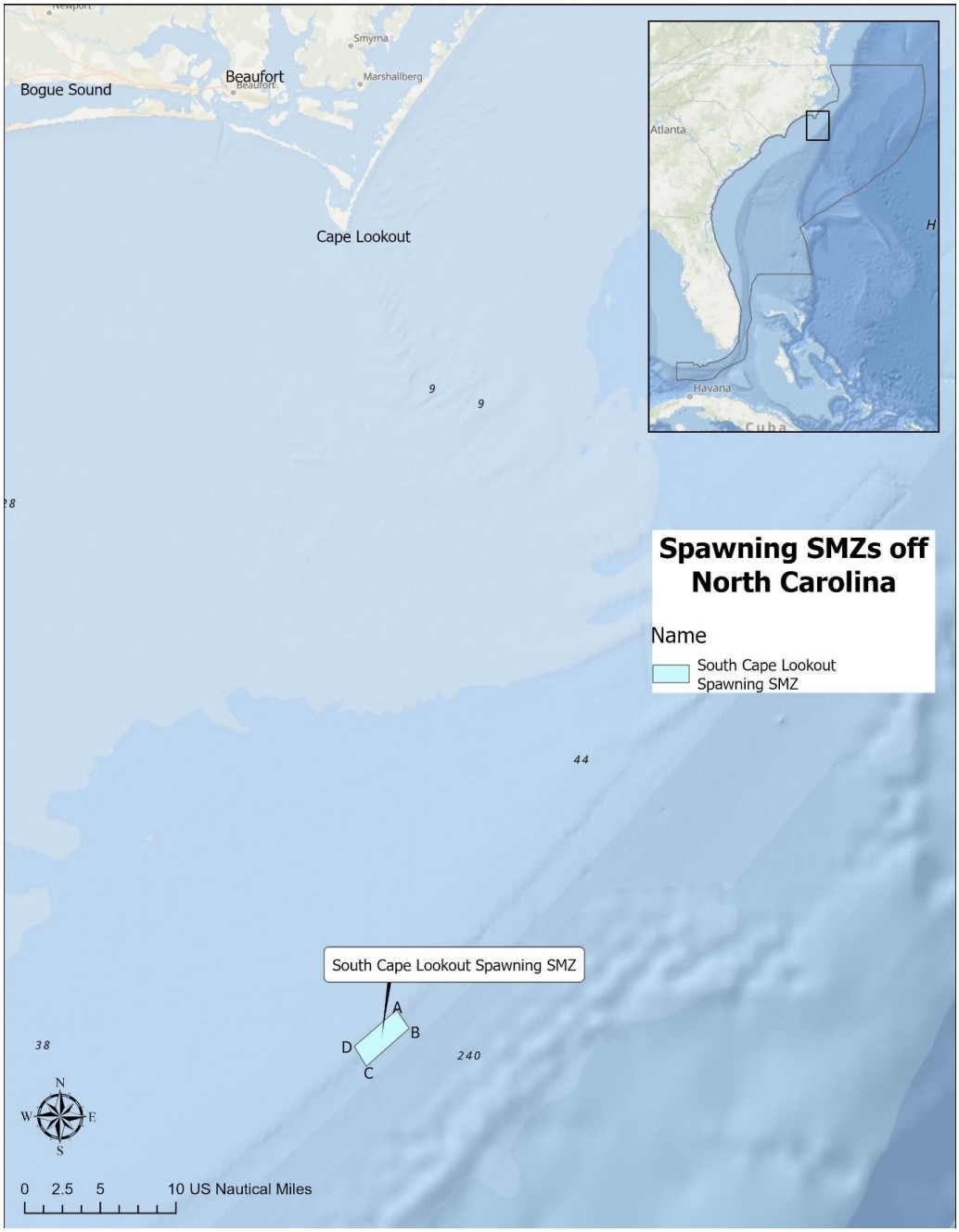



**Figure 1.4.1.** The location of the South Cape Lookout spawning special management zone. The letters on the corners of the SSMZ locations refer to the coordinates from Table 1.4.1.

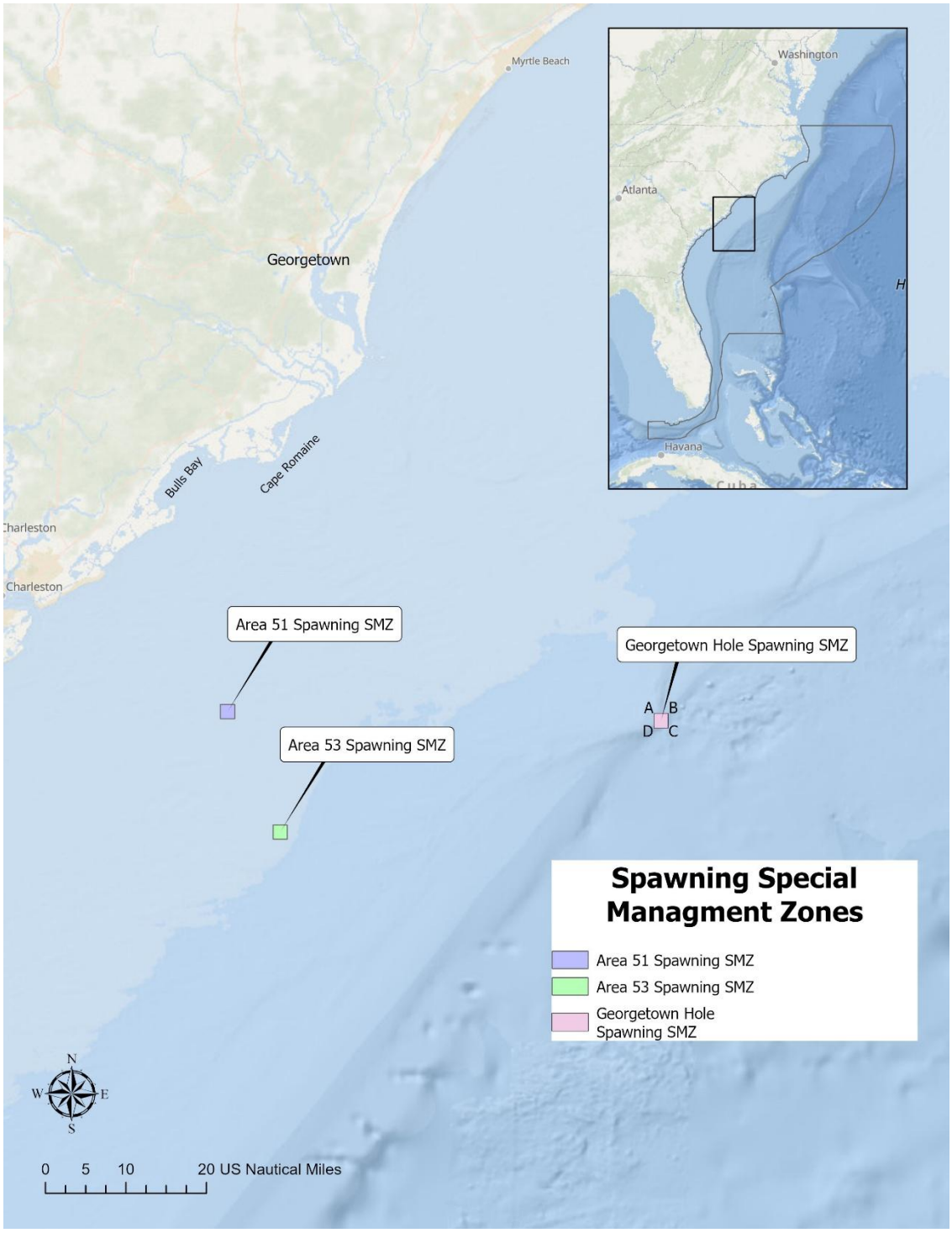



**Figure 1.4.2.** The location of the Devil's Hole/Georgetown Hole, Area 51, and Area 53 SSMZs. Note that Area 51 and Area 53 do not have sunset provisions and are not being considered in this action. The letters on the corners of the SSMZ location refer to the coordinates in Table 1.4.1.

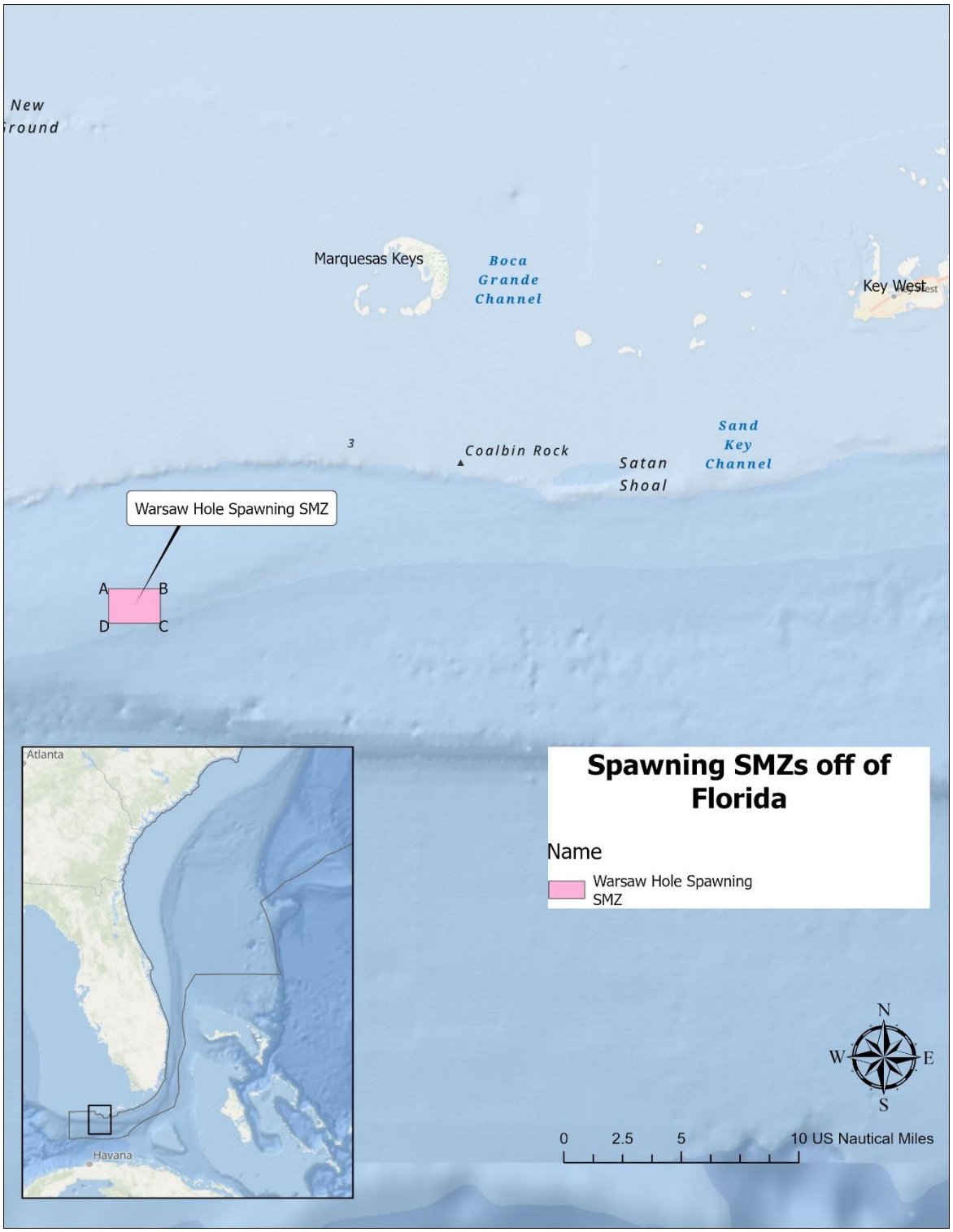



**Figure 1.4.3.** The location of the Warsaw Hole SSMZ. The letters on the corners of the SSMZ locations refer to the coordinates in Table 1.4.1.

## 1.5 Effects of the Actions

### 1.5.1. Biological Effects

Habitat protection associated with the sunset provision depends on the option chosen. The longer the sunset period for the SSMZs, the greater the beneficial effects to the fish stocks. **Option 1 (No Action)** for all three actions would not modify the sunset provision for any of the SSMZs. The sunset provision was developed through Snapper Grouper Amendment 36 and will expire on August 2, 2027. If the sunset provision expires the SSMZ and its current management measure will no longer apply. **Options 2, 3,** and **4** for each action would extend the sunset provision by 7, 10, and 20 years, respectively. **Option 5** for each action would remove the sunset provision from the SSMZs. Removing the sunset provision would retain the SSMZs and their applicable regulations without expiration, until further action is taken to modify the SSMZs. Based on the length of time the SSMZs would be in place, the beneficial biological effects are highest under **Option 5** and decrease sequentially though **Option 4**, **Option 3**, and **Option 2**, reaching the lowest level under **Option 1 (No Action)**.

***South Cape Lookout***

The focal species for this SSMZ are red grouper (*Epinephelus morio*) and greater amberjack (*Seriola dumerili*). Research conducted by The Nature Conservancy, South Carolina Department of Natural Resources, and LGL Ecological Research Associates[1] within the SSMZ indicated high densities of vermilion snapper (*Rhomboplites aurorubens*) which could be related to spawning activity. Researchers also noted that within the SSMZ there was interspersed areas of sandy bottom that were considered potential red grouper spawning habitat. Gonad samples were examined during this project to identify direct evidence of spawning activity. One female and 1 male red grouper were sampled in spawning condition. Several other species were sampled in spawning condition including gag (*Mycteroperca microlepis*), silk snapper (*Lutjanus vivanus*), vermilion snapper, almaco jack (*Seriola rivoliana*), scamp, (*Mycteroperca phenax*), and blackfin snapper (*Lutjanus buccanella*). In addition to these gonad samples, there were observations of advanced age individuals of the following species: red grouper, scamp, red porgy (*Pagrus pagrus*), gray triggerfish (*Balistes capriscus*), graysby (*Balistes capriscus*), and rock hind (*Epinephelus adscensionis)* as well as an immature snowy grouper (*Hyporthodus niveatus*).

***Georgetown Hole***

The focal species for this SSMZ are scamp and gag. Research conducted within the SSMZ indicated scamp and gag in spawning coloration (Figure 1.5.1.1). Gonad samples taken during two different research trips indicated that 100% of a group of seven female scamp and 93% of 15 female scamp were in spawning condition. Additionally, eight female gag were sampled and 88% were observed in spawning condition.

[1] SAFMC Seminar Series Presentation: https://safmc.net/events/seminar-series-do-we-still-need-to-protect-fish-spawning-grounds/



**Figure 1.5.1.1.** A scamp (*Mycteroperca phenax*) showing spawning coloration.

***Warsaw Hole***

The focal species for this SSMZ are warsaw grouper (*Hyporthodus nigritus*) and greater amberjack. Research conducted within the SSMZ indicated large aggregations of greater amberjack, which could be related to spawning activity. Gonad samples of fish within the SSMZ found warsaw grouper, red snapper, and greater amberjack in spawning condition. In addition, there were red snapper of advanced age observed in the SSMZ.

## 1.5.2. Economic Effects

For economic effects, see the Regulatory Impact Review (Chapter 2).

## 1.5.3. Social Effects

In general, areas closed to snapper grouper fishing would be more likely to result in negative effects on fishing communities due to restricted access. However, the SSMZs currently in place contribute to the sustainability of important commercial and recreational snapper grouper species including red grouper, greater amberjack, scamp grouper, and gag grouper. Contributions to the sustainability of important fish stocks can have long term social benefits such as spillover effects and increased access to improved stocks. The social benefits of the three SSMZ would be foregone under **Option 1 (No Action)**.

The expected social effects of a sunset provision on the SSMZs could include both positive and negative effects on fishermen and communities. Expected positive effects would be associated with ensuring that the SSMZs would be reviewed for effectiveness or would expire if no further action is taken. Adoption of a sunset provision would require the Council to review updated research and monitoring efforts and determine whether the SSMZs are contributing to management goals on a set basis. In this way, fishermen and associated communities can be assured that the SSMZs will be reviewed to determine if they are functioning as the Council intends, and if not, they would be modified or removed. Under **Alternative 5** there is no requirement that the SSMZs be periodically reviewed for effectiveness.

However, a sunset provision under **Option 2**, **Option 3**, or **Option 4** could also have more negative effects on fishermen and communities than under **Option 5** if an evaluation is not

possible (due to shortage in funding, staff, etc.) and the SSMZs are removed but actually are contributing to protection of spawning snapper grouper species. Removing effective SSMZs could have negative long term effects on fishermen and communities by contributing to negative biological effects.

The length of time the SSMZs are in place before a sunset provision could apply may affect the social effects of the provision. In general, a longer period before a sunset provision could apply would allow the biological benefits to accrue and be evident through monitoring and research, which would improve data quality and quantity before making a decision to remove or keep the SSMZ. As such, **Option 4** is likely to provide the greatest social benefit, followed by **Option 3**, **Option 2**, **Option 5**, and **Option 1 (No Action)**.

## 1.6. South Atlantic Council's Choice for the Preferred Option

### 1.6.1. Snapper Grouper Advisory Panel (AP) Comments and Recommendations

During the April 2026 Snapper Grouper AP meeting, the panel discussed the SSMZ and their effectiveness in protecting spawning snapper grouper species. The panel discussion generally trended toward keeping the SSMZs in place. Supporters cited:

- Evidence of spawning fish in the zones
- The importance of protecting spawning habitat
- The value of long-term, stable management areas for research and monitoring
- The possibility that even small, protected areas can matter biologically

Those more skeptical emphasized:

- Limited enforcement capacity
- Very small area size relative to the broader spawning range
- Uncertainty about how effective area closures are compared with time-based closures
- Confusion over how much fishing actually occurs inside the zones

Despite those concerns, the informal show of hands suggested the AP was generally comfortable with the zones remaining in effect rather than letting the sunset clauses expire. The AP recommended additional outreach efforts be made to inform stakeholders about the areas and clarify the difference between the Deepwater Marine Protected Areas and the SSMZs. They encouraged staff to work with chart manufacturers to get these areas added to GPS units and chart plotters.

### 1.6.2. Law Enforcement (AP) Comments and Recommendations

During the January 2026 Law Enforcement AP (LEAP) meeting members of the LEAP were asked to complete an online survey in advance of the meeting to help in evaluating enforcement and compliance with SSMZ regulations. Survey results were presented during the meeting and were provided to the System Management Plan Workgroup (Workgroup). Law enforcement input was incorporated into the Workgroup's report and used to inform recommendations to the Council regarding whether to maintain the SSMZs or to allow them to sunset. Previous LE AP

concerns (from Amendment 36) included: enforcement difficulty due to offshore distance, need for buoys and charting, transit/stowage provisions, fishermen's advanced electronics, and mapping inclusion on charts; NOAA navigation chart inclusion limited due to non-permanence; Garmin and other chart providers show areas slowly.

Survey/evaluation results:

- The shortened survey assessed planning, objectives, boundary definition, roles/responsibilities, coordination, monitoring, enforcement resources, outreach, compliance and stakeholder support. Key results:
    - Planning/objectives generally rated positive by several respondents but with some disagreement on sufficiency of evidence.
    - Roles, responsibilities and coordination rated weaker in multiple responses. Enforcement resources and monitoring were frequently rated insufficient; compliance and stakeholder support mixed/uncertain.
    - Most respondents identified enforcement, compliance, and outreach/communication as top needs for improvement.

The LE AP offered the following comments:

- Enforcement challenges: SSMZs are often far offshore (difficulty of patrols and frequency), limited LE resources (few vessels/personnel), need for coordination (NOAA, USCG, state LE, CBP Air & Marine), and challenges with VMS-only enforcement (VMS shows presence but not activity). Visual confirmation (flights) combined with VMS can build cases.
- Buoys: LE views buoy installation as unnecessary for establishing enforceability — coordinates and outreach are primary tools; buoys are vulnerable and can introduce other hazards (shipping, entanglement risk for whales).
- Compliance: success of the SSMZs is tied to compliance; low compliance can mask potential benefits of SSMZs. Outreach/education and community buy-in (conservation-minded anglers reporting violations) are critical.
    - Add the locations to electronic reporting maps
    - Verify Fish Rules has locations – there is not a bounding box, but the rec app will indicate if you are in a closed area.
- Technology & monitoring ideas: Use aircraft overflights (USCG, partner flights) to gather intelligence and shape patrol plans; VMS could be beneficial for vessels that already carry it but would not cover all user groups. Radar improvements increase detection range but not necessarily prosecution without corroborating evidence.
- Research gaps: strong desire for concrete evidence of biological benefit; such evidence can be expensive (e.g., close-kin mark recapture, larval connectivity), and benefits may take many years to materialize.

### 1.6.3. Scientific and Statistical Committee (SSC) Comments and Recommendations

During the August 2026 SSC meeting, the SSC received an overview of the amendment. The SSC was asked to consider the options, provide input the sunset provisions, and what they indicate what they considered to be a reasonable timeframe to collect additional information on the effectiveness of the SSMZs. The SSC provided the following points:

- From a pure biological point of view (without other considerations), typically longer duration is better. However, with other considerations (social, funding opportunities, data collection and analysis of funded projects), the SSC recommends a duration of 10 years.
- Simulation analysis and more social and economic information would be useful to inform the duration of sunset provisions.

### 1.6.3. Public Comments and Recommendations

During the June 2026 Council meeting, an in-person commenter expressed that they felt a 7-year sunset provision for all the SSMZs would keep the SSMZs at the forefront and emphasized that funding is crucial for SSMZ research and monitoring. No written comments were received.
**WILL BE UPDATED.**

### 1.6.4. System Management Plan Workgroup Recommendations

The System Management Plan Workgroup (SMP Workgroup) met in July 2026 to discuss the effectiveness of the SSMZs and recommendations for their retention. The feedback provided from this meeting is included in detail in Appendix C.

### 1.6.5. South Atlantic Council's Conclusions

**TO BE DRAFTED AFTER THE DECEMBER 2026 MEETING.**

# Chapter 2. Regulatory Impact Review

The National Marine Fisheries Service (NMFS) requires a Regulatory Impact Review (RIR) for all regulatory actions that are of public interest to satisfy the obligations under Executive Order (E.O.) 12866, as amended. In conjunction with the analysis of direct and indirect effects of this Amendment, the RIR: 1) provides a comprehensive review of the level and incidence of impacts associated with a regulatory action; 2) provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major options which could be used to solve the problem; and 3) ensures that the regulatory agency systematically and comprehensively considers all available options so that the public welfare can be enhanced in the most efficient and cost effective way. The RIR also serves as the basis for determining whether any proposed regulations are a "significant regulatory action" under certain criteria provided in E.O.12866. In addition, the RIR provides some information that may be used in conducting an analysis of the effects on small entities pursuant to the Regulatory Flexibility Act (RFA). This RIR analyzes the effects this regulatory action would be expected to have on the recreational and commercial sectors of the South Atlantic snapper grouper fishery.

## 2.1 Problems and Objectives

The problems and objectives for the proposed action are presented in **Section 1.2** and **1.3** of this amendment and are incorporated herein by reference.

## 2.2 Economic Description of the Fisheries

### 2.2.1. Description of the Commercial Sector

Economic information pertaining to the commercial snapper grouper fishery is provided in Amendment 59 (NMFS 2025), Amendment 51 (SAFMC 2023a), Amendment 29 (SAFMC 2020), Buck (2018), and Overstreet et al. (2018) and is incorporated herein by reference. Select updates to this information specific to the snapper grouper fishery are provided below. The major sources of data summarized in this section are the NMFS Southeast Regional Office (SERO) Permits Information Management System (PIMS) and the Southeast Fishery Science Center's (SEFSC) Socioeconomic Panel data set. Inflation adjusted values are reported in 2025 dollars.

***Permits***

Any fishing vessel that harvests and sells any of the snapper group species from the South Atlantic exclusive economic zone (EEZ) must have a valid South Atlantic snapper grouper commercial permit, which is a limited access permit. After such a permit expires, it can be renewed or transferred (with restrictions) up to one year after the date of expiration. A vessel with a Snapper Grouper Unlimited permit can harvest up to the full commercial trip limits for all snapper grouper species, excluding wreckfish, per trip. The Snapper Grouper 225-lb Trip-Limited permit limits the harvest of snapper grouper species to 225 pounds combined per trip and this permit can only be transferred onto a different vessel owned by the same entity. In 2024, there were 508 valid or renewable South Atlantic Snapper Grouper Unlimited permits and

86 valid or renewable Snapper-Grouper 225-lb Trip-Limited permits. Some fishing businesses only own one permitted vessel, while others hold or own multiple permits and vessels. The total number of snapper grouper permits has decreased steadily over time, in large part due to the requirement, in most circumstances, to exchange two such permits for one new permit when requesting a permit transfer.[2]

***Vessels, Landings, and Revenue***

Not all holders of South Atlantic commercial permits for snapper grouper are active each year. The information in Tables 2.2.1.1 and 2.2.1.2 describe the landings and revenue for vessels which, during the 2020-2024 timeframe, possessed a valid or renewable commercial South Atlantic snapper grouper permit and were actively fishing. The tables show the landings and revenue from all snapper grouper, other jointly landed species, and non-jointly landed species. Additionally, landings of species harvested in the Gulf by these vessels are shown to provide a full accounting of the commercial fishing activity of commercial South Atlantic snapper grouper permitted vessels.

The number of permitted commercial South Atlantic snapper grouper vessels actively fishing declined 14% between 2020 and 2024 (Table 2.2.1.1). Total landings of snapper grouper species also declined during this period, by 21%, and landings of jointly caught species on snapper grouper trips (i.e., trips that harvested any snapper grouper species) declined 40%. In addition, total landings of all species by permitted commercial South Atlantic snapper grouper vessels declined by 28% from 2020-2024. On average from 2020-2024, snapper grouper species accounted for nearly two-thirds (64%) of total landings by permitted commercial South Atlantic snapper grouper vessels.

[2] Exceptions to this requirement are specified in CFR Section 622.171, paragraphs (b)(1)(i) and (ii).

**Table 2.2.1.1.** Number of vessels, number of trips, and landings (lbs gutted weight) by year for permitted commercial South Atlantic snapper grouper (SG) vessels, 2020-2024.

| Year | # of Vessels | # of SG Trips | # of Other Trips | SG Species Landings | Jointly Caught Species Landings | Other SATL Landings | Other Gulf Landings | Total Landings |
|---|---|---|---|---|---|---|---|---|
| 2020 | 516 | 9,291 | 3,589 | 3,827,146 | 418,446 | 1,590,005 | 564,001 | 6,399,598 |
| 2021 | 461 | 8,440 | 2,991 | 3,581,262 | 354,903 | 1,392,889 | 515,310 | 5,844,364 |
| 2022 | 450 | 8,195 | 2,944 | 3,813,288 | 285,900 | 1,576,168 | 363,871 | 6,039,227 |
| 2023 | 440 | 8,156 | 2,301 | 3,495,483 | 298,983 | 1,083,146 | 189,550 | 5,067,163 |
| 2024 | 444 | 7,218 | 2,694 | 3,042,265 | 247,093 | 1,056,240 | 239,200 | 4,584,798 |
| **Average** | **462** | **8,260** | **2,904** | **3,551,889** | **321,065** | **1,339,690** | **374,386** | **5,587,030** |

Source: Source: SEFSC Social Science Research Group (SSRG) Socioeconomic Panel (Jan 2025 version)
SG = Snapper Grouper; SATL = South Atlantic

Overall, dockside revenue of snapper grouper species landed by permitted commercial South Atlantic snapper grouper vessels was variable from 2020-2024 (Table 2.2.1.2). Revenue from snapper grouper landings decreased 16% during this period, with a peak in 2022. Revenue from jointly caught species on South Atlantic snapper grouper trips and from other South Atlantic species not caught on snapper grouper trips also declined. Total revenue by permitted commercial South Atlantic snapper grouper vessels declined by 21% overall. The maximum total revenue earned by a single vessel from snapper grouper landings during this period was approximately $600,000 (2025 dollars). On average, from 2020-2024, snapper grouper species accounted for 77% of the total revenue by permitted commercial South Atlantic snapper grouper vessels and the average price per pound was $4.84 (2025 dollars).

**Table 2.2.1.2.** Number of vessels and ex-vessel revenue (2025 dollars) by year for permitted commercial South Atlantic snapper grouper vessels, 2020-2024.

| Year | # of Vessels | SG Species Revenue | Jointly Caught Species Revenue | Other SATL Landings Revenue | Other Gulf Landings Revenue | Average Revenue per Vessel |
|---|---|---|---|---|---|---|
| 2020 | 516 | $17,888,227 | $1,026,157 | $3,515,471 | $1,955,099 | $47,349 |
| 2021 | 461 | $16,885,005 | $951,046 | $2,813,691 | $1,989,559 | $49,109 |
| 2022 | 450 | $19,281,529 | $830,125 | $3,405,278 | $1,309,521 | $55,170 |
| 2023 | 440 | $16,883,551 | $859,862 | $2,545,940 | $724,474 | $47,759 |
| 2024 | 444 | $14,969,581 | $717,722 | $2,589,700 | $999,690 | $43,416 |
| Average | 462 | $17,181,579 | $876,983 | $2,974,016 | $1,395,668 | $48,546 |

Source: Source: SEFSC SSRG Socioeconomic Panel (Jan 2025 version)
SG = Snapper Grouper; SATL = South Atlantic

***Economic Values***

Estimates of economic returns are available for commercial vessels that participated in the snapper grouper fishery as a whole. Liese (2023)[3] generated annual vessel-level estimates of costs (as a percentage of revenue) and net revenue from operations for vessels that harvested snappers and groupers in the South Atlantic.

Estimates of producer surplus (PS) can be calculated from the cost information contained in Liese (2023) in conjunction with estimates of annual revenue from the SEFSC-Social Science Research Group Socioeconomic Panel. PS is total annual revenue minus the costs for fuel, other supplies, hired crew, and the opportunity cost of an owner's time as captain. Net revenue from operations, which most closely represents economic profits to the owner(s), is total annual revenue minus the costs for fuel, other supplies, hired crew, vessel repair and maintenance, insurance, overhead, and the opportunity cost of an owner's time as captain, as well as the vessel's depreciation. According to Liese (2023), PS for commercial vessels that harvested South Atlantic snapper grouper was approximately 37.7% of their annual gross revenue, on average, from 2014 through 2018. Net revenue from operations was 8.2% of their annual gross revenue, on average, during this period.

Applying these percentages to the results provided in Table 2.2.1.2 would result in an estimated per vessel average annual PS of $18,302 (2025 dollars) and an average annual net revenue from operations of $3,980 per year. Liese (2023) also provides annual trip-level estimates of costs (as a percentage of trip revenue) and trip net revenue for vessels that harvested snappers and groupers in the South Atlantic. According to Liese (2023), labor, including both hired and owner's time, consumed 48.4% of trip revenue and fuel and supplies consumed 26%, leaving a trip net revenue margin of 25.6%, on average, from 2014 through 2018.

***Dealers***

Commercial harvest of snapper grouper species in the EEZ may only be sold to dealers with a valid federal South Atlantic and Gulf dealer permit. The information in Table 2.2.1.3 illustrates the purchasing activities of dealers that bought South Atlantic snapper grouper landings from permitted vessels during 2020 through 2024. Like vessels, dealer participation in particular fisheries is fluid, and not all dealers purchased snapper grouper in each year during this time. On average, from 2020 through 2024, snapper grouper purchases comprised approximately 14% of all purchases made by these dealers (Table 2.2.1.3). The average annual value of total purchases per snapper grouper dealer declined every year from 2020 to 2024

[3] This report is available at: https://repository.library.noaa.gov/view/noaa/56480

**Table 2.2.1.3.** Purchase statistics for dealers that bought snapper grouper landings, 2020-2024 (thousands of 2025 dollars).

| Year | Number of Dealers | Snapper Grouper Purchases | Other South Atlantic Purchases | Gulf Purchases | Total | Average Total Purchases per Dealer |
|---|---|---|---|---|---|---|
| 2020 | 180 | $21,300,665 | $105,882,749 | $24,853,190 | $152,036,604 | $844,648 |
| 2021 | 186 | $20,846,068 | $107,365,937 | $26,988,846 | $155,200,852 | $834,413 |
| 2022 | 183 | $22,250,415 | $92,394,993 | $29,663,408 | $144,308,816 | $788,573 |
| 2023 | 185 | $19,591,422 | $86,120,459 | $35,043,973 | $140,755,854 | $760,842 |
| 2024 | 211 | $19,035,975 | $83,687,205 | $32,012,457 | $134,735,637 | $638,558 |
| **Average** | 189 | $20,604,909 | $95,090,269 | $29,712,375 | $145,407,553 | $773,407 |

Source: SEFSC Fishing Communities Web Query Tool, Version 1. Accessed 08/12/2026.

***Imports***

Imports of foreign seafood products compete in the domestic seafood market and have dominated many segments of the domestic seafood market. Imports aid in determining the price for domestic seafood products and tend to set the price in the market segments in which they dominate. Seafood imports can have downstream effects on the local fish market. At the harvest level, imports can affect ex-vessel prices fishermen receive for landings. As substitutes to domestic production, imports tend to cushion the adverse economic effects on consumers resulting from a reduction in domestic landings. Imports that directly compete with domestic snapper grouper are described in this section.

***Snappers***

According to NMFS' foreign trade data[4], South Atlantic snapper species are not exported from the U.S. to other countries. Imports of fresh and frozen snapper products, which directly compete with domestic harvest of snapper species, are described in this section. As shown in Table 2.2.1.4, imports of fresh snapper products were 30.5 million pounds product weight (pw) in 2024. Between 2020 and 2024, they peaked at approximately 36.0 million pounds pw in 2021 worth $173.8 million (2025 dollars). The average price per pound for fresh snapper products was $4.61 from 2020-2024. Although not shown in Table 2.2.1.4, imports of fresh snapper products primarily originated in Mexico, Nicaragua, or Panama, entering the U.S. through the port of Miami.

[4] https://www.fisheries.noaa.gov/foss/f?p=215:2

**Table 2.2.1.4.** Annual pounds, value, and price per pound of fresh snapper imports, 2020-2024 (2025 dollars).

| Year | Total Pounds (thousands) | Total value (thousand dollars) | Price per Pound |
|---|---|---|---|
| **2020** | 32,394 | $132,871 | $4.10 |
| **2021** | 35,970 | $173,793 | $4.83 |
| **2022** | 32,180 | $155,150 | $4.82 |
| **2023** | 32,108 | $146,551 | $4.56 |
| **2024** | 30,475 | $143,484 | $4.71 |
| **Average** | 32,626 | $150,370 | $4.61 |

Source: NOAA Foreign Trade Query Tool, accessed 10/20/24.

As shown in Table 2.2.1.5, total revenue from imports of frozen snapper increased from $56.8 million (2025 dollars) in 2020 to a five-year high of $77.8 million in 2021, followed by a 44% decrease in 2023. The average price per pound for frozen snapper products 2020-2024 was $3.97. Although not shown in Table 2.2.1.5, imports of frozen snapper product imports primarily originated in Brazil and Suriname, entering through the port of Miami.

**Table 2.2.1.5.** Annual pounds, value, and price per pound of frozen snapper imports, 2020-2024 (2025 dollars).

| Year | Total Pounds (thousands) | Total Value (thousand dollars) | Price per Pound |
|---|---|---|---|
| **2020** | 15,874 | $56,788 | $3.58 |
| **2021** | 18,225 | $77,751 | $4.27 |
| **2022** | 16,941 | $72,796 | $4.30 |
| **2023** | 11,701 | $43,784 | $3.74 |
| **2024** | 14,837 | $58,874 | $3.97 |
| **Average** | 15,516 | $61,999 | $3.97 |

Source: NOAA Foreign Trade Query Tool, accessed 10/20/24.

***Groupers***

According to NMFS' foreign trade data[5], grouper are not exported. Imports of fresh and frozen grouper products, which also directly compete with domestic harvest of snapper grouper species, are described in this section. As shown in Table 2.2.1.6, between 2020 and 2024, imports of fresh grouper products peaked in 2023. Total value of fresh grouper imports has been increasing in recent years and averaged $64.8 million annually. The average price per pound for fresh grouper products was $5.47 from 2020-2024. Although not shown in Table 2.2.1.6, imports of fresh grouper products primarily originated from Mexico, Panama, and Brazil.

[5] https://www.fisheries.noaa.gov/foss/f?p=215:2

**Table 2.2.1.6.** Annual pounds and value of fresh grouper imports, 2020-2024 (2025 dollars).

| Year | Total Pounds (thousands) | Total Value (thousand dollars) | Price per Pound |
|---|---|---|---|
| **2020** | 10,450 | $47,590 | $4.55 |
| **2021** | 12,247 | $67,230 | $5.49 |
| **2022** | 11,700 | $68,798 | $5.88 |
| **2023** | 12,628 | $70,230 | $5.56 |
| **2024** | 11,995 | $70,286 | $5.86 |
| **Average** | 11,804 | $64,827 | $5.47 |

Source: NOAA Foreign Trade Query Tool, accessed 10/20/24.

As shown in Table 2.2.1.7, imports of frozen grouper products peaked at approximately 2.2 million pounds pw in 2021 from a low of 0.8 million pounds pw in 2020. Total revenue from frozen grouper increased from 2020 to 2021, but decreased each year thereafter to $2.5 million in 2024. The average price per pound for frozen grouper products was $2.37 from 2020-2024. Although not shown in Table 2.2.1.7, imports of frozen grouper products primarily originated in Brazil, Suriname, and Indonesia.

**Table 2.2.1.7.** Annual pounds and value of frozen grouper imports, 2020-2024 (2025 dollars).

| Year | Total Pounds (thousands) | Total Value (thousand dollars) | Price per Pound |
|---|---|---|---|
| **2020** | 814 | $1,757 | $2.16 |
| **2021** | 2,190 | $5,989 | $2.73 |
| **2022** | 1,340 | $3,031 | $2.26 |
| **2023** | 1,154 | $2,740 | $2.37 |
| **2024** | 1,098 | $2,528 | $2.30 |
| **Average** | 1,319 | $3,209 | $2.37 |

Source: NOAA Foreign Trade Query Tool, accessed 10/20/24.

***Business Activity***

The commercial harvest and subsequent sales and consumption of fish generates business activity as fishermen expend funds to harvest the fish and consumers spend money on goods and services, such as grouper purchased at a local fish market and served during restaurant visits. These expenditures spur additional business activity in the region(s) where the harvest and purchases are made, such as jobs in local fish markets, grocers, restaurants, and fishing supply establishments. In the absence of the availability of a given species for purchase, consumers would spend their money on substitute goods, such as other finfish or seafood products, and services, such as visits to different food service establishments. As a result, the analysis presented below represents a distributional analysis that only shows how economic impacts may be distributed through regional markets. It should not be interpreted to represent the impacts if these species are not available for harvest or purchase.

Economic impact models can be used to determine the sources of the impacts. Each impact can be broken down into direct, indirect, and induced economic impacts. "Direct" economic impacts are the results of the money initially spent in the study area (e.g., country, region, state, or community) by the fishery or industry being studied. This includes money spent to pay for labor,

supplies, raw materials, and operating expenses. The direct economic impacts from the initial spending create additional activity in the local economy, i.e., "indirect" economic impacts. Indirect economic impacts are the results of business-to-business transactions indirectly caused by the direct impacts. For example, businesses initially benefiting from the direct impacts will subsequently increase spending at other local businesses. The indirect economic impact is a measure of this increase in business-to-business activity, excluding the initial round of spending which is included in the estimate of direct impacts. "Induced" economic impacts are the results of increased personal income caused by the direct and indirect economic impacts. For example, businesses experiencing increased revenue from the direct and indirect impacts will subsequently increase spending on labor by hiring more employees, increasing work hours, raising salaries/wage rates, etc. In turn, households will increase spending at local businesses. The induced impact is a measure of this increase in household-to-business activity.

Estimates of the U.S. average annual business activity associated with the commercial harvest of all South Atlantic snapper grouper species were derived using the model applied in NMFS (2024)[6] and are provided in Table 2.2.1.8. Specifically, these impact estimates reflect the expected impacts from average annual gross revenues generated by landings of all South Atlantic snapper grouper species from 2020 through 2024. This business activity is characterized as jobs (full- and part-time equivalents), income impacts (wages, salaries, and self-employed income), value-added impacts (the difference between the value of goods and the cost of materials or supplies), and output impacts (gross business sales). Income impacts should not be added to output (sales) impacts because this would result in double counting. The results provided should be interpreted with caution. These results are based on average relationships developed through the analysis of many fishing operations that harvest many different species. Separate models specific to individual species are not available. Between 2020 and 2024, landings of all South Atlantic snapper grouper species resulted in approximately $17.2 million dollars (2025 dollars) in gross revenue on average. In turn, this revenue generated 1,760 jobs, $62.6 million in income, $88.4 million value-added, and output impacts of $170.3 million per year, on average.

[6] A detailed description of the input/output model is provided in NMFS (2011).

**Table 2.2.1.8.** Average annual economic impacts from the commercial harvest of snappers and groupers in the South Atlantic. All monetary estimates are in thousands of 2025 dollars, and employment is measured in full-time equivalent jobs.

| Industry Sector | Direct | Indirect | Induced | Total |
|---|---|---|---|---|
| **Harvesters** | | | | |
| Employment impacts | 307 | 48 | 63 | 418 |
| Income impacts | $9,275 | $1,722 | $4,163 | $15,160 |
| Total value added impacts | $9,886 | $6,199 | $7,124 | $23,209 |
| Output impacts | $17,178 | $13,976 | $13,831 | $44,984 |
| **Primary dealers/processors** | | | | |
| Employment impacts | 64 | 26 | 44 | 134 |
| Income impacts | $3,026 | $2,789 | $2,638 | $8,453 |
| Total value added impacts | $3,226 | $3,558 | $4,966 | $11,750 |
| Output impacts | $9,739 | $7,336 | $9,707 | $26,782 |
| **Secondary wholesalers/distributors** | | | | |
| Employment impacts | 30 | 7 | 29 | 65 |
| Income impacts | $1,803 | $537 | $1,896 | $4,235 |
| Total value added impacts | $1,921 | $900 | $3,238 | $6,059 |
| Output impacts | $4,829 | $1,761 | $6,299 | $12,888 |
| **Grocers** | | | | |
| Employment impacts | 127 | 14 | 28 | 170 |
| Income impacts | $3,708 | $1,233 | $1,862 | $6,802 |
| Total value added impacts | $3,953 | $1,985 | $3,151 | $9,089 |
| Output impacts | $6,338 | $3,225 | $6,187 | $15,749 |
| **Restaurants** | | | | |
| Employment impacts | 792 | 53 | 129 | 974 |
| Income impacts | $14,876 | $4,512 | $8,521 | $27,909 |
| Total value added impacts | $15,857 | $8,065 | $14,357 | $38,279 |
| Output impacts | $28,995 | $12,620 | $28,330 | $69,944 |
| **Harvesters and Seafood industry** | | | | |
| Employment impacts | 1,320 | 147 | 294 | 1,760 |
| Income impacts | $32,687 | $10,791 | $19,080 | $62,558 |
| Total value added impacts | $34,843 | $20,707 | $32,836 | $88,386 |
| Output impacts | $67,078 | $38,917 | $64,352 | $170,347 |

Source: Calculated by NMFS SERO using the model developed for and applied in NMFS (2024).

## 2.2.2. Description of the Recreational Sector

The recreational sector is composed of the private and for-hire modes. The private mode includes anglers fishing from shore (all land-based structures) and private/rental boats. The for-hire mode is composed of charter vessels and headboats. Charter vessels generally carry fewer passengers and charge a fee on an entire vessel basis, whereas headboats carry more passengers

and payment is per person. The type of service, from a vessel- or passenger-size perspective, affects the flexibility to search different fishing locations during the course of a trip and target different species because larger concentrations of fish are required to satisfy larger groups of anglers. Economic information pertaining to the recreational sector of the snapper grouper fishery is provided in Amendment 59 (NMFS 2025) and Amendment 53 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region (SAFMC 2023b) and is incorporated herein by reference.

***Permits***

For anglers to fish for or possess snapper grouper species in or from the South Atlantic EEZ on for-hire vessels, those vessels are required to have an open access South Atlantic Snapper Grouper Charter/Headboat permit (snapper grouper for-hire permit). In 2024, there were 2,106 valid for-hire snapper grouper permits. This sector operates as an open access fishery and not all permitted vessels are necessarily active in the fishery, as evidenced in Souza and Liese (2019). Some vessel owners may have obtained open access permits as insurance for uncertainties in the fisheries in which they currently operate.

Although the for-hire permit application collects information on the primary method of operation, the permit itself does not identify the permitted vessel as either a headboat or a charter vessel and vessels may operate in both capacities. However, only federally permitted headboats are required to submit harvest and effort information to the NMFS Southeast Region Headboat Survey (SRHS).[7] Participation in the SRHS is based on determination by the SEFSC that the vessel primarily operates as a headboat. During 2024, 63 South Atlantic headboats were registered in the SRHS (R. Cheshire, NMFS SEFSC, pers. comm. 2025). The majority of these headboats were located in Florida/Georgia (36), followed by South Carolina (20) and North Carolina (7). As a result, of the 2,106 vessels with snapper grouper for-hire permits, up to 63 may primarily operate as headboats.[8]

There are no specific permitting requirements for recreational anglers to harvest snapper grouper species. Instead, anglers are required to possess either a state recreational fishing permit that authorizes saltwater fishing in general or be registered in the federal National Saltwater Angler Registry system, subject to appropriate exemptions. As a result, it is not possible to identify with available data how many individual anglers would be expected to be affected by this proposed amendment.

[7] All federal charter/headboat permit holders, including charter vessel owners or operators, are required to comply with the Southeast For-Hire Integrated Electronic Reporting (SEFHIER) program. Under this program, all such permit holders must submit logbooks weekly, by 11:59 pm, local time, the Tuesday following a reporting week (Monday-Sunday). Those vessels selected to report to the SRHS (i.e., federally permitted headboats) will continue to submit their reports under the SEFHIER requirements directly to the SRHS program. For more information, see: https://www.fisheries.noaa.gov/southeast/recreational-fishing-data/southeast-hire-integrated-electronic-reporting-program.

[8] This estimate is based on the SEFSC criteria; however, there may be additional vessels not included in the SRHS that also identify as headboats.

***Angler Effort***

Recreational effort derived from the MRIP database can be characterized in terms of the number of trips as follows:

- Target effort - The number of individual angler trips, regardless of duration, where the intercepted angler indicated that the species or a species in the species group was targeted as either the first or the second primary target for the trip. The species did not have to be caught.

- Catch effort - The number of individual angler trips, regardless of duration and target intent, where the individual species or a species in the species group was caught. The fish did not have to be kept.

- Total recreational trips - The total estimated number of recreational trips in the South Atlantic, regardless of target intent or catch success.

Estimates of South Atlantic snapper grouper target and catch effort are provided in Table 2.2.2.1 and Table 2.2.2.2, respectively. As shown in Table 2.2.2.1, an average of 91% of snapper grouper target trips by all modes occurred in Florida from 2020 through 2024, with the other three states accounting for 2% to 4% of the total. The number of snapper grouper target trips declined by 23% between 2020 and 2024.

Snapper grouper catch trips decreased by 10% during the same period (Table 2.2.2.2). After Florida, North and South Carolina recorded the largest number of recreational snapper grouper trips, on average (2020 through 2024).

For both target and catch trips, the private/rental mode was the dominant mode of fishing (Table 2.2.2.1 and Table 2.2.2.2). There were more target and catch trips in 2023 than during any other year from 2020 to 2024.

**Table 2.2.2.1.** South Atlantic snapper grouper recreational target trips, by mode and state, 2020-2024.

| | FL | GA | NC | SC | Total |
|---|---|---|---|---|---|
| | **Shore Mode** | | | | |
| 2020 | 949,565 | 6,257 | 4,867 | 13,641 | 974,329 |
| 2021 | 957,274 | 2,724 | 57,117 | 19,161 | 1,036,276 |
| 2022 | 622,645 | 3,138 | 42,882 | 23,922 | 692,588 |
| 2023 | 950,525 | 0 | 0 | 8,611 | 959,136 |
| 2024 | 714,205 | 0 | 11,193 | 1,992 | 727,390 |
| Average | 838,843 | 2,424 | 23,212 | 13,465 | 877,944 |
| | **Charter Mode** | | | | |
| 2020 | 14,659 | 189 | 9,154 | 1,817 | 25,818 |
| 2021 | 17,868 | 581 | 2,951 | 4,941 | 26,341 |
| 2022 | 12,510 | 231 | 3,230 | 1,659 | 17,630 |
| 2023 | 18,833 | 1,333 | 5,782 | 50 | 25,998 |
| 2024 | 35,772 | 180 | 2,553 | 3,628 | 42,134 |
| Average | 19,928 | 503 | 4,734 | 2,419 | 27,584 |
| | **Private/Rental Mode** | | | | |
| 2020 | 1,298,846 | 48,657 | 49,977 | 105,971 | 1,503,451 |
| 2021 | 856,489 | 25,837 | 46,522 | 50,662 | 979,510 |
| 2022 | 1,043,531 | 21,710 | 39,908 | 57,857 | 1,163,006 |
| 2023 | 1,491,643 | 44,934 | 114,491 | 35,805 | 1,686,873 |
| 2024 | 1,048,373 | 21,443 | 52,068 | 33,656 | 1,155,540 |
| Average | 1,147,776 | 32,516 | 60,593 | 56,790 | 1,297,676 |
| | **All Modes** | | | | |
| 2020 | 2,263,069 | 55,102 | 63,997 | 121,430 | 2,503,598 |
| 2021 | 1,831,631 | 29,142 | 106,590 | 74,765 | 2,042,127 |
| 2022 | 1,678,686 | 25,079 | 86,020 | 83,439 | 1,873,224 |
| 2023 | 2,461,001 | 46,267 | 120,273 | 44,466 | 2,672,007 |
| 2024 | 1,798,351 | 21,623 | 65,814 | 39,276 | 1,925,064 |
| Average | 2,006,548 | 35,443 | 88,539 | 72,675 | 2,203,204 |

Source: MRIP database, SERO, NMFS (July 2026)
*Headboat data are unavailable.

**Table 2.2.2.2.** South Atlantic snapper grouper recreational catch trips, by mode and state, 2020-2024.

| | FL | GA | NC | SC | Total |
|---|---|---|---|---|---|
| | **Shore Mode** | | | | |
| 2020 | 3,447,672 | 65,666 | 201,008 | 188,663 | 3,903,008 |
| 2021 | 2,096,921 | 235,180 | 297,994 | 240,183 | 2,870,279 |
| 2022 | 1,903,463 | 157,902 | 585,893 | 312,295 | 2,959,553 |
| 2023 | 2,503,294 | 177,533 | 378,376 | 461,834 | 3,521,037 |
| 2024 | 2,246,555 | 147,594 | 310,602 | 290,849 | 2,995,600 |
| Average | 2,439,581 | 156,775 | 354,775 | 298,765 | 3,249,895 |
| | **Charter Mode** | | | | |
| 2020 | 111,549 | 1,086 | 40,667 | 18,398 | 171,700 |
| 2021 | 134,057 | 3,643 | 23,081 | 25,599 | 186,380 |
| 2022 | 101,856 | 2,818 | 18,757 | 20,111 | 143,543 |
| 2023 | 122,225 | 3,250 | 56,858 | 29,095 | 211,428 |
| 2024 | 133,321 | 1,766 | 20,439 | 27,879 | 183,405 |
| Average | 120,602 | 2,513 | 31,960 | 24,216 | 179,291 |
| | **Private/Rental Mode** | | | | |
| 2020 | 3,256,320 | 139,403 | 515,030 | 306,477 | 4,217,231 |
| 2021 | 3,453,670 | 125,197 | 489,346 | 384,568 | 4,452,780 |
| 2022 | 3,326,619 | 208,922 | 719,098 | 459,995 | 4,714,634 |
| 2023 | 4,229,040 | 149,913 | 614,318 | 338,536 | 5,331,807 |
| 2024 | 3,293,478 | 149,678 | 563,627 | 317,324 | 4,324,107 |
| Average | 3,511,825 | 154,623 | 580,284 | 361,380 | 4,608,112 |
| | **All Modes** | | | | |
| 2020 | 6,815,541 | 206,155 | 756,705 | 513,538 | 8,291,939 |
| 2021 | 5,684,648 | 364,020 | 810,421 | 650,350 | 7,509,439 |
| 2022 | 5,331,938 | 369,642 | 1,323,748 | 792,401 | 7,817,729 |
| 2023 | 6,854,559 | 330,696 | 1,049,551 | 829,466 | 9,064,272 |
| 2024 | 5,673,354 | 299,038 | 894,668 | 636,052 | 7,503,112 |
| Average | 6,072,008 | 313,910 | 967,019 | 684,361 | 8,037,298 |

Source: MRIP database, SERO, NMFS (July 2026)
*Headboat data are unavailable.

Similar analysis of recreational angler trips is not possible for the headboat mode because headboat data are not collected at the angler level. Estimates of effort by the headboat mode are provided in terms of angler days, or the total number of standardized full-day angler trips.[9] From 2020 through 2024, headboat effort in the South Atlantic, in terms of angler days, fluctuated with

[9] Headboat trip categories include half-, three-quarter-, full-, and 2-day trips. A full-day trip equals one angler day, a half-day trip equals .5 angler days, etc. Angler days are not standardized to an hourly measure of effort and actual trip durations may vary within each category.

a five-year low in 2020 (Table 2.2.2.3). Headboat effort was the highest, on average, during the summer months of June and July (Figure 2.2.2.1.).

**Table 2.2.2.3.** South Atlantic headboat angler days and percent distribution, by state, 2020-2024.

| | Angler Days | | | Percent Distribution | | |
|---|---|---|---|---|---|---|
| Year | FL/GA* | NC | SC | FL/GA | NC | SC |
| 2020 | 84,005 | 14,154 | 34,080 | 64% | 11% | 26% |
| 2021 | 120,367 | 19,719 | 47,908 | 64% | 10% | 25% |
| 2022 | 104,989 | 16,140 | 38,748 | 66% | 10% | 24% |
| 2023 | 105,673 | 16,115 | 35,814 | 67% | 10% | 23% |
| 2024 | 109,336 | 12,654 | 32,529 | 71% | 8% | 21% |
| Average | 104,874 | 15,756 | 37,816 | 66% | 10% | 24% |

Source: NMFS SRHS (2024).
*Headboat data from Florida and Georgia are combined for confidentiality purposes.




**Figure 2.2.2.1.** South Atlantic headboat angler days by month and year (2020-2024).
Source: NMFS SRHS (2024).

## ***Economic Value***

Participation, effort, and harvest are indicators of the value of saltwater recreational fishing. However, a more specific indicator of value is consumer surplus (CS), which is the difference between the maximum amount an angler would be willing to pay for a fish and the amount they actually do pay.[10] CS represents a savings of one's income that can be spent later on other goods and services, leading to an overall increase in utility or satisfaction for the angler and a benefit to the economy. All else equal, the amount anglers are willing to pay and the costs of fishing can

[10] Holding income and the prices of other goods constant.

vary depending on expected catch rates, harvest rates, and existing regulations. The economic value of changes in expected catch rates, harvest rates, or existing regulations can be measured by any associated changes in CS. However, because recreationally-caught fish are non-market goods and there are no transaction data available, CS cannot be measured directly. Instead, using survey elicitation methods and stated or revealed preference models, it is possible to estimate willingness to pay (WTP) values[11] that are a close approximation to the individual CS an angler would derive from an additional fish that is caught and kept. The estimated value of the CS for catching and keeping a second red snapper on an angler trip is $105 (values updated to 2025 dollars[12]), and decreases thereafter ($70 for a third red snapper, $52 for a fourth red snapper, and $41 for a fifth red snapper) (Carter and Liese 2012). The estimated value of the CS for catching and keeping a second grouper on an angler trip is $135 (2025 dollars), and decreases thereafter ($90 for a third grouper, $66 for a fourth grouper, and $52 for a fifth grouper) (Carter and Liese 2012). Another study, Haab et al. (2012), estimated the recreational CS for other snappers harvested on a trip using a mail survey of recreational anglers fishing in the Gulf. Their estimated CS for harvesting one additional snapper was approximately $16.

Economic value for the for-hire component of the recreational sector can be measured in many ways. According to Savolainen et al. (2012), the average charter vessel operating in the Gulf is estimated to receive approximately $110,000 (2025 dollars) in gross revenue and $33,000 (2025 dollars) in net income (gross revenue minus variable and fixed costs) annually. The average headboat is estimated to receive approximately $335,000 (2025 dollars) in gross revenue and $98,000 (2025 dollars) in net income annually. More recent estimates of average annual gross revenue for Gulf headboats are provided in Abbott and Willard (2017) and D. Carter, SEFSC, pers. comm. 2018. Abbott and Willard (2017) suggest that Savolainen, et al.'s estimate of average annual gross revenue for headboats may be an underestimate, as data in the former suggest that average gross revenue in 2009 for the vessels in their sample was about $592,000 (2025 dollars). Further, their data suggest average annual gross revenue per vessel had increased to about $715,000 (2025 dollars) by 2014. However, Abbott and Willard's estimates are based on a sample of 17 headboats that chose to participate in the headboat collaborative program in 2014, while the Savolainen, et al. estimates are based on a random sample of 20 headboats. The headboats that participated in the collaborative program may be economic highliners, in which case Abbott and Willard's estimates would overestimate average annual gross revenue for Gulf headboats. D. Carter, SEFSC, pers. comm. 2018 estimated that average annual gross revenue for Gulf headboats was approximately $530,000 (2025 dollars) in 2017. This estimate is likely the best current estimate of annual gross revenue for Gulf headboats, as it is based on a relatively large sample of 63 boats, or about 86% of the active fleet, and is more recent.

However, gross revenues overstate the annual economic value and profits generated by for-hire vessels. Economic value for for-hire vessels can be measured by PS per passenger trip (the amount of money that a vessel owner earns in excess of the cost of providing the trip). Estimates of revenue, costs, and trip net revenue (TNR) for trips taken by headboats and charter vessels in

[11] These are measures of compensating surplus, or the amount of money that an angler would be willing to pay in order to harvest the additional fish, while maintaining the same level of utility.

[12] Converted to 2025 dollars using the annual, not seasonally adjusted GDP implicit price deflator provided by the U.S. Bureau of Economic Analysis.

2017 are available from Souza and Liese (2019). After accounting for transactions fees, supply costs, and labor costs, net revenue per trip was 42% of revenue for Gulf charter vessels and 54% of revenue for Southeast headboats,[13] or $966 and $2,244 (2025 dollars), respectively (Table 2.2.2.4). When TNR is divided by the number of anglers on a trip, it represents cash flow per angler (CFpA), which is an approximation of PS per angler trip. The estimated CFpA value for an average Gulf charter angler trip is $176 (2025 dollars) and the estimated CFpA value for an average Gulf headboat angler trip is $80 (2025 dollars; Souza and Liese 2019). Estimates of CFpA for individual species group target trips are not available.

**Table 2.2.2.4.** Trip economics for offshore trips by Gulf charter vessels and Southeast headboats in 2017 (2025 dollars).

| | Gulf Charter Vessels | Southeast Headboats |
|---|---|---|
| Revenue | 100% | 100% |
| Transaction Fees (% of revenue) | 3% | 6% |
| Supply Costs (% of revenue) | 27% | 19% |
| Labor Costs (% of revenue) | 27% | 22% |
| Net Revenue per Trip including Labor Costs (% of revenue) | 42% | 54% |
| Net Revenue per Trip | $966 | $2,244 |
| Average # of Anglers per Trip | 5.5 | 28.2 |
| Trip Net Cash Flow per Angler Trip | $176 | $80 |

Source: Souza and Liese (2019).

***Business Activity***

The desire for recreational fishing generates economic activity as consumers spend their income on various goods and services needed for recreational fishing. This spurs economic activity in the region where recreational fishing occurs. Note, in the absence of the opportunity to fish, the income would presumably be spent on other goods and services, and these expenditures would similarly generate economic activity in the region where the expenditure occurs. As such, the analysis below represents a distributional analysis only.

Estimates of the business activity (economic impacts) associated with recreational angling for South Atlantic snapper grouper on charter and private vessels were calculated using average trip-level impact coefficients derived from the 2022 Fisheries Economics of the U.S. report (NMFS 2024) and underlying data provided by the National Oceanic and Atmospheric Administration Office of Science and Technology. Economic impact estimates in 2022 dollars were adjusted to 2025 dollars using the annual, not seasonally adjusted, gross domestic product (GDP) implicit price deflator provided by the U.S. Bureau of Economic Analysis.

[13] Southeast headboats include headboats operating in either the Gulf or South Atlantic. Souza and Liese (2019) state "the sample size available for headboats is limited (n=30) and, hence, the results are presented at an overall SE aggregation."

Business activity (economic impacts) for the recreational sector is characterized in the form of jobs (full- and part-time), income impacts (wages, salaries, and self-employed income), output impacts (gross business sales), and value-added impacts (contribution to the GDP in a state or region). Estimates of the average annual economic impacts (2020-2024) resulting from private, shore, and charter mode trips that targeted snapper grouper fish are provided in Table 2.2.2.5. These impacts should not be added together because this would result in double counting. The average impact coefficients, or multipliers, used in the model are invariant to the "type" of effort (e.g., target or catch) and can therefore be directly used to measure the impact of other effort measures such as South Atlantic snapper grouper catch trips. To calculate the multipliers from Table 2.2.2.5, simply divide the desired impact measure (value-added impact, sales impact, income impact, or employment) associated with a given state and mode by the number of target trips for that state and mode.

The estimates provided in Table 2.2.2.5 only apply at the state-level. Addition of the state-level estimates to produce a regional (or national) total may underestimate the actual amount of total business activity, because state-level impact multipliers do not account for interstate and interregional trading. It is also important to note that these economic impacts estimates are based on trip expenditures only and do not account for durable expenditures. Durable expenditures cannot be reasonably apportioned to individual species or species groups. As such, the estimates provided in Table 2.2.2.5 may be considered a lower bound on the economic activity associated with those private, shore, and charter mode trips that targeted South Atlantic snapper grouper.

Estimates of the business activity associated with headboat effort are not available. Headboat vessels are not covered by MRIP in the Southeast, so, in addition to the absence of estimates of target effort, estimation of the appropriate business activity coefficients for headboat effort has not been conducted.

**Table 2.2.2.5.** Estimated average annual economic impacts (2020-2024) from recreational trips that targeted South Atlantic snapper grouper, by state, using state-level multipliers (2025 dollars).

| | NC | SC | GA | FL |
|---|---|---|---|---|
| | **Charter Mode** | | | |
| Target Trips | 4,734 | 2,419 | 503 | 19,928 |
| Value Added Impacts | $1,961 | $1,023 | $154 | $9,202 |
| Sales Impacts | $3,197 | $1,667 | $249 | $14,610 |
| Income Impacts | $1,394 | $678 | $110 | $6,430 |
| Employment (Jobs) | 34 | 18 | 3 | 131 |
| | **Private/Rental Mode** | | | |
| Target Trips | 60,593 | 56,790 | 32,516 | 1,147,776 |
| Value Added Impacts | $1,608 | $1,111 | $761 | $30,095 |
| Sales Impacts | $2,788 | $1,938 | $1,333 | $50,621 |
| Income Impacts | $904 | $522 | $369 | $14,152 |
| Employment (Jobs) | 17 | 12 | 7 | 274 |
| | **Shore** | | | |
| Target Trips | 23,212 | 13,465 | 2,424 | 838,843 |
| Value Added Impacts | $1,295 | $207 | $121 | $16,680 |

National-level multipliers must be used to account for interstate and interregional trading when calculating a national total of economic impacts. Between 2020 and 2024, and using national-level multipliers, private and charter trips that targeted South Atlantic snapper grouper generated employment, income, value-added, and output (sales) impacts of 1,011 jobs, $66.7 million, $126.5 million, and $242.0 million per year, respectively, on average.

## 2.3 Effects of Management Measures

**Action 1**. Modify the sunset provision for the South Cape Lookout spawning special management zone.

**Option 1 (No Action)** would allow the South Cape Lookout Spawning SMZ to sunset, which would open the area to commercial and recreational harvest of snapper grouper species. Under this option, the economic benefits associated with this protection would be foregone. These foregone benefits include a potential elevated spawning stock biomass and improved spawning capacity for the species receiving the additional protection, which may have long-term economic benefits because commercial and recreational fishermen may experience relative overall higher annual catch limits, increased harvest, and higher catch rates. This Spawning SMZ may also result in larger or higher quality fish, which may allow for a relative increase in gross revenue for commercial fishermen and recreational fishermen could experience increases in consumer surplus (CS).

In the short-term, **Option 1 (No Action)** would allow for potential economic benefits from allowing harvest of snapper grouper species in this Spawning SMZ. Increases in expected harvest are difficult to measure and estimate given the large statistical grids used for reporting catch data. A quantitative approach was applied in Snapper Grouper Amendment 36 (SAFMC 2016) to estimate landings reductions from implementation of the South Cape Lookout Spawning SMZ. Since bottom fishing has not been allowed in this area since implementation of that amendment, thereby limiting the availably of updated data, the quantitative analysis described in Amendment 36 serves as the best available information on the estimated economic effects and is used to provide quantitative effects for this action. The change in economic benefits found in Amendment 36 is in 2014 dollars and is adjusted for inflation to 2025 dollars using the annual, not seasonally adjusted GDP implicit price deflator. In doing so, this option would result in an estimated increase annual commercial ex-vessel value by $746 and annual recreational CS by $21,251 (2025 dollars). The estimated total annual increase in economic benefits would be $21,988 (2025 dollars). As noted in Amendment 36, there is a high level of uncertainty associated with these estimates due to the assumption of uniform distribution of effort within the logbook area examined and no redistribution of effort after the area was closed to harvest of snapper grouper species. Amendment 36 also notes that it would be a reasonable to assume that the change in total ex-vessel revenue and CS would be minimal from fishing activity occurring in the South Cape Lookout Special SMZ. Finally, since the Spawning SMZ is small relative to all available fishing grounds, it is not expected to induce a change in angler effort in the short-term. Therefore, no change in short-term for-hire business producer surplus (PS) is expected.

**Option 2**, **Option 3**, **Option 4**, and **Option 5** would allow the natural bottom habitat area in the South Cape Lookout Spawning SMZ to continue to remain protected from bottom fishing for snapper grouper species and harvest of these species would continue to be prohibited. The realized economic benefits from these options are the same as those described under the forgone benefits in **Option 1 (No Action)**. There would also be foregone short-term economic benefits from **Option 2** through **Option 5** that would be the same as the realized short-term economic benefits described in **Option 1 (No Action)**. Overall, **Option 2**, **Option 3**, **Option 4**, and **Option 5** are expected to have similar economic effects, with the differences in the options stemming from the length of time that would pass before the Spawning SMZ would potentially sunset and the ensuing potential economic effects of this occurrence varying by these timelines as well.

From a long-term economic benefits perspective, **Option 5** would provide the greatest potential benefits followed by **Option 4**, **Option 3**, **Option 2**, and **Option 1 (No Action)**.

**Action 2.** Modify the sunset provision for the Georgetown Hole spawning special management zone.

**Option 1 (No Action)** would allow the Georgetown Hole Spawning SMZ to sunset, which would open the area to commercial and recreational harvest of snapper grouper species. Under this options, the economic benefits associated with this protection would be foregone. These foregone benefits include a potential elevated spawning stock biomass and improved spawning capacity for the species receiving the additional protection, which may have long-term economic benefits because commercial and recreational fishermen may experience relative overall higher

annual catch limits, increased harvest, and higher catch rates. This Spawning SMZ may also result in larger or higher quality fish, which may allow for a relative increase in gross revenue for commercial fishermen and recreational fishermen could experience increases in consumer surplus (CS).

In the short-term, **Option 1 (No Action)** would allow for potential economic benefits from allowing harvest of snapper grouper species in this Spawning SMZ. Increases in expected harvest are difficult to measure and estimate given the large statistical grids used for reporting catch data. A quantitative approach was applied in Snapper Grouper Amendment 36 (SAFMC 2016) to estimate landings reductions from implementation of the Georgetown Hole Spawning SMZ. Since bottom fishing has not been allowed in this area since implementation of that amendment, thereby limiting the availably of updated data, the quantitative analysis described in Amendment 36 serves as the best available information on the estimated economic effects and is used to provide quantitative effects for this action. This option would result in an estimated increase annual commercial ex-vessel value by $115 and annual recreational CS by $5,672 (2025 dollars). The estimated total annual increase in economic benefits would be $5,787 (2025 dollars). As noted in Amendment 36, there is a high level of uncertainty associated with these estimates due to the assumption of uniform distribution of effort within the logbook area examined and no redistribution of effort after the area was closed to harvest of snapper grouper species. Amendment 36 also notes that it would be a reasonable to assume that the change in total ex-vessel revenue and CS would be minimal from fishing activity occurring in the Georgetown Hole Special SMZ. Finally, since the Spawning SMZ is small relative to all available fishing grounds, it is not expected to induce a change in angler effort in the short-term. Therefore, no change in short-term for-hire business producer surplus (PS) is expected.

**Option 2**, **Option 3**, **Option 4**, and **Option 5** would allow the natural bottom habitat area in the Georgetown Hole Spawning SMZ to continue to remain protected from bottom fishing for snapper grouper species and harvest of these species would continue to be prohibited. The realized economic benefits from these options are the same as those described under the forgone benefits in **Option 1 (No Action)**. There would also be foregone short-term economic benefits from **Option 2** through **Option 5** that would be the same as the realized short-term economic benefits described in **Option 1 (No Action)**. Overall, **Option 2**, **Option 3**, **Option 4**, and **Option 5** are expected to have similar economic effects, with the differences in the options stemming from the length of time that would pass before the Spawning SMZ would potentially sunset and the ensuing potential economic effects of this occurrence varying by these timelines as well.

From a long-term economic benefits perspective, **Option** 5 would provide the greatest potential benefits followed by **Option 4**, **Option 3**, **Option 2**, and **Option 1 (No Action)**.

**Action 3.** Modify the sunset provision for the Warsaw Hole spawning special management zone.

**Option (No Action)** would allow Warsaw Hole Spawning SMZ to sunset, which would open the area to commercial and recreational harvest of snapper grouper species. Under this option, the economic benefits associated with this protection would be foregone. These foregone benefits include a potential elevated spawning stock biomass and improved spawning capacity for the

species receiving the additional protection, which may have long-term economic benefits because commercial and recreational fishermen may experience relative overall higher annual catch limits, increased harvest, and higher catch rates. This Spawning SMZ may also result in larger or higher quality fish, which may allow for a relative increase in gross revenue for commercial fishermen and recreational fishermen could experience increases in consumer surplus (CS).

In the short-term, **Option 1 (No Action)** would allow for potential economic benefits from allowing harvest of snapper grouper species in this Spawning SMZ. Increases in expected harvest are difficult to measure and estimate given the large statistical grids used for reporting catch data. A quantitative approach was applied in Snapper Grouper Amendment 36 (SAFMC 2016) to estimate landings reductions from implementation of the Warsaw Hole Spawning SMZ. Since bottom fishing has not been allowed in this area since implementation of that amendment, thereby limiting the availably of updated data, the quantitative analysis described in Amendment 36 serves as the best available information on the estimated economic effects and is used to provide quantitative effects for this action. In doing so, this option would result in an estimated increase annual commercial ex-vessel value by $1,245 and annual recreational CS by $2,449 (2025 dollars). The estimated total annual increase in economic benefits would be $3,694 (2025 dollars). As noted in Amendment 36, there is a high level of uncertainty associated with these estimates due to the assumption of uniform distribution of effort within the logbook area examined and no redistribution of effort after the area was closed to harvest of snapper grouper species. Amendment 36 also notes that it would be a reasonable to assume that the change in total ex-vessel revenue and CS would be minimal from fishing activity occurring in the Warsaw Hole Special SMZ. Finally, since the Spawning SMZ is small relative to all available fishing grounds, it is not expected to induce a change in angler effort in the short-term. Therefore, no change in short-term for-hire business producer surplus (PS) is expected.

**Option 2**, **Option 3**, **Option 4**, and **Option 5** would allow the natural bottom habitat area in the Warsaw Hole Spawning SMZ to continue to remain protected from bottom fishing for snapper grouper species and harvest of these species would continue to be prohibited. The realized economic benefits from these options are the same as those described under the forgone benefits in **Option 1 (No Action)**. There would also be foregone short-term economic benefits from **Option 2** through **Option 5** that would be the same as the realized short-term economic benefits described in **Option 1 (No Action)**. Overall, **Option 2**, **Option 3**, **Option 4**, and **Option 5** are expected to have similar economic effects, with the differences in the options stemming from the length of time that would pass before the Spawning SMZ would potentially sunset and the ensuing potential economic effects of this occurrence varying by these timelines as well.

From a long-term economic benefits perspective, **Option** 5 would provide the greatest potential benefits followed by **Option 4**, **Option 3**, **Option 2**, and **Option 1 (No Action)**.

## 2.4 Net Benefits of Regulatory Action

## 2.5 Determination of Significant Action

Pursuant to E.O. 12866, a regulation is considered a "significant regulatory action" if it is likely to result in: 1) an annual effect of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities; 2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; 3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights or obligations of recipients thereof; or 4) raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this executive order. Based on the information provided above, this action has been determined to not be economically significant for the purposes of E.O. 12866.

# Chapter 3. Regulatory Flexibility Act Analysis

TO BE UPDATED

## 3.1. 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 options contained in the regulatory action and to ensure the agency considers options 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 options 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; 2) a succinct statement of the objectives of, and legal basis for, the proposed regulatory action; 3) a description and, where feasible, an estimate of the number of small entities to which the proposed regulatory action will apply; 4) a description of the projected reporting, record-keeping, and other compliance requirements of the proposed regulatory action, including an estimate of the classes of small entities which will be subject to the requirements of the report or record; 5) an identification, to the extent practicable, of all relevant federal rules, which may duplicate, overlap, or conflict with the proposed rule; and 6) a description of any significant options 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.

## 3.2. Statement of the Need for, Objective of, and Legal Basis for the Proposed Actions

## 3.3. Description and Estimate of the Number of Small Entities to which the Proposed Actions would Apply

## 3.4. Description of the Projected Reporting, Record-Keeping and Other Compliance Requirements of the Proposed Actions

## 3.5. Identification of All Relevant Federal Rules, which may Duplicate, Overlap, or Conflict with the Proposed Action

## 3.6. Significance of Economic Impacts on a Substantial Number of Small Entities

## 3.7. Description of the Significant Options to the Proposed Action and Discussion of How the Options Attempt to Minimize Economic Impacts on Small Entities

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# Appendix A. System Management Plan

The System Management Plan Workgroup (SMP Workgroup) met July 2026. During this meeting the workgroup updated the System Management Plan document. The July 2026 version is included below.

**-- SEE NEXT PAGE --**

# Update on Tasks and Activities Identified in the System Management Plan for Spawning Special Management Zones

**A Review of Tasks Included in the Blueprint for Monitoring, Research, Outreach, Administration, and Evaluation of Spawning Special Management Zones that are Proposed in Amendment 36 to the Snapper Grouper Fishery Management Plan in the South Atlantic Region**

## July 16, 2026

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## Update on Tasks and Activities Identified in the System Management Plan for the South Atlantic Fishery Management Council Snapper-Grouper Fishery Management Plan Amendment 36 Spawning Special Management Zones

### Executive Summary

The South Atlantic Fishery Management Council (SAFMC) developed Spawning Special Management Zones (SSMZs) to protect habitats associated with spawning activity for snapper-grouper species in the South Atlantic region. The SSMZs were intended to reduce fishing pressure in areas where multiple species spawn and decrease bycatch and release mortality of snapper-grouper species.

This updated System Management Plan (SMP) reviews progress made in monitoring, research, outreach, enforcement, and evaluation activities associated with the SSMZs established through Amendment 36 to the Snapper Grouper Fishery Management Plan (SAFMC 2016). The document also identifies remaining scientific and management information gaps and provides a framework for evaluating whether the SSMZs are meeting their intended conservation and fisheries management objectives.

Since development of the original SMP, research conducted by federal and state agencies, academic institutions, non-governmental organizations, and fishermen has improved understanding of spawning activity and species occurrence within several SSMZs. Studies conducted between 2023 and 2025 documented spawning indicators for multiple focal species within the South Cape Lookout, Georgetown/Devil's Hole, and Warsaw Hole SSMZs and expanded the available biological and habitat data for these areas. Ichthyology plankton simulation studies described probability of retention of eggs in the South Atlantic region and compared the SSMZs with other girds in the South Atlantic area.

The SMP organizes management activities into four categories: resource protection, research and monitoring, outreach and education, and administration. Action items within these categories are intended to support adaptive management by identifying activities that improve understanding of spawning habitats, evaluate biological and socioeconomic outcomes, improve compliance, and support long-term management review.

This document places particular emphasis on evaluation of management effectiveness. Evaluation metrics include biological indicators associated with spawning activity and fish abundance, social and economic indicators associated with stakeholder engagement and fishery impacts, and governance indicators related to outreach, compliance, enforcement, and implementation of the SMP. Collectively, these measures are intended to support periodic review of whether the SSMZs are contributing to protection of spawning fish and reduction of snapper-grouper bycatch while improving scientific understanding of spawning habitats in the South Atlantic region.

The SMP is intended to function as a living management document that can be updated as new scientific information, monitoring results, and management needs emerge.

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# 2.0. Spawning Special Management Zones in Amendment 36

## 2.1. Background and Regulatory Context

Amendment 36 to the Snapper Grouper Fishery Management Plan established Spawning Special Management Zones (SSMZs) to protect areas associated with spawning activity for snapper-grouper species in the South Atlantic region. The SSMZs were intended to protect areas where multiple species of fish spawn and reduce bycatch and release mortality of snapper-grouper species.

The SSMZs evaluated through this System Management Plan include South Cape Lookout, Area 51, Area 53, Devil's Hole, and Warsaw Hole. These sites were identified based on available fishery-independent data, habitat information, fisher observations, public comment, and evidence of spawning activity. Areas 51 and 53 are artificial reef research sites managed by the South Carolina Department of Natural Resources.

The SSMZs prohibit fishing for, possession of, and retention of snapper-grouper species within designated boundaries while allowing transit and harvest of non-snapper-grouper species consistent with applicable regulations. The management approach is similar to Deepwater Marine Protected Areas but are strategically placed in potential spawning areas.

This SMP provides an adaptive management framework for evaluating research, monitoring, enforcement, outreach, and management effectiveness associated with the SSMZs.

## 2.2. Legislative Authority

Authority for the establishment and enforcement of SSMZs is provided under the Magnuson-Stevens Fishery Conservation and Management Act. Enforcement responsibilities are shared among NOAA Fisheries Office of Law Enforcement, the United States Coast Guard, and state resource agencies operating under Joint Enforcement Agreements with NOAA Fisheries.

Enforcement activities may include offshore patrols, aerial surveillance, cooperative enforcement operations, and compliance assistance. Enforcement capacity varies among states and agencies due to differences in offshore patrol assets and staffing resources.

## 2.3. Regulations

Within SSMZs, fishing for, possession of, and retention of snapper-grouper species are prohibited. Harvest and possession of non-snapper-grouper species remains allowable while a vessels is transiting through a SSMZs with snapper-grouper species onboard if fishing gear is properly stowed in accordance with federal requirements.

South Cape Lookout, Georgetown/Devil's Hole, and Warsaw Hole SSMZs established through Amendment 36 included a sunset provision requiring future review and reauthorization by the Council.

# 3.0. System Management Plan

The SMP was created to develop a framework for the Council to use adaptive management for the SSMZs. The SMP provides guidance on action items to be completed in the SSMZs and potential methods for evaluation of management effectiveness. If changes in size, configuration,

or regulations are recommended for the SSMZs, the Council will develop an amendment to the Snapper-Grouper Fishery Management Plan.

### 3.1. Goals and Objectives

The SSMZs were established to protect areas associated with spawning activity for snapper-grouper species in the South Atlantic region. The areas evaluated in this SMP include locations where spawning activity has been observed in studies, documented through histological sampling, or identified by fishermen.

Management of the SSMZs is focused primarily on protection of spawning habitats and spawning fish for select snapper-grouper species (**Table 3.1**). The SMP also supports continued research and monitoring intended to improve understanding of spawning timing, habitat use, connectivity, and fish distribution within and adjacent to the SSMZs.

The regulations applicable to the SSMZs prohibit fishing for and possession of snapper-grouper species within the managed areas. Although the limited size of the SSMZs may constrain their ability to produce measurable reductions in regional bycatch, the areas may reduce localized fishing interactions and release mortality for snapper-grouper species during spawning periods.

**Table 0.1.** Focal species of the SSMZs.

| Family | Common Name | Scientific Name |
|---|---|---|
| Amberjack | Greater Amberjack | *Seriola dumerili* |
| Groupers | Coney | *Cephalopholis fulvus* |
| | Graysby | *C. cruentata* |
| | Goliath Grouper | *Epinephelus itajara* |
| | Nassau Grouper | *E. striatus* |
| | Red Grouper | *E. morio* |
| | Red Hind | *E. guttatus* |
| | Rock Hind | *E. adscensionis* |
| | Speckled Hind | *E. drummondhayi* |
| | Snowy Grouper | *Hyporthodus niveatus* |
| | Warsaw Grouper | *H. nigritus* |
| | Yellowedge Grouper | *H. flavolimbatus* f |
| | Black Grouper | *Mycteroperca bonaci* |
| | Gag | *M. microlepis* |
| | Scamp | *M. phenax* |
| Snappers | Blackfin Snapper | *Lutjanus buccanella* |
| | Cubera Snapper | *Lutjanus cyanopterus* |
| | Mutton Snapper | *L. analis* |
| | Red Snapper | *L. campechanus* |
| | Silk Snapper | *L. vivanus* |
| | Yellowtail Snapper | *Ocyurus chrysurus* |
| Tilefishes | Golden Tilefish | *Lopholatilus chamaeleonticeps* |
| | Blueline Tilefish | *Caulolatilus microps* |

The SMP provides a framework for coordinating research, monitoring, outreach, enforcement, and evaluation activities associated with the SSMZs. Information collected through these activities is intended to support evaluations of whether the SSMZs are protecting spawning habitats and contributing to management objectives identified through Amendment 36.

## 3.2. Existing Knowledge Gaps

Evaluation of the effectiveness of SSMZs is constrained by several biological, ecological, socioeconomic, and enforcement-related information gaps. Although research conducted through fishery-independent surveys, cooperative research, modelling, and habitat mapping has improved understanding of the SSMZ sites, uncertainty remains regarding spawning timing, habitat use, fish movement, connectivity, fishing activity, and long-term responses to spatial protection. The following sections summarize major information gaps relevant to future management evaluation and research priorities.

### 3.2.1. Target Resource

Many of the focal species for Amendment 36 lack a complete description of their life history traits including when and where they spawn and whether they aggregate to spawn. Spawning seasons and spawning locations are two key pieces of data that are needed to improve the siting and timing of potential closed areas. Focal species have been observed spawning through direct observation or anecdotal reports in South Cape Lookout, Area 51, Area 53, Devil's Hole, and Warsaw Hole SSMZs. Additional life history research related to spawning behavior or timing could assist in better placement or timing of closed areas. Information on movement (e.g., home range size) and migration patterns during and outside of spawning seasons is also needed to determine if the size of the SSMZ is adequate to protect focal species.

### 3.2.2. Habitat

Characterization of benthic habitats associated with spawning focal species in the snapper-grouper complex remains limited in the South Atlantic region. Additional research is needed to improve understanding of habitat features associated with spawning activity, including the distribution, extent, and seasonal use of habitats within and adjacent to SSMZs.

Recent research has highlighted uncertainty associated with habitat characterization and fish distribution. Review panels for both the South Atlantic Red Snapper Research Program and the Greater Amberjack Count Project did not recommend expanding catch per unit area estimates to absolute abundance estimates because of uncertainty related to habitat characterization and fish distribution (SEDAR 2026a; SEDAR 2026b). These findings underscore the need for improved understanding of habitat associations for focal species.

Available information suggests that many snapper-grouper species may associate with specific bathymetric and geomorphological features during spawning periods, including high-relief hardbottom, shelf-edge habitats, artificial reefs, and areas with increased structural complexity (Heyman and Wright 2011; Kobara et al. 2013; Gokturk et al. 2022). However, the distribution and seasonal use of these habitats within SSMZs remain incompletely understood.

Additional habitat mapping and verification using approaches such as multibeam mapping, backscatter analysis, remotely operated vehicle surveys, stationary camera systems, and fishery-

independent surveys may improve identification of habitats associated with spawning fish and help evaluate whether existing SSMZ boundaries encompass habitats most frequently associated with spawning activity.

Oceanographic conditions associated with spawning activity also remain incompletely understood. Environmental variables such as temperature, currents, dissolved oxygen, and salinity may influence spawning timing, aggregation formation, larval transport, and habitat use (Gokturk et al. 2022). Improved understanding of oceanographic processes may also support evaluation of ecological connectivity among protected spawning areas, including egg distribution, larval transport, settlement patterns, and ontogenetic habitat use.

Although habitat characterization efforts have expanded in recent years, uncertainty remains regarding the interactions among habitat features, oceanographic conditions, and fish behavior in influencing spawning activity and fish distribution within SSMZs. Continued habitat mapping, verification, and environmental monitoring may improve understanding of spawning-associated habitats and support future evaluations of SSMZ effectiveness.

### 3.2.3. Use of SSMZs

Limited spatially explicit fishing effort and catch data constrain the evaluation of how SSMZs may influence fishing behavior, fishing effort redistribution, and interactions with spawning fish. Fishermen stated they fished in the South Cape Lookout, Devil's Hole, and Warsaw Hole SSMZ prior to the closure. Use of Area 51 and Area 53 SSMZs was unknown although tackle was observed by divers (SC DNR observations). Improved understanding of commercial and recreational fishing activity within and adjacent to SSMZs would assist describing fishing pressure and potential reductions in fishing interactions during spawning periods.

### 3.2.4. Connectivity and Larval Dispersal

Oceanographic connectivity among spawning habitats, settlement areas, and reef fish populations in the South Atlantic region remains an active area of research. Ocean currents, larval transport processes, and spawning timing may influence dispersal and recruitment patterns for snapper-grouper species associated with SSMZs.

Several studies have used ichthyoplankton modeling, satellite-tracked drifters, and oceanographic analyses to evaluate potential larval transport pathways and connectivity among spawning areas in the South Atlantic region (Sedberry et al. 2006; Karnauskas et al. 2022; Brothers et al. 2024). These studies provide useful context for understanding how spawning habitats may contribute to broader regional population dynamics; however, the extent to which individual SSMZs contribute to recruitment or population-level effects remains uncertain.

Continued research on spawning timing, larval dispersal, and habitat connectivity may improve understanding of the ecological role of SSMZs (Lindeman et al. 2000, Burke et al. 2003, Paris et al. 2005, Hare and Walsh 2007) and assist future management evaluations.

### 3.2.5. Evaluation Limitations

The relatively small spatial extent of the SSMZs, limited baseline data, limited staff availability, and variability in spawning behavior among focal species may constrain the ability to detect population-level biological responses attributable to the SSMZs. As a result, evaluation efforts may

be more effective when focused on localized indicators such as spawning occurrence, size distribution, and compliance in the managed areas.

## 3.3. Management Action Items

The 2017 SMP details strategies to achieve proposed management action items. The purpose and need detailed in Amendment 36 will be revisited and strategies will be identified through a process that involves affected users. The following information under the four sections of proposed action items includes brief summaries and examples.

### 3.3.1. Resource Protection Action Items

Resource protection efforts for the SSMZs have focused on offshore patrols, interagency coordination, officer training, and evaluation of remote monitoring approaches. Enforcement activities are conducted primarily through NOAA Office of Law Enforcement, the United States Coast Guard, and state agencies operating under Joint Enforcement Agreements.

Available enforcement capacity varies among agencies due to staffing limitations, offshore transit distance, vessel availability, joint enforcement agreements, and funding constraints. Patrols within SSMZs have occurred periodically, although limited offshore enforcement resources constrain the frequency of dedicated patrol operations. Law enforcement personnel have emphasized the importance of identifying periods of elevated fishing activity and improving communication regarding likely timing of spawning activity to support more targeted enforcement efforts.

Interagency coordination continues through annual Law Enforcement Advisory Panel discussions, officer training programs, and cooperative enforcement activities. Additional evaluation of remote monitoring technologies and reporting systems may improve future enforcement efficiency and compliance tracking within SSMZs, but enforcement of possession regulations is likely to require direct observation and boarding by enforcement officers.

### 3.3.2. Research and Monitoring Action Items

Research and monitoring activities conducted through the SSMZ System Management Plan have improved understanding of spawning activity, habitat characteristics, and fish distribution within several SSMZs. Fishery-independent surveys, cooperative research, habitat mapping, remotely operated vehicle surveys, and biological sampling have contributed information on focal species occurrence, spawning condition, and habitat associations within SSMZs.

Research conducted between 2023 and 2025 by LGL Ecological Research Associates, South Carolina Department of Natural Resources, The Nature Conservancy, and other partners expanded biological sampling efforts within South Cape Lookout, Devil's Hole, and Warsaw Hole (see November 2025 SAFMC Seminar Series[14]). Sampling documented spawning indicators and seasonal occurrence for multiple focal species, including gag, greater amberjack, scamp, red grouper, red snapper, and warsaw grouper. Additional regional studies have improved understanding of spawning timing, habitat use, and environmental conditions associated with spawning activity for several snapper-grouper species.

[14] https://safmc.net/events/seminar-series-do-we-still-need-to-protect-fish-spawning-grounds/

Habitat characterization efforts conducted through multibeam mapping programs, the Southeast Reef Fish Survey, South Atlantic Red Snapper Research Program, Greater Amberjack Count Project, and other regional efforts have improved understanding of reef fish habitat distribution and geomorphological features associated with spawning activity in portions of the South Atlantic region. Multibeam mapping within SSMZ boundaries has been completed, although habitat characterization and mapping adjacent to SSMZs may improve understanding of habitat use and boundary placement.

Research efforts have also incorporated predictive modeling, ichthyoplankton modeling, oceanographic analyses, and cooperative research approaches to evaluate spawning habitat associations, larval dispersal, and potential connectivity among spawning areas (Karnauskas et al. 2022, Brothers et al. 2024). Although these efforts have improved understanding of spawning-related processes, uncertainty remains regarding spawning site fidelity, movement patterns, larval transport, and the extent to which individual SSMZs influence recruitment dynamics or broader population-level responses. New projects such as DriftCast[15] are being developed to make ichthyoplankton modeling more accessible.

The relatively small spatial extent of the SSMZs, limited baseline data, and variability in spawning behavior among focal species may constrain the ability to detect broad biological responses attributable to the managed areas. As a result, monitoring efforts are focused primarily on evaluating spawning occurrence, habitat use, fish distribution, and localized interactions with spawning fish within the SSMZs.

Continued research and monitoring will improve understanding of spawning habitats, support future management evaluations, and inform adaptive management of SSMZs in the South Atlantic region. Detailed research and monitoring action items and implementation updates are provided in Appendix II.

### 3.3.3. Outreach and Education Action Items

Outreach and education efforts associated with the SSMZs have focused on improving public awareness of spawning habitats, regulations, ongoing research activities, and the purpose of the managed areas. Outreach products and communication efforts have been developed through collaboration among NOAA Fisheries, state agencies, researchers, fishermen, non-governmental organizations, and the Council.

Outreach activities have included:

- development of educational videos and web content,
- presentations,
- addition of SSMZ locations to Garmin Maps and FishRules,
- social media communication, and
- informational materials describing SSMZ locations, regulations, and spawning behavior of focal species.

[15] DriftCast is an interactive web interface that allows modeling the movement of passive particles in the Atlantic Ocean and Gulf. The models include forward (where larvae settle) and backward (where larvae come from) scenarios.

Research updates and educational materials have also been distributed through Council publications, seminar series presentations, and communication networks.

Several outreach efforts have emphasized cooperative research approaches involving commercial and for-hire fishermen in biological sampling and data collection activities. These efforts have contributed information on spawning occurrence and fish distribution while also increasing stakeholder participation in research associated with the SSMZs.

Outreach and communication remain important components of SSMZ implementation because of the offshore location of the managed areas and the limited opportunities for direct observation of enforcement and research activities by the public. Continued communication efforts may improve awareness of SSMZ regulations, increase understanding of spawning habitats and spawning behavior, and support voluntary compliance within the managed areas.

Additional outreach needs include improving accessibility of spatial information for fishermen, maintaining current educational materials and resources, and continuing communication of research findings relevant to the evaluation of SSMZs. Detailed outreach and education action items and implementation updates are provided in Appendix II.

### 3.3.4. Administrative Action Items

Implementation and evaluation of the SSMZ System Management Plan (SMP) has required coordination among federal and state agencies, researchers, fishermen, non-governmental organizations, and advisory groups. Administrative activities associated with the SMP have focused on coordinating research and monitoring efforts, facilitating information exchange, supporting outreach and enforcement activities, and developing evaluation approaches for the SSMZs.

The Council's amendment and advisory panel process provided the initial framework for development of the SSMZs and the associated SMP. Since implementation, coordination among management agencies and research partners has supported biological sampling, habitat mapping, outreach activities, enforcement coordination, and periodic review of management needs associated with the SSMZs.

Evaluation of SSMZ effectiveness is intended to incorporate biological, socioeconomic, outreach, governance, and enforcement information. Continued coordination among agencies and partners may improve consistency of data collection, improve accessibility of information relevant to management evaluation, and support future adaptive management discussions.

Administrative coordination remains particularly important because many research and monitoring activities associated with the SSMZs are conducted through cooperative projects, short-term funding sources, or broader regional research programs rather than dedicated long-term monitoring programs specific to the SSMZs. Continued collaboration among partners may improve the ability to evaluate management effectiveness and identify future research and monitoring priorities.

Detailed administrative action items and implementation updates are provided in Appendix II.

## 3.4. Management Effectiveness Evaluation

Evaluation of the SSMZs is intended to assess whether the managed areas are contributing to protection of spawning habitats and reducing fishing interactions with spawning snapper-grouper

species within the managed areas. Evaluation efforts also provide information on habitat characteristics, spawning occurrence, fish distribution, compliance, outreach effectiveness, and implementation of management activities associated with the SMP.

Because of the relatively small spatial extent of the SSMZs, limited baseline information, and variability in spawning behavior among focal species, evaluation of management effectiveness is focused primarily on localized biological, fishery, outreach, and governance indicators rather than broader population-level responses. Although population-level responses will be difficult to identify many of the focal species are overfished or are experciencing overfishing based on their most recent assessments (**Table 3.2**). Monitoring and evaluation efforts are intended to support adaptive management by identifying information gaps, tracking implementation progress, and improving understanding of spawning habitats and spawning activity within the South Atlantic region.

Evaluation indicators are grouped into three broad categories: biological and habitat indicators, fishery and socioeconomic indicators, and compliance and implementation indicators.

**Evaluation Limitations**

Several factors constrain evaluation of management effectiveness for the SSMZs, including limited baseline information, uncertainty regarding spawning site fidelity and connectivity, variable sampling intensity among sites and years, and limited spatially explicit fishing effort data. In addition, the relatively small size of the SSMZs may limit the ability to detect broader population-level or fishery-wide responses attributable to the managed areas.

As a result, evaluation efforts are focused primarily on localized indicators associated with spawning occurrence, outreach, compliance, and implementation of management activities.

**Table 0.2.** Stock status of SSMZ focal species in the South Atlantic as of May 2026. The stock status is based on the most recent SEDAR assessment if conducted or the National Marine Fisheries Service (NMFS) stock status report.

| Species | Assessment | Year | Overfished | Overfishing |
|---|---|---|---|---|
| Greater amberjack | SEDAR 59 | 2017 | No | No |
| Coney | | | Unknown | Unknown |
| Graysby | | | Unknown | Unknown |
| Goliath grouper | SEDAR 23 | 2011 | Unknown | Unknown |
| Nassau grouper[+] | | | Threatened | Unknown |
| Red grouper | SEDAR 53 | 2015 | Yes | Yes |
| Red hind | | | Unknown | Unknown |
| Rock hind | | | Unknown | Unknown |
| Speckled hind | Potts and Brennan | 2001 | Unknown | Unknown |
| Snowy grouper | SEDAR 36 Update | 2018 | Yes | No |
| Warsaw grouper | Huntsman et al. | 1992 | Unknown | Unknown |
| Black grouper | SEDAR 19b | 2010 | No | No |
| Gag | SEDAR 71 | 2019 | Yes | Yes |
| Scamp | SEDAR 68 OA | 2021 | Yes | No |
| Blackfin snapper | | | Unknown | Unknown |

| | | | | |
|---|---|---|---|---|
| Cubera snapper | | | Unknown | Unknown |
| Mutton snapper | SEDAR 79 | 2023 | No | No |
| Red snapper | SEDAR 73 Update | 2023 | No | No |
| Silk snapper | | | Unknown | Unknown |
| Yellowtail snapper | SEDAR 97 | 2023 | No | No |
| Golden tilefish | SEDAR 89 | 2022 | No | No |
| Blueline tilefish | SEDAR 92 | 2024 | Unknown | Unknown |

[+]Nassau grouper was listed as an ESA threatened species indicating the population is at low levels.

### 3.4.1. Biophysical Indicators

Biological and habitat indicators are intended to evaluate whether SSMZs continue to encompass habitats associated with spawning activity and whether spawning fish utilize these areas over time. Indicators focus on spawning occurrence, population structure, and habitat characterization because these metrics are currently the most feasible to evaluate consistently with available data sources.

#### 3.4.1.1. Spawning Occurrence

The primary biological indicator for evaluating spawning activity within SSMZs is the number of fish collected in spawning condition within the managed areas. Biological sampling and histological analyses provide direct evidence of spawning activity and can improve understanding of spawning timing, species occurrence, and seasonal use of SSMZs.

Observations from recent cooperative research by LGL Ecological Research Associates (LGL) and The Nature Conservancy (TNC) in South Cape Lookout, Devil's Hole, and Warsaw Hole from 2023 to 2025 found:

- 122 individuals of 9 focal species were in spawning condition [(predicted to spawn or had spawned within 24 hours of sample collection), **Table 3.3**].
- SSMZ
- Warsaw grouper were observed in spawning condition.
- While not in spawning condition, multiple speckled hind were observed in the SSMZs.

The cooperative research was timed so that they would overlap suspected spawning times for focal species known to be in the area. The sampling targeted Warsaw Hole during spawning of greater amberjack (April) and warsaw grouper (June). Devil's Hole was targeted to catch spawning gag, scamp, and warsaw grouper (April, two different years). Cape Lookout was sampled in April and June targeting red grouper and other shallow water grouper. The number of days and months sampled provides a limited number of focal species in spawning condition in the areas.

Due to limited funding and no sunset clause on regulations, Area 51 and Area 53 were not included in the sampling described above. Dive surveys conducted by SC Aquarium collected abundance information in Area 51 and 53 but biological samples are lacking.

#### 3.4.1.2. Population Structure

Because sampling time can influence which species are in spawning condition, population structure indicators (e.g. size or age of fish) may provide indirect information on spawning of focal species observed within the SSMZs. These indicators may help evaluate whether larger or reproductively mature individuals continue to utilize spawning habitats within the managed areas.

Based on the recent work by LGL and TNC from 2023 to 2025:

- All focal species caught in the SSMZs had greater than 50% of the individuals retained for histological analysis except for speckled hind (**Table 3.3)**.
- Many focal species caught in the SSMZs had greater than 50% of the individuals analyzed for age and histological sampling except for speckled hind, black grouper, and silk snapper.
- Graysby and rock hind caught in the SSMZs had ages that exceed the current maximum age for the species.

#### 3.4.1.3. Habitat Mapping and Characterization

Habitat mapping indicators are intended to evaluate the extent to which spawning-associated habitats within SSMZs have been characterized using multibeam mapping, habitat verification surveys, and other habitat assessment methods. Habitat characterization may improve understanding of the relationship between spawning activity and geomorphological or oceanographic features within and adjacent to the managed areas.

Metrics for mapping characterization include:

- 100% of the SSMZs are mapped using multibeam (**Table 3.4**).
- Video has been collected in the SSMZs and rough characterizations of the habitat are available.
- Features associated with spawning activity have not been developed because direct observation of spawning fish has not been observed. Fish could move locations during actual spawning events.
- Comparative work has not been completed outside of SSMZs. Data is available from monitoring sites but those are selected on a random basis which may not match with spawning time.

#### 3.4.1.4. Ichthyoplankton and Larval Dispersal Models

Ichthyoplankton modeling and larval dispersal analyses provide additional information on potential transport pathways and connectivity associated with spawning activity within SSMZs. Existing regional modeling efforts have evaluated simulated dispersal patterns for several focal species and may improve understanding of oceanographic conditions associated with spawning activity and larval transport. A SAFMC Seminar Series[16] described ichthyoplankton dispersal for red snapper, gag, scamp, and red grouper.

Potential metrics may include:

- Presence of modeled larval transport pathways originating from SSMZs (Karnauskas et al. 2022, Brothers et al. 2024).
- Modeling predicts eggs spawned in SSMZs will settle in the SAFMC region.
- New projects are being developed to make larval transport models more accessible.

Interpretation of ichthyoplankton indicators could help to describe uncertainty associated with spawning location, spawning timing, larval behavior, oceanographic variability, and model assumptions. Existing modeling efforts helped to improve understanding of potential connectivity.

[16] https://youtu.be/oqQ11E99vTQ?si=Umn5W2UE3u0-WbwG

**Table 0.3.** Sample size, number and percent of females in spawning condition in SSMZ collected from 2023 to 2025 and their associated life history characteristics. Samples were collected from 2023 to 2025 by LGL in South Cape Lookout, Devil's Hole, and Warsaw Hole. Highlighted species had individuals observed in spawning condition. Data sources for predicted maximum total length, maximum age, size of maturity, and age of maturity are provided in Appendix III.

| Species | Predicted Max Total Length (TL, cm) | 75% Max TL (cm) Size | Max Age | Size of Maturity (Mat, cm) | Age of Mat | >75% of Max TL (%) | > Size of Mat (%) | > Age of Mat (%) | Sample Size (Length/ Maturity/ Age) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| Greater amberjack | 119 | 89 | 17 | 73 | 1 | 23 (100%) | 23 (100%) | 20 (100%) | 25/23/20 | |
| Coney | 38 | 29 | 19 | 18 | | | | | | |
| Graysby | 45 | 34 | 13 | 16 | | 3 (100%) | 3 (100%) | | 3/3/3 | Aged 7-19 |
| Goliath grouper | 250 | 187.5 | 37 | 110-120 | 5-6 | | | | | |
| Nassau grouper | 122 | 91.5 | 29 | 44-50 | 4-5 | | | | | |
| Red grouper | 85 | 63.75 | 26 | 49 | 2-3 | 3 (100%) | 3 (100%) | 3 (100%) | 3/3/3 | Ages 19-23 |
| Red hind | 57 | 43 | 11 to 22 | 24 | 2 | | | | | |
| Rock hind | 50 | 37.5 | 12 | 20 | 4 | 1 (100%) | 1 (100%) | 1 (100%) | 1/1/1 | Age 21 |
| Speckled hind | 110 | 82.5 | 35 | 81 | 6-7 | 0 (0%) | 0 (0%) | 2 (29%) | 7/2/7 | Ages 3 - 7 |
| Snowy grouper | 122 | 91.5 | 56/80 | 54.1 | 5 | 0 (0%) | 7 (58%) | 9 (60%) | 16/12/15 | Ages 2 to 11 |
| Warsaw grouper | 230 | 172.5 | 41 | | | 0 (0%) | | | 6/6/4 | Ages 7 - 11 |

| Species | Predicted Max Total Length (TL, cm) | 75% Max TL (cm) Size | Max Age | Size of Maturity (Mat, cm) | Age of Mat | >75% of Max TL (%) | > Size of Mat (%) | > Age of Mat (%) | Sample Size (Length/ Maturity/ Age) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| Yellowedge grouper | 97 | 73 | 85 | 51 | 7 | | | | | |
| Black grouper | 133 | 99.75 | 33 | 86 | 6-7 | 0 (0%) | 1 (50%) | 0 (0%) | 2/2/2 | Both Age 6 |
| Gag | 91 | 68.25 | 30 | 65 | 3 | 12 (100%) | 12 (100%) | 11 (100%) | 12/12/11 | 12/12/11 |
| Scamp | 107 | 80.25 | 30 | 40 | 3 | 2 (5%) | 41 (100%) | 31 (100%) | 43/41/31 | Ages 2 to 21 |
| Blackfin snapper | 62-73 | 46 | | | | 8 (17%) | * | * | 48/46/27 | Spawning fish ranged from 34 to 50 cm TL and Age 2+. |
| Cubera snapper | 130 | 98 | | 70 | | | | | | |
| Mutton snapper | 86 | 65 | 40 | 35 | 2 | 1 (100%) | 1 (100%) | 1 (100%) | 1/0/1 | |
| Red snapper | 90 | 68 | 54 | 37 | 2 | 12 (75%) | 16 (100%) | 15 (100%) | 16/15/15 | Ages 5-21 |
| Silk snapper | 83 | 62.25 | 33 | 45 | 5 | 1 (1%) | 41 (53%) | 14 (18%) | 78/74/78 | Ages 2 to 7 |
| Yellowtail snapper | 62 | 47 | 23 | 23 | 2 | | | | | |
| Golden tilefish | 125 | 93.75 | 40/50 | <61 | 3 | | | | | |
| Blueline tilefish | 90 | 67.5 | 43 | ~36 | 3 | 0 (0%) | 3 (100%) | 3 (100%) | 3/3/3 | |

**Table 0.4.** Habitat mapping metrics for SSMZ area mapped**.**

| MPA | Total Area Square Miles | Area Mapped Square Miles |
|---|---|---|
| South Cape Lookout | 5 | 5 |
| Area 51 | 3 | 3 |
| Area 53 | 3 | 3 |
| Devil's Hole | 3 | 3 |
| Warsaw Hole | 3.6 | 3.6 |

### 3.4.2. Social and Economic Indicators

Fishery and socioeconomic indicators are intended to monitor understanding of fishing activity, stakeholder awareness, and localized interactions with spawning fish within the SSMZs. Limited spatially explicit fishing effort and catch information at the scale of the SSMZs constrain the ability to evaluate broader fishery-level responses. As a result, evaluation efforts are focused primarily on stakeholder participation, outreach implementation, and available information on fishing activity and area use.

Selected indicators include participation in cooperative research and citizen science programs, stakeholder awareness of SSMZ regulations, and qualitative information regarding fishing activity within and adjacent to the managed areas. Most metrics indicated that there is limited information related to social and economic metrics except development of a Citizen Science Program (**Table 3.5**).

**Table 0.5.** Social and economic metrics for the SSMZ System Management Plan.

| Metric | Completion Status |
|---|---|
| Study developed to collect baseline social and economic data to understand effects of SSMZ. | Planned |
| Study to understand impact of fishermen targeting species outside the SSMZs. | Not started |
| Data on stakeholder's knowledge of SSMZs are collected. | Not started |
| Data on perception of the SSMZs are collected. | Not started |
| Citizen Science Program initiated. | Completed |
| Citizen Science Program assisting in the monitoring spawning in SSMZs. | Completed* |

*Cooperative research conducted by LGL and commercial and charter fishermen.

### 3.4.3. Compliance and Implementation Indicators

Compliance and implementation indicators are intended to evaluate enforcement coordination, outreach activities, implementation of monitoring efforts, and overall administration of the SMP. These indicators may assist managers in identifying operational limitations, information gaps, and opportunities to improve future monitoring and management activities associated with the SSMZs.

Indicators include enforcement patrol activity, outreach products developed and distributed, implementation of research and monitoring activities, and coordination among management agencies and research partners.

The establishment of the SMP occurred but has met sporadically due to limited staff time (**Table 3.6**). Dedicated staff would help to maintain momentum in evaluating the SSMZs and other managed areas. Evaluations often require full-time staff dedication.

**Table 0.6.** Establishing and utilizing the SMP for SSMZs.

| Metric | Completion Status |
|---|---|
| SMP Workgroup formed. | Completed |
| Evaluation conducted. | Ongoing |
| SMP WG met. | Completed |

Some of the requested materials identified in the SMP has been created (**Table 3.7**). Some of the key pieces[17] of outreach include:

- SSMZs were added to Garmin maps.
- FishRules has SSMZ regulations included in their app.
- A phone and computer training module was developed to describe SSMZs.
- Research in the SSMZ was presented at a SAFMC Seminar Series.
- Three short videos were created describing importance of protecting spawning areas.

**Table 0.7.** Outreach metrics for evaluating SSMZs.

| Metric | Completion Status |
|---|---|
| Short-term outreach action items created. | Completed |
| Outreach items updated and web page developed with new management regulations. | Completed |
| Point of Contact (POC) designated for SSMZs in SAFMC, SouthEast Regional Office (SERO), and SouthEast Fisheries Science Center (SEFSC). | Completed |
| List of key contacts created. | Completed |
| SAFMC communicate with key contacts 2 times per year. | Not Started |
| Collaboration with agencies and organizations for teacher workshops initiated and maintained. | Not Started |
| Download of boundary files for use with GPS units tracked. | Not Started |
| Polls developed to track stakeholder's knowledge of SSMZs. | Not Started |

[17] SAFMC Marine Protected Areas webpage

| | |
|---|---|
| Questions added regarding SSMZs during interviews with fishermen. | Not Started |

There is anecdotal evidence of non-compliance within some Spawning Special Management Zones (SSMZs). Enforcement of the SSMZs is challenging due to their offshore location and the limited availability of enforcement personnel and resources. As a result, dedicated patrols focused solely on SSMZ compliance are unlikely. When patrols do occur in the vicinity of an SSMZ, they would likely be conducted as part of broader offshore enforcement operations that include surrounding areas, particularly given the relatively small size of the zones and the limited amount of time required to assess compliance within them.

Although a dedicated enforcement assessment has not been developed specifically for the SSMZs, a report prepared for Gray's Reef National Marine Sanctuary documented enforcement considerations for similar offshore protected areas (Kendall et al. 2020). However, the regulations in Gray's Reef National Marine Sanctuary differ from those in the SSMZs. The sanctuary includes a research area where fishing, diving, and vessel stopping are prohibited, whereas the SSMZs allow certain fishing activities but prohibit fishing for snapper grouper species and anchoring by fishing vessels. Because some fishing activity is permitted within the SSMZs, effective enforcement will require on-water patrols and vessel inspections to determine compliance.

**Table 0.8.** Law enforcement metrics for evaluating SSMZs.

| Metric | Completion Status |
|---|---|
| Number of patrols exceeds 5 patrols/year/ SSMZ. | NA |
| Enforcement vessels in state adjacent to SSMZ increased or maintained. | NA |
| Updates on enforcement and adjudication provided to the Council regarding SSMZs. | Completed |
| Enforceability ratings maintained or increased for SSMZs. | Not Started |

**Table 0.9.** Compliance metrics for evaluating SSMZs.

| Metric | Completion Status |
|---|---|
| Percent of patrols with violation is less than 20%/year. | NA |
| Remote monitoring methods for SSMZs reviewed. | Completed* |
| Remote monitoring method for SSMZs recommended. | NA |
| Citizen Science Program developed. | Completed |

*Gray's Reef National Marine Sanctuary investigated different methods of monitoring offshore areas (Kendall et al. 2020).

## 4.0. Site Description and Existing Information

This section summarizes available habitat, biological, oceanographic, and fishery-independent information for each SSMZ evaluated through the SMP. The information presented provides baseline context for interpreting research, monitoring, and management effectiveness indicators associated with the SSMZs.

Available information differs among sites because sampling intensity, habitat mapping coverage, biological sampling, and research effort have varied spatially and temporally. Existing information includes fishery-independent surveys, habitat mapping, remotely operated vehicle observations, cooperative research, and biological sampling conducted by federal and state agencies, academic institutions, non-governmental organizations, and fishermen.

The five SSMZs are located in federal waters in the South Atlantic region, consisting of live bottom, hard bottom, and artificial habitats from low relief to high relief. Additionally, these sites range from 70 to 453 feet in depth off the coasts of North Carolina to south Florida from latitudes 33°35′N to 24°20′N (**Figure 1**).

*Affected Users*
Social effects of restricting access to fishing are discussed in detail in Amendment 36 to the Snapper Grouper FMP (SAFMC 2016). In general, benefits to fishermen and coastal communities would be associated with biological benefits that result from prohibiting or restricting harvest in the designated area. If there is improvement in a stock over time, more fish available, this could benefit fishermen due to the expected spillover effect from closed areas. Additionally, improved fish stock health that fishermen observe first hand would also help improve buy-in for closed areas.

In most cases there would be expected negative effects from closed areas on fishermen and fishing communities if access to fishing grounds is prohibited or restricted. For commercial fishermen and for-hire businesses that use the fishing grounds, closing an area could negatively affect business profits in the short-term. For private recreational anglers, restricted access could negatively affect fishing opportunities and trip satisfaction. Additionally, SSMZs are specifically designed to protect spawning habitat, and this could be detrimental for fishermen who target a particular species at certain locations where fish are aggregating.

Designating areas as a SSMZ and prohibiting fishing for snapper grouper species requires compliance via buy-in from the public and enforcement. If these are lacking, the SSMZ may not generate the expected biological benefits, which would negatively affect fishermen and communities. **Amendment 36 Section 3.3.3** describes the communities and fishermen who may be affected by establishment of SSMZs.

## 4.1. South Cape Lookout

### Site Description

The South Cape Lookout SSMZ is located offshore of North Carolina along the continental shelf and shelf-edge region in an area characterized by hardbottom habitat, live bottom communities, and complex bathymetric features. The site contains habitat commonly associated with reef fish assemblages in the South Atlantic region and has been identified through fishery-independent surveys, habitat characterization efforts, and fisher observations as an area associated with spawning activity for multiple snapper-grouper species.

The coordinates are:

| Latitude | Longitude |
|---|---|
| 33° 53.040’ | 76° 28.617’ |
| 33° 52.019’ | 76° 27.798’ |
| 33° 49.946’ | 76° 30.627’ |
| 33° 51.041’ | 76° 31.424’ |

Habitat characterization efforts within the South Cape Lookout SSMZ have included multibeam mapping, remotely operated vehicle surveys, trap surveys, and stationary camera sampling. These efforts have identified hardbottom habitat and live bottom habitat with some areas described as pavement along with areas with relief.

Regional habitat mapping efforts associated with the Southeast Reef Fish Survey, South Atlantic Red Snapper Research Program, and other research initiatives have improved the understanding of habitat distribution and reef fish associations in the surrounding region. Additional habitat verification and mapping adjacent to the SSMZ may improve understanding of habitat continuity and habitat use outside the managed area boundaries.

**Existing Biological Information**

Fishery-independent surveys and biological sampling conducted within the South Cape Lookout SSMZ have documented multiple focal species, including greater amberjack, graysby, speckled hind, rock hind, red grouper, scamp, gag, red snapper, silk snapper, and blueline tilefish. Remotely operated vehicle surveys and fishery-independent monitoring efforts have also documented diverse reef fish assemblages associated with hardbottom habitats within the area.

Biological sampling conducted through cooperative research and fishery-independent surveys identified individuals in spawning condition for several focal species. Existing information suggests the area may function as seasonally important spawning habitat for multiple snapper-grouper species; however, the timing, frequency, and spatial extent of spawning activity remain incompletely understood.

The Southeast Reef Fish Survey (SERFS) and cooperative research has sampled the South Cape Lookout SSMZ and collected data on 13 focal species (**Table 4.1**). Samples collected prior to or recently after the SSMZ was established (7 focal species) had fewer focal species compared to samples collected from 2023 to 2025 (11 focal species). Additionally more focal species were observed in sampling condition (4 prior compared to 8 after established).

Because sampling may occur outside of peak spawning periods or lunar-associated spawning times, fish size can provide indirect evidence that sexually mature or spawning-capable individuals use the area.. There were 10 focal species with average size greater than the size of 50% maturity (**Table 4.2**). The only focal species with the average size of less than the size of maturity was speckled hind.

Based on ichthyoplankton modelling, South Cape Lookout exhibited comparatively low modeled larval retention compared to other SSMZs and other all other areas[18]. For scamp, only

[18] Presentation given to the SMP Workgroup on the work of Brothers et al. https://safmc.net/documents/smp_a3_brothers_safmc_11_15_23_ssmzdispersal-pdf/

approximately 4% of modeled larvae successfully settled within suitable South Atlantic habitat, with most larvae transported offshore by prevailing oceanographic conditions. Although the area may support spawning activity, the modeling suggested that relatively few larvae produced in the area were retained within the South Atlantic region. Consequently, South Cape Lookout generally ranked lower than the other SSMZs in terms of modeled recruitment contribution and did not fall within the higher-performing spawning areas identified for gag, scamp, red snapper, or red grouper.

**Table 0.10.** List of focal species with specimens and data provided to South Carolina Department of Natural Resources (SC DNR Data Pre-2017) and collected by LGL and TNC in the South Cape Lookout SSMZ. Blanks indicated no information was available.

| | SC DNR Data Pre-2017 | | LGL/TNC 2023-25 Spawning Study | |
|---|---|---|---|---|
| **Focal Species** | **Number** | **Number in Spawning Condition** | **Number** | **Number in Spawning Condition** |
| Greater Amberjack | 1 | 1 | 8 | 6 |
| Graysby | | | 3 | 0 |
| Speckled Hind | 2 | 0 | | |
| Red Hind | | | | |
| Rock Hind | 1 | 1 | 1 | 0 |
| Red Grouper | 20 | 5 | 3 | 3 |
| Gag | 3 | 0 | 1 | 1 |
| Scamp | 6 | 3 | 9 | 6 |
| Snowy Grouper | | | 15 | 0 |
| Blackfin Snapper | | | 6 | 5 |
| Red Snapper | | | 2 | 2 |
| Silk Snapper | | | 38 | 8 |
| Blueline Tilefish | 1 | 0 | 3 | 2 |

**Remaining Information Gaps**

Although substantial biological and habitat information has been collected within the South Cape Lookout SSMZ, uncertainty remains regarding spawning periodicity, spawning site fidelity, movement patterns, larval dispersal, and long-term trends in species composition and abundance. Additional monitoring, seasonal biological sampling, habitat verification, and fish movement studies may improve understanding of spawning activity and habitat use within and adjacent to the managed area.

**Table 0.11.** Average total length (Avg TL, cm) of focal species with specimens and data provided to South Carolina Department of Natural Resources (SC DNR Data Pre-2017) and collected by LGL and TNC in the South Cape Lookout SSMZ. The size of maturity is based on papers cited in Table 3.3. Avg TL is the average total length for all fish collected and Avg TL in spawning condition is the average size for spawning fish based on histology.

| | | SC DNR Data Pre-2017 | | LGL/TNC 2023-25 Spawning Study | |
|---|---|---|---|---|---|
| **Focal Species** | **Size of Maturity (cm)** | **Avg TL (cm)** | **Avg TL (cm) in Spawning Condition** | **Avg TL (cm)** | **Avg TL (cm) in Spawning Condition** |
| Greater Amberjack | 73 | 115 | | 107 | 105 |
| Graysby | | | | | |
| Speckled Hind | 81 | 55 | | | |
| Red Hind | 24 | 37 | | | |
| Rock Hind | | | | 41 | |
| Red Grouper | 49 | 69 | 73 | 90 | 90 |
| Gag | 65 | 77 | | 96 | 96 |
| Scamp | 40 | 69 | 71 | 65 | 71 |
| Snowy Grouper | 54 | | | 54 | |
| Blackfin Snapper | | | | 38 | 39 |
| Red Snapper | 37 | | | 76 | 76 |
| Silk Snapper | 45 | 51 | | 47 | 53 |
| Blueline Tilefish | 36 | 48 | | 56 | 58 |

## 4.2. Area 51

The SC DNR experimental artificial reef site designated as Area 51 was established April 24, 1998 to investigate the feasibility of using artificial reef materials as an experimental MPA. The preferred SSMZ for Area 51 encompasses 1.5 mile X 1.5 miles of the permitted artificial reef site located in approximately 70 feet of water off the South Carolina coast on sandy bottom.

The bottom composition of Area 51 is sandy bottom enhanced with artificial reef materials that were placed in the area beginning in 1998. SC DNR has been sampling this artificial reef site through the Artificial Reef Program. Forty-three species have been observed by SC DNR on the artificial reef including greater amberjack, red grouper, scamp, gag, warsaw grouper, and red snapper, which are focal species of the SSMZs (**Table 4.3**).

The South Carolina Aquarium has been sampling Area 51 and recorded siting frequency and density of fish using the REEF Volunteer Fish Survey Project methods. Greater amberjack were observed on all dives and gag and red snapper were observed on 83% of the dives (**Table 4.4**). SC

DNR has plans to sample the location in 2026 in comparison with other nearby artificial and natural reefs.

Ichthyoplankton modeling indicated that Area 51 had the highest modeled larval retention rates among the SSMZs[19]. For scamp, approximately 75% of larvae released from the area successfully settled within suitable habitat in the South Atlantic region. While Area 51 was not consistently ranked among the highest recruitment locations overall, it generally performed moderately well relative to other modeled spawning areas, particularly for scamp and gag. Modeling results suggested that the area benefits from relatively high local retention due to its inshore position, although its contribution to overall regional recruitment was limited by its small spatial footprint.

**Table 0.12.** Focal species (left column) and other snapper grouper species (right column) observed at Area 51 since the material has been placed in the area by SC DNR. Bolded species are focal species identified in Amendment 36. Source: Robert Martore, SC DNR.

| Common Name | Scientific Name | Common Name | Scientific Name |
|---|---|---|---|
| **Red Grouper** | ***Epinephelus morio*** | White Grunt | *Haemulon plumierii* |
| **Scamp** | ***Mycteroperca phenax*** | Atlantic Spadefish | *Chaetodipterus faber* |
| **Gag** | ***M. microlepsis*** | Tomtate | *Haemulon aurolineatum* |
| **Warsaw Grouper** | ***Hyporthodus nigritus*** | Vermillion Snapper | *Rhomboplites aurorubens* |
| **Red Snapper** | ***Lutjanus campechanus*** | Whitebone Porgy | *Calamus leucosteus* |
| **Greater Amberjack** | ***Seriola dumerili*** | Black Sea Bass | *Centropristis striata* |
| | | Bank Sea Bass | *C. ocyurus* |
| | | Gray Triggerfish | *Balistes capriscus* |

**Table 0.13.** Species observed at Area 51 by the South Carolina Aquarium. Bolded species are focal species identified in Amendment 36. Siting frequency is how often a fish is sited and density is based on number of fish observed using the REEF methodology. Source: Arnold Postell, SC Aquarium.

| Species | Siting Frequency (%) | Density |
|---|---|---|
| **Gag** | 83.33 | 1.6 |
| **Greater Amberjack** | 100 | 3 |
| **Red Snapper** | 83.33 | 2.4 |
| Almaco Jack | 33.33 | 2 |
| Atlantic Spadefish | 100 | 3.67 |
| Black Sea Bass | 100 | 3.33 |
| Gray Snapper | 83.33 | 2 |
| Gray Triggerfish | 100 | 2.33 |
| Longspine Porgy | 33.33 | 2 |

[19] Presentation given to the SMP Workgroup on the work of Brothers et al. https://safmc.net/documents/smp_a3_brothers_safmc_11_15_23_ssmzdispersal-pdf/

| | | |
|---|---|---|
| Tomtate | 100 | 3.67 |
| Vermillion Snapper | 50 | 2.67 |

**Remaining Information Gaps**
Available information for Area 51 remains limited with respect to spawning activity, reproductive condition, seasonal habitat use, and fish movement patterns. Additional biological sampling and seasonal monitoring may improve understanding of the ecological role of the site and its relevance to spawning activity for focal species.

## 4.3. Area 53

Due in part to the results obtained from work on the Area 51 reef site, the SAFMC provided funding to replicate the study design of Area 51 in deeper water in order to specifically target a wider range of snapper-grouper species. The permitting process and all reef parameters for the new site, designated Area 53, were identical to Area 51 except that water depth for this site was 105 feet. The preferred SSMZ for Area 53 encompasses 1.5 mile X 1.5 miles of the permitted artificial reef site.

The bottom composition of Area 53 is sandy bottom enhanced with artificial reef materials that were placed in the area beginning in 2003. Forty-two species have been recorded on the artificial reef including greater amberjack, scamp, gag, warsaw grouper, and red snapper, which are focal species of the SSMZs (**Table 4.5**). Neither the NMFS remotely operated vehicle (ROV) study nor the SERFS has sampled this location. Red snapper have been observed in spawning condition in the area based on histology sampling.

The South Carolina Aquarium has been sampling Area 53 and recorded siting frequency and density of fish using the REEF Volunteer Fish Survey Project methods. Gag, red snapper, and scamp were observed on all dives and greater amberjack were observed on 80% of the dives (**Table 4.6**).

Area 53 showed favorable larval retention characteristics based on ichthyoplankton modelling, with approximately 66% of modeled scamp larvae successfully settling within the South Atlantic region[20]. Although retention was slightly lower than Area 51, the location ranked well for scamp recruitment because it combined relatively good settlement success with moderate modeled spawning output. For scamp, Area 53 was identified as being within the higher-performing recruitment areas in the South Atlantic and was considered among the better-positioned SSMZs relative to other spawning locations.

**Table 0.14.** Focal species (left column) and other snapper grouper species (right column) observed at Area 53 since the material has been placed in the area by SC DNR. Bolded species are focal species identified in Amendment 36. Source: Robert Martore, SC DNR.

[20] Presentation given to the SMP Workgroup on the work of Brothers et al. https://safmc.net/documents/smp_a3_brothers_safmc_11_15_23_ssmzdispersal-pdf/

| Common Name | Scientific Name | Common Name | Scientific Name |
|---|---|---|---|
| **Greater Amberjack** | ***S. dumerili*** | Black Sea Bass | *Centropristis striata* |
| **Scamp** | ***Mycteroperca phenax*** | Bank Sea Bass | *C. ocyurus* |
| **Gag** | ***M. microlepsis*** | Gray Triggerfish | *Balistes capriscus* |
| **Warsaw Grouper** | ***Hyporthodus nigritus*** | Almaco Jack | *Seriola rivoliana* |
| **Red Snapper** | ***Lutjanus campechanus*** | White Grunt | *Haemulon plumierii* |
| | | Atlantic Spadefish | *Chaetodipterus faber* |
| | | Tomtate | *Haemulon aurolineatum* |
| | | Margate | *H. album* |
| | | Vermillion Snapper | *Rhomboplites aurorubens* |
| | | Red Porgy | *Pagrus pagrus* |
| | | Whitebone Porgy | *Calamus leucosteus* |

**Table 0.15.** Species observed at Area 53 by the South Carolina Aquarium. Bolded species are focal species identified in Amendment 36. Siting frequency is how often a fish is observed and density is based on number of fish observed using the REEF methodology. Source: Arnold Postell, SC Aquarium.

| Common Name | Siting Frequency (%) | Density |
|---|---|---|
| **Gag** | 100 | 2 |
| **Greater Amberjack** | 80 | 3.25 |
| **Red Snapper** | 100 | 3.6 |
| **Scamp** | 100 | 2 |
| Almaco Jack | 40 | 2.5 |
| Atlantic Spadefish | 80 | 3.5 |
| Black Sea Bass | 100 | 3.2 |
| Gray Snapper | 100 | 2.2 |
| Gray Triggerfish | 100 | 3 |
| Longspine Porgy | 20 | 2 |
| Tomtate | 100 | 3.2 |
| Vermillion Snapper | 40 | 3 |
| White Grunt | 100 | 1.6 |

**Remaining Information Gaps**

Available information for Area 53 remains limited with respect to spawning activity, reproductive condition, seasonal habitat use, and fish movement patterns. Additional biological sampling and seasonal monitoring may improve understanding of the ecological role of the site and its relevance to spawning activity for focal species.

## 4.4. Devil's Hole

The Devil's Hole (also known as Georgetown Hole) SSMZ was described in the MPA Expert Working Report (SAFMC 2013) as an area where warsaw grouper had been caught. The Devil's Hole includes an "elbow" where there is a drastic change in depth. Areas such as this have been

described as a characteristic feature for spawning for snapper grouper species in other areas (Kobara et al. 2013). In the area where the SSMZ is located, warsaw grouper, scamp, and grey triggerfish were observed in spawning condition (Heyman 2015).

The Devil's Hole is approximately 55 to 60 miles from Georgetown and encompasses 3.1 square miles. The depth on the inshore side is 180 feet and offshore 591 feet.

The coordinates are:

| Latitude | Longitude |
|---|---|
| 32° 34.311' | 78° 33.220' |
| 32° 34.311' | 78° 34.996' |
| 32° 32.748' | 78° 34.996' |
| 32° 32.748' | 78° 33.220' |

**Existing Biological Information**

Cooperative research (scientists working with commercial and for-hire fishermen) has been conducted within the SSMZ with sampling events from 2014 to 2016 and 2023 to 2025. Focal species observed in the SSMZs included greater amberjack, speckled hind, snowy grouper, warsaw grouper, scamp, and blueline tilefish (**Table 4.7**). Seven focal species were seen in spawning condition (likely to spawn or has spawned within 24 hours). New species observed in spawning condition during the 2023 to 2025 sampling by LGL and TNC included gag and silk snapper. Species observed in spawning condition in both time periods include scamp and red snapper.

**Table 0.16.** List of focal species with specimens and data provided to South Carolina Department of Natural Resources (SC DNR Data Pre-2017) and collected by LGL and TNC in the Devil's Hole SSMZ. The number in spawning condition is the total number of fish in spawning condition, and if a subsample occurred, the number in parenthesis is the number of fish that were sampled for reproductive stage. Blanks indicated no information was available.

| | SC DNR Data Pre-2017 | | LGL/TNC 2023-25 Spawning Study | |
|---|---|---|---|---|
| **Focal Species** | **Number Caught** | **Number in Spawning Condition** | **Number Caught** | **Number in Spawning Condition** |
| Greater Amberjack | 1 | 0 | 1 | 0 |
| Graysby | 1 | 1 | | |
| Speckled Hind | 19 | 0 | 5 | 0 (2) |
| Gag | 1 | 0 | 11 | 8 |
| Scamp | 38 | 17 | 30 | 29 |
| Snowy Grouper | 34 | 0 (7) | 1 | 0 |
| Warsaw Grouper | 4 | 0 | 2 | 0 |
| Yellowedge Grouper | 1 | 0 | | |
| Blackfin Snapper | | | 38 | 20 |
| Red Snapper | 3 | 2 | 3 | 1 |

| | | | | |
|---|---|---|---|---|
| Silk Snapper | | | 26 | 10 |
| Blueline Tilefish | 6 | 2 | | |

Because sampling may occur outside of peak spawning periods or lunar-associated spawning times, fish size can provide indirect evidence that sexually mature or spawning-capable individuals use the area (**Table 4.8**). The average size of eleven focal species were caught above the size of maturity. The only focal species observed in the area with average size smaller than the size of maturity is speckled hind. For the individuals in spawning condition, the average length of fish was greater than the size of maturity for eight focal species.

Two NMFS ROV dives occurred in the area of the Devil's Hole and the habitat varied depending on the location of the dive in the SSMZ. One dive was done on a ledge with 60 meters (m) overall relief (depth of 105-165m), but there was not a prominent vertical wall. The ledge was best described as a gradual slope with low relief outcrops on it. The other dive was done in shallower water (about 63m) and consisted of a low relief ledge where relief was about 1m. On the two dives, a total of 50 species were observed including: greater amberjack, speckled hind, snowy grouper, and scamp (**Table 4.**), which are focal species.

Ichthyoplankton modeling indicated that 35% to 41% of the eggs released from Devil's Hole would be retained in the South Atlantic region. The site ranked within the top 10% of modeled spawning locations for larval retention in the South Atlantic for gag and scamp.

Based on ichthyoplankton modelling, Devil's Hole consistently ranked among the strongest-performing SSMZs in the larval dispersal modeling[21]. Approximately 41% of modeled scamp larvae settled successfully within the South Atlantic region, while the site also exhibited relatively high modeled spawning output. As a result, Devil's Hole ranked within the upper tier of spawning locations for gag and scamp recruitment potential and was estimated to provide approximately 70% of the recruitment produced by the single highest-performing spawning location for scamp. Modeling indicated that the site fell within the top third of spawning locations for scamp and gag and, for some analyses, was associated with areas in the top 10% of modeled recruitment output. These results suggest that Devil's Hole is well positioned oceanographically to support recruitment.

**Table 0.17.** Average total length (Avg TL, cm) of focal species with specimens and data provided to South Carolina Department of Natural Resources (SC DNR Data Pre-2017) and collected by LGL and TNC in the Devil's Hole SSMZ. The size of maturity is based on papers cited in **Table 3.3**. Avg TL is the average total length for all fish collected and Avg TL in spawning condition is the average size for spawning fish based on histology.

| | | **SC DNR Data Pre-2017** | | **LGL/TNC 2023-25 Spawning Study** | |
|---|---|---|---|---|---|
| **Focal Species** | **Size of Maturity (cm)** | **Avg TL (cm)** | **Avg TL (cm) in** | **Avg TL (cm)** | **Avg TL (cm) in** |

[21] Presentation given to the SMP Workgroup on the work of Brothers et al. https://safmc.net/documents/smp_a3_brothers_safmc_11_15_23_ssmzdispersal-pdf/

| | | | Spawning Condition | | Spawning Condition |
|---|---|---|---|---|---|
| Greater Amberjack | 73 | 129 | | 101 | |
| Graysby | | 35 | 35 | | |
| Speckled Hind | 81 | 54 | | 42 | |
| Gag | 65 | | | 97 | 88 |
| Scamp | 35 | 55 | 56 | 59 | 59 |
| Snowy Grouper | 54 | 55 | | 22 | |
| Warsaw Grouper | | | | 123 | |
| Yellowedge Grouper | 51 | 62 | | | |
| Blackfin Snapper | | | | 43 | 43 |
| Red Snapper | 37 | 57 | 48 | 82 | 79 |
| Silk Snapper | 45 | | | 51 | 51 |
| Blueline Tilefish | ~36 | 59 | 66 | | |

**Table 0.18.** List of fish observed by the NMFS ROV in 2013 and 2014 in the area of Devil's Hole SSMZ. Focal species (left column and bold) and other snapper grouper species (right column) observed in the SSMZs.

| Common Name | Scientific Name | Common Name | Scientific Name |
|---|---|---|---|
| **Greater Amberjack** | ***Seriola dumerili*** | Red Porgy | *Pagrus pagrus* |
| **Speckled Hind** | ***Epinephelus drummondhayi*** | Hogfish | *Lachnolaimus maximus* |
| **Snowy Grouper** | ***Hyporthodus niveatus*** | Almaco Jack | *S. rivoliana* |
| **Scamp** | ***Mycteroperca phenax*** | Tomtate | *Haemulon aurolineatum* |

**Remaining Information Gaps**
Available information for Devil's Hole remains limited with respect to spawning activity, reproductive condition, seasonal habitat use, and species composition. Additional biological sampling and seasonal monitoring may improve understanding of the ecological role of the site and its relevance to spawning activity for focal species.

## 4.5. Warsaw Hole

The Warsaw Hole SSMZ was described in the MPA Expert Working Report as an area where warsaw grouper had been seen in higher than normal abundance compared to other areas and at least one female was caught with obvious roe (SAFMC 2013). Greater amberjack were also suspected to spawn at Warsaw Hole.

The Warsaw Hole is 35 miles from Key West, and the protected area is 3.6 square miles. The depth on the inshore side of the SSMZ is 230 feet and on the offshore side is 443 feet. In the middle of the area is a deep hole (**Figure 3**).

The coordinates are:

| Latitude | Longitude |
|---|---|
| 24° 22.277' | 82° 20.417' |
| 24° 22.277' | 82° 18.215' |
| 24° 20.932' | 82° 18.215' |
| 24° 20.932' | 82° 20.417' |

**Habitat and Managed Species Characterization**

The area was selected based on reports of greater amberjack, black grouper, scamp, warsaw grouper, silk snapper, blackfin snapper, and red snapper being caught in the vicinity of the hole. Cooperative research trips occurred in 2017 (Pew and FWC) and 2024 and 2025 [(LGL, TNC, and SC DNR), **Table 4.10** and **4.11**). The 2017 and 2024 trips occurred in June around the full moon targeting spawning warsaw grouper. The 2025 trip occurred in April targeting spawning greater amberjack.

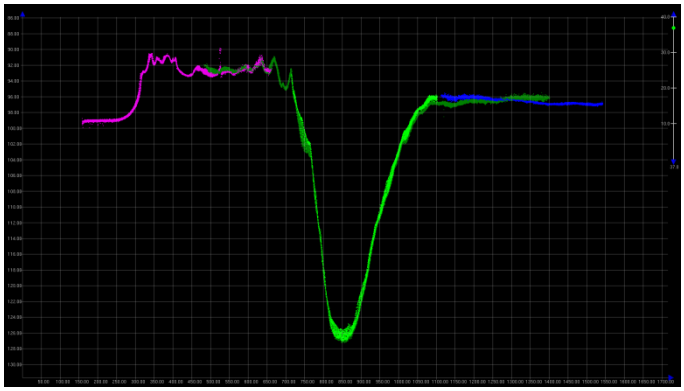


**Figure 0.1.** Elevation profiles for a cross section of the Warsaw Hole. Source: NOAA - Multi-beam mapping of Warsaw Hole by the Nancy Foster Associated with NF 15-04 FKNMS Ecological Assessment

In 2017, focal species observed in the area included greater amberjack, scamp, snowy grouper, warsaw grouper, red snapper, and silk snapper. One of the warsaw groupers had fully yolked oocytes indicating spawning would occur soon. The sampling in 2024 and 2025 collected greater amberjack, speckled hind, black grouper, scamp, warsaw grouper, blackfin snapper, mutton snapper, red snapper, and silk snapper (**Table 4.10**). Of the 10 greater amberjack saved for histology sampling (microscopic inspection of reproductive tissue) in April 2024, 10 greater amberjack (100%) were in spawning condition. Additional greater amberjack were observed in spawning condition in June based on histology (2 out of 4 in spawning condition). Warsaw grouper were also observed in spawning condition in the area (50% in both sampling time periods). Both red and silk snapper were observed in spawning condition.

Because sampling may occur outside of peak spawning periods or lunar-associated spawning times, fish size can provide indirect evidence that sexually mature or spawning-capable individuals use the area. The average length of fish observed in the Warsaw Hole exceeded the reported size at maturity for greater amberjack, scamp, mutton snapper, and red snapper. Average lengths were

close to the reported size at maturity (within 2 cm, ~ 1 inch) for black grouper, and below the size at maturity for speckled hind, snowy grouper, and silk snapper (**Table 4.11**).

The ichthyoplankton modelling suggested Warsaw Hole had mixed larval dispersal outcomes because of its location near the boundary between the Gulf and South Atlantic regions[22]. Modeling indicated that approximately 20% of larvae released from the area settled within the South Atlantic region, while an additional 20% settled within the Gulf, resulting in an overall modeled settlement success of approximately 40%. For some species, particularly red grouper, Warsaw Hole ranked relatively well compared to other Atlantic spawning areas in percentile-based analyses, although the absolute magnitude of recruitment contribution was lower than the highest-performing locations. For gag and scamp, the area generally ranked within the moderate range of modeled spawning locations compared to the strongest recruitment hotspots. The results suggest that Warsaw Hole may contribute to connectivity between the Gulf and South Atlantic populations, although its contribution to South Atlantic recruitment alone was more limited than Devil's Hole SSMZs.

[22] Presentation given to the SMP Workgroup on the work of Brothers et al. https://safmc.net/documents/smp_a3_brothers_safmc_11_15_23_ssmzdispersal-pdf/

**Table 0.19.** List of focal species collected by an independent researcher and charter fishermen in the Warsaw Hole SSMZ. The number in spawning condition is the total number of fish in spawning condition and if a subsample was taken, the number is parenthesis is the number of fish that were sampled for reproductive stage. Information is lacking on the spawning condition for most fish from the 2017 trip. Blanks indicated no information was available.

| | Pew Funded Trip 2017 | | LGL/TNC 2023-25 Spawning Study | |
|---|---|---|---|---|
| **Focal Species** | **Number Caught** | **Number in Spawning Condition** | **Number Caught** | **Number in Spawning Condition (number subsampled for histology)** |
| Greater Amberjack | 1 | | 16 | 12 (14) |
| Speckled Hind | | | 2 | (0) |
| Black Grouper | | | 2 | 0 |
| Scamp | 3 | | 3 | 0 (1) |
| Snowy Grouper | 1 | | | |
| Warsaw Grouper | 2 | 1 | 4 | 2 |
| Blackfin Snapper | | | 3 | 0 (2) |
| Mutton Snapper | | | 1 | (0) |
| Red Snapper | 5 | | 11 | 4 |
| Silk Snapper | 11 | | 13 | 2 (10) |

**Table 0.20.** Average total length (Avg TL) of focal species collected by an independent researcher and charter fishermen in the Warsaw Hole SSMZ. The size of maturity is based on papers cited in **Table 3.3**. Avg TL is the average total length for all fish collected and Avg TL in spawning condition is the average size for spawning fish based on histology.

| | | Pew Funded Trip 2017 | | LGL/TNC 2023-25 Spawning Study | |
|---|---|---|---|---|---|
| **Focal Species** | **Size of Maturity (cm)** | **Avg TL (cm)** | **Avg TL (cm) in Spawning Condition** | **Avg TL (cm)** | **Avg TL (cm) in Spawning Condition** |
| Greater Amberjack | 73 | 107 | | 116 | 116 |
| Speckled Hind | 81 | | | 42 | |
| Black Grouper | 86 | | | 85 | |
| Scamp | 35 | 53 | | 59 | |
| Snowy Grouper | 54 | 38 | | | |
| Warsaw Grouper | | 104 | 106 | 119 | 128 |
| Blackfin Snapper | | | | 34 | |
| Mutton Snapper | 35 | | | 66 | |

| | | | | | |
|---|---|---|---|---|---|
| Red Snapper | 37 | 64 | | 74 | 73 |
| Silk Snapper | 45 | 36 | | 39 | 39 |

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Appendices

Appendix I. List of Acronyms

## Appendix I. List of Acronyms

| | |
|---|---|
| AP | Advisory Panel |
| AUV | Automated Underwater Vehicle |
| BACI | Before/After, Control/Impact |
| CEBA | Comprehensive Ecosystem Based Amendment |
| EFH | Essential Fish Habitat |
| EFH-HAPC | Essential Fish Habitat- Habitat Areas of Particular Concern |
| FWC | Florida Fish and Wildlife Commission |
| GADNR | Georgia Department of Natural Resources |
| HAPC | Habitat Areas of Particular Concern |
| IPT | Interdisciplinary Plan Team |
| JEA | Joint Enforcement Agreement |
| LEAP | Law Enforcement Advisory Panel |
| MARMAP | Marine Resources Monitoring, Assessment, and Prediction |
| MPA | Marine Protected Area |
| MSA | Magnuson-Stevens Act |
| NCDEQ | North Carolina Department of Environmental Quality |
| NGO | Non-Governmental Organization |
| NMFS | National Marine Fisheries Service |
| NOAA | National Oceanic and Atmospheric Administration |
| NOVA | Notice of Violation and Assessment |
| OLE | Office of Law Enforcement |
| RHIB | Rigid Hull Inflatable Boat |
| ROV | Remote Operated Vehicle |
| S-G | Snapper-Grouper |
| SAFMC | South Atlantic Fishery Management Council |
| SC DNR | South Carolina Department of Natural Resources |
| SE-DSCTP | Southeast Deep Sea Coral Technology Program |
| SEFIS | Southeast Fishery-Independent Survey |
| SEFSC | Southeast Fisheries Science Center |
| SERFS | Southeast Reef Fish Survey |
| SERO | Southeast Regional Office |
| SMP | System Management Plan |
| SMZ | Special Management Zone |
| USCG | United States Coast Guard |

## Appendix II. Action Items

NOTE: This document is for information purposes only; nothing in this document commits any agency to supply any specific resources or create any financial obligations. This document does not change any statutory authority or create any new responsibilities.

**Enforcement and Compliance**

**Action Item 1:** Develop *cooperative enforcement via intelligence and asset sharing, meetings, and training to encourage coordination of patrols and investigations.*

**Task:** Schedule SSMZ enforcement activities and challenges to be reported at Law Enforcement Advisory Panel (LEAP) annual meeting to coordinate patrols and investigations.

**Justification:** Coordination among enforcement agencies can help to minimize duplicative effort and provide better coverage with limited resources.
**Deliverables:** Reports on patrols and investigations are provided by enforcement agencies, as much as possible. Oral report at LEAP meeting.
**Completion Status:** As of May 2026, engagement with the LEAP and updates to the SAFMC are ongoing.

**Task:** Continue officer training at the United States Coast Guard (USCG) Southeast Regional Fisheries Training Center.

**Justification:** The Southeast Regional Fisheries Training Center has been a valuable asset for training state and federal resource officers in enforcement of fisheries regulations, including those pertaining to SSMZs.
**Deliverables: Trained** officers.
**Completion Status:** As of May 2026, officer training continues.

**Tasks:** Consider a patrol/sortie reporting form and database for determining compliance in SSMZs and centralized database for information access.

**Justification:** A standardized reporting form developed by the law enforcement partners would help collect data to improve frequency and effectiveness of enforcement patrols. A centralized database would assist in reporting of data to requesting agencies such as NMFS or SAFMC.
**Deliverables**: An online form that can be provided to law enforcement officers to be used on the water.
**Completion Status:** As of May 2026, an online form has been developed but not provided to law enforcement agencies as the form is not available offshore.

**Action Item 2:** Ensure a *"high" enforceability rating for the Warsaw Hole SSMZ and at least "moderate" enforceability rating for the other SSMZs.*

**Tasks:** Purchase and maintain vessels capable of conducting offshore patrols and increase enforcement capacity to monitor SSMZs.

**Justification:** Protection of SSMZs is crucial to their success. Fishing incursions into the area could remove individuals from the population and prevent spawning enhancement and increased recruitment. Having enforcement assets to monitor SSMZs is critical for preventing incursions into the area. Large patrol vessels to monitor the offshore MPAs can cost over $1,000,000. Some states may require more than one vessel. Additional funds are needed to maintain current vessels.
**Deliverables:** Add additional vessels to aid in enforcement, increase enforcement and reduce the number of fishing infractions within the SSMZs.
**Completion Status:** As of May 2026, funding constraints make enforcement of offshore locations difficult.

**Action Item 3:** Patrol *SSMZs with aerial and at-sea assets.*

**Tasks:** Provide a deterrent presence within SSMZs through routine aerial and at-sea patrols and schedule and conduct dedicated surge operations.
**Justification:** A deterrent presence is needed in SSMZs to reduce incursions into the areas. Fishing incursions may prevent attainment of the stated biological goals of the SSMZs. The estimate of the cost of a monitoring event for a SSMZ included three patrol officers per event and each event lasted 12 hours. The budget is estimated assuming five monitoring events per SSMZ and five SSMZs.
**Deliverables: Prevent** fishing infractions within the SSMZs by increasing law enforcement presence in the areas through multiple patrols avenues.
**Completion Status:** As of May 2026, infrequent patrols are conducted in SSMZs. Law enforcement has asked for best time to enforce due to the limited number of trips that can be taken to the area.

**Action Item 4**: *Initiate a remote monitoring program for SSMZs.*

**Task:** Review methods for remote monitoring in offshore areas.
**Justification:** Patrols in SSMZs are expensive and can occupy an entire day for officers involved in the patrol. Frequently when patrols occur in protected areas, no vessels are sighted. Remote monitoring methods can provide information to enforcement agencies on dates or times when incursions are more likely to occur. Kendall et al. 2020 explored a variety of methods to monitor Gray's Reef National Marine Sanctuary.
**Deliverables:** A report on remote monitoring methods.
**Completion Status:** As of May 2026, a report on remote monitoring methods has not been developed.

**Task: Seek** funding for remote monitoring of SSMZs and implement program.
**Justification:** Funding is limited in the South Atlantic Region for remote monitoring of offshore areas. Additional funding will be required if a remote monitoring program is to be developed. The budget estimate is based on ten monitoring events for the five SSMZs at an estimated cost of $2,500 per event.
**Deliverables:** Monitoring of protected areas has been included in SAFMC Research and Monitoring Plans.

**Completion Status:** As of May 2026, staff are not aware of attempts to receive funding.

**Action Item 5:** Develop *a citizen science/cooperative research program and database for reporting data collected in SSMZs.*

**Tasks:** Identify potential partners (federal and state resource agencies, non-governmental organizations (NGOs), academic institutions) to seek funding for a citizen science/cooperative research program focusing on SSMZ compliance; conduct a review of existing citizen science and cooperative research programs to aid in the development of a citizen science program for the South Atlantic; and identify and develop a database to enter data collected in the SSMZs through a citizen science/cooperative research program.

**Justification:** Citizen science/cooperative research program*s promote* buy-in from the public and contribute to voluntary compliance over the long-term. Such programs also enhance education and outreach opportunities and promote resource stewardship.

**Deliverables:** A research program related to the data collection for the SSMZs.

**Completion Status:** As of May 2026, a research program related to data collection for the SSMZs has not been developed, however the SAFMC has developed a citizen science program.

**Action Item 6:** Report *enforcement and compliance activities to the South Atlantic Fishery Management Council.*

**Task:** Annually report enforcement and compliance activities at SAFMC Meetings.

**Justification:** Reporting on enforcement activities enables enforcement agencies to collaboratively review the patrolling of SSMZs to determine if sufficient patrols have been conducted and keeps management informed of law enforcement activities.

**Deliverables:** Annual enforcement reports (at Council meetings).

**Completion Status:** As of May 2026, continued annual enforcement reports are delivered at Council meetings.

**Action Item 7:** *Provide compliance assistance to user groups through outreach and education.*

**Task:** Communicate to the public about SSMZs while on patrol in the vicinity of SSMZs and at outreach and education events.

**Justification:** Communication by patrol officers can help to educate and increase the public's understanding of the importance of SSMZs and regulations and increase compliance.

**Deliverables: Outreach** materials.

**Completion Status:** As of May 2026, some outreach materials have been developed, however the LEAP requested rack cards for the areas since internet service is not available offshore.

**Action Item 8:** *Encourage North Carolina to commit to a JEA with NOAA.*

**Task:** Have the SAFMC Chair send a letter encouraging North Carolina to commit to the joint enforcement agreement (JEA) with NOAA law enforcement.

**Justification:** Currently North Carolina is the only state in the South Atlantic region without a JEA. This limits their ability to enforce federal regulations for all vessels in federal waters. The JEA could also provide funds for purchasing assets or maintaining current assets for patrols in federal waters.

**Deliverables:** North Carolina committing to a JEA with NOAA law enforcement.

**Completion Status:** A letter from the Council chair was sent.

**Action Item 9:** Monitor *and improve adjudication of SSMZ regulations.*

**Tasks:** Monitor court decisions and orders to track adjudication of Notices of Violation and Assessment in the SSMZs and, if needed, recommend modifications to regulations or other actions to improve adjudication in favor of enforcement agencies.

**Justification:** Regulations must be enforceable, and monitoring enforcement decisions and orders provides an opportunity to determine if current regulations should be altered or if other actions by the Council are needed.

**Deliverables:** Annual oral updates at LEAP meeting.

**Completion Status:** As of May 2026, no issues have been identified for enforcing the regulations.

## Biological

**Action Item 1:** *Locate spawning areas of snapper and grouper species.*

**Priority Ranking From 2016 SMP: 1**

**Task:** Conduct studies to identify spawning areas for focal species.

**Justification:** Spawning areas are valuable habitats for populations. Protecting these areas is important for sustaining fisheries and building resilience into marine populations. In order to maintain fish stocks at proper levels for a healthy, profitable fishery, spawning areas need to be protected from exploitation.

**Projects Completed or Underway:**

- LGL Ecological Research Associates, Inc. conducted a study using geomorphology to predict spawning aggregation sites since 2014 (Heyman 2015).
- Farmer et al. 2017 reviewed timing and locations of spawning for several species of snapper grouper species. The study identified a Warsaw Grouper spawning in Georgetown/Devil's Hole off South Carolina.
- Binder et al. 2021 investigated literature and stakeholder identified spawning locations; however, field validation of aggregations did not confirm any spawning aggregations in South Florida Reef Tract.
- Wells 2023 predicted spawning location for Red Snapper, Scamp, Snowy Grouper, and Vermilion Snapper. Spawning hotspots were predicted outside of SSMZs.

- LGL, SCDNR, and TNC collected data in South Cape Lookout, Devils Hole, and Warsaw Hole from 2023 to 2025 and found spawning individuals from multiple focal species.

**Action Item 7:** *Characterize spawning indicators of snapper grouper species within the SSMZs. This includes distribution and abundance patterns, spawning areas, and histology.*

**Priority Ranking From 2016 SMP: 2**

**Task:** Focal species are sampled in SSMZs to characterize distribution, abundance, and spawning.

**Justification:** Characterization of these parameters for snapper grouper species inside vs. outside the SSMZs provides a means to evaluate the efficacy of the protected areas. Ideally, a higher abundance of reproductively active focal species would be observed inside the SSMZs given enough time following implementation of fishing restrictions. Evaluation of distribution and abundance patterns inside vs. outside the SSMZs provides an indication of whether or not the SSMZ is protecting important habitats for spawning. Evaluation of gonad stage through histology will confirm if fish in the SSMZs are reproducing.

**Projects Completed or Underway:**

- LGL, SCDNR, and TNC collected data in South Cape Lookout, Devils Hole, and Warsaw Hole from 2023 to 2025 and used research from other areas to determine sampling time for species such as Greater Amberjack, Scamp, Red Grouper, and Warsaw Grouper.

**Projects in Other Areas:**

- Farmer et al. 2017 identified areas with high bathymetric slope and curvature as strong predictors of spawning habitats.
- Wells 2023 identified latitude, longitude, and temperature as strong predictors of spawning location and dissolved oxygen, salinity, and biota density as secondary predictors.
- Stock et al. 2023 identified post full moon for spawning for Nassau Grouper. Heidmann et al. 2024 suggested geomorphology and oceanographic currents water important factors for identifying location of spawning aggregations and post-full moon for timing of spawning for Mutton Snapper.
- NMFS, SEFSC, Panama City Lab collected data on distribution and abundance of all fish species from ROV surveys in the South Atlantic region (see SAFMC Seminar Series).

**Action Item 9:** *Complete multibeam surveys of the SSMZs.*

**Priority Ranking From 2016 SMP: 3**

**Task:** Multibeam surveys are completed in the SSMZs.

**Justification:** Comprehensive, high-resolution bathymetry surveys are a priority to determine the extent of biological and geological habitat and emergent features which may serve as essential fish habitat inside the SSMZs.

**Deliverables:** Mapping and bottom characterization of all of the SSMZs.

**Completion Status:** Completed.

**Action Item 2:** *Determine pre-closure distribution and abundance of focal species inside and outside SSMZs, in order to provide context for subsequent assessments.*

**Priority Ranking From 2016 SMP: 4**

**Task: Compile** data collected in and around SSMZs on the distribution and abundance of focal species.

**Justification:** In order to differentiate changes in key resources, a baseline set of criteria must be established and monitored over subsequent years. These data can assist scientists and managers to more precisely determine the natural variability inherent in the system and changes resulting from anthropogenic influences. No projects are sufficient to estimate abundance inside SSMZ prior to closure. Relative abundance will need to be used to detect trends in abundance.

**Projects Completed or Underway:**

- NMFS, SEFSC, Panama City Lab has been collecting data on distribution and abundance of all fish species from ROVs within the South Atlantic Region
- SERFS has been collecting data on distribution and abundance from video and trap surveys from Cape Hatteras, North Carolina to Cape Canaveral, Florida. They are expected to expand the survey into the Florida Keys.

**Action Item 3: Develop** *and apply coupled biological and physical models to locate potential nursery sites.*

**Priority Ranking From 2016 SMP: Medium**

**Task:** Model potential nursery sites of focal species using biological and physical distribution models.

**Justification:** Locating potential nursery sites would identify areas to monitor for increased recruitment that could be attributed to increased spawning activity.

**Projects Completed or Underway:**

- NOAA, SERO and SEFSC, has produced a geographic distribution model for speckled hind and warsaw grouper that incorporates a hydrographic model to evaluate the relative utility and benefits of the protected areas for fisheries management (SAFMC MPA Expert Workgroup, 2012 & 2013).
- North Carolina State University has produced a Coastal Circulation and Ecosystem Nowcast/Forecast System for the South Atlantic Bight and Gulf of Mexico (Xue et al. 2015).
- NOAA, SEFSC has a proposal titled "Use of a biophysical modeling framework to develop a recruitment index for inclusion in stock assessment in the Gulf of Mexico and South Atlantic".
- Stock et al. (2023) developed a model to predict location of spawned Nassau Grouper off Little Cayman. The model predicted local retention in some years and served as potential source for other island locations in other years.

- DriftCast[23] is in development which can be used to hindcast where larvae originated and predict settlement locations based on spawning location using ecological modeling.

**Action Item 4: Use** *satellite drifters or ichthyoplankton modelling to improve the understanding of the connectivity of SSMZs and other managed areas.*

**Priority Ranking From 2016 SMP: Medium**

**Task:** Model connectivity of SSMZs and other managed areas based on satellite drifters or ichthyoplankton models.

**Justification:** Understanding the larval dispersal patterns of reef fish can help to improve the placement of SSMZs.

**Projects Completed or Underway:**

- Karnauskas et al 2022, Brothers et al. 2024 developed ichthyoplankton models for simulated dispersal of red snapper and scamp eggs and larvae.
- Brothers et al. also developed ichthyoplankton models for gag, red grouper, and red snapper. See SAFMC SMP Workgroup Presentation
- Fathom Science is developing DriftCast[23] that allows users to forward cast and back cast larval dispersal.

**Action Item 5:** *Maintain an annual monitoring program to collect data inside and outside the SSMZs. Data collected should include distribution, abundance, size and spawning condition of focal species inside and outside the SSMZs.*

**Priority Ranking From 2016 SMP: Low**

**Task:** Fund and maintain an annual monitoring program to collect data on focal species in the South Atlantic region and collects data in SSMZs.

**Justification:** An annual monitoring program needs continued funding to track long-term changes in the spawning population at SSMZs. Since many of the snapper-grouper species that are protected by these SSMZs are long-lived species with a late onset of maturity, the effect of protecting the SSMZs may take many years to detect a change in abundance.

**Projects Completed or Underway:**

- Funding through Cooperative Research Program, SAFMC, and The Nature Conservancy was used for short-term data collection.
- No dedicated funds have been identified.

**Action Item 6: Track** *movement of adult fish.*

**Priority Ranking From 2016 SMP: Low**

[23] DriftCast is an interactive web interface that allows modeling the movement of passive particles in the Atlantic Ocean and Gulf. The models include forward (where larvae settle) and backward (where larvae come from) scenarios.

**Task:** Tag adults of focal species with conventional and/or acoustic tags to track movements in and around SSMZs.

**Justification:** Having knowledge of the temporal and spatial movements of key fishery species makes it easier to protect them. If fish readily move in and out of the closed areas, protection of fish populations will be minimal. Although this information would be extremely useful, it is ranked low in priority because it will be difficult and expensive to obtain. Many of the species being protected (e.g. speckled hind and warsaw grouper) may be too rare to be able to tag or track enough individuals to decipher movement patterns.

**Projects Completed or Underway:**

- No receiver arrays are located in the SSMZs.

**Projects Completed Nearby:**

- Acoustic and conventional tags were used in the South Atlantic Red Snapper Program and Greater Amberjack Count Project.

**Action Item 8: Characterize** *fish communities, inside and outside of SSMZs, including habitat utilization patterns, trophic interactions, ontogenetic changes, and predator prey relationships.*

**Priority Ranking From 2016 SMP: Low**

**Task: Focal** species are sampled in and around SSMZs to characterize habitat utilization patterns, trophic interactions, ontogenetic changes, and predator prey relationships.

**Justification:** Detailed characterization of fish communities provides an understanding of the dynamics of the ecosystem. This information significantly increases the confidence of predictive exercises when forecasting how changes in one part of the system will affect other parts. The different components which parameterize this characterization process vary tremendously in cost, difficulty, and time to complete.

**Projects Completed or Underway:**

- Southeast Reef Fish Survey (SERFS) has been collecting information on habitat utilization patterns from video and trap surveys inside and outside SSMZs from Cape Hatteras, North Carolina to Cape Canaveral, Florida. The survey is expected to expand to the Florida Keys and could collect information from Warsaw Hole.
- Florida FWC is developing an Ecopath model with Ecosim and Ecospace that could be used to investigate trophic interactions and predator prey relationships. Data are not available at a sufficient resolution to describe differences inside and outside of the SSMZs.SC DNR and South Carolina Aquarium has been collecting data at Area 51 and 53 and plans to continue to monitor the areas.

**Action Item 10:** *Complete multibeam surveys of areas adjacent to, but outside the SSMZs (within a 5 nautical mile radius of the SSMZs).*

**Priority Ranking From 2016 SMP: Low**

**Task: Multibeam** surveys are completed in areas adjacent to SSMZs.

**Justification:** Comprehensive, high-resolution bathymetry surveys are a priority to determine the extent of biological and geological habitat and emergent features which may serve as essential fish habitat adjacent to the SSMZs. Mapping these areas will be used to determine if SSMZs boundaries should be altered. Based on a rate of 16km$^2$ mapped per evening, the area around the five SSMZs, which totals 539 km$^2$, could be mapped in 34 days plus travel time among areas.

**Projects Completed or Underway:**

- NMFS SEFIS has been collecting multibeam data in the South Atlantic region.
- Additional mapping data have been collected as part of funded research associated with the South Atlantic Red Snapper Research Program and Greater Amberjack Count Project.

**Action Item 11:** *Ground truth bathymetric data for habitat classification.*

**Priority Ranking From 2016 SMP: Low**

**Task:** Acoustic bathymetric and backscatter data are verified using ROVs or automated underwater vehicles (AUVs).

**Justification:** Acoustic bathymetry and backscatter data are useful for detecting features, which may provide habitat for focal reef fish; however, visual data are required to confirm habitat suitability. Ground truthing using ROVs or AUVs provides a cost- effective method for collecting visual data of representative features showing similar bathymetric profiles and backscatter reflectance patterns.

**Deliverables: High** resolution video and digital stills from ROV, AUV, or submersible surveys depicting habitat type (rugosity, relief, geomorphology, and substrate).

**Schedule: Long**-term

**Budget: Unknown** or to be determined

**Potential Partners: NMFS**, independent researchers

**Projects Completed or Underway:**

- SERFS has been collecting multibeam data with trap and stationary cameras since 2010.
- Towed cameras were used to identify habitat types as part of funded research associated with the South Atlantic Red Snapper Research Program and Greater Amberjack Count Project.

**Action Item 12:** *Generate habitat classification maps.*

**Priority Ranking From 2016 SMP: Low**

**Task:** Habitat maps are generated for SSMZs and adjacent areas.

**Justification: Habitat** classification maps are the penultimate goal of most mapping programs. This process allows tremendous predictive capabilities over very large areas once the areas have been acoustically mapped and ground truthing of representative areas has been completed. This procedure does not require field work, yet it requires skilled technicians to yield high-quality results. Habitat classification is relatively low

cost, but it does require inputs of acoustic and visual data which themselves are acquired at relatively high cost.

**Projects Completed Outside of SSMZs:**

- South Atlantic Red Snapper Research Program and Greater Amberjack Count Project developed methods to identify habitat types suitable for Red Snapper and Greater Amberjack.

## Economic and Social

**Action Item 13:** *Collect baseline social and economic data on resource user groups in different areas to understand the social and economic effects of prohibiting access to the SSMZs.*

**Priority Ranking From 2016 SMP: 1**

**Task: Social** and economic data are collected to determine effects of SSMZs on different user groups.

**Justification:** Understanding the social and economic effects of area closures can help managers compare biological benefits to social and economic costs of establishing closed areas. Additionally, detailed information on different user groups in different areas will allow analysis of cumulative effects on fishermen and communities when a closed area is implemented. Collection of baseline data will allow for comparison of future data to better understand how fishing behavior changed, and how fishing businesses and recreational anglers adapted to restricted access.

**Projects Completed or Underway:** None

**Projects Completed on Other Closed or Managed Areas:**

- A socioeconomic study of the impacts of the *Oculina* Bank has been conducted (Helies et al. 2011).
- TBD Economics (2019) estimates the economic contribution of spending in the Florida Keys National Marine Sanctuary.

**Action Item 14:** *Develop techniques to track the public's knowledge and perception regarding the purpose of, importance of, and regulations in SSMZs.*

**Priority Ranking From 2016 SMP: 2**

**Task:** Techniques are developed to track the public's knowledge and perception of SSMZs.

**Justification:** Data are needed to evaluate public's knowledge and perception of SSMZs. The data could be collected via online survey to evaluate communication and outreach strategies. Surveys conducted by the SAFMC and NOAA Fisheries remain a challenge due to the level of review needed for implementation.

**Projects Completed or Underway:** None.

**Action Item 15:** *Monitor stakeholder perception of SSMZ as a management tool.*

**Priority Ranking From 2016 SMP: 3**

**Task: Stakeholder** perception of SSMZs is monitored through a survey.

**Justification: Data** are needed to evaluate stakeholder knowledge and perception of SSMZs. Data could be collected via online surveys, or during public meetings. The outcomes could be used to evaluate communication and outreach strategies. Surveys conducted by the SAFMC and NOAA Fisheries remain a challenge due to the level of review needed for implementation.
**Projects Completed or Underway: None**.

**Action Item 16: Engage** *stakeholders in a citizen science program to collect data used to evaluate the effectiveness of SSMZs.*

**Priority Ranking From 2016 SMP: 4**

**Task: A** citizen science program is initiated and engages stakeholders in the collection of data to evaluate the effectiveness of SSMZs.

**Justification: Due** to a limited budget, a Citizen Science Program is needed to gather data to assist in the evaluation of the SSMZs to determine if the area is a spawning area for snapper grouper species. Additionally, cooperative research and involvement of resource users in data collection will increase buy-in for area-based management as a management tool and foster a better understanding of the purpose of SSMZs.
**Projects Completed or Underway:**

- Work conducted by LGL was funded through cooperative research funds (and other sources) collected data with local charter and commercial fishermen in the SSMZs.

## Outreach and Communication

**Action Item 1:** Work *with fishing chart manufacturers (both printed and electronic) and/or vendors to improve available information for the SSMZs.*

**Tasks:** Identify manufacturers of commonly used fishing charts in the South Atlantic, contact manufacturers and coordinate methods to update products.

**Justification:** Fishermen have expressed concerns that commonly used charts do not currently portray the coordinates and restrictions for new SSMZs.
**Deliverables:** Add information to electronic and printed charts. Labels would apply to printed charts available at retail outlets. SAFMC staff requested NOAA's Marine Charting Division add SSMZ boundaries and regulations to the digital overlay of marine protection boundaries. The request was denied. A separate request from all councils to have their marine protected areas added to the NOAA Marine Protected Area Inventory was denied.
**Current Services with Locations:**
Garmin Maps
FishRules not boxed but indicate no possession in the areas when hovered over.
Protected Seas Navigator
Maps Unique
**Future Direction:** Staff time is the primary expected cost for working with electronic chart manufacturers.

**Action Item 2:** Develop *files for managed area boundaries that can downloaded onto a SD card from the SAFMC website for various GPS units and have directions on how to use the file.*

**Tasks:** Create files that have boundaries with regulations for managed areas in the South Atlantic. Identify manufacturers of commonly used fishing charts in the South Atlantic, contact manufacturers and coordinate methods to update products.

**Justification:** Fishermen have requested to have the boundaries of SSMZs be available for download onto SD cards for use in their GPS units.

**Deliverables:** Locations are available on the website in multiple formats. See https://safmc.net/managed-areas/marine-protected-areas/

**Completion Status:** Completed

**Action Item 3:** *Incorporate new information about SSMZs and rack cards (Northern and Southern SMZs) into the Council's mobile application, SA Fishing Regulations.*

**Tasks:** Develop new area specific rack cards – one for the Northern SSMZs (Carolinas/Georgia) and one for the Southern SSMZs (Florida). These new rack cards would be incorporated and made available on the Council's website and the Council's mobile app for fishing regulations, *SA Fishing Regulations*.

**Justification:** Area specific rack cards with a concise summary of regulations can be used for targeted outreach efforts in the Carolinas/Georgia (Northern) and Florida (Southern). Using the Council's website and mobile app are ideal platforms for making the information readily available to the public and easy to update in electronic form.

**Deliverables:** Inclusion of the SSMZs within SAFMC applications.

**Completion Status:** The SAFMC worked with FishRules to develop an app for recreational and commercial fishermen that includes information on managed areas. Both apps include locations of the SSMZs but do not display the location on the map.

**Action Item 4:** *Develop a video presentation about SSMZs; post on the SAFMC website and You Tube, and disseminate to fishing clubs, environmental groups, state Sea Grant programs, local governments, etc.*

**Tasks:** Design and create a video to highlight information on spawning fish and habitat, SSMZs locations and regulations, etc.

**Justification:** Creation of a video presentation and online publishing provides a quick method to distribute information for use by various audiences that can be readily updated.

**Deliverables:** A full presentation on data collected in the SSMZ was presented at a SAFMC Seminar Series and multiple videos have been developed.
Why Protect Areas - https://www.youtube.com/watch?v=BdIZKK4o5dc&t=12s
Signs of Spawning - https://www.youtube.com/watch?v=mMqKKC7pdyU&t=9s
What Fish Spawning Looks Like - https://www.youtube.com/watch?v=KKpvlGlDjfQ&t=2s

**Completion Status**: Ongoing. The videos have not been shared widely.

**Action Item 5:** *Expand the SAFMC's existing Managed Areas web pages to provide comprehensive education and outreach products about SSMZs. Publicize availability of information by having links posted on other fishing, NGO, and tourism related websites.*

**Tasks:** Enhance the SAFMC's Managed Areas web pages and integrate materials such as a PowerPoint Presentation and links to other relevant sites. Publicize the availability of web-based information.

**Justification:** The SAFMC website is the best medium for maintaining comprehensive, dynamic content and imagery. The availability of this information can be publicized from other existing high-profile websites.

**Deliverables:** Materials related to the SSMZs available on the Council webpage.

**Completion Status:** Completed for posting materials. Outreach is ongoing.

**Action Item 6:** *Develop a list of key contacts (tackle shops, state parks, county government offices, outreach staff in other agencies, etc.) in port communities near SSMZ sites for targeted outreach efforts and materials.*

**Tasks:** Enhance targeted communication and outreach efforts about SSMZs through development of a database of key contacts in coastal communities in close proximity to SSMZ sites. Working with partners to identify key contacts will be critical to developing the contacts database.

**Justification:** Identifying key contacts that facilitate information exchange within their local communities (tackle shops, state parks, county government offices, outreach staff in other agencies, etc.) will help streamline outreach efforts about specific SSMZ sites.

**Deliverables:** Identify key contacts to enhance communication regarding SSMZs.

**Completion Status:** Staff through the MyFishCount, Best Fishing Practices, and SAFMC Release Campaigns have been collecting information on tackle shops.

**Action Item 7:** *Develop area-specific rack cards of SSMZs (NC/SC/GA and FL) for print, website, and mobile application.*

**Tasks:** New area specific rack cards – one for the Northern SSMZs (Carolinas/Georgia) and one for the Southern SSMZs (Florida) in the region – will be developed and distributed to targeted businesses and fishing tournament directors and webpage and mobile application will be developed.

**Justification:** Effectively designed rack cards would draw attention to the SSMZs and provide quick access to general information about habitat, fish species, maps, regulations, and law enforcement contacts.

**Deliverables**: Area specific rack-cards.

**Completion Status:** Not completed, developed digital materials instead. Law enforcement has requested printed materials.

**Action Item 8:** *Develop a SAFMC SSMZs informational brochure designed for fishermen to be added to SAFMC website.*

**Tasks:** Develop an informational brochure about spawning fish and habitats, the purpose of SSMZs and regulations within SSMZs for distribution to fishery stakeholders.

**Justification:** The informational brochure will provide a summary of regulations and information for the SSMZs as well as an identification chart for snapper/grouper species found in the region. The brochure will be available on the SAFMC website.

**Deliverables:** Instead of printing an informational brochure that could become outdated a webpage was created with content that could be adjusted easily.

**Completion Status:** Brochure not developed but webpage is complete.

**Action Item 9:** *Develop and distribute news releases (coordinating with local contacts) to describe research and monitoring projects and the ecological importance of the SSMZs.*

**Tasks:** Create science-based news releases relevant to ongoing research and monitoring activities in SSMZs with a focus on habitat, snapper grouper species, and ecosystem-based management. Coordinate releases with ongoing activities and strive to provide high-resolution photos and graphics to media.

**Justification:** The news releases will increase awareness of all activities in the SSMZs.

**Deliverables:** Distribute relevant information regarding the SSMZs to stakeholders. The SAFMC has adjusted outreach and communication since the development of the 2016 SMP. The SAFMC has the Bite which is a bi-weekly new letter with targeted information, feature articles which take a deep dive into a subject, social media posts, and seminar series. The SSMZs have been highlighted in the Seminar Series.

**Completion Status:** Ongoing

## Administrative

**Action Item 1:** *Develop a SMP for evaluation of SSMZs through a public process.*

**Tasks:** Develop a SMP for SSMZs.

**Justification:** The SMP will be used to develop the goals and objectives for management of SSMZs and provide a process for review of the SSMZ management.

**Deliverables:** Complete an evaluation of the SSMZs.

**Completion Status:** Ongoing.

**Tasks:** Form Advisory Panel for the SMP.

**Justification:** The SMP WG is needed to advise the Council on developing managed areas and reviewing the evaluation report.

**Deliverables:** Form the SMP Workgroup

**Completion Status:** Completed.

**Tasks:** SMP WG review and provide recommendations based on data collected from SSMZs and review and provide recommendations on the evaluation report.

**Justification:** The SMP WG review will provide advice to the Council on SSMZs and improvements for the evaluation report.
**Deliverables:** Develop a report and provide recommendations on the SSMZs to the Council.
**Completion Status:** Ongoing.

## Appendix III: Sources of life history information

| Species | Source |
|---|---|
| Greater amberjack | SEDAR 2008 |
| Coney | Burton et al. 2015, Garciov Filho et al. 2019 |
| Graysby | Potts and Manooch 1999, Fishbase 2026 |
| Goliath grouper | SEDAR 2011a |
| Nassau grouper | U.S. OFR 2014 |
| Red grouper | SEDAR 2010b |
| Red hind | Williams and Carmichael 2009, Cushion 2010 |
| Rock hind | Potts and Manooch 1995, Marques and Ferreira 2018 |
| Speckled hind | Williams and Carmichael 2009 |
| Snowy grouper | SEDAR 2020 |
| Warsaw grouper | Williams and Carmichael 2009 |
| Yellowedge grouper | Cook 2007 |
| Black grouper | SEDAR 2010a |
| Gag | SEDAR 2014 |
| Scamp | SEDAR 2021 |
| Blackfin snapper | Ault et al. 2008 |
| Cubera snapper | Martinez-Andrade 2003 |
| Mutton snapper | O'Hop et al. 2015 |
| Red snapper | SEDAR 2010c |
| Silk snapper | Martinez-Andrade 2003 |
| Yellowtail snapper | O'Hop et al. 2012 |
| Golden tilefish | SEDAR 2011b |
| Blueline tilefish | SEDAR 2013a |

# Appendix B. System Management Plan Workgroup Recommendations

## Executive Summary

This report summarizes advisory panel input collected during the evaluation of the South Atlantic Spawning Special Management Zones (SSMZ) established through Amendment 36 to the Snapper Grouper Fishery Management Plan. The evaluation was conducted to assess whether the existing SSMZ network continues to support its intended conservation and fisheries management objectives, while also identifying implementation gaps, operational constraints, and opportunities for adaptive management moving forward.
The review focused on five SSMZs:

- South Cape Lookout
- Devil's Hole / Georgetown Hole
- Warsaw Hole
- Area 51
- Area 53

South Cape Lookout, Devil's Hole, and Warsaw Hole are SSMZs that contain natural hard bottom areas and have a sunset provision with regulations scheduled to expire in July 2027 unless renewed through Council action.

The review currently includes comments from the Law Enforcement Advisory Panel (LEAP), Habitat and Ecosystem Advisory Panel (HEAP), and Snapper Grouper Advisory Panel (SGAP). Additional review and scientific input from the Scientific and Statistical Committee (SSC) will be incorporated during future stages of the evaluation process as well as recommendations from the System Management Plan Workgroup (SMP Workgroup).

Across advisory groups, the evaluation revealed a consistent pattern: while stakeholders continue to recognize the conservation rationale and potential long-term ecological value of the SSMZ network, implementation effectiveness remains constrained by limited enforcement capacity, insufficient monitoring resources, uneven stakeholder awareness, and substantial uncertainty regarding measurable biological outcomes.

Despite these challenges, advisory panels and workgroup supported retaining the SSMZs. The groups recommended improving:

- monitoring and evaluation,
- stakeholder outreach and education, and
- enforcement and compliance.

### Key Findings

- The original purpose of the SSMZs remains supported by most advisory panel members.

- Enforcement limitations represent the most significant challenge affecting implementation effectiveness.
- Existing monitoring and research programs are insufficient to fully evaluate long-term biological outcomes.
- Outreach and stakeholder awareness require improvement.
- Current evidence (direct or indirect evidence of spawning in all locations) does not support for removing protections.
- Most advisory groups favored precautionary retention while improving evaluation and implementation capacity.

The evaluation also highlighted the importance of continued adaptive management. Advisors repeatedly emphasized that the absence of definitive evidence regarding population-level benefits should not necessarily be interpreted as evidence of ineffectiveness, particularly given the complexity of measuring spawning protection outcomes in offshore marine systems.

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**DRAFT DOCUMENT**

# 1.0. Introduction and Background

## 1.1. Purpose of the Evaluation

The South Atlantic Fishery Management Council (SAFMC) initiated this evaluation to assess the effectiveness of the Spawning Special Management Zones (SSMZ) established through Amendment 36 implemented in 2017. The review was intended to determine whether the existing zones continue to support their original conservation objectives and whether current management measures remain appropriate given available scientific information, implementation capacity, and stakeholder perspectives. Emphasis was placed on the three natural reef SSMZs (South Cape Lookout, Devil's Hole / Georgetown Hole, and Warsaw Hole) which had sunset provisions scheduled to expire in July 2027. The evaluation also sought to identify operational strengths and weaknesses, gaps in monitoring and enforcement, stakeholder concerns, and opportunities for adaptive management improvements.

## 1.2. Creation of SSMZ in Amendment 36

Amendment 36 established a network of five Spawning Special Management Zones intended to protect important spawning habitat and spawning fish for snapper grouper species.

The amendment was developed between 2012 and 2016 and implemented in 2017 following extensive Council review and stakeholder engagement.

The purpose and need for Amendment 36 was to:

> "*Protect important spawning habitat for snapper grouper species that can be designated for protection to enhance spawning. Reduce bycatch and bycatch mortality of snapper grouper species, including speckled hind and warsaw grouper. Prevent overfishing and achieve optimum yield (National Standard 1); reduce bycatch and bycatch mortality of economically and ecologically important snapper grouper species, including speckled hind and warsaw grouper, to the extent practicable (NS 9); and achieve conservation goals while minimizing to the extent practicable negative social and economic effects to snapper grouper fishermen and fishing communities (NS 8).*" (SAFMC 2016)

The management strategy was designed as an approach focused on protecting locations believed to support predictable spawning activity and important reef habitat characteristics.

## 1.3. SSMZ Network Description

The current SSMZ network includes five protected areas distributed across the South Atlantic region including natural reef sites and artificial reef sites. Collectively, the SSMZ account for 17.7 square miles which is less than 0.001% of the South Atlantic region.

The natural reef sites were selected based on habitat characteristics and evidence suggesting recurring spawning activity for multiple species. The sites are

- South Cape Lookout off North Carolina
- Devil's Hole off South Carolina
- Warsaw Hole off Florida

The artificial reef sites (Area 51 and Area 53) were originally established as unmarked artificial reefs to test the idea of using artificial reefs as protected areas.

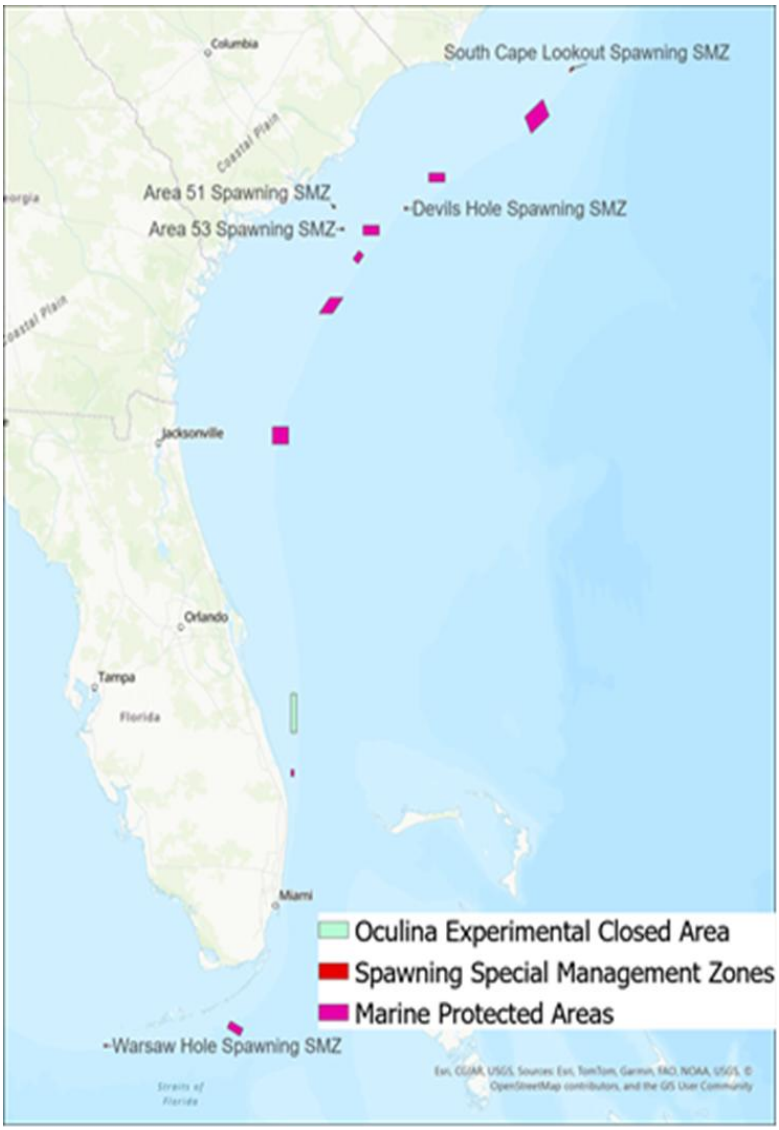



**Figure 1.** Map of protected areas established through the Snapper Grouper Fishery Management Plan. The Spawning Special Management Zones created through Amendment 36 are labelled.

### 1.4. Existing Management Measures

Current regulations within SSMZs are:

> "*Any fishing vessel in a spawning SMZ is prohibited to fish for or harvest species in the snapper-grouper fishery management unit year-round. For a fishing vessel to possess snapper-grouper species on board while in a spawning SMZ, the vessel must be in transit and fishing gear must be appropriately stowed…*" (Code of Federal Regulations, 2026)

### 1.5. Focal Species

The SSMZs were developed to support management of 23 species in the snapper grouper complex.

Focal species include:

- Greater Amberjack
- Coney
- Graysby
- Goliath Grouper
- Nassau Grouper
- Red Grouper
- Red Hind
- Rock Hind
- Speckled Hind
- Snowy Grouper
- Warsaw Grouper
- Yellowedge Grouper
- Black Grouper
- Gag
- Scamp
- Blackfin Snapper
- Cubera Snapper
- Mutton Snapper
- Red Snapper
- Silk Snapper
- Yellowtail Snapper
- Golden Tilefish
- Blueline Tilefish

The Council's original intent was to establish protections that would support spawning success, reduce fishing mortality associated with spawning behavior, and contribute to long-term stock sustainability.

# 2.0. Evaluation Methods and Process

The evaluation was designed as a structured review of both management implementation and outcomes. It assessed whether the SSMZs remain biologically relevant and whether the broader management approach functions effectively from operational, enforcement, and stakeholder perspectives. The evaluation examined SSMZ planning and design, enforcement and compliance, outreach and stakeholder engagement, monitoring and data collection, and biological and socioeconomic outcomes.

## 2.1. Advisory Panel Engagement

This initial evaluation is designed to gather input from a variety of stakeholders and provide the Council with a variety of perspectives. Staff have reached out to different advisory panels using in-person meetings, webinar meetings, and evaluation tools to gather input. Currently, input has been received from Law Enforcement (LEAP), Habitat and Ecosystem (HEAP), and Snapper Grouper Advisory Panels (SGAP) with additional input to be gathered from the Scientific and Statistical Committee.

## 2.2. Evaluation Categories

The discussion from the advisory panels focused on five key topics: planning and design, roles and coordination, resource and capacity, management implementation, and outcomes. Some topics (e.g. planning and design) are well suited to discuss as broad topics while others are better suited for individual areas (e.g. outcomes).

## 2.3. Evaluation Limitations

Advisory groups identified several limitations affecting the evaluation process and interpretation of findings. These included few advisors completing evaluation tool, many advisors were unfamiliar with all sites, limited biological datasets, absence of nearby comparison areas, and challenges associated with offshore monitoring (biological and enforcement). Advisors also emphasized that many biological processes associated with spawning protection and larval recruitment are inherently difficult to measure directly, particularly within relatively small offshore protected areas. As a result, advisory groups frequently characterized the evaluation as an early-stage adaptive review rather than a definitive assessment of long-term effectiveness.

# 3.0. Cross-Cutting Findings

## 3.1. Overview

Although each advisory panel approached the evaluation from a different perspective, several common themes emerged consistently across discussions. These themes provide important context for understanding both the strengths and limitations of the current SSMZ management. Overall, advisory groups viewed the original conservation rationale underlying the SSMZ network as valid but repeatedly emphasized that implementation effectiveness is constrained by

operational limitations, insufficient monitoring capacity, and uncertainty regarding measurable outcomes.

### 3.2. Enforcement and Compliance Constraints

Enforcement capacity emerged as the single most consistent concern across all advisory groups. Advisors repeatedly emphasized that the offshore location, small spatial footprint, and limited patrol resources associated with the SSMZs created persistent challenges. The LEAP noted that there were vessel range limitations, limited staff to conduct offshore trips, weather conditions, lack of Joint Enforcement Agreement between NC Division of Marine Fisheries and NOAA Fisheries, and competing enforcement priorities significantly reduced the frequency of offshore patrol activity.

The LEAP also discussed limitations associated with existing monitoring technologies. While Vessel Monitoring System (VMS), Automatic Identification System (AIS), radar systems, and aerial patrols may improve targeting efficiency, these tools cannot independently verify illegal fishing activity without additional observation or investigation.

Several advisory groups expressed concern that inconsistent enforcement visibility may undermine stakeholder confidence in the effectiveness of the protections.

### 3.3. Outreach and Stakeholder Awareness

Outreach and stakeholder education were identified as major opportunities for near-term improvement.

Members across all panels noted that awareness of the SSMZs remains inconsistent among portions of both the recreational and commercial fishing sectors. Several members indicated that many fishermen remain unfamiliar with the location and regulations for the SSMZs.

Advisory panels emphasized that improved outreach may represent one of the most practical and cost-effective approaches for improving compliance in offshore areas where routine enforcement presence is limited.

Suggested improvements included:

- expanded integration into chart plotters and electronic navigation systems,
- improved visibility within fishing applications,
- targeted outreach through marinas and tackle shops,
- social media campaigns,
- printed educational materials,
- and highlight enforcement actions in closed areas.

### 3.4. Biological Effectiveness

A recurring theme throughout the evaluation was the difficulty of measuring biological effectiveness and relevance of the SSMZs.

Advisory panels acknowledged that spawning activity has been documented in all the SSMZs, and larval connectivity modeling suggests potential regional contribution for most sites.

Several advisors described the challenge of demonstrating measurable spillover or recruitment benefits as one of the central scientific limitations affecting marine protected area evaluations more broadly. For SSMZs, the discussions highlighted the need for additional data on spawning fish, monitoring through existing programs is insufficient, and population-level benefits will be difficult to assess.

Although there was concern about the biological effectiveness of the SSMZs, some members cautioned against interpreting limited evidence as evidence of ineffectiveness.

### 3.5. Monitoring and Research Needs

All advisory panels identified monitoring limitations as a major constraint affecting evaluation of the SSMZs. Members noted the need to expand the biological sampling to include areas nearby the SSMZs, develop a long-term monitoring program, and improve data on social and economic impacts of the closed area.

Advisory panels repeatedly stressed that improved monitoring capacity is essential for strengthening future management decisions and evaluating long-term effectiveness.

### 3.6. Advisory Panel Perspectives on Retention

Most stakeholder perspectives favored retaining the SSMZs while continuing to improve outreach, enforcement, monitoring, and evaluation. Supportive comments emphasized the value of protecting important spawning habitat and the precautionary role of closures, while more skeptical comments focused on offshore enforcement challenges, limited evidence of measurable outcomes, potential effort displacement, and the small size of the protected areas. Overall, the advisory panels did not recommend removing the SSMZs outright, but several individuals noted that additional information would help guide future management decisions. Suggestions for management of the SSMZs from advisory panel members included:

- Keeping regulations and management the same with increased biological and enforcement monitoring;
- Increasing spawning season closures due to low compliance; and
- Allowing for rotating closures of artificial reefs.

### 3.7. System Management Plan Workgroup Perspectives on Retention

The System Management Plan Workgroup concluded that the available information did not support removing protections for the five SSMZs. While members acknowledged that additional biological, ecological, and fisheries information would improve future evaluations, they found that the existing evidence was insufficient to remove continued protection of the sites.

The workgroup recommended retaining the sunset provisions to ensure the SSMZs are periodically re-evaluated as new biological, ecological, fisheries, social, economic, and enforcement information becomes available.

The workgroup emphasized that information from nearby habitats would provide valuable context for evaluating the relative importance and representativeness of each SSMZ. The workgroup noted that spawning by focal species has been documented within the natural SSMZs, reinforcing the value of continued protection during spawning periods. Members also identified

opportunities to improve outreach and education to increase awareness of SSMZ regulations among the fishing community. Finally, the workgroup recognized that enforcement will continue to be challenging because of the offshore location of the sites. Although emerging technologies may improve the ability to detect potential violations, effective enforcement will still require on-water patrols and vessel inspections to document violations and support enforcement actions. Additional details are provided in the site-specific findings.

# 4.0. Site-Specific Findings

Although the advisory panels identified several common implementation themes across the SSMZs, advisors also discussed important differences among the individual sites. Perceived effectiveness, stakeholder support, available monitoring information, and implementation challenges varied substantially by location.

Overall, Devil's Hole received the most consistently positive feedback regarding biological relevance and management effectiveness, while South Cape Lookout generated greater uncertainty regarding measurable outcomes and implementation capacity. The artificial reef sites, Area 51 and Area 53, received little discussion with some members supportive of using artificial reef sites as protected areas.

## 4.1. South Cape Lookout

Advisory panels consistently identified South Cape Lookout as one of the more challenging sites within the SSMZ network. They noted the limited monitoring coverage, lack of Joint Enforcement Agreement between North Carolina Division of Marine Fisheries and NOAA Fisheries, uncertain compliance rates, and insufficient biological data to evaluate long-term outcomes.

Several advisors also noted that stakeholder familiarity with the site and its management objectives appears relatively limited.

Despite uncertainty regarding outcomes, most advisory advisors favored retaining protections at South Cape Lookout while improving monitoring capacity, outreach, and enforcement. Some advisory panel members suggested increasing seasonal closures as opposed to area closures.

### Workgroup Recommendation

The System Management Plan Workgroup considered the South Cape Lookout SSMZ the most difficult of the five sites to evaluate. Unlike the other natural SSMZs, South Cape Lookout is not associated with a distinct bathymetric or habitat feature that clearly distinguishes it from adjacent areas, making it more difficult to assess its relative importance as a spawning location. Although members identified several information gaps and agreed that additional biological, fisheries, and habitat data would improve future evaluations, the available evidence documenting spawning by focal species did not support removing the existing protections.

The workgroup expressed a preference for retaining the current regulations while maintaining the sunset provision to ensure the site is re-evaluated as additional information becomes available.

Members emphasized that improved monitoring, additional information from surrounding habitats, and expanded outreach would strengthen future evaluations of the site's effectiveness and importance. The lack of a Joint Enforcement Agreement between North Carolina and NOAA Fisheries will be an additional challenge.

### 4.2. Devil's Hole / Georgetown Hole

Among all evaluated sites, Devil's Hole received the strongest support regarding:

- biological relevance,
- management effectiveness, and
- justification for continued protection.

Advisors frequently referenced the area as one of the stronger examples supporting the broader SSMZ concept. Sampling efforts documented spawning condition and spawning-associated activity for gag and scamp.

Advisory groups also noted that monitoring and data collection efforts at Devil's Hole appear somewhat more developed than at several other sites. Nevertheless, advisors continued to emphasize the need for expanded monitoring and increased enforcement.

Most advisory groups supported retaining the existing protections at Devil's Hole with relatively limited discussion regarding modifications to management or boundaries.

#### Workgroup Recommendation

The System Management Plan Workgroup considered Devil's Hole to have the strongest support for retaining existing protections among the five SSMZs. The site is associated with a distinct bathymetric feature that has been identified through multiple studies as an important spawning location for reef fish. Members highlighted the strong biological evidence documenting spawning by focal species within the area, as well as larval dispersal modeling indicating that larvae produced at Devil's Hole have moderate retention and rank among the higher-performing spawning locations for contributing recruits to the South Atlantic region. Based on the available biological and modeling information, the workgroup reached consensus that the existing regulations for Devil's Hole should be retained.

### 4.3. Area 51

Area 51 is an artificial reef SSMZ originally established as an unmapped reef site and became a SSMZ through Amendment 36. Compared with several natural reef sites, Area 51 generated somewhat more neutral or mixed responses regarding biological outcomes and compliance. Panel members acknowledged the site's habitat and conservation value, though uncertainty regarding spawning benefits remained common.

Monitoring efforts documented use of the site by black sea bass, gag grouper, and red snapper. Advisory groups noted that artificial reef monitoring efforts have contributed useful observational information but remain insufficient for comprehensive long-term evaluation.

Most advisors supported continued protection while emphasizing the need for expanded monitoring, clearer management objectives, and improved evaluation metrics.

**Workgroup Recommendation**

The System Management Plan Workgroup considered the artificial reef SSMZs to be unique opportunities to evaluate how protected artificial reef habitats can support spawning by reef fish. Members recognized that these sites were established as artificial reefs where fishing for snapper grouper species has been prohibited since their creation, providing a rare opportunity to evaluate long-term biological responses under reduced fishing pressure. The workgroup also noted that Area 51 continues to support ongoing research and monitoring efforts and that additional information on spawning activity and fish use of the site would strengthen future evaluations. Based on the available information, the workgroup recommended retaining the existing regulations for Area 51.

### 4.4. Area 53

Area 53 is an artificial reef SSMZ originally established as an unmapped reef site and became a SSMZ through Amendment 36. Monitoring efforts documented the presence of black sea bass, gag grouper, red snapper, and evidence of spawning-associated activity.

Advisors emphasized that monitoring remains limited, compliance information is incomplete, and long-term performance indicators remain uncertain.

While many Advisory Panel members supported retaining protections, others suggested that future adaptive modifications or alternative management approaches may warrant consideration such as rotating closures among artificial reefs or seasonal openings.

**Workgroup Recommendation**

The System Management Plan Workgroup considered the artificial reef SSMZs to be unique opportunities to evaluate how protected artificial reef habitats can support spawning by reef fish. Members recognized that these sites were established as artificial reefs where fishing for snapper grouper species has been prohibited since their creation, providing a rare opportunity to evaluate long-term biological responses under reduced fishing pressure. The workgroup also noted that additional information on spawning activity and fish use of the site would strengthen future evaluations. Based on the available information, the workgroup recommended retaining the existing regulations for Area 53.

### 4.5. Warsaw Hole

The advisory panels described Warsaw Hole as biologically important but difficult to monitor and enforce due to its offshore location and limited resources. Biological sampling showed warsaw grouper and greater amberjack in spawning condition, supporting continued management for spawning fish, though the evidence base was acknowledged as limited.

Most advisory groups supported retaining the existing protections at Warsaw Hole with relatively limited discussion regarding modifications to management or boundaries.

**Workgroup Recommendation**

The System Management Plan Workgroup considered Warsaw Hole SSMZ to have strong support for retaining the existing protections. The site is centered on a distinct bathymetric feature that has been identified as an important spawning location for reef fish. Members noted observations of spawning-condition warsaw grouper within the hole, as well as spawning-condition greater amberjack in the SSMZ, providing biological evidence that the site supports spawning by focal species. Based on the available biological and modeling information, the workgroup recommends that the existing regulations for Warsaw Hole should be retained.

# 5.0. Advisory Panel Perspectives

## 5.1. Overview

Each advisory panel approached the evaluation from a distinct perspective. Although substantial overlap existed among many conclusions, the panels differed in emphasis regarding implementation priorities, operational concerns, and long-term management considerations. Collectively, the advisory process provided an assessment of the SSMZs that incorporated enforcement realities, ecological considerations, stakeholder perspectives, and fishery management concerns.

## 5.2. Law Enforcement Advisory Panel

The Law Enforcement Advisory Panel focused primarily on enforceability, compliance, offshore patrol limitations, and practical implementation constraints. They emphasized that offshore SSMZs are inherently difficult to patrol consistently due to vessel range limitations, staffing shortages, weather constraints, and competing enforcement priorities. Advisors also stressed that compliance depends heavily on public awareness, and outreach may provide one of the most practical near-term tools for improving effectiveness.

Key discussion themes included limitations of VMS-only enforcement, difficulties proving violations offshore, importance of coordinated federal and state enforcement, and the growing challenge associated with modern vessel technology.

The Law Enforcement Advisory Panel generally supported retaining the SSMZs while improving enforcement coordination, stakeholder education, and monitoring support tools.

## 5.3. Habitat and Ecosystem Advisory Panel

The Habitat and Ecosystem Advisory Panel focused primarily on ecological function, habitat protection, biological uncertainty, and adaptive monitoring needs. They discussed the broader ecological rationale supporting spawning habitat protection, even in situations where measurable fishery outcomes remain difficult to quantify. The panel emphasized limited long-term monitoring capacity, insufficient comparison data, uncertainty regarding recruitment contribution, and the need for expanded biological and socioeconomic research.

The group also discussed emerging technologies and integrated monitoring frameworks as potential future tools for improving evaluation capacity.

The Habitat and Ecosystem Advisory Panel favored precautionary retention of the SSMZs while expanding monitoring programs, biological sampling, and adaptive evaluation frameworks.

### 5.4. Snapper Grouper Advisory Panel

The Snapper Grouper Advisory Panel focused heavily on the fishery, stakeholder awareness, management clarity, and long-term conservation tradeoffs. Advisors discussed both the biological rationale for protecting spawning habitat and the operational realities associated with offshore fishing activity. They highlighted limited awareness of the SSMZs among fishermen, concerns regarding enforcement feasibility, uncertainty regarding measurable biological outcomes, and the importance of stable long-term management areas for scientific evaluation.

Several advisors also emphasized that even relatively small protected areas may still provide meaningful biological value.

The Snapper Grouper Advisory Panel supported maintaining the SSMZs while improving outreach, evaluation transparency, and future monitoring efforts.

## 6.0. Management Implications and Recommendations

The advisory process identified several important implications for future Council deliberations regarding the SSMZs. Although uncertainty remains regarding the magnitude of long-term biological benefits, the evaluation demonstrated broad support for continuing a precautionary and adaptive management approach while improving implementation effectiveness.

Overall, advisors viewed the SSMZ network as a potentially valuable conservation tool whose long-term success depends heavily on improved monitoring, stronger stakeholder awareness, enhanced enforcement coordination, and more systematic evaluation frameworks.

### 6.1. Preliminary Management Direction

Based on advisory input collected during the evaluation, the prevailing management direction included retaining the existing SSMZ network in the near term, maintaining protections pending additional information, and improving implementation capacity before considering major changes.

Few advisors advocated removing protections outright, and most groups concluded that existing uncertainty does not provide a sufficient basis for eliminating the current management measures.

### 6.2. Recommended Management Priorities

**Recommended Priority 1:** The Council should prioritize improved public communication and stakeholder education.

Recommended outreach improvements include expanded integration into chart plotters, improved fishing application visibility, marina and tackle shop outreach, social media campaigns, and updated educational materials. Improved stakeholder awareness was consistently identified as one of the most practical near-term opportunities for improving compliance.

**Recommended Priority 2:** The Council should also continue exploring integrated monitoring technologies including AIS or VMS, satellite imagery, passive acoustic monitoring, and AI-assisted detection tools.

**Recommendation Priority 3:** Advisors consistently emphasized the need for expanded long-term monitoring programs capable of supporting adaptive management decisions. Priority needs include expanded biological sampling, recruitment and connectivity analysis, socioeconomic monitoring, comparison-site evaluation, and standardized performance metrics.

**Recommended Priority 4:** The advisory process supported continued management review of the SSMZ network.

Future evaluations should incorporate standardized metrics, improve stakeholder participation, establish clearer performance benchmarks, and continue integrating emerging scientific information. Advisors emphasized that long-term ecological processes associated with spawning protection may require extended evaluation timeframes before measurable outcomes become fully detectable.

The workgroup emphasized that future monitoring, research, outreach, and enforcement activities should be coordinated among NOAA Fisheries, the U.S. Coast Guard, state resource agencies, non-governmental organizations, and the Council. Members noted that funding for SSMZ-related activities should, where practical, be coordinated with existing programs and collaborative initiatives to maximize efficiency, leverage partner expertise, and avoid duplication of effort.

Advisors also recognized that offshore enforcement resources remain limited, making strategic patrols essential. Improved coordination among enforcement agencies, combined with collaborative monitoring and research efforts, was viewed as an opportunity to increase effectiveness while improving the information available for future evaluations of the SSMZs.

# Appendices

### Advisory Panel Comments

Comments have been collected from advisory panel members of Law Enforcement, Habitat and Ecosystem, and Snapper Grouper. Additional information will be gathered from the Scientific and Statistical Committee at a later date. The panel members were given an opportunity to comment at the meeting and to use the tool developed for the Workgroup. Response rate for using the tool has been low with 1 or 2 members from each group using it.

## Law Enforcement Advisory Panel

Charleston, SC
January 20, 2026

### Overview

The meeting focused on evaluating South Atlantic spawning special management zones (SMZs), including three hard-bottom areas with a sunset clause expiring in July 2027 and two South Carolina artificial reef areas created in the late 1990s/early 2000s. Law enforcement and advisory panel members discussed whether these areas should remain as-is, be modified, or have management removed, with recurring themes of weak enforcement capacity, limited monitoring resources, and the need for better outreach and education.

### Purpose of the Evaluation

The presenter explained that the session was intended to gather law enforcement advisory panel input to inform the System Management Plan Workgroup, a broader group made up of fishermen, scientists, outreach staff, and law enforcement. The goal was to assess whether the SMZs are effective and how they should be managed going forward, especially given the upcoming 2027 sunset for the three hard-bottom areas.

### Background on the Areas

The protected areas discussed include three hard-bottom spawning SMZs and two artificial reef areas managed by the South Carolina Department of Natural Resources. The artificial reefs were created over sand bottom and were not originally placed on public maps; they were intended more as fish refuge areas than traditional fishing reefs. The presenter noted that, although the reef areas do not have a sunset clause, management can still be changed if warranted.

### Prior Advisory Panel Concerns

The presenter reviewed conclusions from Amendment 36 and earlier law enforcement advisory panel comments. Key concerns included:

- The sites are very small, far offshore, and difficult to enforce.
- Buoys were suggested, but they could create issues near shipping channels and may be problematic for protected species such as whales.
- Transit rules and stowage requirements were considered consistent with other closed areas.
- The areas are mostly square or lat/long-based boxes, with one area following a depth contour more closely.

- The spawning SMZs should appear on NOAA charts, but NOAA's line office does not allow permanent inclusion because the areas are not permanent.
- The team has worked with providers such as Garmin and Fish Rules to improve visibility of the closures on electronic tools.

**Research and Monitoring Efforts**

The presenter said this was the first evaluation cycle for these areas, even though it should have happened more regularly. Research has been limited by funding and has focused on likely spawning seasons for target species:

- Warsaw Hole: sampling around Warsaw grouper and greater amberjack spawning periods.
- Devil's Hole: sampling during scamp spawning season.
- South Cape Lookout: sampling around red grouper spawning season.
- The two artificial reef areas: sampling has occurred, but mostly to document species presence rather than spawning condition.

**Survey Results Shared With the Group**

The presenter summarized survey responses, noting that only four responses were received and that the results were mixed but generally leaned positive on the original planning:

- Planning and purpose: respondents agreed that the management purpose and objectives were clearly defined.
- Boundaries: most felt the boundaries were clear and based on habitat or known aggregation sites.
- Roles and responsibilities: responses were weaker, with some disagreement or neutrality about whether monitoring and implementation responsibilities were clearly defined.
- Coordination: this received more negative feedback, with several respondents saying coordination was limited.
- Resources and enforcement: respondents said there were not enough monitoring and enforcement resources, particularly for South Cape Lookout.
- Outreach and communication: this was identified as needing improvement.
- Enforcement and compliance: responses suggested irregular enforcement and weak compliance in some areas.
- Outcomes: respondents were divided or unsure about whether to retain, modify, or remove the areas.

**Discussion on Effectiveness of Closures**

A key discussion point was whether closures like these actually improve fish stocks. One participant argued that protected areas often fail to show clear biomass benefits outside the closed box and cited the Gulf of Mexico as an example where closures did not deliver the expected results. In response, the presenter acknowledged that strong proof is difficult to produce and described that the "holy grail" of research would be directly showing movement from protected spawning areas into broader populations.

The presenter said current science offers only limited evidence, mostly through:

- simulation studies of larval drift,
- spawning-season sampling,
- and new techniques such as close-kin mark recapture.

The group also discussed examples where closures may have worked better, especially Riley's Hump in the Florida Keys, where members said mutton snapper populations appeared to improve after closure. That example was repeatedly described as a strong success story.

### Enforcement Challenges

Enforcement was a major theme throughout the discussion. Several participants said these offshore closures are difficult to patrol consistently, especially more than 60 miles offshore. Key points included:

- VMS can help identify vessels in closed areas, but VMS alone does not prove illegal activity without on-water or aerial confirmation.
- Patrol frequency is limited by vessel range, personnel, and available resources.
- In some states, enforcement coverage is especially thin, relying heavily on NOAA, Coast Guard, JEA, and air support.
- Radar and modern boat technology make enforcement harder because fishermen can detect patrols sooner.

Despite these limitations, participants said VMS, flights, and coordinated patrols can still help target enforcement more effectively.

### Outreach and Education

Several speakers emphasized that better public education may be one of the most practical improvements. Suggestions included:

- Put more effort into outreach rather than buoys.
- Distribute flyers, rack cards, and similar materials more widely.
- Improve visibility in fishing apps and electronic tools.
- Make sure the public clearly understands coordinates, boundaries, and the purpose of the zones.

The presenter also noted that a flyer for the spawning SMZs already exists and includes coordinates in latitude/longitude format.

### Views on Buoys and Mapping

There was strong skepticism about using buoys as a primary compliance tool. One participant said buoys should not matter from an enforcement perspective because coordinates and GPS are the real standard offshore. Others agreed that buoys can disappear, create confusion, or become unreliable as evidence. The group favored better information delivery over physical markers. Participants also asked whether the zones could appear in logbook-related mapping tools or fishing apps used daily by anglers. The presenter said they are working with providers to improve that visibility, though the process is slow.

### Compliance and Public Perception

Multiple participants stressed that compliance is essential for these areas to be effective. If people ignore closures and avoid being caught, then the zones may protect only the people who already follow the rules. Speakers said low compliance undermines stakeholder confidence in management.

One participant argued that the public needs to see actual enforcement cases and outcomes after adjudication so that violators understand there are consequences. Another noted that enforcement perceptions differ between recreational and commercial sectors, with recreational violations sometimes receiving less lasting scrutiny because of political influence or public attitudes.

### Retention Views

By the end of the discussion, there was no clear consensus to remove the zones. Instead, the main recommendations were:

- improve outreach and education,
- consider VMS or similar monitoring tools where possible,
- strengthen coordination among NOAA, Coast Guard, state agencies, and other partners,
- and focus on better documentation of effectiveness.

The presenter summarized the group's feedback as leaning toward keeping the zones in place for now while improving compliance strategies and public awareness, especially since the current evidence base is not strong enough to justify major changes with confidence.

### Key Takeaway

The group broadly agreed that the spawning SMZs and related artificial reef protections may have value, but their success is constrained by limited enforcement, poor public awareness, and weak evidence of measurable biological outcomes. The strongest near-term path forward identified in the meeting was to improve outreach, monitor compliance more effectively, and continue evaluating whether these areas should remain unchanged, be modified, or eventually be removed.

## Habitat and Ecosystem Advisory Panel

Webinar
January 29, 2026

### Overview

The meeting focused on evaluating the Council's spawning special management zones (SMZs), created in Amendment 36 in 2017 to protect spawning habitat, reduce bycatch, and support conservation goals while minimizing social impacts. The discussion reviewed the zones' design, monitoring history, preliminary survey results, and whether the areas should be retained, modified, or removed.

### Purpose and Design of the SMZs

The five spawning SMZs were established to protect important spawning habitat and species that may aggregate in predictable locations year after year. The areas are intended to reduce bycatch and bycatch mortality, particularly for speckled hind and Warsaw grouper, while also helping prevent overfishing and achieve optimum yield under National Standard 1.
The five zones are:

- South Cape Lookout
- Devil's Hole / Georgetown Hole
- Warsaw Hole
- Area 51

- Area 53

These areas are very small, with the largest about 5 square miles. The natural reef sites were selected because they appeared to host multiple spawning species and had distinctive habitat features, while the artificial reef sites were originally created for fish population rebuilding and later designated as spawning SMZs.

### Regulations and Scope

The SMZ regulations prohibit harvest and possession of snapper-grouper species within the zones, using a broad definition that covers the full fishery complex. The rules also allow transit through the areas if gear is properly stowed and prohibit anchoring by fishing vessels.
The three natural reef SMZs have a sunset clause, meaning the regulations will expire after July 2027 unless renewed.

### Habitat, Focal Species, and Monitoring

The natural reef sites include different habitat types, including promontory-like areas with strong edges and a flatter pavement area. Monitoring and research discussed included:

- A larval connectivity model by Brothers et al.
- Sampling by The Nature Conservancy and LGL during spawning seasons
- Monitoring of artificial reefs by the South Carolina Aquarium
- Opportunistic data collection by the Southeast Reef Fish Survey

The research suggested some sites may contribute more than others, but overall the small size of the zones means their measurable contribution may be limited.

### Why the Evaluation Is Happening?

The evaluation was described as necessary to make sure the SMZs are doing what they were intended to do and are not functioning as a "black box." The review is focused on planning and design, inputs such as resources and capacity, processes such as enforcement and outreach, and outputs and early outcomes. The evaluation also considers whether management should stay the same, be modified, or be changed in some other way.

### Main Survey Findings

Overall, responses were more positive on planning and design than on implementation capacity and outcomes.

#### *Planning*

Responses were mostly positive on whether the areas were clearly designated, whether the objectives matched the purpose of spawning protection, and whether documentation was sufficient. Responses were more neutral on whether the boundaries fully encompass known spawning areas.

#### *Roles and Responsibilities*

The review suggested the Council did well on defining roles and making decisions transparently. Coordination among agencies and stakeholder engagement were less positive.

### *Resources and Data Collection*

Resources were viewed as inadequate across the areas, including funding, personnel, vessels, and access to data. Data collection programs were also often seen as insufficient.

### *Management Measures*

Responses were mixed on whether management measures are being implemented as intended, with some sites viewed more positively than others.

### *Outcomes*

For several sites, outcomes were rated as negative or insufficiently known for biological indicators, habitat condition, non-target species trends, compliance, and stakeholder buy-in. In many cases, the main response was to retain the areas as is or to say there was not enough information to decide.

## Site-by-Site Themes

### *South Cape Lookout*

This site received mixed to negative feedback on resources and data programs. Biological indicators, habitat condition, non-target species outcomes, compliance, and stakeholder buy-in were all viewed as weak or uncertain. The dominant response was retain as is or insufficient information.

### *Area 51 and Area 53*

These artificial reef sites were viewed somewhat more positively than South Cape Lookout, especially for biological indicators, habitat condition, and non-target species trends. Compliance remained largely unknown, and stakeholder buy-in was still mixed.

### *Devil's Hole/Georgetown Hole*

This site received the strongest overall feedback. Data collection, management implementation, and biological outcomes were viewed more positively, though there was still a need for better information overall.

### *Warsaw Hole*

This site showed inadequate resources, weak or uncertain data collection, and mixed views on management implementation. Outcomes remained uncertain, though stakeholder engagement was somewhat more positive.

### *Cross-Area Evaluation*

Across all areas, the review suggested planning is the strongest area, enforcement, compliance, and outreach need improvement, funding, staffing, and monitoring capacity are weak, outputs show limited progress, and outcomes are variable and often uncertain. The most common improvement priorities were:

- More biological, social, and economic research
- More funding and capacity for monitoring and management
- Better compliance and enforcement

- Stronger outreach and education
- Ongoing monitoring of biological, economic, social, and environmental trends

### Major Concerns and Ideas

A recurring concern was that the zones are offshore and difficult to monitor, especially because most are more than 30 miles offshore. Another major issue was the lack of comparison data from nearby unprotected areas.
Several monitoring and enforcement tools were discussed as possible solutions:

- Satellite imagery
- Vessel Monitoring Systems
- AIS data
- Passive acoustic monitoring
- AI-based detection of spawning fish and vessel activity
- Multi-method predictive models combining several data sources

A separate offshore sanctuary study was described as an example of how combining AIS, satellite imagery, hydrophones, cameras, vessel surveys, and aerial surveys can identify visitation patterns and improve enforcement targeting.

### Retention Views

The overall direction of the discussion leaned toward retaining the zones. The main rationale was that the original conservation purpose still appears valid, there is evidence of spawning activity in the closed areas, and there is not enough information to justify removing protections.

## Snapper Grouper Advisory Panel

Charleston, SC
April 23, 2026

### Overview

The meeting focused on the South Atlantic Snapper Grouper Advisory Panel's review of the spawning special management zones (SSMZs), including the purpose, research basis, evaluation tool, and whether the existing sunset provisions should remain. Discussion centered on three natural reef areas with sunsets—South Cape Lookout, Devil's Hole, and Warsaw Hole—and the panel ultimately leaned toward keeping the zones in place while improving outreach and education.

### Background on the SSMZ Program

The presentation reviewed why the council created the spawning SMZs in Amendment 36 and established them in 2017 after work from 2012–2016. The core purpose was to protect important spawning habitat, enhance spawning, reduce bycatch and bycatch mortality for species such as speckled hind and Warsaw grouper, prevent overfishing, and achieve optimum yield while minimizing social and economic impacts.

The areas discussed are very small in total—less than 20 square miles combined, comparable in scale to a downtown area. Because of their size, presenters noted that the bycatch reduction and

mortality-reduction goals are ambitious, but the areas may still provide meaningful spawning protection and some spillover benefits.

**Regulations and Management Purpose**

The regulations prohibit fishing for harvest of, and possession of, snapper grouper species inside the zones, and anchoring is not allowed. A transit provision allows possession of snapper grouper species if gear is properly stowed. The management goal is to protect multiple spawning species where fish may aggregate, while supporting long-term conservation and minimizing negative effects where practical.

The focal species list included groupers, greater amberjack, several snappers including blackfin, cubera, mutton, red, silk, and yellowtail, plus golden tilefish and blueline tilefish. It was noted that some of the current sites are not expected to be ideal habitat for golden or blueline tilefish, but those species were included for flexibility if new protected areas are created later.

**Research and Evidence Discussed**

A substantial portion of the meeting reviewed existing habitat mapping, underwater video, biological sampling, and larval connectivity research. Speakers noted that although the areas are tiny, research indicates they can produce larvae that recruit back into the South Atlantic region. Biological samples collected through work supported by The Nature Conservancy, LGL Associates, and South Carolina DNR showed spawning condition in focal species at the natural reef sites:

- Warsaw Hole: Warsaw grouper and greater amberjack
- Devil's Hole: gag grouper and scamp grouper
- South Cape Lookout: red grouper and red snapper

For artificial reefs, monitoring by the South Carolina Aquarium and other efforts have documented species such as black sea bass, gag grouper, and red snapper, with some observations of spawning condition at Area 53. The Southeast Reef Fish Survey and a master's thesis were also referenced as contributing evidence.

**Evaluation Tool and Panel Feedback**

The council's system management plan workgroup created an evaluation tool to assess whether the SSMZs are meeting their goals. The evaluation covered planning, implementation, management measures, outcomes, and stakeholder support.
For the two zones evaluated by that morning—Area 53 and Warsaw Hole—the feedback was mixed to negative on operational issues:

- Adequate resources for monitoring and enforcement: disagreed or strongly disagreed
- Enforcement sufficiency: disagreed or strongly disagreed
- Data collection: neutral
- Gear/possession/transit rule implementation: one disagreed
- Outreach and education materials: neutral
- Enforcement actions/compliance: disagreed or strongly disagreed
- Biological outcomes: mixed, with some disagreement about effectiveness in abundance/spawning activity
- Habitat condition: neutral

- Non-target impacts: strongly disagreed on displacement/crowding concerns for Area 53
- Stakeholder support: negative for Area 53, but more favorable for Warsaw Hole

Based on the written responses, Area 53 was recommended for a modified approach, including the idea of cycling different spawning special management zones on and off rather than keeping them closed continuously. Warsaw Hole was also recommended for modification, with comments that the area should have been larger to protect more habitat.

**Advisory Panel Discussion on Survey Limitations**

Several panel members said the survey questions were too vague or difficult to answer for sites they do not know well, especially South Cape Lookout. Multiple members asked for an "NA / not applicable" option so they could avoid guessing on questions they were not qualified to answer.

Members also said many AP participants were unfamiliar with the SSMZs, especially recreational and even some commercial fishermen, and that the current information is not always accessible in a digestible format. Staff acknowledged the challenge of presenting extensive research in a short meeting and explained that the advisory panel input, along with online responses, would be consolidated into a written summary.

**Outreach and Enforcement Themes**

Outreach emerged as one of the strongest themes. Members suggested:

- Include the zones on electronics and chart plotters
- More physical marking, though cost and practicality were concerns
- Social media, magazines, tackle-shop outreach, and newsletters
- Clearer enforcement communications showing that violations do occur
- Better education for anglers who may not realize the zones exist

Several participants noted that newer electronics often already show the zones, but older systems and casual users may not. Others argued that enforcement is limited by the sheer size and offshore location of some areas, making awareness and education more important than relying on enforcement alone.

**Views on Keeping or Removing the Zones**

The panel discussion trended toward keeping the SSMZs in place. Supporters cited:

- Evidence of spawning fish in the zones
- The importance of protecting high-value spawning habitat
- The value of long-term, stable management areas for research and monitoring
- The possibility that even small, protected areas can matter biologically

Those more skeptical emphasized:

- Limited enforcement capacity
- Very small area size relative to the broader spawning range
- Uncertainty about how effective area closures are compared with time-based closures
- Confusion over how much fishing actually occurs inside the zones

Despite those concerns, the informal show of hands suggested the AP was comfortable with the zones remaining effective rather than letting the sunset clauses expire.

### Clarification on Deepwater MPAs vs. SSMZs

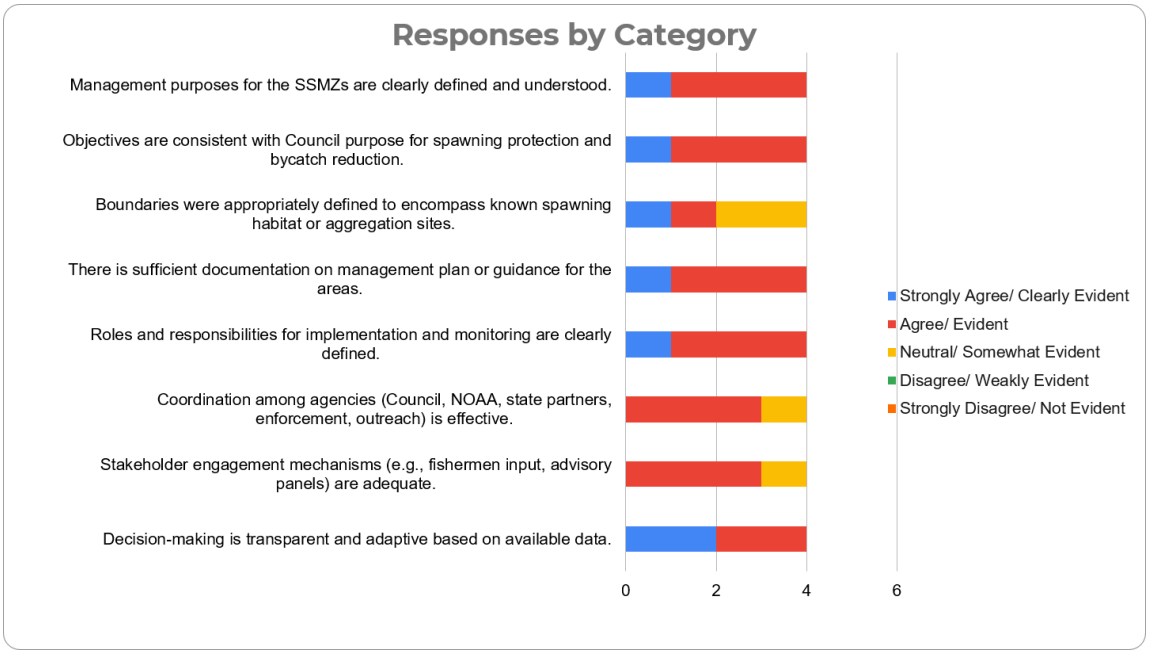
The discussion also clarified that the Deepwater MPAs are distinct from the spawning SMZs. Deepwater MPAs were created to reduce discard mortality and protect juvenile fish, while SSMZs are focused on protecting spawning fish and spawning habitat. Some participants initially confused the two systems because both involve protected fishing areas.
Staff explained that the Deepwater MPAs do not have sunset clauses, while the natural reef SSMZs do. The Council is specifically reviewing whether the SSMZ regulations for South Cape Lookout, Devil's Hole, and Warsaw Hole should remain, be modified, or be removed.

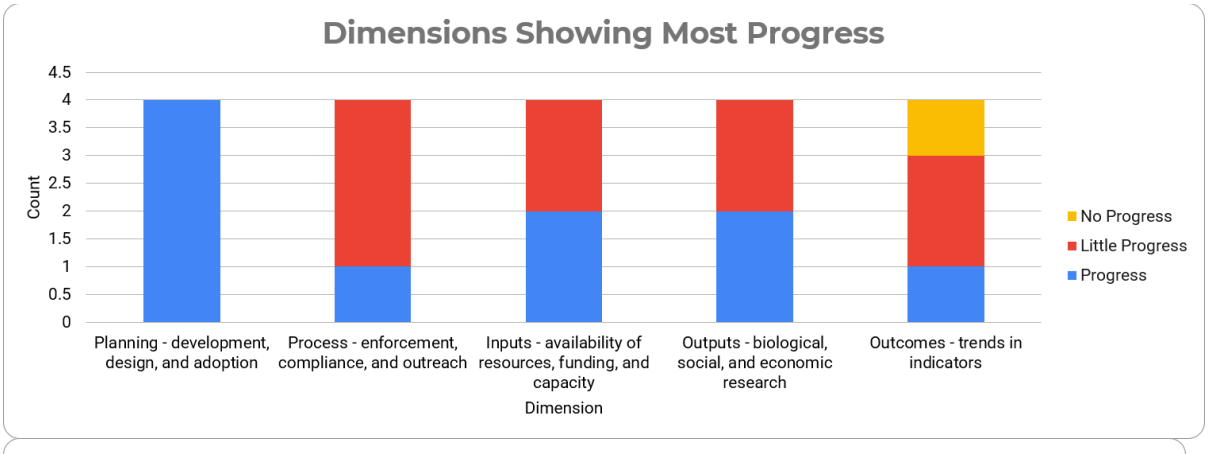
### Retention Views

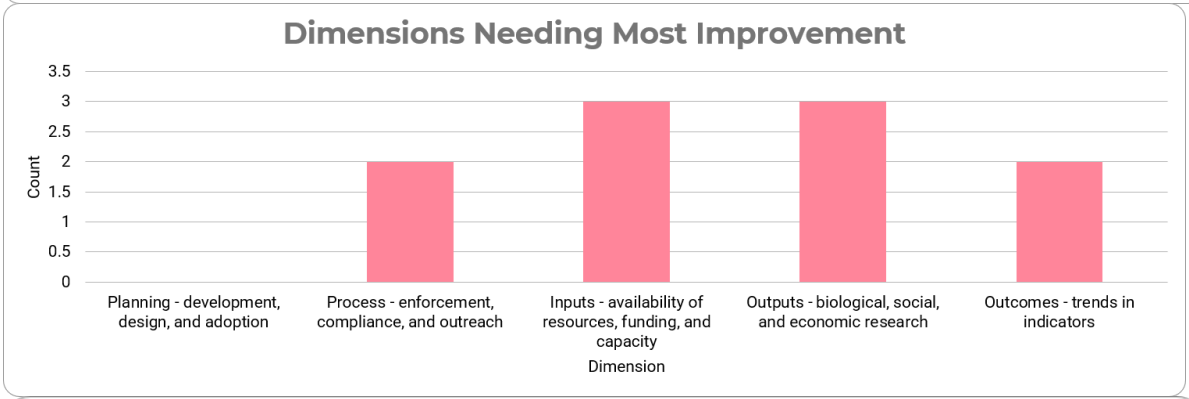
The AP's discussion ended with a consensus to support keeping the SSMZs, while recognizing the need for better outreach, clearer education materials, and more systematic evaluation of site effectiveness. There was also interest in better data collection in the future, including comparisons of inside-versus-outside catch rates if a properly designed survey becomes available.

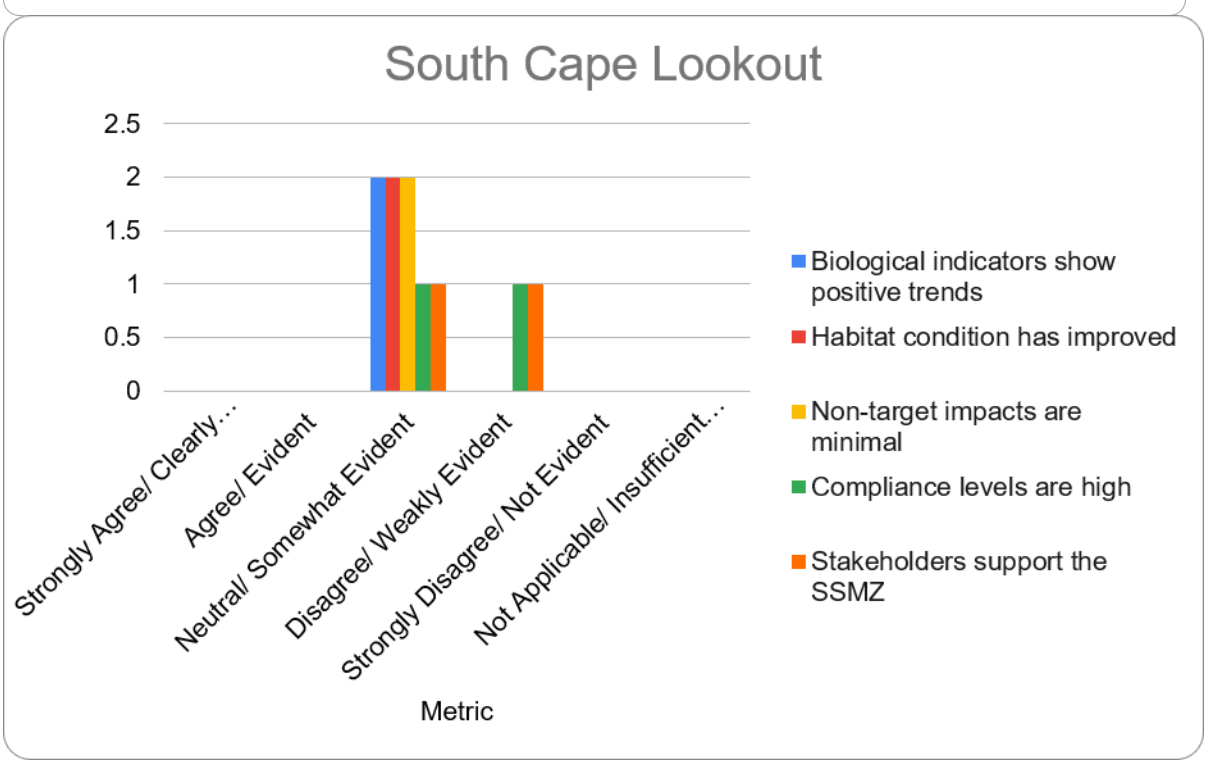
## SMP Workgroup Preliminary Responses to Evaluation Survey

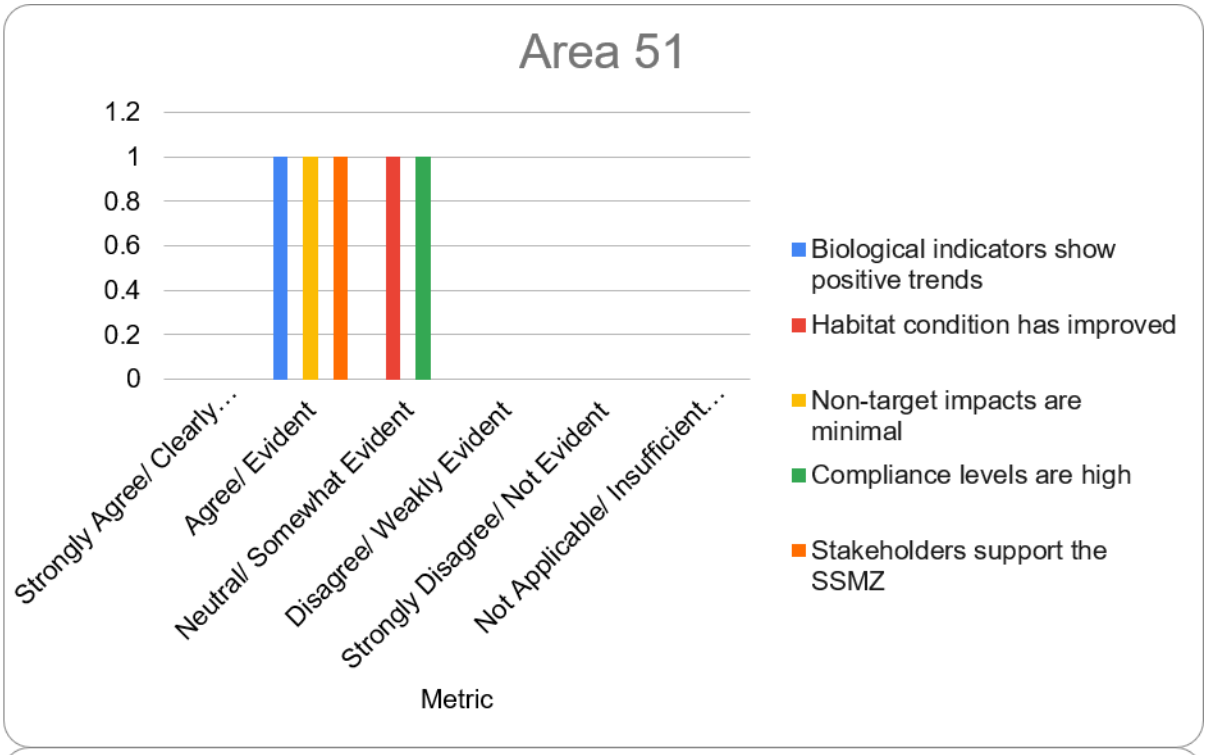
Four members fill out the evaluation survey tool and the responses were used as a strawman for discussion by the workgroup. The below figures are not the final recommendations from the workgroup. The report represents the final recommendations.

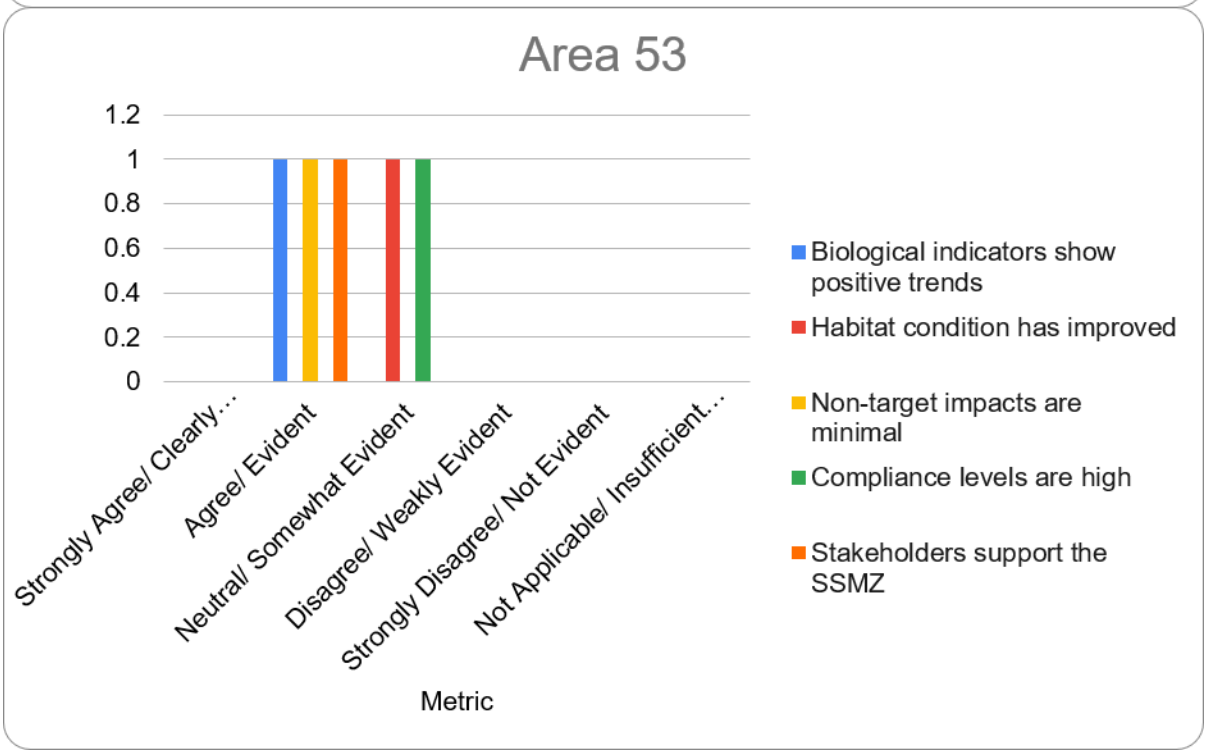


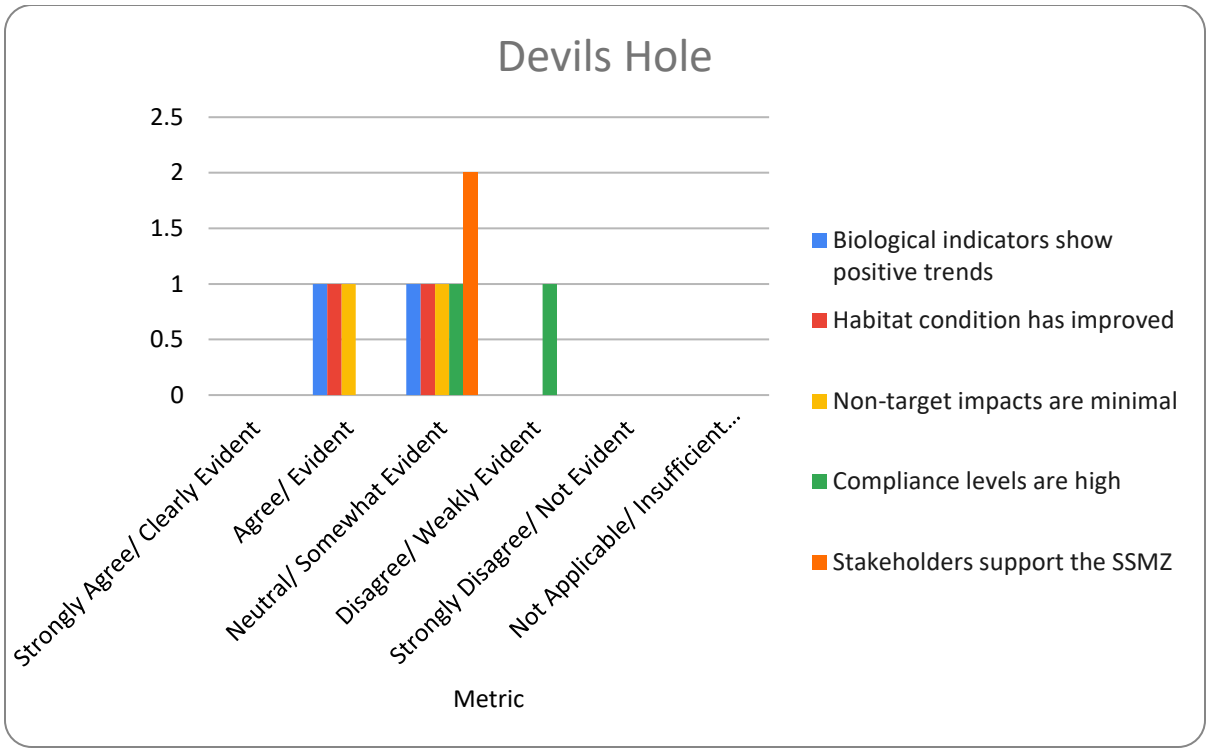

Dimensions Showing Most Progress
Count
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Planning - development, design, and adoption
Process - enforcement, compliance, and outreach
Inputs - availability of resources, funding, and capacity
Outputs - biological, social, and economic research
Outcomes - trends in indicators
Dimension
No Progress
Little Progress
Progress


Dimensions Needing Most Improvement
Count
3.5
3
2.5
2
1.5
1
0.5
0
Planning - development, design, and adoption
Process - enforcement, compliance, and outreach
Inputs - availability of resources, funding, and capacity
Outputs - biological, social, and economic research
Outcomes - trends in indicators
Dimension


South Cape Lookout
2.5
2
1.5
1
0.5
0
Strongly Agree/ Clearly…
Agree/ Evident
Neutral/ Somewhat Evident
Disagree/ Weakly Evident
Strongly Disagree/ Not Evident
Not Applicable/ Insufficient…
Metric
Biological indicators show positive trends
Habitat condition has improved
Non-target impacts are minimal
Compliance levels are high
Stakeholders support the SSMZ


Area 51
1.2
1
0.8
0.6
0.4
0.2
0
Strongly Agree/ Clearly…
Agree/ Evident
Neutral/ Somewhat Evident
Disagree/ Weakly Evident
Strongly Disagree/ Not Evident
Not Applicable/ Insufficient…
Metric
Biological indicators show positive trends
Habitat condition has improved
Non-target impacts are minimal
Compliance levels are high
Stakeholders support the SSMZ


Area 53
1.2
1
0.8
0.6
0.4
0.2
0
Strongly Agree/ Clearly…
Agree/ Evident
Neutral/ Somewhat Evident
Disagree/ Weakly Evident
Strongly Disagree/ Not Evident
Not Applicable/ Insufficient…
Metric
Biological indicators show positive trends
Habitat condition has improved
Non-target impacts are minimal
Compliance levels are high
Stakeholders support the SSMZ


Devils Hole
2.5
2
1.5
1
0.5
0
Strongly Agree/ Clearly Evident
Agree/ Evident
Neutral/ Somewhat Evident
Disagree/ Weakly Evident
Strongly Disagree/ Not Evident
Not Applicable/ Insufficient...
Metric
Biological indicators show positive trends
Habitat condition has improved
Non-target impacts are minimal
Compliance levels are high
Stakeholders support the SSMZ