INTRODUCTION SYSTEM MANAGEMENT PLAN FOR THE AMENDMENT 36 SMZs

The South Atlantic Fishery Management Council is preparing a System Management Plan (SMP) for the Spawning Special Management Zones (SMZs) established through Snapper Grouper Amendment 36. The SMZs are designed to protect areas where spawning has been observed or likely to occur based on the bottom topography. The Council recognizes the necessary funding for enforcement, research/monitoring, outreach, and evaluation is not likely, and a concerted effort to identify specific projects and funding is necessary. The Council is committed to using community outreach networks, citizen science and traditional fishery independent surveys to conduct this work. The Council will actively search for the necessary funding for this work.

The System Management Plan will be the vehicle to identify the outreach, enforcement, and research/monitoring necessary for the Council to conduct a successful evaluation of the SMZs. The Council's current timing is as follows:

A. IPT revise document as necessary – June/July 2015
B. Council reviews comments/document and provides guidance – September 2015
C. IPT revise document as necessary – September/October
D. SSC review – October 2015
E. Snapper Grouper AP input – October 2015
F. Council reviews input and approves Final SMP – December 2015

Drafts of sections are included here for the Council's review at the December 2015 meeting. A final SMP will completed after the locations have been selected and analyses have been done based on recommendations from the Council.

System Management Plan Outline for the SAFMC Amendment 36 Spawning Special Management Zones

1 Executive Summary

A framework was developed for a System Management Plan (SMP) for the proposed SAFMC Snapper-Grouper Amendment 36 SMZs and to provide a foundation for potential future SAFMC MPA management plans in the southeast U.S. This document is currently serving as a starting point to expand the development of adaptive- and effective- based management of the SAFMC's array of protected areas.

This SMP draft is intended to increase the dialogue among the SAFMC and NOAA, commercial and recreational fishers, other members of affected communities, scientists, and additional agencies and stakeholders to achieve common goals to effectively monitor and protect the resources intended by the Amendment 36 SMZs. Once the primary working structure is established, the component sections of the SMP will be reviewed through the SAFMC's public process.

The final SMP will contain the proposed management action items and background details for the five SMZs established by Amendment 36:

- South of Cape Lookout
- Area 51 off South Carolina
- Area 53 off South Carolina
- Devil's Hole
- Warsaw Hole

To provide a foundation for the SMP, four steps for management actions are proposed: resource protection, research and monitoring, outreach and education, and administrative. Additionally, management effectiveness evaluations are recommended as a fundamental component that the final SMP will contain to determine the status and utility of the SMZs in achieving the intentions set by Amendment 36 (Appendix II). The final SMP expects to support the requirements of the reauthorized Magnuson-Stevens Fishery Conservation and Management Act (U.S. Public Law 109-479 2007) and aims to utilize SMZs in the southeast as a viable fishery management tool to protect and assess target resource populations and associated habitats.

Table of Contents

2 Amendment 36 Overview

2.1 Overview

Amendment 36 states that "the primary purposes of the action is to identify important spawning habitat for snapper grouper species that can be designated for protection to enhance spawning and increase recruitment, reduce bycatch and bycatch mortality of snapper grouper species including speckled hind and warsaw grouper, and align the existing South Carolina MPA with the permitted site" (2015).

The Council had previously included a deepwater closure (240 ft. seaward) for deepwater species to help protect warsaw grouper and speckled hind, two deepwater species extremely vulnerable to overfishing (Amendment 17B; SAFMC 2010b). Regulations became effective on January 31, 2011.

Regulatory Amendment 11 (SAFMC 2011b) eliminated the restriction on the possession or harvest of some deepwater snapper grouper species in waters greater than 250 feet deep. Regulations became effective on May 10, 2012. The deepwater species closure was implemented in January 2011 to help protect speckled hind and warsaw grouper; however, data indicate that the closure likely did not significantly reduce bycatch of these species while the socieoeconomic impacts of the closure were significant in some areas. The Council originally planned to re-address measures to reduce bycatch of speckled hind and warsaw grouper in Comprehensive Ecosystem-Based Amendment 3 (CEBA 3). The issue of protecting speckled hind and warsaw grouper was moved from CEBA 3 to Regulatory Amendment 17 and then to Amendment 36 to have changes implemented more quickly. The SMZs in Amendment 36 will focus on spawning areas for several snapper grouper species in addition to speckled hind and warsaw grouper (see **Table 3.1.1** for a species list).

2.2 Legislative Authority

The authority to create SMZs comes from the Magnuson-Stevens Act and enables NMFS to enact area-based management. Area-based management is required to be based on science, include criteria to assess benefit, timetable for review, and based on benefit/impact analysis. Amendment 36 will be reviewed to determine if it meets the requirements for area-based management. The placement of the Spawning SMZs was developed through a series of meeting with stakeholders and scientist in order to protect important spawning habitat for snapper grouper species and reduce bycatch for speckled hind and warsaw grouper. This SMP will provide additional guidance on the information used to evaluate the SMZs and a timetable for the review.

The authority to enforce SMZ regulations comes from the Magnuson-Stevens Act and is granted to the USCG and NMFS (**Table 2.2.1**). State agencies can enforce federal law through Joint Enforcement Agreements (JEAs). Currently North Carolina is the only state in the southeast without a JEA. Although North Carolina does not have a JEA, they can enforce SMZ regulations if a North Carolina licensed vessel is found in violation of the federal regulations.

Table 2.2.1. Natural resource enforcement agency's role and authority for enforcement of regulations for the SMZs in the South Atlantic.

Agency	Agency Role and Authority
U.S. Coast Guard	The U.S. Coast Guard District Seven and District Five have a primary role in protecting natural resources under the Magnuson-Stevens Act Managed Areas Act (Deepwater Marine Protected Area Network *50 CFR 622.35i*, Deepwater Coral Habitat Areas of Particular Concern *50 CFR 622.35n* and Bottom Line Prohibition Zone *50 CFR 622.25b*), National Marine Sanctuaries Act, and Endangered Species Act. They also provide support to state and federal fisheries enforcement.
NOAA Fisheries	NOAA Fisheries has a primary role in protecting natural resources under the Magnuson-Stevens Act Managed Areas Act and has Joint Enforcement Agreements with state agencies to assist in the enforcement of federal regulations in nearshore ocean state waters, federal offshore waters, and inshore waters.
FWC	FWC has a Joint Enforcement Agreement with NOAA Fisheries which provides funding to the state to enforce federal regulations. FWC re-organized their fleet in 2014.
GADNR	GADNR has a Joint Enforcement Agreement with NOAA Fisheries which provides funding to the state to enforce federal regulations. However GADNR does not have any patrol assets capable of enforcing Spawning SMZs regulations due to their distance from shore.
SCDNR	SCDNR has a Joint Enforcement Agreement with NOAA Fisheries which provides funding to the state to enforce federal regulations. However SCDNR does not have any patrol assets capable of enforcing Spawning SMZs regulations due to their distance from shore.
NCDEQ	North Carolina does not have a Joint Enforcement Agreement with NOAA Fisheries. The state currently has one vessel that could patrol the SMZs off North Carolina but funding for the vessel is uncertain.

2.3 Regulations

The Spawning SMZS are Type-II MPA which means some fishing is allowed in the area but the closure is throughout the year. In the SMZs, fishing for and possession of snapper-grouper species is prohibited and shark bottom longline is prohibited. Trolling for pelagic species such as dolphin, mackerel, marlin, tuna, and wahoo is allowed. A transit provision allows fishermen with snapper grouper species onboard their vessel to traverse the MPA if their fishing gear is stowed according to regulations. Properly stowed means:

- Terminal gear must be disconnected and stowed separately from automatic reel, bandit gear, buoy gear, hand-line, or rod and reel. Rod and reel must be removed from the rod holder and stowed securely on or below deck
- Longline may be left on the drum if all gangions and hooks are disconnected and stowed below deck. Hooks cannot be baited. All buoys must be disconnected from the gear: however, buoys can remain on deck.
- A trawl or try net may remain on deck, but trawl doors must be disconnected from the net and must be secured. Note: This regulation may vary among protected areas and habitat areas of particular concern.
- A gill net, stab net, or trammel net must be left on the drum. Any additional such nets not attached to the drum must be stowed below deck.
- A crustacean trap, golden crab trap, or sea bass pot cannot be baited. All buoys must be

disconnected from the gear; however, buoys can remain on deck.

3 System Management Plan

3.1 Goals and Objectives

The following goals and objectives were used to choose the specific Spawning Special Management Zone (SMZ) sites and to specify the research, monitoring, evaluation, enforcement, and communication tasks. The goals and objectives will be reviewed by the SMP Advisory Panel (AP) to determine if the goals and objectives should be modified to meet management needs. The recommendations from the SMP AP will be reviewed by stakeholders, other APs, and the Council. The Council will approve the final Goals and Objectives of the SMP for the Spawning SMZs. The numbers in parentheses correspond to goals listed in How Is Your MPA Doing? (Pomeroy et al. 2004). G=Governance, BI= Biophysical, SE=Socioeconomic.

Goal 1: Develop and adopt an effective process to evaluate and refine management of Spawning SMZs

Obj. A: Habitats where spawning for multiple snapper grouper species is likely to occur or documented are considered for management as SMZs based on input from scientist, fishermen, and public. (G 1F, B 2D)

Obj. B: Implement management planning and ensure an effective process (G 1A).

Obj. C: Ensure a co-management system that is efficient and representative of fishery stakeholders. (G 3A)

Obj. D: Co-management support by fishermen through cooperative research and citizen science projects within the Spawning SMZs is increased or maintained or developed. (G 4D)

Obj. E: Evaluations conducted on the knowledge regarding spawning within each site at the end of 3, 6, and 9 years and reported to Council. (G 1F)

Goal 2: Knowledge and protection of important spawning locations increased or maintained through research and monitoring.

Obj. F: Knowledge on the spawning locations in SA for target species (Table xx) enhanced (G 6C, 6D)

Obj. G: Habitat characterization of potential or selected Spawning SMZs increased. (G 6C, 6D)

Obj. H: Habitats where spawning is likely to occur or documented for multiple snapper grouper species are protected from human impacts. (B 2E, 4A)

Goal 3: Environmental awareness and knowledge about the Spawning SMZs improved

Obj. I: Level of knowledge about the purpose, importance of and regulations in Spawning SMZs held by the public increased. (SE 6C)

Obj. J: Stakeholder participation strengthened and enhanced. (G 3C)

Obj. K: Existence value of Spawning SMZs enhanced or maintained. (SE 3B)

Goal 4: Enforceability and compliance within the Spawning SMZs enhanced

Obj. L: User participation in surveillance, monitoring, and enforcement increased (G 4D)

Obj. M: Surveillance and monitoring of coastal areas maintained or improved (e.g., satellites, drones, research vessels, etc.) (G 4A)

Obj. N: Compliance with regulations within the Spawning SMZs is increased or maintained through targeted communication. (G 4F)

Obj. O: Application of law and regulations adequately maintained or improved. (G 4E)

Obj. P: Law Enforcement AP recommendations for MPAs are considered.

Goal 5: Research and Monitor impact of invasive species (new goal added by IPT based on public comments)

Obj. Q: Invasive lionfish population reduced or eliminated in Spawning SMZs.

Table 3.1.1. Target species of the spawning SMZs.

Groupers
goliath grouper (*Epinephelus itajara*)
Nassau grouper (*E. striatus*)
red grouper (*E. morio*)
red hind (*E. guttatus*)
speckled hind (*E. drummondhayi*)
snowy grouper (*Hyporthodus niveatus* formerly *E. niveatus*)
warsaw grouper (*H. nigritus* formerly *E. nigritus*)
black grouper (*Mycteroperca bonaci*)
gag (*M. microlepis*)
scamp (*M. phenax*)
Snappers
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*)

3.2 Connectivity Within and Among SMZs

The Spawning SMZs are connected by oceanographic features, that can facilitate larval dispersal within and among S-G spawning sites in or outside of these SMZs (Sedberry et al. 2006, Lesher 2008). Additionally, satellite-tracked drifters can assist in the identification of oceanographic features that can connect settlement and nursery habitats to spawning sites (M.S.T. Meadows and G.R. Sedberry unpublished). Protecting essential fish habitat (e.g., spawning and nursery habitats) through the use of SMZs facilitates the potential for both the advection and retention of larval S-G species to settlement sites associated with the SMZs (Lindeman et al. 2000, Burke et al. 2003, Paris et al. 2005, Hare and Walsh 2007). Post-settlement recruitment is important for replenishment of reef fish populations at multiple regional scales in the southeast U.S.

3.3 Existing Knowledge Gaps

(Description of specific information gaps of the target resources, habitat, and uses of the MPAs.)

3.3.1 Target Resource

Many of the target species for Amendment 36 lack a complete description of their life history traits including spawning season and spawning location. Spawning season and spawning location are two key pieces of data that are needed to improve the siting and timing of potential closed areas. In each of the areas, target species have been observed and either through direct observation or anecdotal reports spawning has been reported in South of Cape Lookout, Devil's Hole, and Warsaw Hole. Further life history research could assist in better placement or timing of closed areas. Movement and migration patterns during spawning season are also needed to determine if the size of the SMZ is adequate to protect fish during spawning activities.

3.3.2 Habitat

The habitat where spawning occurs has not been described in thorough detail for the South Atlantic.

3.3.3 Use of MPAs

Fishermen have stated they fish in the area of the South of Cape Lookout, Devil's Hole, and Warsaw Hole proposed SMZs. It is not known if fishermen use Area 51 and Area 53 proposed SMZ. Site specific fishing location data are lacking for the snapper grouper fishery. Therefore estimating use by fishermen of the area is difficult. Description of economic and social impacts could be improved with more detailed fishing location for both recreational and commercial fishermen.

3.4 Management Action Items

The final SMP will detail the strategies to achieve the proposed management action items. The purpose and needs detailed in Amendment 36 sections will be revisited along with identifying additional needs and strategies through a participatory process with affected users. The following

information under the four categories of proposed action items includes brief summaries and examples.

3.4.1 Resource Protection Action Items

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

Enforcement of SMZs can be controversial concerning aspects of type of area-based management. The Council has been advised throughout the entire process of developing SMZs by its Law Enforcement Advisory Panel (LEAP) and has been given a list of recommendations (SAFMC 2005) by this group. The Council followed those recommendations as closely as possible while balancing the biological, social, and economic objectives and impacts of SMZs. Because the Council chose to allow some fishing (Type-II MPAs) and transit through the SMZs, enforcement will be very challenging.

Law enforcement partners were requested to provide information on the enforceability of the SMZs and available assets that could be used to monitor the SMZs. Enforceability ratings will be given by state agencies and USCG for each of the SMZs at the March 2016 Law Enforcement Advisory Panel Meeting (**Table 3.4.1**). Two very large obstacles continue to limit enforcement of some SMZs: (1) distance from shore of the majority of SMZs and (2) Type 2 designation, which allows certain fishing activities to take place. Consequently, occasional flyovers by enforcement aircraft, drone, or satellite are not effective for enforcing regulations; therefore, an on-site enforcement presence is necessary in order to determine whether the fishing activity is lawful or not.

The current ratings will be based on the same criteria as in Amendment 14:

> A **"HIGH"** rating means that the area is easily accessible with the assets and personnel already in place. Such an area may already be patrolled and would not require additional assets. Additional funding ***may*** be required to maintain adequate enforcement patrols.
>
> A **"MODERATE"** rating indicates that with some additional assets, or the relocation of existing assets, patrols could be conducted from time to time and during targeted details. Additional funding ***will likely*** be required to increase the ability rating to "HIGH".
>
> A **"LOW"** rating means that patrols of the area would only occur during an organized enforcement detail with Federal partners such as NMFS or USCG. The States do not have the assets or personnel with the proper training to patrol the area. Additional funding will be ***essential*** to increase the ability rating.

Table 3.4.1. The enforceability rating of the Spawning SMZs in the South Atlantic. State ratings were developed by state enforcement agency in the closest state.

Spawning SMZ	Closest State	State Rating	USCG Rating (2015)
South of Cape Lookout	North Carolina		
Area 51	South Carolina		
Area 53	South Carolina		
Devil's Hole	South Carolina		
Warsaw Hole	Florida		

The available assets to monitor the SMZs vary by state and agency. NCDEQ currently has one vessel capable of traveling to the South of Cape Lookout SMZ; however funding for that vessel is currently under review. FWC increased the size of the offshore fleet to a total of five high speed offshore vessels on the East Coast and has aircraft. The vessels range in size from 33' to 40' in length. The newer vessels allow FWC to cover more distance with lower cost and less down time than previously experienced. The newer vessels also have soft collars, which allow crews to conduct a higher number of inspections in various sea states. A 40' Brunswick Impact Patrol vessel has been moved to New Smyrna. A 33' Brunswick Impact has been moved to Jupiter. NOAA OLE has a 24' Rigid Hull Inflatable Boat (RHIB) for available surge operations. The USCG has several types of vessels available (**Table 3.4.2**).

Table 3.4.2. USCG enforcement assets available for monitoring the Spawning SMZs.

Coastal Patrol Boats (CPB)
Fast Response Cutters (FRC)
Helicopters (HH-60)
Aircrafts (C-130)
Medium Endurance Cutters (MEC)
High Endurance Cutters (HEC

Three Notices of Violation and Assessments (NOVA) have been issued for violating regulations established for the other MPAs in the South Atlantic. The cases were either settled out of court or uncontested. In the uncontested case, the Administrative Law Judge used several pieces of evidence to support the default judgement that the fishermen violated the MSA including: the vessel was anchored inside an MPA, the fishing gear was not properly stowed, the fisherman was in possession of snapper-grouper species while inside a MPA, and the fishermen was liable for violating fishing regulations under the MSA. If NOVAs are issued for the SMZs, the regulations established for the SMZs might be challenged and changes to the regulations may be needed to improve adjudication in favor of the enforcement agencies.

The resource protection action items aim to address the following goals and objectives of the System Management plan:

Goal 4: Enforceability and compliance within the Spawning SMZs enhanced

Obj. L: User participation in surveillance, monitoring, and enforcement increased (G 4D)
Obj. M: Surveillance and monitoring of coastal areas maintained or improved (e.g., satellites, drones, research vessels, etc.) (G 4A)
Obj. N: Compliance with regulations within the Spawning SMSs is increased or maintained through targeted communication. (G 4F)
Obj. O: Application of law and regulations adequately maintained or improved. (G 4E)
Obj. P: Law Enforcement AP recommendations for MPAs are considered.

The following action items would be initiated by either Council staff and/or by potential partners:

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

Tasks:
- Schedule SMZ enforcement activities and challenges to be reported at 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: Oral Report at LEAP Meeting
Schedule: Yearly in March
Budget: OLE Partners Time, Meeting cost done in conjunction with yearly LEAP Meeting
Potential Partners/roles: NMFS, Law Enforcement Partners

Tasks:
- Continue to have officers train at the USCG Southeast Regional Fisheries Training Center

Justification: The Southeast Regional Fisheries Training Center has been a valuable asset for training officers in enforcement of fisheries regulations, including those pertaining to Spawning SMZs.
Deliverables: Trained Officers
Schedule: Annually
Budget:
Potential Partners/roles: USCG, NOAA OLE, FWC, GADNR, NCDEQ, SCDNR

Tasks:
- Develop a patrol/sortie reporting form and database for determining compliance in SMZs
- Develop 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: Form and database to calculate compliance
Schedule:
Budget:
Potential Partners/roles: NMFS, Law Enforcement Partners

Action Item 2: Have a *"high" enforceability rating for the Warsaw Hole SMZ and at least "moderate" for the other SMZs.*

Tasks:

- Purchase and maintain vessels capable of conducting offshore patrols
- Increase enforcement capacity to monitor the SMZs

Justification: Protection of the Spawning SMZs 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 the SMZs is critical for preventing incursions into the area. If new vessels are needed for enforcement of the SMZs off each of the states, a vessel costs approximately $150,000 for a large center console vessel two outboard engines. Some states may require more than one vessel. Additional funds are needed to maintain current vessels.
Deliverables: Vessels available for offshore patrol
Schedule: Med/Long-term (with funding)
Budget: $200,000 per year
Potential Partners/roles: Law Enforcement Partners

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

Tasks:

- Provide a deterrent presence within the SMZ through routine aerial and at-sea patrols
- Schedule and conduct dedicated surge operations.

Justification: A deterrent presence is needed in the SMZs to reduce incursions into the areas. Fishing incursions may prevent attaining the stated biological goals of the SMZs. To monitor the SMZs, it was estimated to have three patrol officers per trip. The trip would last approximately 12 hours. The cost per officer was approximately $40 per hour and includes all fringe values. The vessel operating cost is approximately $100 per hour. This adds up to approximately $2,640 per monitoring event. The budget is estimated assuming five monitoring events per SMZ and five SMZs.
Deliverables: Patrols are conducted in the SMZs
Schedule: Long-term (dependent on Action Item 2)
Budget: $66,000
Potential Partners/roles: Law Enforcement Partners

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

Tasks:

- Review methods for remote monitoring in offshore areas.

Justification: Patrols in the SMZ are expensive and can occupy an entire day for officers involved in the patrol. Frequently when patrols occur in the SMZs, no vessels are sighted. Remote monitoring methods can be used to detect incursions at times when they are likely to occur.
Deliverables: Report on remote monitoring methods
Schedule: Report- Short/Med-term

Budget: Staff Time
Potential Partners/roles: NMFS MPA Center, NMFS SEFSC, SECOORA, NOS, SAFMC Staff

Tasks:

- Apply to possible funding sources for remotely monitoring offshore sites and implement program.

Justification: Funding is limited in the SE for remote monitoring offshore areas. Additional funding will be required if a remote monitoring program is to be developed. The cost estimate is based on ten monitoring events for the five SMZs at an estimated cost of $2,500 per event.
Deliverables: Grant/Funding requests for monitoring offshore areas.
Schedule: Long-term
Budget: $125,000 per year
Potential Partners/roles: NMFS, SAFMC Staff

Action Item 5: *Develop a citizen science/research science program and database for reporting effort in SMZs.*

Tasks:

- Identify potential partners (federal and state resource agencies, NGOs, academic institutions) to seek funding for a cooperative research/citizen science program focusing on SMZ compliance

Justification: Cooperative research/citizen science programs would 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: Research existing cooperative research/citizen science programs. Develop list of possible partners and contact information.
Schedule: Short-term
Budget:
Potential Partners/roles: SAFMC, NMFS SEFIS, FWC, GADNR, NCDEQ, SCDNR

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

Tasks:

- Report annually on enforcement and compliance activities at the South Atlantic Fishery Management Council Meetings

Justification: Reporting on enforcement activities enables the enforcement agencies to review the patrolling of the MPAs to determine if sufficient patrols have been conducted and keeps management agencies informed of law enforcement activities.
Deliverables: Annual enforcement reports (at Council meetings)
Schedule: Short-term
Budget: Law Enforcement Partners staff time
Potential Partners/roles: Law Enforcement Partners

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

Tasks:

- Communicate to the public about the SMZs while on patrol in the and outreach and education events.

Justification: Communication by patrol officers can help to educate and increase the public's understanding of the importance of the SMZs and regulations to protect them.
Deliverables: Increased public awareness
Schedule: Ongoing
Budget: Law Enforcement Partners staff time
Potential Partners/roles: Law Enforcement Partners

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

- Have SAFMC Chair send a letter encouraging North Carolina to commit to the JEA with NOAA.

Justification: Currently North Carolina is the only state in the South Atlantic Region without a JEA. This limits their ability to enforce the 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: Letter sent to North Carolina DENR
Schedule: Short-term
Budget: $0
Potential Partners: SAFMC

Action Item 9: *Monitor/Improve adjudication of SMZ regulations.*
Tasks:

- Monitor court decisions and orders to track adjudication of Notices of Violation and Assessment in the SMZs 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 the current regulations should be altered or if other actions by the Council are needed.
Deliverables: Annual oral updates at LEAP meeting
Schedule: Short-term
Budget: Staff time
Potential Partners/roles: SAFMC, Law Enforcement Partners, NOAA General Counsel Enforcement Section

3.4.2 Research and Monitoring Action Items

Scientific research and stakeholder collaboration was heavily incorporated into the decision making process of selecting the Spawning SMZs created by Amendment 36. New research and monitoring will continue to inform decision-makers during consideration of the existing and potential new protected areas. The Council included a sunset clause in Amendment 36 that will remove the SMZs if spawning is not documented in the area.

The purpose of the Research and Monitoring Action Plan is to provide a guide for data collection and research activities inside the SMZs, and throughout the region, that will improve management and preservation of the protected areas. Strategies will be detailed to achieve anticipated goals and objectives through proposed natural resource and socioeconomic research and monitoring action

items.

The Research and Monitoring Action Plan includes several components under the general headings of monitoring, assessment, and mapping. Considerable efforts were made to balance the benefits of each component against its cost and feasibility. As a result several items were deleted from the plan. This is not to imply these items do not have merit and would provide a benefit to management, however their costs and/or feasibility impractical. Examples of items intentionally left off this plan include mapping of nursery and settlement habitats, trophodynamics in habitats in and adjacent to SMZs and environmental stressors in habitats in and adjacent to SMZs. There are finite resources available to execute the Research and Monitoring Plan; the best returns for both scientific and financial considerations are included below.

3.4.2.1 Resource Monitoring

The main objective is to determine and monitor the effect of SMZs on snapper grouper species' spawning. The most significant benefit of SMZs is to enhance fisheries through recovery of populations as a result of protection of adults at spawning aggregation sites and spillover into adjacent fishing grounds. A variety of approaches are needed to assess fish populations synoptically in and outside the SMZs with the first step being collection of baseline data to compare to subsequent assessments. The second approach is to collect biological data on the spawning condition of snapper grouper species to determine if the SMZs are protecting fish in spawning condition.

Action Item 1: *Determine pre-closure distribution and abundance of dominant harvested species inside and outside the SMZs, in order to provide historical context for subsequent assessments.*

Justification: In order to differentiate changes in key resources that occur naturally from those which are caused by human influence, a baseline set of criteria must be established and monitored over subsequent years. Once these data have been gathered and analyzed, scientists and managers can determine more precisely what variability is naturally inherent in the system and what changes may be the result of anthropogenic influences.

Projects Completed or Underway:

- NOAA Fisheries, Southeast Fisheries Science Center, Panama City Lab has been collecting data on distribution and abundance of all fish species from ROV
- Marine Resources Monitoring, Assessment, and Prediction (MARMAP) have been collecting data on distribution and abundance from trap surveys.
- NOAA Ocean Exploration conducted video surveys of fish species composition from submersible dives on shelf edge reefs (Schobernd and Sedberry, 2009; Fraser and Sedberry, 2008).

Deliverables: Baseline density and distribution data for key fishery species with which to compare future data against.

Priority: High

Schedule: Short-term

Budget: Staff-time

Potential Partners: NMFS, MARMAP

Action Item 2: *Maintain an annual monitoring program to collect data inside and outside the MPAs. Data collected should include: distribution, abundance, size and spawning condition of dominant harvested species in and outside the MPAs.*

Justification: Ensuring an annual monitoring program continues to be funded for several years is the only way to collect the data necessary to assess the effectiveness of the SMZs. The grouper, snapper, and tilefish that are protected by these SMZs are long lived species with a late onset of maturity. Couple that with many of the species being uncommon to rare means that it may take a long time to see changes or increases frequency of observed spawning events.

Projects Completed or Underway:

- NOAA Fisheries, Southeast Fisheries Science Center, Panama City Lab has been collecting data on distribution and abundance of all fish species from ROV surveys.
- Southeast Reef Fish Survey (SERFS), which is a collaboration of SEFIS and MARMAP, have been collecting distribution, abundance, size and spawning condition,

Deliverables: Distribution, abundance, and demographic data on key fishery species with which spatial and temporal changes inside and outside the SMZs can be determined.

Priority: High

Schedule: Ongoing

Budget:

Potential Partners: NMFS, MARMAP

Action Item 3: *Locate spawning aggregations of snapper and grouper species.*

Justification: Spawning aggregations are valuable sources of recruits to populations. Protecting these sources of larvae is important for sustaining fisheries and building resilience into marine reserve networks. In order to maintain fish stocks at proper levels for a healthy, profitable fishery, spawning aggregations need to be protected from exploitation.

Projects Completed or Underway:

- LGL Ecological Research Associates, Inc. (Will Heyman) has been conducting a study using geomorphology to predict spawning aggregation sites since 2014.
- NOAA Fisheries, Southeast Regional Office, Southeast Fisheries Science Center has produced a geographic distribution model which includes potential spawning habitats of snapper grouper species (SAFMC MPA Expert Workgroup, 2012 & 2013).

Deliverables: Locations of target fishery species spawning aggregations.

Priority: High

Schedule: Ongoing for NMFS and MARMAP

Budget: NMFS Estimate/$50,000 per site per year – Independent Researchers

Potential Partners: NMFS, MARMAP, Citizen Science Program, Independent Researchers

Potential Methods: A variety of gear types could be used to locate spawning aggregations including manned submersibles, ROVs, and drop cameras. Unless gamete release is observed, spawning condition of the fish needs to be verified via histology.

Action Item 4: *Track movement of adult fish.*

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.

Projects Completed or Underway:

- McGovern et al, 2005. This was a tag and recapture study of gag grouper in the south Atlantic completed during 1995-1999.

Priority: Low. This information would be extremely useful. It is only ranked low in priority because it will be difficult and expensive to obtain. Many of the species being protected (i.e. grouper species like speckled hind and warsaw grouper) are too rare to be able to tag or track enough of them to decipher movement patterns.

Deliverables: Migration patterns of adult fish within and adjacent to the SMZs.

Schedule: Long-term

Budget: Telemetry >$2,500,000/ Tag and Recapture >$1,000,000

Potential Partners: State Agencies, NMFS, Independent Researchers, Citizen Science Program

Potential methods: Telemetry or tag and recapture.

Action Item 5: *Develop and apply coupled biological and physical models to locate potential nursery sites.*

Justification: Locating potential nursery sites for increased recruitment from increased spawning activity.

Projects Completed or Underway:

- NOAA Fisheries, Southeast Regional Office, Southeast Fisheries Science Center has produced a geographic distribution model for speckled hind and Warsaw grouper which incorporates a hydrographic model to evaluate the relative utility and benefits of the MPAs for fisheries management (SAFMC MPA Expert Workgroup, 2012 & 2013).
- North Carolina State University (Ruoying He) has produced a Coastal Circulation and Ecosystem Nowcast/Forecast System for the South Atlantic Bight and Gulf of Mexico. See: http://omgsrv1.meas.ncsu.edu:8080/ocean-circulation/
- NOAA, Southeast Fishery Science Center 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".

Deliverables: Physical Models

Priority: Low

Schedule: Long-term

Budget:

Potential Partners:

Action Item 6: Use satellite drifters or ichthyoplankton modelling to improve the understanding of the connectivity of SMZs.

Justification: Understanding the larval dispersal patterns of reef can help to improve the placement of the spawning SMZs.

Projects Completed or Underway:

- There are several models that can be used to predict larval dispersal patterns including ROMS, Ichthyop, and Hycom.
- Satellite drifters have been used in other MPAs to understand connectivity

among the South Atlantic.
Deliverables: Larval dispersal models
Priority: Medium
Schedule: Long-term
Budget:
Potential Partners:

Assessment Needs
The purpose of monitoring is first to determine if spawning occurs within the boundary of the spawning SMZ. If spawning is observed, then monitoring can collect baseline of information on natural resources and other components of the ecosystem so that changes over time can be detected and assessed. As monitoring studies gather data, they have the potential to detect significant changes in natural resources that result from management actions or from other causes. The finding of research projects must also help mangers and scientists identify cause and effect relationships that generate ecological patterns and trends, and stressors, and other factors that threaten the health of the reef ecosystem.

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

Justification: Characterization of these parameters for snapper grouper species inside vs. outside the SMZs provides a means to evaluate the efficacy of the protected areas. Ideally, a higher abundance of key fishery species would be observed inside the SMZs given enough time following implementation of fishing restrictions. Evaluation of size and age structure of fishery species inside vs. outside the SMZs provides an indication of whether or not the SMZ is protecting reproductively active individuals, particularly larger and older fish that are the most productive spawners. The size/age structure of fished populations should remain fairly constant over time, whereas it should increase within the SMZs if fishing mortality is eliminated (or significantly reduced) and the SMZs are large enough to encompass the home range of the fish.

Projects Completed or Underway:

- A collaborative NOAA project (Southeast Fisheries Science Centers of Panama City and Beaufort and Gray's Reef National Marine Sanctuary) titled, "Assessing the efficacy of South Atlantic deepwater MPAs" includes density and distribution data for all fish species from 1985-2014.
- Marine Resources Monitoring, Assessment, and Prediction (MARMAP) have been collecting distribution, abundance, size, age and reproductive data from trap surveys since 1987.
- NOAA Southeast Fishery-Independent Survey (SEFIS) has been collecting distribution, abundance, size, age and reproductive data from trap surveys since 2010.
- NOAA Fisheries, Southeast Fisheries Science Center, Panama City Lab has been collecting data on distribution and abundance of all fish species from ROV surveys since 2004.

Deliverables: Comparison of variables such as distribution, densities, size and age distribution, and sex ratios for snapper grouper species inside the SMZs vs. reference areas outside the SMZs.

Priority: High
Schedule: Ongoing
Budget:
Potential Partners: MARMAP, NMFS
Potential Methods: If there have been surveys conducted prior to implementation of the SMZs, a BACI (before/after, control/impact) sampling design could be used when examining SMZ effectiveness.

Action Item 8: *Characterize fish communities, inside and out of the SMZs, including habitat utilization patterns, trophic interactions, ontogenetic changes, and predator prey relationships.*
Justification: Detailed characterization of fish communities allows a much greater 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 the cost, difficulty, and time to complete. However synergism with other ongoing field collections and laboratory analyses allow many of the components to be evaluated in a cost effective manner.
Projects Completed or Underway:

- A collaborative NOAA project (Southeast Fisheries Science Centers of Panama City and Beaufort and Gray's Reef National Marine Sanctuary) titled, "Assessing the efficacy of South Atlantic deepwater MPAs" includes density and distribution data for all fish species from 1985-2014.
- NOAA Fisheries, Southeast Fisheries Science Center, Panama City Lab has been collecting data on habitat utilization patterns of all fish species from ROV surveys inside and outside several of the MPAs since 2004 including: Snowy Wreck, Northern South Carolina, Edisto, Georgia, North Florida, and East Hump.
- Marine Resources Monitoring, Assessment, and Prediction (MARMAP) have been collecting information on habitat utilization patterns from trap surveys inside and outside several of the MPAs since 1987 including: Snowy Wreck, Northern South Carolina, Edisto, Georgia, North Florida, and St. Lucie Hump.
- NOAA Southeast Fishery-Independent Survey (SEFIS) has been collecting information on habitat utilization patterns from trap surveys inside and outside several of the MPAs since 2010 including: Snowy Wreck, Northern South Carolina, Edisto, Georgia, and North Florida.
- NOAA's SE-DSCTP project collected data on habitat utilization patterns of all fish species from ROV dives conducted in 2011 inside and around the North Florida and East Hump MPAs (Reed et al., 2014).

Deliverables: Comparison of fish communities inside the MPAs to reference areas outside the MPAs.
Priority: Medium
Schedule: Ongoing
Budget:
Potential Partners: NMFS, MARMAP
Potential Methods: Since there have been surveys conducted prior to implementation of the MPAs, a BACI (before/after, control/impact) sampling design should be used

when examining MPA effectiveness.

3.4.2.2 Habitat Monitoring

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

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 SMZs. The preferred alternatives total 39.05 km^2. On average 16 km^2 can be mapped in one day. It would take a minimum of three days to map the area but additional time will be needed for travel to and from the SMZ.

Projects Completed or Underway:

- NOAA Fisheries Southeast Fisheries Science Center (SEFSC), Panama City Lab has been collecting multibeam data along the South Atlantic.
- NOAA Fisheries SEFSC Southeast Fishery-Independent Survey (SEFIS) group has collected multibeam data.
- Note: We will include a figure displaying all the mapping that has been completed in and around the MPAs in the next draft.

Deliverables: High resolution GeoTIFFs

Priority: High

Schedule: Ongoing

Budget:

Potential Partners: NMFS, Independent Researchers

Action Item 10: *Complete multibeam surveys of areas adjacent to, but outside the SMZs (within a 20 nautical mile radius of the SMZs).*

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 SMZs. Mapping these areas will be used to determine if better locations are available for placement of the spawning SMZs. On average 16 km^2 can be mapped in one evening and the area around the 5 SMZs totals 2080 km^2. To map 20 nautical miles around the SMZ will take 130 days.

Projects Completed or Underway:

- NOAA Fisheries, Southeast Fisheries Science Center, Panama City Lab has been collecting multibeam data along the South Atlantic.
- NOAA Southeast Fishery-Independent Survey (SEFIS) has been collecting multibeam data.
- NOAA Ocean Exploration (Sedberry) conducted sonar surveys between 2001 and 2003 (Schobernd and Sedberry, 2009; Fraser and Sedberry, 2008).
- The US Navy contracted for a large multibeam survey off NE Florida in 2010. These areas are used for anti-submarine warfare training and encompass areas containing EFH and deep reefs.
- NOAA's SE-DSCTP project completed mapping in 2011 off North Florida (Reed et al., 2014).

Deliverables: High resolution GeoTIFFs

Priority: High

Schedule: Ongoing

Budget:
Potential Partners: NMFS, Independent Researchers

Action Item 11: *Ground-truth bathymetric data for habitat classification.*
Justification: Acoustic bathymetry and backscatter data are useful for detecting features which may provide habitat for targeted 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.
Projects Completed or Underway:
- NOAA Fisheries, Southeast Fisheries Science Center, Panama City Lab has been collecting multibeam data with ROV surveys.
- Southeast Reef Fish Survey (SERFS), which is a collaboration of SEFIS and MARMAP, have been collecting multibeam data with trap and stationary cameras since 2010.
- NOAA Ocean Exploration (Sedberry) conducted sonar surveys with submersible groundtruthing between 2001 and 2003 (Schobernd and Sedberry, 2009; Fraser and Sedberry, 2008).
- The US Navy contracted for a large multibeam survey off NE Florida in 2010. The areas covered are the USWTR and the CC Box.
- NOAA's SE-DSCTP project completed mapping in 2011 (Reed et al., 2014).

Deliverables: High resolution video and digital stills from ROV, AUV, or submersible surveys depicting habitat type (rugosity, relief, geomorphology, and substrate).
Priority: Medium
Schedule: Long-term
Budget:
Potential Partners: NMFS, Independent Researchers

Action Item 12: *Generate habitat classification maps.*
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 or Underway: None
Deliverables: GIS map displaying the distribution of habitat types for all areas where multibeam surveys have been conducted.
Priority: Low
Schedule: Long-term
Budget:
Potential Partners: NMFS, State Agencies, Independent Researchers

3.4.2.3 Socioeconomic monitoring

(Description of current and anticipated socioeconomic monitoring efforts.)

3.4.3 Outreach and Education Action Items

Outreach is an essential component of effective ongoing fisheries and spatial management. Outreach activities within the community and with stakeholders helps to inform the public of the purpose and associated laws and regulations of the protected areas, and achieves a level of awareness and understanding while promoting public participation, ownership, and compliance. The desired outreach action items in this section are listed as projects and are similar to the outreach component of the Amendment 14 to the SG FMP (SAFMC 2007), SAFM Public Hearing Draft (2006), the Council's Oculina Experimental Closed Area (OECA) Evaluation Plan (2005), and the Deepwater MPAs System Management Plan.

"The Council will solicit input from its Information and Education Advisory Panel and the Information and Education Committee in reviewing these needs and possibly developing further recommendations. As with the outreach component of the Oculina Experimental Closed Area Evaluation Plan, the Council acknowledges the need to work closely through partnerships to achieve these outreach needs. Possible partners in outreach efforts include, but are not limited to: Sea Grant, NOAA Fisheries, NOAA National Undersea Research Center at the University of North Carolina – Wilmington (NURC/UNCW), NOAA Office for Law Enforcement, individual state marine resources and law enforcement agencies, NOAA National Marine Sanctuary Program, Harbor Branch Oceanographic Institution, Centers for Ocean Sciences Education Excellence (COSEE) in South Carolina and Florida, Project Oceanica, and others" (SAFMC 2007).

The outreach action items aim to address the following goals and objectives of the System Management plan:

Goal 3: Environmental awareness and knowledge about the Spawning SMZs improved

Obj. I: Level of knowledge about the purpose, importance of and regulations in Spawning SMZs held by the public increased. (SE 6C)

Obj. J: Stakeholder participation strengthened and enhanced. (G 3C)

Obj. K: Existence value of Spawning SMZs enhanced or maintained. (SE 3B)

The management plan will be enhanced through effective communication developed during outreach efforts. Specific communications targets for outreach include:

- Communication products accessible to the public in various formats.
- Management plan development delivered through transparent and open process.
- Compliance with the management plan is fostered through targeted communication.

The following eight outreach action items would be initiated by either Council staff and/or by potential partners:

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

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

Justification: fishermen have expressed concerns that charts commonly used do not

currently portray the coordinates and restrictions for new spawning SMZs.
Deliverables: add information to electronic and printed charts, possible labels to apply to existing printed charts available at retail outlets.
Schedule: Year 1, identify manufacturers and assess best method to modify information currently available. Year 2, work with cooperating manufacturers to modify electronic data for products. Due to publishing constraints, outcomes of this project may not be immediately evident but will have long-reaching effects.
Budget: Staff time is the primary expected cost for working with electronic chart manufacturers; dependent upon the number of printed fishing charts currently available (including those in storage), cost of creating and printing additional labels for existing printed charts.
Potential Partners/Roles: Council staff will work with NOAA's Marine Charting Division to investigate if spawning SMZ boundaries and regulations can be included in a new proposed digital overlay of marine protection boundaries.

Action Item 1 addresses Goal 3, Obj I and J; Goal 4, Obj N and O

Action Item 2: *Develop area-specific rack cards of spawning SMZs (NC/SC and GA/FL) to distribute at area bait and tackle shops, marinas, fish houses, boating stores, fishing tournaments, boat shows, etc.*

Tasks: New area specific rack cards – one for the Northern spawning SMZs (Carolinas) and one for the Southern spawning SMZs (Georgia/Florida) in the region – will be developed and distributed to targeted businesses and fishing tournament directors.
Justification: effectively designed rack cards would draw attention to the spawning SMZs and provide quick access to general information about habitat, fish species, maps, regulations, and law enforcement contacts.
Deliverables: rack cards
Schedule: Year 1, design two rack cards – one for the Northern spawning SMZs (Carolinas) and one for the Southern spawning SMZs (Georgia/Florida) in the region – and receive input from the Council's I&E AP; Year 2, print and distribute rack cards; Years 3-5, edit and reprint rack cards as needed.
Budget: Staff time in Year 1; Year 2, printing and mailing costs for distributing rack cards; Years 3-5, printing and mailing costs for distribution, as needed.
Potential Partners/roles: SAFMC Outreach Staff; State Marine Resource Agencies; SAFMC Information & Education Advisory Panel; NOAA Fisheries; and Sea Grant.

Action Item 2 addresses Goal 3, Obj I and J; Goal 4, Obj N

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

Tasks: new area specific rack cards – one for the Northern spawning SMZs (Carolinas) and one for the Southern spawning SMZs (Georgia/Florida) – will be developed under Action Item 2. 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: Rack cards available for electronic download on the Council's website and

mobile app.
Schedule: Year 1, design and development of rack cards; Year 2, rack cards made available on the Council's website and mobile app; Years 3-5, update rack cards as needed.
Budget: Year 1, staff time designing rack cards; Year 2, cost of incorporating rack cards into mobile app and staff time to upload to the Council's website; Years 3-5, staff time to update as needed.
Potential Partners/roles: Council Outreach Staff, mobile app developer (Verona Solutions), website management company (Nassau Web Design).

Action Item 3 addresses Goal 3, Obj I and J; Goal 4, Obj N

Action Item 4: *Develop a SAFMC spawning SMZs informational brochure to area fishermen.*
Tasks: Develop an informational brochure about spawning fish and habitats, the purpose of spawning SMZs and regulations within spawning SMZs for distribution to fishery stakeholders.
Justification: The informational brochure will provide a summary of regulations and information for the spawning SMZs as well as an identification chart for snapper/grouper species found in the region. The brochure will also be available on the SAFMC website and the mobile application, *SA Fishing Regulations*.
Deliverables: SAFMC informational spawning SMZs brochures.
Schedule: Year 1, develop brochure and receive input from the Council's I&E AP; Year 2, print and distribute SMZ brochure; Years 3-5, reprint as necessary.
Budget: Year 1, staff time; Year 2, printing and mailing costs for distribution; Year 3-5, reprinting and mailing costs for distribution, as needed.
Potential Partners/roles: Council Outreach Staff, State Marine Resource Agencies, SAFMC Information & Education Advisory Panel, NOAA Fisheries' Southeast Fisheries Science Center (SEFSC), possible contractual graphic designer (if not produced in-house).

Action Item 5: *Develop and distribute news releases (coordinating with local contacts) to focus on research and monitoring projects, and the ecological importance of the Type 2 MPAs.*
Tasks: create science-based news releases relevant to ongoing research and monitoring activities with focus on habitat, snapper grouper species, and links to ecosystem-based management. Coordinate releases with ongoing activities and strive to provide high-resolution photos and graphics to media.
Justification: increase awareness of all activities in the Type 2 MPAs.
Deliverables: news releases; outlets may include NOAA News, local/national media, and ENN. Coordinate releases with ongoing activities and strive to provide high-resolution photos and graphics to media.
Schedule: Years 1-5, produce at least one feature news release/year; research cruises provide good opportunities for releases and events (e.g., port days, at-sea visits).
Budget: Years 1-5, staff time.
Potential Partners/roles: NOAA Fisheries Southeast Fisheries 1 Science Center, NOAA Undersea Research Center, Sea Grant; Harbor Branch Oceanographic Institution; NOAA Fisheries' Southeast Regional Office; NOAA Office for Law Enforcement, and Florida Fish and Wildlife Commission.

Action Item 6: *Develop PowerPoint presentations about the spawning SMZs in the region; 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 PowerPoint presentation using existing photos, video, maps, and other information to highlight information on spawning fish and habitat, spawning SMZs locations and regulations, etc.

Justification: provides a quick method to distribute information for use by various audiences that can be readily updated.

Deliverables: PowerPoint presentation on website and You Tube.

Schedule: Year 1, produce and distribute PowerPoint; Years 2-5, update as necessary with current news and information on research and monitoring.

Budget: Years 1-5, staff time.

Potential Partners/roles: Council outreach staff;

Action Item 6 addresses Goal 3, Obj I, J, K

Action Item 7: *Expand the Council's existing Managed Areas web pages to provide comprehensive education and outreach products about spawning SMZs. Publicize availability of information by having links posted on other fishing/Non-Governmental Organizations/tourism related web sites.*

Tasks: enhance the Council's Managed Areas web pages and integrate materials, including links to other relevant sites. Publicize the availability of web-based information.

Justification: The Web site is the best media for maintaining comprehensive, dynamic content and imagery. The availability of this information can be publicized from other existing high profile Web sites.

Deliverables: Web site and promotion.

Schedule: Year 1, develop expanded content with feedback from the Council's I&E AP and program partners; Years 2-5, implement expanded web pages, promote availability, and update quarterly.

Budget: Year 1, staff time; Years 2-5, dependent on expansion of web page content and use of multi-media.

Potential Partners/roles: SAFMC Outreach Staff; State Marine Resource Agencies; NOAA Fisheries' Southeast Fisheries Science Center (SEFSC) and Southeast Regional Office (SERO); NOAA Office for Law Enforcement; Sea Grant.

Action Item 7 addresses Goal 3, Obj I, J, K;

Action Item 8: *Develop a list of key contacts (tackle shops, state parks, county government offices, outreach staff in other agencies, etc.) in the port communities near the spawning SMZ sites to target outreach efforts and materials.*

Tasks: enhance targeted communication and outreach efforts about the SMZs through development of a database of key contacts in coastal communities in close proximity to SMZ 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 SMZ sites.

Deliverables: Database of key contacts in coastal communities.

Schedule: Year 1, work with program partners to develop database by state; Years 2-5, update database as needed.
Budget: Years 1-5, staff time.
Potential Partners/roles: SAFMC Outreach Staff, Sea Grant, State Marine Resource agencies, NOAA Fisheries' Southeast Fisheries Science Center (SEFSC).

Action Item 8 addresses Goal 1, Obj C and D;

3.4.4 Administrative Action Items

The spawning SMZs were developed through the fishery management plan amendment process which involved a series of public meetings including an expert working group meeting as well as public scoping and public hearings. The evaluation of the SMZ effectiveness will be conducted every xx years with yearly updates on accomplishments and tracking of action items and includes a 10-year sunset clause, which will remove all the spawning SMZs if an Amendment is not passed to keep them. The evaluation will be conducted by a SMP Team which will consist of representatives from law enforcement, research scientists, commercial fishermen, recreational fishermen, outreach experts, non-governmental organizations, and NMFS staff. A report will be written by the SMP Interdisciplinary Plan Team (IPT), similar to the development of amendments. Council staff will be the lead for compiling the document with assistance from NMFS. The SMP AP will first review the Spawning SMZ Evaluation Report. After review by the SMP AP, other relevant Advisory Panels (Habitat and Environmental Protection, Snapper Grouper, Information and Education, Law Enforcement, and Coral) and the Council's Science and Statistical Committee will review and comment on the document. The recommendations from these groups will be forwarded to the Council. If a recommendation for a change to the regulations or configuration of the SMZs is developed, a plan amendment to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region would be necessary. The plan amendment will gather public input through the public comment process. Additionally, the public can provide input at any Council meeting which occur quarterly and advisory panel meetings.

Meetings
Yearly meetings will be held to discuss the action items and review the results from completed tasks. Decisions for the SMP will be completed through consensus. Updates will be given to the Council on the action items. A Spawning SMZ Evaluation Report will be completed every xx years and additional meetings will be required to review the draft report. Habitat and Environmental Protection, Snapper Grouper, Information and Education, Law Enforcement, and Coral will review the evaluation report in conjunction with a regularly scheduled AP meeting.

Membership
The SMP AP will include two AP members from each AP and MPA scientists or 4 from Snapper Grouper and 2 from Coral, Habitat and Environmental Protection, Law Enforcement, and Information and Education along with 3 MPA scientists. The documents to be reviewed by the AP will be developed by IPT.

Action Item 1: *Develop a SMP for the evaluation of the Spawning SMZs through a public process.*

Tasks: Develop a SMP for the Spawning SMZs

Justification: The SMP will be used to develop the goals and objectives for management of the spawning SMZs and provide a process for review of the outcomes and adaptive management.
Deliverables: SMP.
Schedule: 2015, Develop the SMP for the Spawning SMZs.
Budget: $9,587.50 (Note: This is the same cost from the Deepwater MPA)
Potential Partners/roles: SAFMC, Contractors (Michelle Tishler and Ken Lindeman), and NMFS.

Tasks: Form Advisory Panel for the SMP with representativeness based on fisheries, areas, and expertise.
Justification: The SMP AP is needed to advise the Council on developing managed areas and reviewing the evaluation report.
Deliverables: SMP AP.
Schedule: Year 1 (2016), Form SMP AP.
Budget: (within Council's administrative budget)
Potential Partners/roles: SAFMC and Advisory Panels.

Tasks: SMP AP review and provide recommendations on information collected from the spawning SMZs and review and provide recommendations on the evaluation report.
Justification: The SMP AP is needed to advise the Council on developing managed areas and reviewing the evaluation report.
Deliverables: Yearly meetings and xx year review.
Schedule: Year 2 (2017). Review information collected in spawning SMZs. Year 20xx. Review and provide comments on the evaluation report
Budget: $5,000 for annual review and $15,000 for five (or other time frame) year review
Potential Partners/roles: SAFMC, NMFS, and Advisory Panels.

3.5 Management Effectiveness Evaluation

The effectiveness and management of the SMP and five Amendment 36 Spawning SMZs will be evaluated at various levels, both continuously and periodically, to ensure fruition of desired goals and objectives. Multiple frameworks and examples exist for assessing management effectiveness of protected areas (E.g., Ervin 2003, Pomeroy et al. 2004, Hockings et al. 2006 (Fig. 1), NOAA 2007, Leverington et al. 2010, Commission for Environmental Cooperation 2011, NOAA 2011, Coastal Conservation and Education Foundation 2011, and COST and CODFW 2013). The SMP for Amendment 36 SMZs is based on a framework of Hockings et al. (2006).

This section describes methods for evaluation focusing on Design/Planning, Adequacy/ Appropriateness, and Delivery (Figure xx). This SMP was constructed after the initial designing and planning phase, but management is an adaptive process that can and should change over time. The goals of the spawning SMZs focuses on indentifying and protecting spawning habitats and spawning fish for multiple reef fish species including: speckled hind and Warsaw grouper. When the SMZs were being designed, there was a need to additional protections for speckled hind and Warsaw grouper after the removal of the deepwater closure. The deepwater species closure was implemented in January 2011 to help protect speckled hind and warsaw grouper; however, data

indicate that the closure may not significantly reduce bycatch of these species while the socieoeconomic impacts of the closure are significant in some areas. The Council originally planned to readdress measures to reduce bycatch of speckled hind and warsaw grouper in Comprehensive Ecosystem-Based Amendment 3 (CEBA 3). The issue of protecting speckled hind and warsaw grouper was moved from CEBA 3 to Regulatory Amendment 17 and then to Amendment 36 to have changes implemented more quickly. Based on the purpose and need of Amendment36, the spawning SMZs were designed to identify and protect spawning habitat and spawning fish in the snapper grouper complex including speckled hind and warsaw grouper. The target list has been further refined to include: goliath grouper, Nassau grouper, red grouper, red hind, speckled hind, snowy grouper, warsaw grouper, black grouper, gag, scamp, yellowtail snapper, cubera snapper, mutton snapper, red snapper, silk snapper, golden tilefish, and blueline tilefish.

The evaluation of the SMZs should include a design and planning component to frame the context of the SMZ, adequacy and appropriateness of the current rules and regulation, science, outreach, and enforcement to achieve the goals and objectives of Amendment 36, and review of the outputs of science, outreach, and governance and the outcomes of the efforts (Hockings et al 2006). The designing and planning phases of the SMZs were conducted through the amendment process that included a special working group to assist in the selection of appropriate potential SMZ sites, solicitation of public comments, review and comments by advisory panels and SSC review, and final SMZ selection by the Council. Any changes to the SMZ will be required to follow the Council's FMP Amendment Process; therefore, the designing and planning will not be a focus of the evaluation of effectiveness unless the SMP AP indicates this is needed for more effective management. At that time, the new method for designing and planning will be added to the SMP. The outputs of science, outreach, and governance and the outcomes of the efforts (Hockings et al 2006) will be updated annually to assist with planning of future monitoring, outreach, and enforcement, discuss potential attributes and lessons learned of past work, and potential improvements of future work. Adequacy and appropriateness of the current rules and regulation, science, outreach, and enforcement to achieve the goals and objectives of Amendment 36 will be reviewed through an evaluation report provided to the Council to adapt management based on comments from the SMP AP and public comment. The metrics used to evaluate the adequacy and appropriateness were separated into biophysical, socioeconomic, and governance and based on Pomeroy et al. (2004).

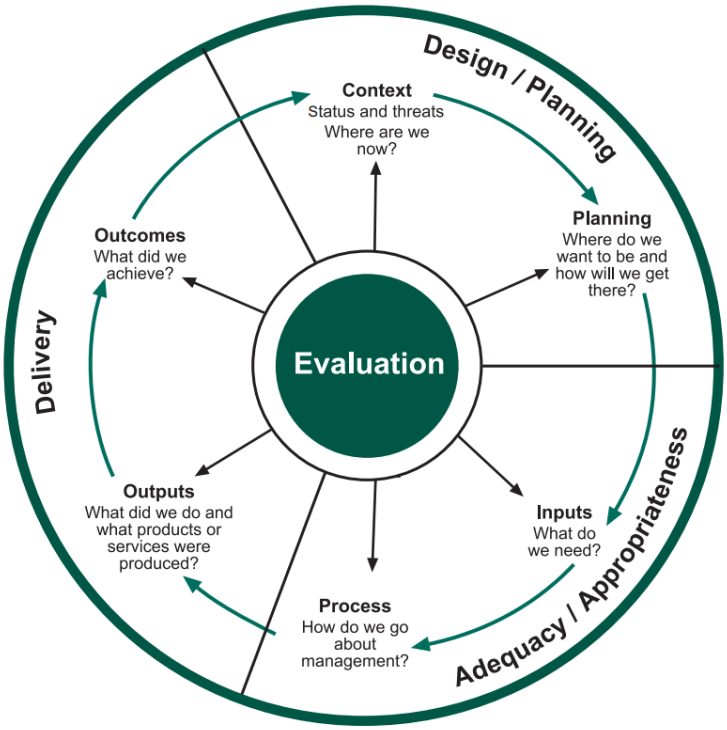


Figure xx. Management effectiveness framework for protected areas (Hockings et al. 2006).

3.5.1 Goals and Objectives

The overall goal of the SMZ is to identify and protect important spawning habitat for snapper grouper species. With the increased protection in the SMZ, the number of spawning individuals should increase and lead to spillover of snapper grouper species outside of the SMZ. To accomplish the goal of identifying and protecting spawning locations, the SMZs were selected through the public fishery management plan amendment process. During the development of Amendment 36, a list of species was developed to define the species of interest for creating and evaluating the SMZs and their stock statuses are in Table 3.5.1. The goals and objectives developed for the SMP will need to be reviewed periodically to adapt to management goals and objectives from the FMP. The following sections contain metrics for evaluating the SMZs and accomplish SMP Goals and Objectives:

Goal 1: Develop and adopt an effective process to evaluate and refine management of Spawning SMZs

Obj. A: Habitats where spawning for multiple snapper grouper species is likely to occur or documented are considered for management as SMZs based on input from scientist, fishermen, and public. (G 1F, B 2D?)

Obj. B: Implement management planning and ensure an effective process (G 1A).

Obj. C: Ensure a co-management system that is efficient and representative of fishery stakeholders. (G 3A)

Obj. D: Co-management support by fishermen through cooperative research and

citizen science projects within the Spawning SMZs is increased or maintained or developed. (G 4D)

Obj. E: Evaluations conducted on the knowledge regarding spawning within each site at the end of 3, 6, and 9 years and reported to Council. (G 1F)

Goal 2: Knowledge and protection of important spawning locations increased or maintained through research and monitoring.

Obj. F: Knowledge on the spawning locations in SA for target species (Table 3.5.1) enhanced (G 6C, 6D)

Obj. G: Habitat characterization of potential or selected Spawning SMZs increased. (G 6C, 6D)

Obj. H: Habitats where spawning is likely to occur or documented for multiple snapper grouper species are protected from human impacts. (B 2E, 4A)

Goal 3: Environmental awareness and knowledge about the Spawning SMZs improved

Obj. I: Level of knowledge about the purpose, importance of and regulations in Spawning SMZs held by the public increased. (SE 6C)

Obj. J: Stakeholder participation strengthened and enhanced. (G 3C)

Obj. K: Existence value of Spawning SMZs enhanced or maintained. (SE 3B)

Goal 4: Enforceability and compliance within the Spawning SMZs enhanced

Obj. L: User participation in surveillance, monitoring, and enforcement increased (G 4D)

Obj. M: Surveillance and monitoring of coastal areas maintained or improved (e.g., satellites, drones, research vessels, etc.) (G 4A)

Obj. N: Compliance with regulations within the Spawning SMSs is increased or maintained through targeted communication. (G 4F)

Obj. O: Application of law and regulations adequately maintained or improved. (G 4E)

Obj. P: Law Enforcement AP recommendations for MPAs are considered.

Goal 5: Research and Monitor impact of invasive species (new goal added by IPT based on public comments)

Obj. Q: Invasive lionfish population reduced or eliminated in Spawning SMZs.

Table 3.5.1. Stock status of the target species for the SMZs in the South Atlantic. The stock status is based on the most recent SEDAR assessment if conducted or the NMFS stock status report. Improving the snapper grouper stocks to sustainable levels is a goal of the Snapper Grouper Fishery Management Plan and therefore should be considered in the evaluation of the SMZs.

Species	Assessment	Year	Overfished	Overfishing
Goliath grouper	SEDAR 23	2011	Unknown	Unknown

Nassau grouper			Unknown	Unknown
Red grouper	SEDAR 19	2010	Yes	Yes
Red hind			Unknown	Unknown
Speckled hind	Potts	2001	Unknown	Yes*
Snowy grouper	SEDAR 36	2013	Yes	No
Warsaw grouper	Potts	2001	Unknown	Yes*
Black grouper	SEDAR 19	2010	No	No
Gag	SEDAR 10 Update	2014	No	Yes
Scamp			Unknown	Unknown
Yellowtail snapper	SEDAR 27A	2012	No	No
Cubera snapper			Unknown	Unknown
Mutton snapper	SEDAR 15 Update	2015	No	No
Red snapper	SEDAR 24	2010	Yes	Yes
Silk snapper			Unknown	Unknown
Golden tilefish	SEDAR 25	2011	No	No
Blueline tilefish	SEDAR 32	2013	No	Yes

*Current overfishing status was based on NMFS Stock Status Report 2015 http://www.nmfs.noaa.gov/sfa/fisheries_eco/status_of_fisheries/archive/2015/second/overfished_overfishing_stocks_q2_2015.pdf

Metrics

The metrics below are designed to evaluate the effectiveness of the SMZ and the associated regulations. Similar to the goals, the metrics are divided into biophysical, socioeconomic, and governance. Some the metrics may cover multiple goals. Combining the number of goals accomplished, the priority of the goal, and cost of the metric, a ranking system of the metrics could be used to recommend the greatest number and highest ranked goals with limited funding.

3.5.2 Biophysical Indicators

The biophysical indicators of the spawning SMZs include identifying spawning areas and tracking the spawning identify and protect spawning areas.

Metrics were selected by the IPT to rate the effectiveness of the SMZs. The SMZs should be rated as an overall group and individually. The abundance metric/s is/are _____. The population structure metrics are _____. The habitat metric is/are _____.

Potential Metrics for abundance (consider items below)

A. Evaluate species spawning stock biomass
B. number/percentage of samples in spawning condition within SMZ
C. Compare number of spawning individuals inside and outside of SMZ.
D. The number of spawning individuals identified by method of determination.

Table 3.5.2.1. Potential Metric for abundance from list above

Species	Pre-Closure	2016-2020	2021-2025
Goliath grouper			
Nassau grouper			
Red grouper			
Red hind			
Speckled hind			
Snowy grouper			
Warsaw grouper			
Black grouper			
Gag			
Scamp			
Yellowtail snapper			
Cubera snapper			
Mutton snapper			
Red snapper			
Silk snapper			
Golden tilefish			
Blueline tilefish			

Biological Evaluation

Table 3.5.2.2. Percent/number of spawning individuals observed in the SMZs.

Species	Pre-Closure	2016-2020	2021-2025
Goliath grouper			
Nassau grouper			
Red grouper			
Red hind			
Speckled hind			
Snowy grouper			
Warsaw grouper			
Black grouper			
Gag			
Scamp			
Yellowtail snapper			
Cubera snapper			
Mutton snapper			
Red snapper			
Silk snapper			
Golden tilefish			
Blueline tilefish			

Potential Metric for Population Structure (consider items below). Have percentages varied over time as expected by growth rates.

A. For groupers, males are xx% of the population
B. For tilefish, sex ratio is xx females: xx males
C. For size structure, xx% of the population is 75% of the maximum length
D. For size structure, xx% of the population is greater than the size of maturity
E. For age structure, xx% of the population is greater than the age of maturity

Table 3.5.2.3. Potential metrics for population structure

Species	Predicted max (cm)	75% Max Size	Maximum Age	Size of Maturity	Age of Maturity	Source	Preclosure	2016-2020	2021-2025
Goliath grouper	250	187.5	37	110-120	5-6	SEDAR 23			
Nassau grouper	122	91.5	29	44-50	4-5	FRN			
Red grouper	85	63.75	26	49	2-3	SEDAR 19			
Red hind	76	57	11 to 22	25	3	FI Workshop, Fishbase			
Speckled hind	110	82.5	35	81	4-7	FI Workshop			
Snowy grouper	122	91.5	27/40	54.1	5	SEDAR 36			
Warsaw grouper	230	172.5	41			FI Workshop			
Black grouper	133	99.75	33	86	6-7	SEDAR 19			
Gag	91	68.25	30	65	3	SEDAR 10 Update			
Scamp	107	80.25	30		1-2	FI Workshop, Fishbase			
Yellowtail snapper	62	47	23	23	2	SEDAR 27A			
Cubera snapper	160	120				Fishbase			
Mutton snapper	86	65	40	35	2	SEDAR 15A Update			
Red snapper	90	68	54	37	2	SEDAR 24			
Silk snapper	83	62.25		50	5	Fishbase			
Golden tilefish	125	93.75	40/50	<61	3	SEDAR 25			
Blueline tilefish	90	67.5	43	~36	3	SEDAR 32			

FRN=Federal Register Notice for Nassau Grouper Listing, FI Workshop=Fishery Independent Workshop

Potential Metric for Habitat Mapping (consider items below).
X% of the SMZ mapped
X% of the area outside the SMZ mapped (20 mile radius)
Habitat type characterized inside the SMZ

Table 3.5.2.4. Habitat mapping metrics for SMZ area mapped

MPA	Total Area	Area Mapped	% Likely Spawning Habitat
South Cape Lookout			
Area 51			
Area 53			
Devil's Hole			
Warsaw Hole			

Table 3.5.2.5. Habitat mapping metrics for area mapped within 20 miles of SMZs.

MPA	Total Area	Area Mapped	% Likely Spawning Habitat
South Cape Lookout			
Area 51			
Area 53			
Devil's Hole			
Warsaw Hole			

Table 3.5.2.6. Habitat mapping metrics of the SMZs for habitat characterization

MPA	Total Area	Area Mapped	% Likely Spawning Habitat
South Cape Lookout			
Area 51			
Area 53			
Devil's Hole			
Warsaw Hole			

3.5.3 Socioeconomic Indicators (to be updated)

When the Council selected the preferred SMZs, they considered several factors beyond biological and habitat data. The Council wanted to select areas and a management strategy that would minimize impacts to other fisheries. Metrics were selected by the IPT to rate the effectiveness of the SMZs based on the Socioeconomic Indicators.

Indicator 1:
Indicator 2: etc

3.5.4 Governance Indicators

The governance indicators of the SMZs focuses on the SMP after the SMZs have been created. The selection of the SMZs is a management decision for the Council and need to be considered in the Amendment Process. The governance indicators cover important aspects of the managing the SMZs including review of the SMZs, development of the SMP, outreach, compliance with rules and regulations, and enforcement of regulations. In Indicators should be addressed on a site specific basis if possible.

Table 3.5.4.1. Governance metrics for establishing and utilizing the SMP for the SMZs.

Metric	Yes/No
SMP formed	
Evaluation conducted	
SMP AP met	

Table 3.5.4.2. Governance outreach metrics for evaluating the SMZs.

Metric	Yes/No
Short-term outreach action items created	
Outreach items updated with new management regulations	
POC Designated for SMZ in SAFMC, SERO, SEFSC	
List of key contacts created	
SAFMC communicate with key contacts x times per year	
Collaboration with agencies and organizations for teacher workshops initiated/maintained	

Table 3.5.4.3. Governance law enforcement metrics for evaluating the SMZs.

Enforcement	Yes/No
Number of patrols exceeds 5 patrols/year/SMZ	
Enforcement vessels in adjacent state increased or maintained	
Updates on enforcement and adjudication provided	
Ratings maintained/increased for SMZ	

Table 3.5.4.4. Governance compliance metrics for evaluating the SMZs.

Metric	Yes/No

Number of citations < 2/year Percent of patrols with violation < 20%/year Remote monitoring methods reviewed Remote monitoring method recommended Citizen Science Program developed	

3.6 Financial Plan

The estimated costs in the tables below were based on cost estimates in 2015. The costs will need to be updated over time as the SMP is modified to match the goals and objectives and reflect current prices.

Table 3.6.1. Estimated costs of Resource Protection Action Items. Action items in yellow indicate high priority.

Resource Protection Action Items (AI)	Estimate Annual Cost					
	Year 1	Year 2	Year 3	Year 4	Year 5	
AI 1: Cooperative Enforcement	$0	$0	$0	$0	$0	*In conjunction with LEAP meeting*
AI 2: Maintain/Increase Enforceability	$200,000	$200,000	$200,000	$200,000	$200,000	*$1,000,000*
AI 3: Patrol SMZs	$ 66,000	$ 66,000	$ 66,000	$ 66,000	$ 66,000	*$330,000*
AI 4: Remote Monitoring Program	$0	$125,000	$125,000	$125,000	$125,000	*$500,000*
AI 5: Citizen Science Program for Estimating Effort and Database						
AI 6: Report Enforcement and Compliance Activities to SAFMC	$0	$0	$0	$0	$0	*$0*
AI 7: Compliance Assistance Provided to User Groups	$0	$0	$0	$0	$0	*$0*
AI 8: Encourage NC to commit to JEA with NOAA	$0	$0	$0	$0	$0	*$0*
AI 9: Monitor/Improve Adjudication	$0	$0	$0	$0	$0	*$0*
TOTAL Budget:	**$266,000**	**$391,000**	**$391,000**	**$391,000**	**$391,000**	***$1,830,000***

Table 3.6.2. Estimated costs of Research and Monitoring Action Items. Action items in yellow indicate high priority.

Research and Monitoring Action Items (AI)	Estimated Annual Cost					Total Estimated Cost Over 5 Years
	Year 1	Year 2	Year 3	Year 4	Year 5	
AI 1: Determine pre-closure species distribution	Staff Time	Staff Time				*Staff time*
AI 2: Annual monitoring program						
AI 3: Locate spawning aggregations (cost per site)	$50,000 per site	$50,000 per site	$50,000 per site	$50,000 per site	$50,000 per site	*$250,000*
AI 4: Track fish within SMZs	>$1,000,000	>$500,000	>$500,000	>$500,000	>$500,000	*>$3,000,000*
AI 5: Locate nursery sites						
AI 6: Modelling larval dispersal.						
AI 7: Characterize spawning indicators						
AI 8: Characterize fish communities within SMZs						
AI 9: Multibeam mapping of the SMZ						
AI 10: Multibeam mapping of the area around SMZs						

AI 11: Ground truth the habitat classification						
AI 12: Develop habitat classification maps						
TOTAL Budget:						

Table 3.6.3. Estimated costs of Outreach and Education Action Items. Action items in yellow indicate high priority.

Outreach Action Items (AI)	Estimated Annual Cost					Total Estimated Cost Over 5 Years
	Year 1	Year 2	Year 3	Year 4	Year 5	
AI 1: Work with fishing chart manufacturers to improve paper and electronic charts	TBD	$1,000	TBD	TBD	TBD	*$1000 but dependent on manufacturer approached*
AI 2: Develop area specific rack cards	$1,000	$1,500	$500	$250	$250	*$3,500*
AI 3: New rack cards into mobile app, SA Fishing Regulations	$200	$0	$0	$0	$0	*$200*
AI 4: Provide SAFMC Deepwater regulation brochures to area fishermen	$0	$5,000	$0	$2,000	$0	*$7,000*
AI 5: Develop and distribute news releases on research related to the SMZs	$0	$0	$0	$0	$0	*$0*
AI 6: Develop PowerPoint presentations and distribute	$0	$0	$0	$0	$0	*$0*
AI 7: Expand website to provide extensive outreach and educational materials	$0*	$0*	$0*	$0*	$0*	**Dependent on scope of expansion*
AI 8: List of key contacts to target for outreach efforts and materials	$0	$0	$0	$0	$0	*$0*
TOTAL Budget:	**$1,200**	**$7,500**	**$500**	**$2,250**	**$250**	***$11,700***

Table 3.6.4. Estimated costs of Administrative Action Items. Action items in yellow indicate high priority.

Administrative Action Items (AI)	Estimated Annual Cost					Total Estimated Cost Over 5 Years
	Year 1	Year 2	Year 3	Year 4	Year 5	
AI 1a: Develop SMP for Deepwater MPAs	$10,000	$0	$0	$0	$0	*$10,000*
AI 1b: SMP Review by SMP AP at Annual Meeting	$0	$5,000	$5,000	$5,000	$0	*$15,000*
AI 1c: Five Year Review	$0	$0	$0	$0	$15,000	*$15,000*
TOTAL Budget:	**$10,000**	**$5,000**	**$5,000**	**$5,000**	**$15,000**	**$40,000**

3.7 Timelines

The SMP Evaluation Team will deliver its first report to the Council by xx and should include recommendations for size, configuration, and regulations as well as the objective, goals, tasks and metrics. Each subsequent review of the SMZs should be conducted every xx years. The Team should be initiated at least 10 months prior to the report due date to the Council to provide for compilation of material, construction of the report, reviews by each of the committees, and final review of the report by the SMP Evaluation Team prior to submission to the Council.

Within the SMP, each action item is listed as short-term, mid-term, long-term, or ongoing. Short-term action items are expected to be completed within two years. Mid-term action items are expected to be completed within five years. Long-term action items are expected to be completed within the ten years. Some of the projects once they are initiated will be moved to ongoing projects.

4 Site Characterization

Overall
The five SMZs are positioned in deepwater, 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°21´N.

Essential Fish Habitat Considerations of the Sites
Discuss essential fish habitat considerations for the network of MPAs and connectivity to nursery and settlement sites.

Affected Users
Describe the users affected by the MPAs. Amendment 14 (SAFMC 2007) contains a detailed description of affected users, for example:

- Commercial industry
- Recreational anglers
- Charter boats
- Headboats
- Local fish houses and dealers
- Docks and marinas
- Bait and tackle shops

4.1 South of Cape Lookout

Location and Zoning

The South of Cape Lookout SMZ is 64 miles from South Inlet and is 5 square miles. The depth on the inshore side of the SMZ is 246 feet and on the offshore side is 453 feet.

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’

Source: Roger Pugliese, SAFMC Staff

Habitat and Managed Species Characterization

The South of Cape Lookout location has been sampled by the Southeast Reef Fish Survey and observed red grouper in spawning condition in the SMZ. Although the SMZ has not been sampled for habitat characterization, a location nearby was sampled by a remote operated vehicle (ROV). The habitat included hard bottom habitat consisting of Scleractinia hard coral, Octocoral, and Sponges.

4.2 Area 51

The SCDNR experimental artificial reef site designated Area 51 was established April 24, 1998 to investigate the feasibility of using artificial reef materials as an experimental Marine Protected Area (MPA). Area 51 is a 1.5 mile X 1.5 mile permitted artificial reef site located in approximately 70 feet of water off the South Carolina coast on sandy bottom.

Location and Zoning

Coordinates will be included in the Amendment.

Habitat and Managed Species Characterization

The bottom composition of Area 51 is sandy bottom enhanced with artificial reef materials that were placed in the area beginning in 1998. Forty-three species have been recorded on the artificial reef including red grouper, scamp, gag, warsaw grouper, and red snapper, which are target species of the SMZs (Table 4.1.1.2.1).

Table 4.2.1. Species observed at Area 51 since the material has been placed in the area. Bolded species are target species identified in Amendment 36.

Common Name	Scientific Name	Common Name	Scientific Name
Black Sea Bass	*Centropristis striata*	Southern Hake	*Urophycis floridana*
Bank Sea Bass	*Centropristis ocyurus*	Barracuda	*Sphyraena barracuda*
Gray Triggerfish	*Balistes capriscus*	Remora	*Remora remora*
Red Grouper	***Epinephelus morio***	Cubbyu	*Pareques acuminatus*
Scamp	***Mycteroperca phenax***	Gulf Flounder	*Paralichthys albigutta*
Gag	***Mycteroperca microlepsis***	Slippery Dick	*Halichoeres bivittatus*
Warsaw Grouper	***Hyporthodus nigritus***	Pearly Razor	*Xyrichtys novacula*
Red Snapper	***Lutjanus campechanus***	Tautog	*Tautoga onitis*
Vermillion Snapper	*Rhomboplites aurorubens*	Surgeonfish	*Acanthurus sp.*
Cobia	*Rachycentron canadum*	Spotted Goatfish	*Pseudupeneus maculatus*
Whitebone Porgy	*Calamus leucosteus*	Inshore Lizardfish	*Synodus foetens*
Sheepshead	*Archosargus probatocephalus*	Oyster Toadfish	*Opsanus tau*
Greater Amberjack	*Seriola dumerili*	Batfish	*Ogcocephalus sp.*
Spot	*Leiostomus xanthurus*	Southern Stingray	*Dasyatis americana*
White Grunt	*Haemulon plumierii*	Nurse Shark	*Ginglymostoma cirratum*
Pigfish	*Orthopristis chrysoptera*	Sandbar Shark	*Carcharhinus plumbeus*
Blue Angelfish	*Holacanthus bermudensis*	Spotted Moray	*Gymnothorax moringa*
Atlantic Spadefish	*Chaetodipterus faber*	Round Scad	*Decapterus punctatus*
Spottail Pinfish	*Diplodus holbrooki*	Scup	*Stenotomus chrysops*
Pinfish	*Lagodon rhomboides*	Reef Butterflyfish	*Chaetodon sedentarius*
Tomtate	*Haemulon aurolineatum*	Loggerhead Turtle	*Caretta caretta*
Planehead Filefish	*Stephanolepis hispidus*		

4.3 Area 53

Due in part to the results obtained from work on the Area 51 reef site, the South Atlantic Fishery Management Council (SAFMC) provided funding to replicate that study design 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.

Location and Zoning

Coordinates will be included in the Amendment.

Habitat and Managed Species Characterization

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 scamp, gag, warsaw grouper, and red snapper, which are target species of the SMZs (Table 4.1.1.3.1).

Table 4.3.1. Species observed at Area 53 since the material has been placed in the area. Bolded species are target species identified in Amendment 36.

Common Name	Scientific Name	Common Name	Scientific Name
Black Sea Bass	*Centropristis striata*	Southern Hake	*Urophycis floridana*
Bank Sea Bass	*Centropristis ocyurus*	Barracuda	*Sphyraena barracuda*
Gray Triggerfish	*Balistes capriscus*	Sand Perch	*Diplectrum formosum*
Queen Triggerfish	*Balistes vetula*	Cubbyu	*Pareques acuminatus*
Scamp	***Mycteroperca phenax***	Honeycomb Cowfish	*Acanthostracion polygonius*
Gag	***Mycteroperca microlepsis***	Pearly Razor	*Xyrichtys novacula*
Warsaw Grouper	***Hyporthodus nigritus***	Sand Tilefish	*Malacanthus plumieri*
Red Snapper	***Lutjanus campechanus***	Blue Runner	*Caranx crysos*
Vermillion Snapper	*Rhomboplites aurorubens*	Jacknifefish	*Equetus lanceolatus*
Red Porgy	*Pagrus pagrus*	Spanish Hogfish	*Bodianus rufus*
Whitebone Porgy	*Calamus leucosteus*	Loggerhead Turtle	*Caretta caretta*
Banded Rudderfish	*Seriola zonata*	Frogfish	*Antennarius Sp.*
Greater Amberjack	*Seriola dumerili*	Nurse Shark	*Ginglymostoma cirratum*
Almaco Jack	*Seriola rivoliana*	Spotted Moray	*Gymnothorax moringa*
White Grunt	*Haemulon plumierii*	Lionfish	*Pterois volitans*
Blue Angelfish	*Holacanthus bermudensis*	Greater Soapfish	*Rypticus saponaceus*
Atlantic Spadefish	*Chaetodipterus faber*	Round Scad	*Decapterus punctatus*
Spottail Pinfish	*Diplodus holbrooki*	Scup	*Stenotomus chrysops*
Planehead Filefish	*Stephanolepis hispidus*	Reef Butterflyfish	*Chaetodon sedentarius*
Tomtate	*Haemulon aurolineatum*	Blenny	
Margate	*Haemulon album*	Ocean Sunfish	*Mola mola*

4.4 Devil's Hole

The Devil's Hole was described in the MPA Expert Working Report (SAFMC 2013) as an area where warsaw grouper had been caught and has been sampled by LGL and MARMAP.

Location and Zoning

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

The coordinates are:	
32° 34.311'	78° 33.220'
32° 34.311'	78° 34.996'
32° 32.748'	78° 34.996'
32° 32.748'	78° 33.220'

Habitat Characterization

The Devil's Hole includes an "elbow" where there is a drastic change in depth which has been described as a characteristic feature for spawning for snapper grouper species in other areas. In the area where the proposed SMZ is located, warsaw grouper scamp, and grey triggerfish have been observed in spawning condition.

4.5 Warsaw Hole

The Warsaw Hole was described in the MPA Expert Working Report (SAFMC 2013) as an area where warsaw grouper had been seen aggregating and at least one female was caught with obvious roe. Although not a target species, greater amberjack may also spawn at Warsaw Hole.

Location and Zoning

The Warsaw Hole is 35 miles from Key West and is 1 square mile. The depth on the inshore side of the SMZ is 230 feet and on the offshore side is 443 feet. In the middle of the proposed SMZ is a deep hole (Figure 4.1.1.5.1).

The coordinates are:

Latitude	Longitude
24° 21.972'	82° 19.802'
24° 21.972'	82° 18.882'
24° 21.154'	82° 18.882'
24°.21.154'	82° 19.802'

Source: Roger Pugliese, SAFMC Staff

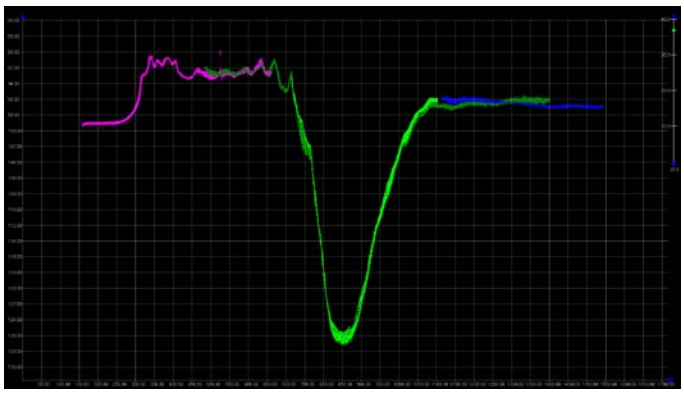


Figure 4.1.1.5.1. Elevation profiles for a cross section of the Warsaw Hole.
Source: NOAA - Multi-beam mapping of Warsaw Hole by the Nancy Foster Associated with NF 15-04 FKNMS Ecological Assessment

Habitat and Managed Species Characterization

In addition to warsaw grouper, black grouper, scamp, silk snapper, blackfin snapper, and red snapper have been reported being caught in the vicinity of the hole. The Warsaw Hole is a distinct geographic feature and this feature may cause fish to aggregate near it for spawning.

5. Literature Cited & Resources Consulted

Ault, J.S., G.A. Meester, J. Luo, S.G. Smith, K.C. Lindeman. 2000. Natural resources affected environment: Dry Tortugas National Park draft environmental impact statement. In Dry Tortugas National Park General Management Plan. National Park Service. Denver, CO. 250 p.

Bachelor, N.M., C.M. Schobernd, Z.H. Schobernd, W.A. Mitchell, D.J. Berrane, G.T. Kellison, M.J.M. Reichert. 2013. Comparison of trap and underwater video gears for indexing reef fish presence and abundance in the southeast United States. Fisheries Research 143: 81- 88.

Burke, J.S., C.A. Currin, D.W. Field, M.S. Fonseca, J.A. Hare,W.J. Kenworthy, and A.V. Uhrin. 2003. Biogeographic analysis of the Tortugas Ecological Reserve: examining the refuge effect following reserve establishment. Marine Conservation Series MSD-04-1. U. S. Department of Commerce, NOAA, Marine Sanctuaries Division, Silver Spring, MD.
28pp.

California Department of Fish and Game. 2008. Master plan for marine protected areas. California Marine Life Protection Act.

Cowie-Haskell, B.D., and J.M. Delaney. 2003. Integrating science into the design of the Tortugas Ecological Reserve. MTS Journal. 37(1):68-79.

Dudley, N. (ed.). 2008. Guidelines for applying protected area management categories. Gland, Switzerland: IUCN. 86 p.

Hare, J.A. and H.J. Walsh. 2007. Planktonic linkages among marine protected areas on the south Florida and southeast United States continental shelves. Can. J. Fish. Aquat. Sci.
64(9):1234-47.

IUCN World Commission on Protected Areas (IUCN-WCPA). 2008. *Establishing marine protected area networks—making it happen.* Washington, D.C.: IUCN-WCPA, NOAA and TNC. 118 p.

Fraser, S.B., and G.R. Sedberry. 2008. Reef morphology and invertebrate distribution at continental shelf edge reefs in the South Atlantic Bight. Southeastern Naturalist. 7(2):191-206.

Jeffrey, C.F.G., V.R. Leeworthy, M.E. Monaco, G. Piniak, and M. Fonseca (eds.). 2012. An integrated biogeographic assessment of reef fish populations and fisheries in Dry Tortugas: Effects of no-take reserves. NOAA Technical Memorandum NOS NCCOS
111. Prepared by the NCCOS Center for Coastal Monitoring and Assessment Biogeography Branch. Silver Spring, MD. 147 p.

Kelleher, G.1999. Guidelines for marine protected areas. IUCN, Gland, Switzerland and Cambridge, UK. 107 p.

Laffoley, D. (ed). 2008. Towards networks of marine protected areas. The MPA Plan of Action for IUCN's World Commission on Protected Areas. IUCN WCPA, Gland, Switzerland. 28 p.

Lesher, A.T. 2008. An analysis of larval dispersal and retention within the South Atlantic Bight using satellite-tracked drifters released on reef fish spawning grounds. Master's Thesis. The Graduate School of the College of Charleston. 64 p.

Lindeman, K.C., R. Pugliese, G.T. Waugh, and J.S. Ault. 2000. Developmental patterns within a multispecies reef fishery: management applications for essential fish habitats and protected areas. Bull. Mar. Sci. 66(3):929-56.

National Research Council. 2001. Marine protected areas: tools for sustaining ocean ecosystems. National Research Council, Washington, D.C. 288 p.

Paris, C.B., R.K. Cowen, R. Claro, and K.C. Lindeman. 2005. Larval transport pathways from Cuban snapper (Lutjanidae) spawning aggregations based on biophysical modeling. Mar. Ecol. Prog. Ser. 296:93-106.

Pomeroy, R.S., J.E. Parks, and L.M. Watson. 2004. How is your MPA doing? A guidebook of natural and social indicators for evaluating marine protected area management effectiveness. IUCN, Protected Areas Program; WWF; United States, NOAA.

Rudershausen, P.J., W.A. Mitchell, J.A. Buckel, E.H. Williams, and E. Hazen. 2010. Developing a two-step fishery-independent design to estimate the relative abundance of deepwater reef fish: Application to a marine protected area off the southeastern United States coast. Fisheries Research. 105(3): 254–260.

Rizk, C., J. Semelin, C. Karibuhoye. 2011. Methodological guidebook for the development of management plans for marine protected areas in West Africa.

SAFMC. 2013. South Atlantic Fishery Management Council MPA Expert Workgroup Meeting II Overview. South Atlantic Fishery Management Council, Charleston, South Carolina.

SAFMC. 2012. South Atlantic Fishery Management Council MPA Expert Workgroup Meeting Overview. South Atlantic Fishery Management Council, Charleston, South Carolina.

SAFMC. 2009. Regulations for deepwater marine protected areas in the South Atlantic. South Carolina Seagrant Extension Program.

SAFMC. 2007. Snapper Grouper Amendment Number 14. South Atlantic Fishery Management Council, Charleston, South Carolina. 601 p.

SAFMC. 2005. Final Evaluation Plan for the *Oculina* Experimental Closed Area. South Atlantic Fishery Management Council, Charleston, South Carolina. 84 p.

Sale, P.F., H.V. Lavieren, M.C. Ablan Lagman, J. Atema, M. Butler, C. Fauvelot, J.D. Hogan, G.P. Jones, K.C. Lindeman, C.B. Paris, R. Steneck and H.L. Stewart. 2010. Preserving reef connectivity: A handbook for marine protected area managers. Connectivity Working Group, Coral Reef Targeted Research and Capacity Building for Management Program, UNU-INWEH.

Salm, R.V., and J.R. Clark. 2000. IUCN marine and coastal protected areas. IUCN, Washington, D.C. 370 p.

Sedberry, G.R., O. Pashuk, D.M. Wyanski, J.A. Stephen and P. Weinbach. 2006. Spawning locations for Atlantic reef fishes off the southeastern U.S. Proc. Gulf Carib. Fish. Inst. 57:463-514.

Sedberry, G.R., P. Weinbach, J.A. Stephen, D.J. Machowski, J.K. Loefer, D. dosReis, K. Draganov and S.B. Griffin. 2005. GIS analysis of fishery-independent data in relation to definition of essential fish habitat, habitat areas of particular concern, and marine protected areas in the South Atlantic Bight. Final Project Report, South Carolina Department of Natural Resources, MRRI. Charleston, South Carolina.

SEMARNAP. 2000. Programa de Manejo Parque Nacional Arrecife de Puerto Morelos. Comunidad de Puerto Morelos, Quintana Roo, Mexico.

Schobernd C.M., and G.R. Sedberry. 2009. Shelf-Edge and Upper-Slope Reef Fish Assemblages in the South Atlantic Bight: Habitat Characteristics, Spatial Variation, and Reproductive Behavior. Bulletin of Marine Science. 84(1):67-92.

Thomas, L. and J. Middleton. 2003. Guidelines for management planning of protected areas. IUCN Gland, Switzerland and Cambridge, UK. 79 p.

U.S. Department of Commerce. 2009. 50 CFR Part 622. Fisheries of the Caribbean, Gulf of Mexico, and South Atlantic; Snapper-Grouper Fishery off the Southern Atlantic States; Amendment 14: Final Rule. NOAA.

U.S. Department of Commerce. 2007. Florida Keys National Marine Sanctuary: Revised management plan. NOAA. 369 p.

U.S. Department of Commerce. 2006. Gray's Reef National Marine Sanctuary: Final management plan / final environmental impact statement. NOAA. 260 p.

U.S. Department of Commerce. 2000. Tortugas Ecological Reserve: Final supplemental environmental impact statement / final supplemental management plan. NOAA. 310 p.

U.S. Public Law 109-479. 2007. Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006.

White, D.B. and S.M. Palmer. 2004. Age, growth, and reproduction of the red snapper, *Lutjanus campechanus*, from the Atlantic waters of the southeastern U.S. Bulletin of Marine Science. 75(3):335-360.

Appendices

Appendix I. List of Acronyms

AP	Advisory Panel
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
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
NOAA	National Oceanic and Atmospheric Administration
NOVA	Notice of Violation and Assessment
OLE	Office of Law Enforcement
ROV	Remote Operated Vehicle
S-G	Snapper-Grouper
SAFMC	South Atlantic Fishery Management Council
SCDNR	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. The IUCN Management Effectiveness Framework

(Box 3 Pomeroy et al. 2004)

Box 3

THE IUCN MANAGEMENT EFFECTIVENESS FRAMEWORK

The IUCN management effectiveness framework (Hockings *et al.*, 2000) presents an iterative protected area management cycle of design, management, monitoring, evaluation and adaptation.

Through this process, managers are empowered with the ability to diagnose and adaptively improve their management actions. To begin the evaluation process in this management cycle three sets of simple questions must be answered:

1. In terms of the design of the protected area:

   What is the *context* in which the protected area is designated?

   What is the desired result and how will *planning* enable its achievement?

2. In terms of how appropriate are the management system and process:

   What *inputs* are required to designate the protected area?

   What is the *process* used to go about defining it?

3. In terms of the achievement of desired objectives:

   What activities were undertaken and what were the *outputs* (products) of this?

   What *outcomes* (impacts) were achieved based on the outputs and their application?

These questions identify six categories of potential indicators for measuring management effectiveness:

- Context indicators
- Planning indicators
- Input indicators
- Process indicators
- Output indicators
- Outcome indicators

Using this general framework allows protected area managers to customize a set of appropriate indicators to be used on relevant scales. It serves as a foundation from which to further investigate a specific category of indicators (e.g. outcomes) or to determine which indicators are most appropriate based on the use of a specific protected area tool. The framework provides a common language and an important structure from which to improve protected area learning, efficacy and achievement. As a tool for designing an evaluation approach – rather than providing a specific set of indicators and methodologies to measure them – it helps to explain variations in the context, available resources, evaluative purpose and specific management objectives across protected areas.

Appendix III. Biophysical Goals and Objectives
(Figure 2 Pomeroy et al. 2004)

GOAL 1	**Marine resources sustained or protected**
1A	*Populations of target species for extractive or non-extractive use restored to or maintained at desired reference points*
1B	*Losses to biodiversity and ecosystem functioning and structure prevented*
1C	*Populations of target species for extractive or non-extractive use protected from harvest at sites and/or life history stages where they become vulnerable*
1D	*Over-exploitation of living and/or non-living marine resources minimized, prevented or prohibited entirely*
1E	*Catch yields improved or sustained in fishing areas adjacent to the MPA*
1F	*Replenishment rate of fishery stocks increased or sustained within the MPA*
GOAL 2	**Biological diversity protected**
2A	*Resident ecosystems, communities, habitats, species, and gene pools adequately represented and protected*
2B	*Ecosystem functions maintained*
2C	*Rare, localized or endemic species protected*
2D	*Areas protected that are essential for life history phases of species*
2E	*Unnatural threats and human impacts eliminated or minimized inside and/or outside the MPA*
2F	*Risk from unmanageable disturbances adequately spread across the MPA*
2G	*Alien and invasive species and genotypes removed or prevented from becoming established*
GOAL 3	**Individual species protected**
3A	*Focal species abundance increased or maintained*
3B	*Habitat and ecosystem functions required for focal species' survival restored or maintained*
3C	*Unnatural threats and human impacts eliminated or minimized inside and/or outside the MPA*
3D	*Alien and invasive species and genotypes removed from area or prevented from becoming established*
GOAL 4	**Habitat protected**
4A	*Habitat quality and/or quantity restored or maintained*
4B	*Ecological processes essential to habitat existence protected*
4C	*Unnatural threats and human impacts eliminated or minimized inside and/or outside the MPA*
4D	*Alien and invasive species and genotypes removed or prevented from becoming established*
GOAL 5	**Degraded areas restored**
5A	*Populations of native species restored to desired reference points*
5B	*Ecosystem functions restored*
5C	*Habitat quality and/or quantity restored or rehabilitated*
5D	*Unnatural threats and human impacts eliminated or minimized inside and/or outside the MPA*
5E	*Alien and invasive species and genotypes removed or prevented from becoming established*

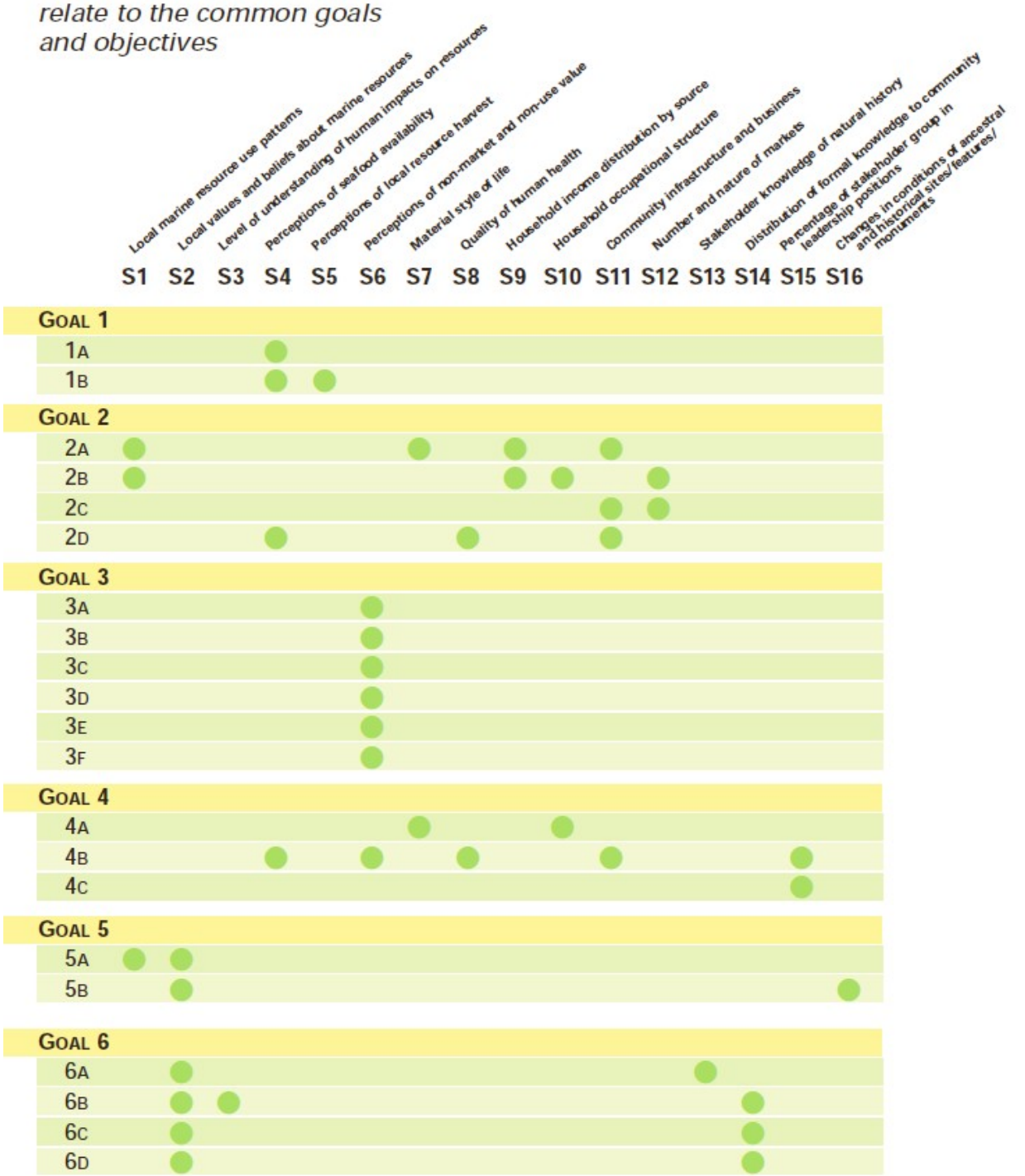
How the biophysical indicators relate to the common goals and objectives

	B1 Focal species abundance	B2 Focal species population structure	B3 Habitat distribution and complexity	B4 Composition and structure of the community	B5 Recruitment success within the community	B6 Food web integrity	B7 Type, level and return on fishing effort	B8 Water quality	B9 Area showing signs of recovery	B10 Area under no or reduced human impact
GOAL 1										
1A	●	●				●	●			
1B			●	●	●			●		
1C	●	●		●		●	●		●	●
1D	●	●		●		●	●			●
1E	●				●		●		●	●
1F	●	●					●		●	
GOAL 2										
2A				●	●		●		●	●
2B						●		●	●	
2C	●	●		●						
2D		●	●				●	●		●
2E				●				●		●
2F										
2G	●			●						
GOAL 3										
3A	●	●	●			●	●		●	
3B			●	●		●	●	●	●	
3C							●	●		●
3D	●	●		●						
GOAL 4										
4A			●	●	●			●	●	
4B			●	●	●			●	●	
4C			●	●	●			●		●
4D	●		●	●				●		
GOAL 5										
5A	●					●	●		●	
5B	●	●		●				●	●	
5C		●	●	●				●	●	
5D	●			●				●	●	●
5E	●		●	●					●	

Appendix IV. Socioeconomic Goals and Objectives
(Figure 3 Pomeroy et al. 2004)

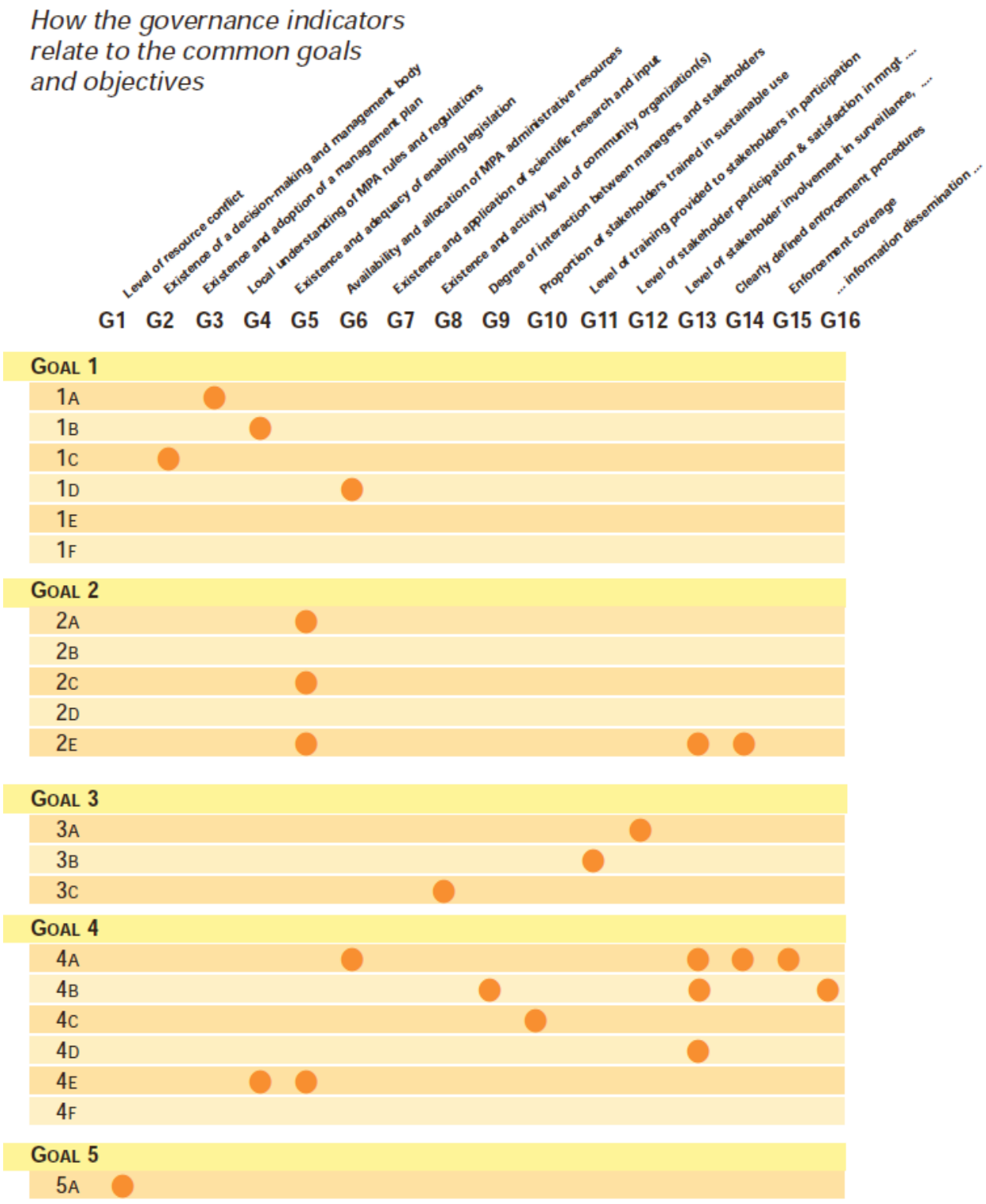
GOAL 1	**Food security enhanced or maintained**
1A	*Nutritional needs of coastal residents met or improved*
1B	*Improved availability of locally caught seafood for public consumption*
GOAL 2	**Livelihoods enhanced or maintained**
2A	*Economic status and relative wealth of coastal residents and/or resource users improved*
2B	*Household occupational and income structure stabilized or diversified through reduced marine resource dependency*
2C	*Local access to markets and capital improved*
2D	*Health of coastal residents and/or resource users improved*
GOAL 3	**Non-monetary benefits to society enhanced or maintained**
3A	*Aesthetic value enhanced or maintained*
3B	*Existence value enhanced or maintained*
3C	*Wilderness value enhanced or maintained*
3D	*Recreation opportunities enhanced or maintained*
3E	*Cultural value enhanced or maintained*
3F	*Ecological services values enhanced or maintained*
GOAL 4	**Benefits from the MPA equitably distributed**
4A	*Monetary benefits distributed equitably to and through coastal communities*
4B	*Non-monetary benefits distributed equitably to and through coastal communities*
4C	*Equity within social structures and between social groups improved and fair*
GOAL 5	**Compatibility between management and local culture maximized**
5A	*Adverse effects on traditional practices and relationships or social systems avoided or minimized*
5B	*Cultural features or historical sites and monuments linked to coastal resources protected*
GOAL 6	**Environmental awareness and knowledge enhanced**
6A	*Respect for and/or understanding of local knowledge enhanced*
6B	*Public's understanding of environmental and social 'sustainability' improved*
6C	*Level of scientific knowledge held by the public increased*
6D	*Scientific understanding expanded through research and monitoring*

How the socio-economic indicators relate to the common goals and objectives



Appendix V. Governance Goals and Objectives
(Figure 4 Pomeroy et al. 2004)

GOAL 1	**Effective management structures and strategies maintained**
1A	*Management planning implemented and process effective*
1B	*Rules for resource use and access clearly defined and socially acceptable*
1C	*Decision-making and management bodies present, effective, and accountable*
1D	*Human and financial resources sufficient and used efficiently and effectively*
1E	*Local and/or informal governance system recognised and strategically incorporated into management planning*
1F	*Periodic monitoring, evaluation, and effective adaptation of management plan ensured*
GOAL 2	**Effective legal structures and strategies for management maintained**
2A	*Existence of adequate legislation ensured*
2B	*Compatibility between legal (formal) and local (informal) arrangements maximized or ensured*
2C	*National and/or local legislation effectively incorporates rights and obligations set out in international legal instruments*
2D	*Compatibility between international, national, state, and local rights and obligations maximized or ensured*
2E	*Enforceability of arrangements ensured*
GOAL 3	**Effective stakeholder participation and representation ensured**
3A	*Representativeness, equity, and efficacy of collaborative management systems ensured*
3B	*Resource user capacity effectively built to participate in co-management*
3C	*Community organizing and participation strengthened and enhanced*
GOAL 4	**Management plan compliance by resource users enhanced**
4A	*Surveillance and monitoring of coastal areas improved*
4B	*Willingness and acceptance of people increased to behave in ways that allow for sustainable management*
4C	*Local ability and capacity built to use resources sustainably*
4D	*User participation in surveillance, monitoring, and enforcement increased*
4E	*Application of law and regulations adequately maintained or improved*
4F	*Access to and transparency and simplicity of management plan ensured and compliance fostered*
GOAL 5	**Resource use conflicts managed and reduced**
5A	*User conflicts managed and/or reduced: 1) within and between user groups, and/or 2) between user groups and the local community or between the community and people outside it*


How the governance indicators relate to the common goals and objectives
Level of resource conflict
Existence of a decision-making and management body
Existence and adoption of a management plan
Local understanding of MPA rules and regulations
Existence and adequacy of enabling legislation
Availability and allocation of MPA administrative resources
Existence and application of scientific research and input
Existence and activity level of community organization(s)
Degree of interaction between managers and stakeholders
Proportion of stakeholders trained in sustainable use
Level of training provided to stakeholders in participation
Level of stakeholder participation & satisfaction in mngt ...
Level of stakeholder involvement in surveillance, ...
Clearly defined enforcement procedures
Enforcement coverage
... information dissemination ...
G1 G2 G3 G4 G5 G6 G7 G8 G9 G10 G11 G12 G13 G14 G15 G16
GOAL 1
1A
1B
1C
1D
1E
1F
GOAL 2
2A
2B
2C
2D
2E
GOAL 3
3A
3B
3C
GOAL 4
4A
4B
4C
4D
4E
4F
GOAL 5
5A

Appendix VI: List of Preparers

Michelle Meadows, Meadows Ecological, LLC
Ken Lindeman, PhD, Florida Institute of Technology (Member, MPA Expert Working Group)