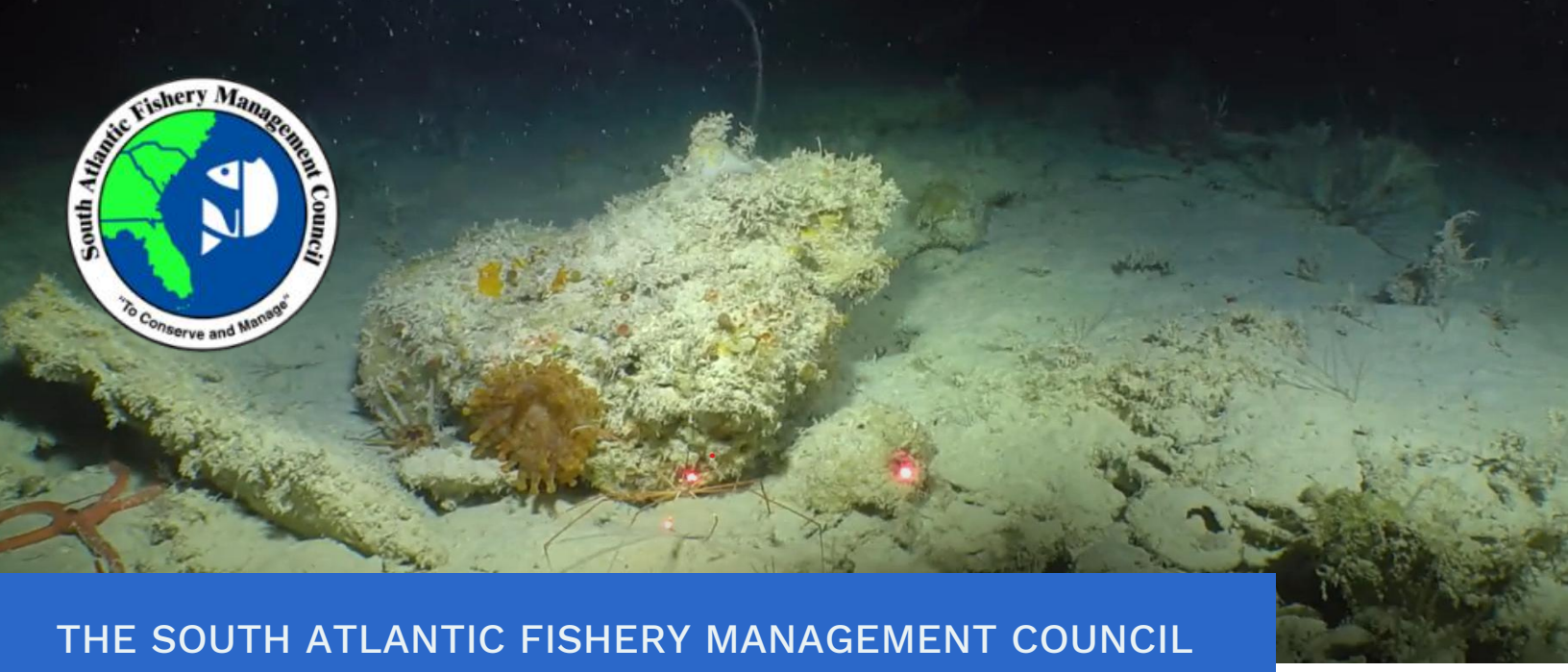


THE SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL

Snapper Grouper Regulatory Amendment 39

Revising the sunset provision for South Atlantic Spawning Special Management Zones

Snapper Grouper Advisory Panel Review, October 2026

Background

Snapper Grouper Amendment 36 established 5 spawning special management zones (SSMZs): South Cape Lookout (NC), Georgetown Hole/Devil's Hole (SC), Area 51 (SC), Area 53 (SC), and Warsaw Hole (FL). In addition, the amendment established a 10-year sunset provision for all of the SSMZs except for 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.

In addition, Amendment 36 included a System Management Plan for Spawning Special Management Zones that serves as a framework for monitoring, research, outreach, administration, and evaluation of these zones. The Council also developed the System Management Plan Workgroup to help the Council evaluate the protected areas based on biological protection, social and economic impacts, and compliance. The group was also tasked with recommending any changes in the shape, location, and size of the protected areas.

Regulatory Amendment 39 will consider options for the sunset provisions for the South Cape Lookout, Georgetown Hole/Devils Hole, and Warsaw Hole SSMZs.

Research conducted by The Nature Conservancy, South Carolina Department of Natural Resources, and LGL Ecological Research Associates within the SSMZs was presented during an SAFMC Seminar Series in November 2025. Research findings are summarized in the discussion of each action.

For the full draft amendment document see the September Council Meeting Briefing Book.

Current management measures within the SSMZs: 50 CFR 622.183(a)(2)

- No fishing for or harvesting snapper grouper species year-round.
- A vessel may possess snapper grouper species within the spawning SMZ as long as it is transiting with gear appropriately stowed.
- No anchoring, use of an anchor and chain or grapple and chain (with the exception of Area 51 and 53).

Advisory Panel Objectives

- Review actions, alternatives and the Council's preferred alternatives.
- Provide input as needed.

Tentative Amendment Timing

June 2026	Review draft actions and options
September 2026	**Review public hearing document, select preferred options and approve for public hearings**
November 2026	Webinar Public Hearings will be held November 9th
December 2026	Review public hearing comments and a final draft and consider for final approval

Proposed Actions and Options

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

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 3. The CFR (50 CFR 622.183(a)(2)(iii)) references both names, however this document and the draft amendment will reference Georgetown Hole exclusively.*

Table 1. The coordinates of the South Cape Lookout, Georgetown Holes, and Warsaw Hole SSMZs.

	Point	North Latitude	West Longitude
South Cape Lookout (NC)	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 (SC)	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 (FL)	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′

Table 2. The attributes of the South Cape Lookout, Georgetown Hole, and Warsaw Hole SSMZs.

SMZ Location	Distance from Near Shore Point	Size	Species Focus
South Cape Lookout	52.2 nautical miles from Beaufort NC	3.84 sq nautical miles	red grouper and greater amberjack
Georgetown Hole	61.12 nautical miles from Georgetown SC	3.23 sq nautical miles	Gag, scamp
Warsaw Hole	34.7 nautical miles from Key West FL	2.69 Sq nautical miles	warsaw grouper, greater amberjack

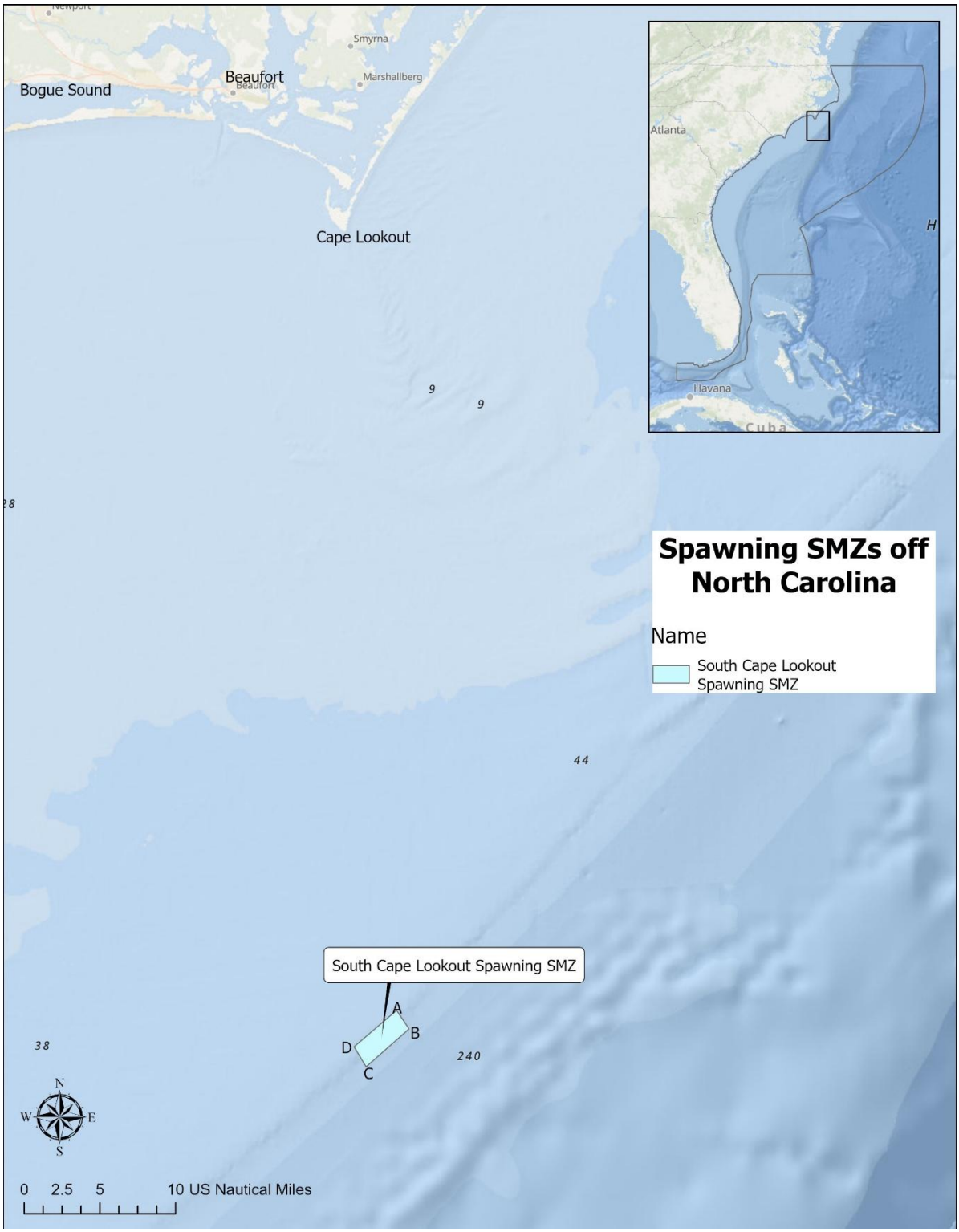


Figure 1. The location of the South Cape Lookout SSMZ. The letters on the corners of the SSMZ location refer to the coordinates in Table 1.

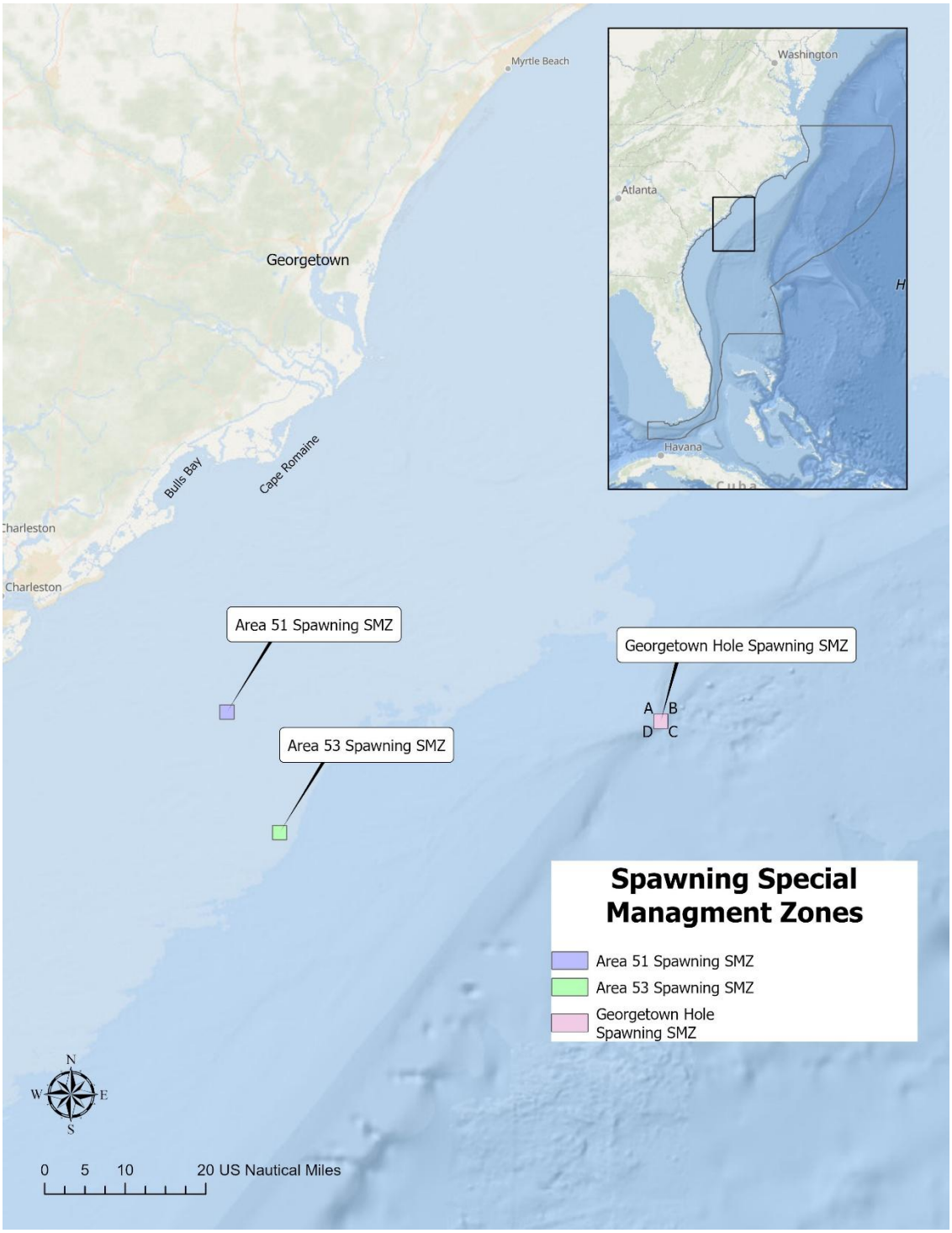


Figure 2. The location of the Devil's Hole/Georgetown Hole, Area 51, and Area 53 spawning special management zones. Note that Area 51 and Area 53 do not have sunset provisions and are not being considered in **Action 2**. The letters on the corners of the SSMZ location refer to the coordinates in Table 3.

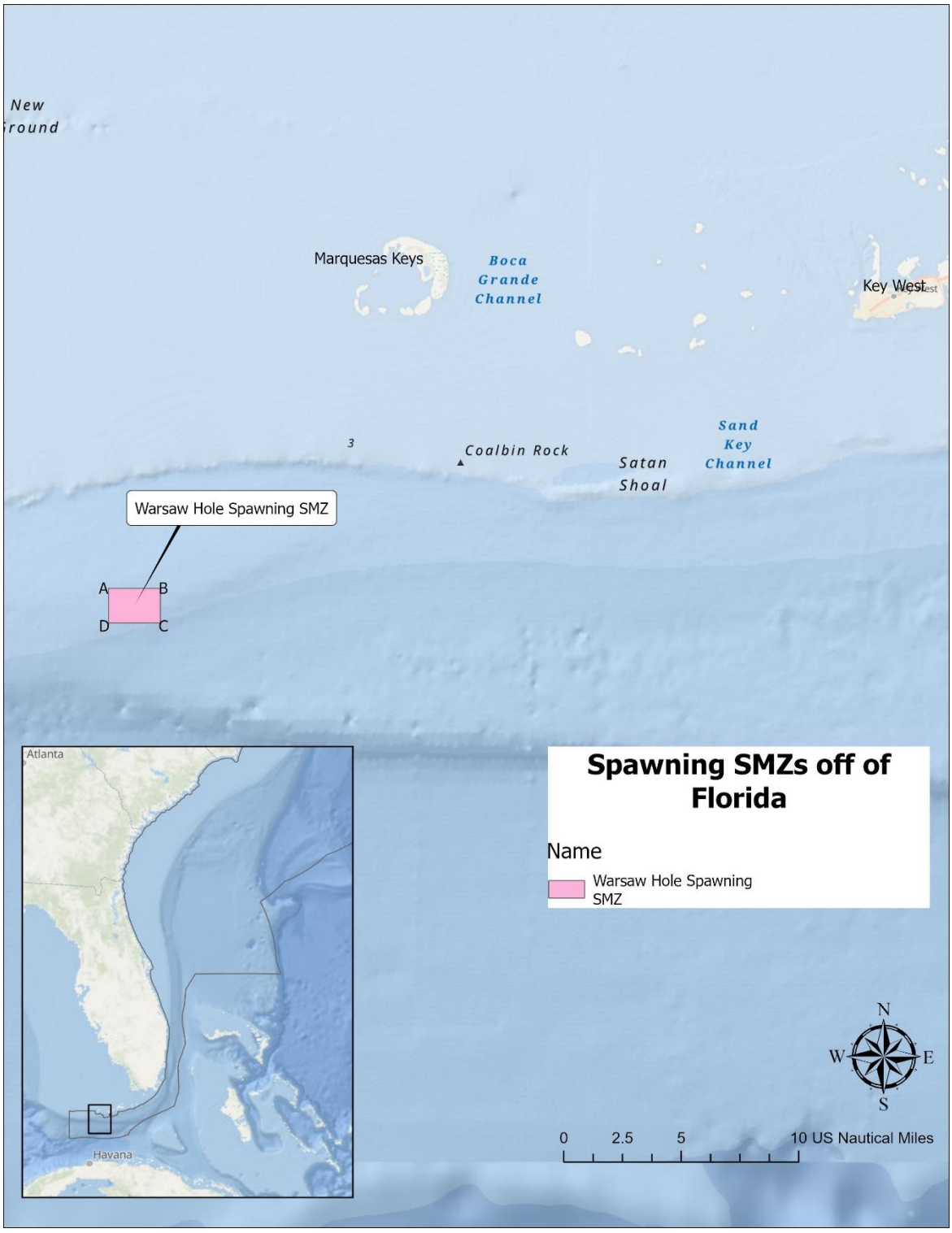


Figure 3. The location of the Warsaw Hole spawning special management zone. The letters on the corners of the SSMZ location refer to the coordinates in Table 5.

Discussion

South Cape Lookout (NC)

- The focal species for the South Cape Lookout SSMZ are red grouper and greater amberjack.
- This SSMZ has less high-relief bottom area than the other two SSMZs.
- Indirect evidence (observations) of South Cape Lookout spawning activity:
    - High densities of vermilion snapper.
    - Interspersed sandy areas that were considered potential red grouper spawning habitat.
- Direct evidence (gonad samples) of South Cape Lookout spawning activity:
    - April 2025:
        - 1 female and 1 male red grouper sampled in spawning condition
        - Other females sampled in spawning condition: gag (n=1), silk snapper (n=2), scamp (n=1), blackfin snapper (n=1).
    - May 2025:
        - Spawning females: vermilion snapper (n=18), almaco jack (n=2), blackfin snapper (n=2), scamp (n=3).
- Other species of note observed within this SSMZ:
    - Advanced age red grouper (23 yrs), scamp (21 yrs), red porgy (12 yrs), gray triggerfish (10 yrs), graysby (19 yrs), and rock hind (21 yrs).
    - Immature snowy grouper.

Georgetown Hole (SC)

- The focal species for the Devil's Hole/Georgetown Hole SSMZ are scamp and gag.
- Indirect evidence (observations) of Georgetown/Devil's Hole spawning activity:
    - Scamp in spawning coloration.
    - Black belly gag present.
- Direct evidence (gonad samples) of Georgetown/Devil's Hole spawning activity:
    - April 2023
        - 7 female scamp sampled, 100% where spawning.
    - April 2024:
        - 15 female scamp sampled, 93% were spawning.
        - 8 female gag sampled and 88% were spawning.
- Other species of note observed within this SSMZ:
    - Warsaw grouper
    - Speckled hind
    - Blackfin snapper

Warsaw Hole (SC)

- The focal species for the Warsaw Hole SSMZ are warsaw grouper and greater amberjack.
- Indirect evidence (observations) of spawning activity in Warsaw Hole:
    - Large aggregations of greater amberjack, believed to be related to spawning.

- Direct evidence (gonad samples) of Warsaw Hole spawning activity:
    - June 2024:
        - 2 female warsaw grouper were sampled but were regressing from having recently spawned.
        - 1 female red snapper was sampled in spawning condition.
    - April 2025:
        - 2 female warsaw grouper sampled in spawning condition.
        - 6 female greater amberjacks sampled in spawning condition.
- Other species of note observed within this SSMZ:
    - Advanced age (>10 yrs) red snapper
    - Speckled hind
    - Black grouper

Effects Summary

Biological Effects

- Longer or permanent protection would provide greater biological benefits by maintaining habitat and spawning-area protection for longer.
- Overall, expected biological benefits rank (highest benefit to lowest benefit): **Option 5**, **Option 4**, **Option 3**, **Option 2**, and then **Option 1 (No Action).**

Social Effects

- Potential effects on fishing communities:
    - Fishing closures can have negative short-term social effects by restricting fishermen's access to fishing grounds.
    - However, the existing SSMZs can provide long-term social benefits by supporting the sustainability of important commercial and recreational species.
    - Healthier fish stocks could result in benefits such as spillover and increased access to improved fish populations.
    - These potential social benefits would be lost under **Option** 1 **(No Action)** if the SSMZs expire.
- Benefits of having a sunset provision:
    - Sunset provisions create an opportunity for the Council to periodically review the effectiveness of the SSMZs.
    - Reviews would incorporate new research and monitoring information to determine whether the SSMZs are meeting management goals.
    - If the SSMZs are not effective, they could be modified or removed.
    - **Option 5**, which removes the sunset provision, would not provide the same assurance of periodic effectiveness reviews.
- Potential downside of a sunset provision
    - Under **Options 2–4**, SSMZs could potentially be removed if funding, staffing, or other limitations prevent an adequate evaluation.
    - If an SSMZ is removed even though it is effectively protecting spawning fish, this could result in negative long-term biological effects.

    - If the SSMZs are removed, benefits the stocks derive from spawning area protection would not be realized.
- Importance of the length of the sunset period
    - A longer period of protection allows biological benefits to accumulate and gives researchers more time to collect monitoring data.
    - Therefore, longer sunset periods are generally expected to provide greater social benefits.
- Overall ranking of expected social benefits (highest benefit to lowest benefit): **Option 4**, **Option 3**, **Option 2**, **Option 5**, and then **Option 1 (No Action).**

Economic Effects

- Maintaining the closures provides potential long-term economic benefits by supporting spawning stock biomass, spawning capacity, catch rates, and potentially larger/higher-quality fish.
- Allowing harvest within the SSMZs would provide economic benefit to both recreational and commercial fishermen.
- Although allowing harvest under **Option 1 (No Action)** could provide relatively small short-term economic gains, maintaining the SSMZs is expected to provide greater long-term economic benefits by supporting healthier and more productive snapper grouper stocks.

Advisory Panel Action

- REVIEW THE COUNCIL'S PREFERRED ALTERNATIVE.
- PROVIDE FEEDBACK AS NEEDED.

Appendix I.

Below is the draft of the updated tasks and activities identified in the System Management Plan for Spawning Special Management Zones. The System Management Plan Workgroup will be reviewing this document in subsequent meetings.

--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

1.0. 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[1]). 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.

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[2] 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

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

[2] 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.

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.

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[3] 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.

[3] 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

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
Warsaw grouper	230	172.5	41			0 (0%)			6/6/4	Ages 7 - 11
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					

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
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[4] 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

[4] 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[5]. For scamp, only 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

[5] 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/

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[6]. 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

[6] 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/

Black Sea Bass	100	3.33
Gray Snapper	83.33	2
Gray Triggerfish	100	2.33
Longspine Porgy	33.33	2
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[7]. 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

[7] 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/

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.

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[8]. 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.

[8] 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 0.17. 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 Spawning Condition**	**Avg TL (cm)**	**Avg TL (cm) in 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.

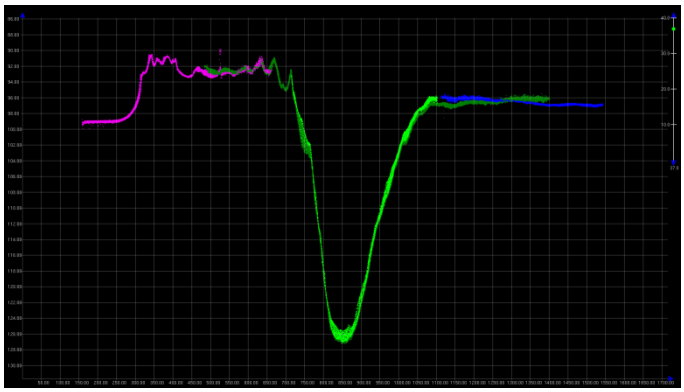


Figure 0.1. Elevation profiles for a cross section of the Warsaw Hole. Source: NOAA - Multi-beam mapping of Warsaw Hole by the Nancy Foster Associated with NF 15-04 FKNMS Ecological Assessment

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[9]. 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.

[9] 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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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[10] 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 **s**atellite 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[10] 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.*

[10] 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.

Priority Ranking From 2016 SMP: Low

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