INTRODUCTION
SYSTEM MANAGEMENT PLAN
FOR THE AMENDMENT 14 MPAs

The South Atlantic Fishery Management Council is preparing a System Management Plan (SMP) for the Marine Protected Areas (MPAs) established through Snapper Grouper Amendment 14 in January 2009. A review of the impacts of implementing the MPAs was presented to the Council during the December 2013 meeting. Lack of adequate funding to conduct the required enforcement, monitoring, and evaluations left the Council in the position of not being able to clearly demonstrate the benefits of the MPAs. The Council determined that to ensure the necessary enforcement, research/monitoring, outreach, and evaluation were possible, a concerted effort to identify specific projects and funding would be 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 MPAs. The Council's current timing is as follows:

Final Timing 2015:

a. Contract work on items to develop an outline – 2014/15
b. √IPT meeting – 12/10/14
c. √IPT works on items in the outline – January 2015 through March 2015
d. √Council reviews draft SMP and provides guidance – March 2015
e. √IPT revise document as necessary – March-May 2015
f. √Snapper Grouper AP input/overview – April 13-14, 2015
g. √SSC & SEP will provide initial comments in April 2015
h. A sub-group of the I & E AP will provide initial commends prior to June 2015
i. Council reviews/approves Draft SMP – June 2015
j. IPT revise document as necessary – June/July 2015
k. Public input – July/August/September 2015
l. Council reviews comments/document and provides guidance – September 2015
m. IPT revise document as necessary – September/October
n. SSC review – October 2015
o. Snapper Grouper AP input – October 2015
p. Council reviews input and approves Final SMP – December 2015

Drafts of sections are included here for the Council's initial input at the June 2015 meeting. A complete draft SMP will be available at the September 2015 meeting. In addition, a draft SMP chapter will be included with the Amendment 36 document used for the 2nd round of public hearings in August 2015.

System Management Plan Outline for the SAFMC Amendment 14 MPAs

1. Executive Summary

A framework is in development for a System Management Plan (SMP) for the eight SAFMC Snapper-Grouper Amendment 14 MPAs and to provide a foundation for potential future SAFMC MPA management plans in the southeast U.S. This document is currently in outline form, serving as a starting point to expand the development of adaptive- and effectiveness-based management of the SAFMC's array of protected areas.

This SMP draft outline is intended to also 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 14 MPAs. Once the primary working outline structure is established, the component sections of the SMP will be populated and vetted through the SAFMC's public process.

The final SMP will contain the proposed management action items and background details for the eight MPAs established by Amendment 14 in January of 2009:

Snowy Grouper Wreck MPA
Northern South Carolina MPA
Edisto MPA
Charleston Deep Artificial Reef MPA
Georgia MPA
North Florida MPA
St. Lucie Hump MPA
East Hump MPA

To provide a foundation for the SMP, four steps for management actions are proposed: resource protection, research and monitoring, outreach and education, and administrative and financial. Additionally, management effectiveness evaluations are recommended as a fundamental component that the final SMP will contain to determine the status and utility of the MPAs in achieving the intentions set by Amendment 14 (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 MPAs in the southeast as a viable fishery management tool to protect and assess target resource populations and associated habitats.

2. Amendment 14 Overview

2.1 Overview

(Background information on Amendment 14.)

Amendment 14 states that "the primary purpose of these actions is to employ a collaborative approach to identify sites for Type 2 marine protected areas (MPAs) with the potential to protect a portion of the population (including spawning aggregations) and habitat of long-lived, slow growing, deepwater snapper grouper species (speckled hind, snowy grouper,

Warsaw grouper, yellowedge grouper, misty grouper, golden tilefish, and blueline tilefish) from directed fishing pressure to achieve a more natural sex ratio, age, and size structure within the proposed MPAs, while minimizing adverse social and economic effects. MPAs are the most effective fishery management tool that allows deepwater snapper grouper species to reach their natural size and age, protect spawning locations, and provide a refuge for early developmental stages of fish species" (2009).

2.2 Legislative Authority

(Description of the regulatory agencies in charge of implementing the system management plan and managing the MPAs.)

2.3 Regulations

(Overview of current regulations in these Type-II MPAs.)

3. System Management Plan

3.1 Goals and Objectives

(Measurable goals and objectives of the system management plan.)

The following are the goals and objectives in Amendment 14 (2009), used to choose the specific MPA sites (details in Appendix III). Additional goals and objectives should be identified through a participatory process with all stakeholders.

Goal 1: Utilize a collaborative process to select MPAs

Obj. A: Utilize input from scientists, fishermen, and the public to select proposed MPAs.

Goal 2: Maximize biological benefits

Obj. B: Protect some habitat known to support deepwater snapper and grouper species. Utilize hardbottom locations to provide locations suitable to satisfy the need for these MPAs.

Obj. C: Protect some areas where spawning activity of snapper-grouper has been recorded.

Obj. D: Protect some areas known to be nursery areas for deepwater species.

Goal 3: Minimize adverse social and economic effects

Obj. E: Minimize impact on fishermen in MPAs that do not target snapper-grouper Species.

Obj. F: Orient the MPAs in a manner that provides consideration to the way that fishermen fish.

Obj. G: Consider boater safety when designating proposed closed areas.

Goal 4: Maximize MPA enforceability

Obj. H: Consider the seven criteria from the Law Enforcement AP's report when determining suitable MPA sites.

Goal 5: Maximize research and monitoring capabilities

Obj. I: Utilize available fishery-independent and fishery-dependent data to provide locations suitable to satisfy the need for MPAs.

Obj. J: Utilize traditional knowledge, in part, to provide locations suitable to satisfy the need for MPAs.

3.2 Connectivity Within and Among MPAs

(Brief summary of available information on larval connectivity among sites, potential self-recruitment to sites, and potential spillover.)

The Amendment 14 MPAs are connected by oceanographic features, that can facilitate larval dispersal within and among S-G spawning sites in or outside of these MPAs (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 the Amendment 14 MPAs and 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 MPAs facilitates the potential for both the advection and retention of larval S-G species to settlement sites associated with the MPAs (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.)

3.4 Management Action Items

(Strategies to achieve the objectives of the management plan as a system-wide entity while suggesting potential action items specific to each individual MPA.)

The final SMP will detail the strategies to achieve the four proposed management action items. The purpose and needs detailed in Amendment 14 sections (2009, Appendix IV) will be revisited along with identifying additional needs and strategies through a participatory process with affected users. The following information under the four proposed action items includes brief summaries and examples for the purposes of this SMP outline.

3.4.1 Resource Protection Action Items

(Description of how the MPAs have been enforced to protect target resources, potential ways to facilitate compliance with the regulations, and surveillance options.)

Amendment 14 section 4.13 (Appendix IV) describes the enforceability considerations of the existing MPAs. Most of these MPAs are considered to have Low or Medium enforceability ratings, with regards to how well the site can be enforced. With the Tortugas Ecological Reserve (2000), a high focus was placed on increasing compliance within the MPA, which in turn improves enforcement endeavors. Overall, outreach to

affected user groups, funding, and interagency cooperation are key components to enforcing resource protection.

3.4.2 Research and Monitoring Action Items

(The final SMP will contain a description of the existing and anticipated plans to conduct research and ongoing monitoring efforts of the target resources and habitats at these sites.)

Similarly to the process in establishing the Tortugas Ecological Reserve (Cowie-Haskell and Delaney 2003), scientific research was heavily incorporated into the decision making process of selecting the existing MPAs. This research along with new research continues to help inform the decision making for existing and potential MPAs (MPA Expert Workgroup 2012, 2013). The seven research activities described below are some examples of research and monitoring efforts relating to the Amendment 14 MPAs, which address the Research Needs section of Amendment 14 (Appendix IV).

NOAA Fisheries, Southeast Regional Office, Southeast Fisheries Science Center:
What: Ongoing monitoring/sampling using remotely operated vehicle surveys to videotape and analyze the species and habitats inside and outside the deepwater MPAs.
Scientists involved: Stacey Harter, Andrew David, Marta Ribera
MPAs: Snowy Grouper Wreck MPA, Northern South Carolina MPA, Edisto MPA, Georgia MPA, and North Florida MPA.
Dates: 2004 – Present

What: Modeling geographic distribution of speckled hind and Warsaw grouper, potential spawning habitats of S-G species, and larval connectivity using habitat, hydrodynamic, and bathymetric models to evaluate the relative utility and benefits of existing and proposed MPAs in the southeast for fisheries management.
Scientists involved: Nick Farmer (SERO), Mandy Karnauskas (SEFSC)
Collaborators: Will Heyman, Shin Kobara, Marcel Reichert, Joseph Ballenger, Tracey Smart, Church Grimes, David Huff, George Sedberry
MPAs: All existing Amendment 14 MPAs and MPAs proposed by the SAFMC MPA Expert Workgroup (2012, 2013).
Dates: 2011 - Present

Marine Resources Monitoring, Assessment, and Prediction (MARMAP) & Southeast Fishery-Independent Survey (SEFIS):
What: Long-term fisheries independent and fisheries dependent monitoring program with reproductive biology, age, size, length, and species abundance data using annual trap and video camera survey (started 2010) of S-G species at multiple sites throughout the southeast, including the Amendment 14 MPAs. Additionally, a long-term sampling project has been conducted at the Edisto MPA site and Northern South Carolina MPA site since the early 1980s.
Scientists/researchers involved: Nate Bacheler, Joseph Ballenger, David J. Berrane, Laurie DiJoy, Joseph Evans, Michelle Falk, Dawn Glasqow, Sarah F. Goldman, Todd Kellison, Kevin Kolmos, Betsy Laban, Stephen A. Long, Paulette P. Mikell, Warren

Mitchell, Michelle Pate, Marcel Reichert, Christina Schobernd, Zeb Schobernd, Tracey Smart, D. Byron White, David Wyanski
MPAs: Snowy Grouper MPA, Northern South Carolina MPA, Edisto MPA, Georgia MPA, and North Florida MPA, and St. Lucie Hump MPA.
Dates: 1987 – Present (However MARMAP started in 1972).
Related publications: White and Palmer (2004), Sedberry et al. (2005, 2006), Bacheler et al. (2013).

North Carolina Sea Grant
What: Acoustic surveys to measure reef fish relative abundance and to demonstrate its utility as viable fishery-independent research.
MPAs: Snowy Wreck MPA
Dates: 2007 -2008
Related publications: Rudershausen et al. (2010)

NOAA Ocean Exploration:
What: Video and sonar surveys of benthic habitat and fish species composition from submersible dives on shelf edge reefs off the southeastern U.S.
MPAs: North Florida MPA and Northern South Carolina MPA, and previously proposed MPA alternatives were sampled from North Florida through Charleston, SC.
Dates: 2002
Related publications: Schobernd and Sedberry (2009)
What: Video analysis of benthic habitats and species composition from submersible dives on shelf edge reefs off the southeastern U.S
MPAs: North Florida MPA and Northern South Carolina MPA, and previously proposed MPA alternatives were sampled from North Florida through Charleston, SC.
Dates: 2001 - 2003
Related publications: Fraser and Sedberry (2008)

Larval Connectivity Studies:
What: Larval connectivity demonstrated among and within the Amendment 14 MPAs and *Oculina* HAPC by using satellite tracked drifters released at S-G spawning sites in the South Atlantic Bight.
MPAs: Snowy Grouper Wreck MPA, Northern South Carolina MPA, Edisto MPA, Charleston Deep Artificial Reef MPA, Georgia MPA, North Florida MPA, and *Oculina* HAPC.
Dates: 2005 - 2008
Related publications: Lesher (2008), Meadows and Sedberry (unpublished)

3.4.2.1 Resource Monitoring

(Description of current and anticipated ongoing monitoring of the target species at this site.)
See above for examples.

3.4.2.2 Habitat Monitoring

(Description of current and anticipated ongoing monitoring of the habitat.)

See above for examples.

3.4.2.3 Socioeconomic monitoring

(Description of current and anticipated socioeconomic monitoring efforts.)

3.4.3 Outreach and Education Action Items

(Description of the current and anticipated plans to establish outreach programs to involve stakeholders and the general public.)

Amendment 14 (Appendix IV) describes eight potential outreach projects for these MPAs, which were established based on the outreach plan of the *Oculina* Experimental Closed Area Evaluation Plan (2005). The primary outreach goal stated in Amendment 14 was to "Increase awareness and understanding of the Deepwater Type 2 MPAs among fishermen, citizens, and visitors in the South Atlantic region and the U.S. public" (2009). An example of one of these outreach projects is the Deepwater MPA brochure (SAFMC 2009), which provides a well-rounded summary of the purpose, needs, regulations, and details of the established MPAs.

3.4.4 Administrative Action Items

(Description of the anticipated framework of committees, operations, on site and day to day management, staffing and training, and partnerships.)

3.5 Management Effectiveness Evaluation

(Description of the anticipated plans to evaluate the overall effectiveness of the MPAs and management plan. See Appendix V for the Pomeroy et al. (2004) effectiveness framework for assessment.)

3.5.1 Goals and Objectives

(Measurable goals and objectives of the effectiveness evaluations for adaptive management purposes.)

3.5.2 Biophysical Indicators

(Assessment of the biophysical indicators relevant to each MPA. See Appendix VI for examples Pomeroy et al. 2004)

Indicators should be addressed on a site specific basis. Examples of biophysical indicators to potentially consider when evaluating the Amendment 14 MPAs (based on Pomeroy et al. 2004; Appendix VI) are:

Indicator 1: Focal species abundance
Indicator 2: Focal species population structure
Indicator 3: Habitat distribution and complexity
Indicator 4: Composition and structure of the community
Indicator 5: Recruitment success within the community
Indicator 6: Food web integrity

Indicator 7: Type, level, and return on fishing effort
Indicator 8: Water quality
Indicator 9: Area showing signs of recovery
Indicator 10: Area under no or reduced human impact

3.5.3 Socioeconomic Indicators

(Assessment of the socioeconomic indicators relevant to each MPA. See Appendix VII for examples Pomeroy et al. 2004)

Indicators should be addressed on a site specific basis. Examples of socioeconomic indicators to potentially consider when evaluating the Amendment 14 MPAs (based on Pomeroy et al. 2004; Appendix VII) are:

Indicator 1: Local marine resource use patterns
Indicator 2: Local values and beliefs about marine resources
Indicator 3: Level of understanding of human impacts on resources
Indicator 4: Perceptions of seafood availability
Indicator 5: Perceptions of local resource harvest
Indicator 6: Perceptions of non-market and non-use value
Indicator 7: Material style of life
Indicator 8: Quality of human health
Indicator 9: Household income and distribution by source
Indicator 10: Household occupational structure
Indicator 11: Community infrastructure and business
Indicator 12: Number and nature of markets
Indicator 13: Stakeholder knowledge of natural history
Indicator 14: Distribution of formal knowledge to community
Indicator 15: Percentage of stakeholder group in leadership positions
Indicator 16: Changes in conditions of ancestral and historical sites/features/monuments

3.5.4 Governance Indicators

(Assessment of the governance indicators relevant to each MPA. See Appendix VIII for examples from Pomeroy et al. 2004)

In Indicators should be addressed on a site specific basis. Examples of governance indicators to potentially consider when evaluating the Amendment 14 MPAs (based on Pomeroy et al. 2004; Appendix VIII) are:

Indicator 1: Level of resource conflict
Indicator 2: Existence of a decision-making and management body
Indicator 3: Existence and adoption of a management plan
Indicator 4: Local understanding of MPA rules and regulations
Indicator 5: Existence and adequacy of enabling legislation
Indicator 6: Availability and allocation of MPA administrative resources

Indicator 7: Existence and application of scientific research and input
Indicator 8: Existence and activity level of community organizations
Indicator 9: Degree of interaction between managers and stakeholders
Indicator 10: Proportion of stakeholders trained in sustainable use
Indicator 11: Level of training provided to stakeholders in participation
Indicator 12: Level of stakeholder participation and satisfaction in management processes and activities
Indicator 13: Level of stakeholder involvement in surveillance, monitoring, and enforcement
Indicator 14: Clearly defined enforcement procedures
Indicator 15: Enforcement coverage
Indicator 16: Degree of information dissemination to encourage stakeholder compliance

3.6 Financial Plan

(Description of the anticipated costs to implement the management action items and effectiveness evaluations.)

3.7 Timelines

(Projected schedule to achieve the goals and objectives set by the actions plans.)

4. **Site Characterization**

4.1 Snowy Grouper Wreck MPA

(Repeat the following 4.1.1 – 4.1.6 for each of the other MPAs listed in 4.2 – 4.8.)

4.1.1 Location and Zoning

(Chart and description of the MPA location, boundary coordinates, and zoning information.)

4.1.2 Summary of the Site Management History

(History of the management activities at this specific site.)

4.1.3 Habitat Characterization

4.1.3.1 Habitat Structure

(Benthic and water column habitat composition, geomorphological features, and other key habitat features at this site.)

4.1.3.2 Essential Fish Habitat Considerations

(EFH and EFH-HAPC attributes of this site.)

4.1.3.3 Threats

(Threats specific to the habitat and area.)

4.1.4 Managed Species Resource Characterization

4.1.4.1 Primary Snapper-Grouper Species in this Area

(Brief descriptions of the prominent Snapper-Grouper target species and other S-G species utilizing this site and adjacent areas, including temporal variation in occurrence.)

4.1.4.2 Threats and Status

(Summary of the current assessment status of primary S-G species at this site.)

4.1.5 Site Activities

4.1.5.1 Fishing

(Description of current and historical commercial and recreational fishing activities.)

4.1.5.2 Research

(Research activities currently and previously conducted related to this MPA.)

4.1.5.3 Outreach

(Existing outreach activities related to this MPA.)

4.1.5.4 Other

(Other activities that may occur at this site or in relation to this site.)

4.1.6 Affected Users

(Description of stakeholders that are directly and indirectly affected by this MPA.)

4.2 Northern South Carolina MPA

4.3 Edisto MPA

4.4 Charleston Deep Artificial Reef MPA

4.5 Georgia MPA

4.6 North Florida MPA

4.7 St. Lucie Hump MPA

4.8 East Hump MPA

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.

6. Appendices

Appendix I. List of Acronyms
Appendix II. Purpose and Need (Amendment 14 2009)
Appendix III. Goals and Objectives (Amendment 14 2009)
Appendix IV. Research, Outreach, and Enforcement Needs (Amendment 14 2009)
Appendix V. The IUCN Management Effectiveness Framework (Box 3 Pomeroy et. al. 2004).
Appendix VI. Biophysical Goals and Objectives (Figure 2 Pomeroy et al. 2004)
Appendix VII. Socioeconomic Goals and Objectives (Figure 3 Pomeroy et al. 2004) Appendix VIII. Governance Goals and Objectives (Figure 4 Pomeroy et al. 2004)
Appendix IX: List of Preparers

Appendix I. List of Acronyms

EFH	Essential Fish Habitat
EFH-HAPC	Essential Fish Habitat- Habitat Areas of Particular Concern
HAPC	Habitat Areas of Particular Concern
MARMAP	Marine Resources Monitoring, Assessment, and Prediction
MPA	Marine Protected Area
NOAA	National Oceanic and Atmospheric Administration
S-G	Snapper-Grouper
SAFMC	South Atlantic Fishery Management Council
SEFIS	Southeast Fishery-Independent Survey
SEFSC	Southeast Fisheries Science Center
SERO	Southeast Regional Office
SMP	System Management Plan

Appendix II. Purpose and Need (Amendment 14 2009)

The following are the goals and objectives from Amendment 14 for choosing the MPA sites (2009).

Purpose and Need

Recent stock assessments indicate snowy grouper, golden tilefish, vermilion snapper, and black sea bass are experiencing overfishing (NMFS 2005b). Snowy grouper, black sea bass, and red porgy are overfished (NMFS 2005b). While we do not know the status of all snapper grouper species, it is a safe presumption based on the data we do have that the size, age, and genetic structure of many snapper grouper species has been altered by fishing pressure. Amendment 13C

included management measures that end overfishing of snowy grouper, golden tilefish, vermilion snapper, and black sea bass. Amendment 15 will specify rebuilding plans for snowy grouper, black sea bass, and red porgy. Many snapper grouper species are vulnerable to overfishing because they are long-lived (e.g., snowy grouper, golden tilefish, red snapper, gag, scamp, red grouper, and red porgy), protogynous, i.e., change sex usually from female to males as they grow older/larger (e.g., snowy grouper, speckled hind, Warsaw grouper, yellowedge grouper, gag, scamp, red porgy, and black sea bass), form spawning aggregations (e.g., snowy grouper, gag, scamp, and red snapper), and suffer high release mortality in deepwater. Deepwater species (snowy grouper, golden tilefish, speckled hind, Warsaw grouper, blueline tilefish, and misty grouper) are most vulnerable to overfishing because they live for longer than 50 years, do not survive the trauma of capture, and are protogynous (groupers) or exhibit sexual dimorphism, i.e., males and females grow at different rates (tilefishes). Data deficiencies make it difficult for fishery scientists and managers to develop management measures that can be trusted to sustain stocks over time, particularly for those species that are very vulnerable to overfishing while attempting to minimize, to the extent practicable, the adverse socioeconomic impacts of management measures on fishing communities.

The primary purpose of these actions is to employ a collaborative approach to identify MPA sites with the potential to protect a portion of the population (including spawning aggregations) and habitat of long-lived, slow growing, deepwater snapper grouper species (speckled hind, snowy grouper, Warsaw grouper, yellowedge grouper, misty grouper, golden tilefish, and blueline tilefish) from directed fishing pressure to achieve a more natural sex ratio, age, and size structure within the proposed Type 2 MPAs, while minimizing adverse social and economic effects. The proposed Type 2 MPAs are the most effective fishery management tool that allows deepwater snapper grouper species to reach their natural size and age, protect spawning locations, and provide a refuge for early developmental stages of fish species. To determine alternatives for the location, size, and orientation of the MPAs, the Council considered the specific goals of: (1) Utilizing a collaborative process to select MPAs; (2) Maximizing the biological benefits; (3) Minimizing the adverse social and economic effects; (4) Maximizing MPA enforceability; and (5) Maximizing monitoring capabilities. The goals are statements of a desired outcome in terms of MPA location, size, and orientation from biological, social, economic, and enforcement perspectives. Objectives include criteria the Council considered when trying to achieve these goals. The goals and objectives were developed through discussions among various interest groups, Council committees, Advisory Panels (e.g., snapper grouper, law enforcement), scientific committees, and the public. The alternative comparison summaries in Section 2 of this amendment summarize the degree that each proposed site meets each goal.

Appendix III. Goals and Objectives (Amendment 14 2009)

The following are the goals and objectives from Amendment 14 for choosing the MPA sites (2009).

Goals and Objectives

Goal 1: Utilize a collaborative process to select MPAs

Objective A. *Utilize input from scientists, fishermen, and the public to select proposed*

MPAs. During the selection of the proposed Type 2 MPAs, a process was employed that involved scientists, fishermen, and the public. An Advisory Panel, consisting of scientists and fishermen, assembled known data to identify locations that would provide the greatest biological benefit to snapper grouper species. Experts on MPAs traveled throughout the southeast coast and discussed the benefits of MPAs with the public.
Public input during the scoping process and the informational public hearings revealed that closure of certain sites would generate intense public disapproval. The Council realized implementation of those sites would create a degree of controversy that could impede implementation of the MPAs and compliance. Following public input, the Council employed a "bottom up" process where stakeholders proposed sites that could still achieve the biological objectives. As an example, the Council worked with fishermen in the Florida Keys following the Council's proposed placement of an MPA on the popular location referred to as the "Islamorada Hump". This proposal generated intense controversy due to the popularity of fishing for such fish as billfish, dolphin, wahoo, and mackerel at this site. The Council worked with the local fishing community to propose a nearby site that would achieve the biological objectives (of the MPA designation) but would not have the degree of impact and controversy as the original proposal.

Goal 2: Maximize biological benefits
Objective B. *Protect some habitat known to support deepwater snapper and grouper species. Utilize hardbottom locations to provide locations suitable to satisfy the need for these MPAs.*
The Southeast Area Monitoring and Assessment Program (SEAMAP) has surveyed bottom habitat type and obtained additional data from numerous sources. This information, in part, was used to site the Type 2 MPAs to maximize the biological benefits. Submersible work and fishery-independent surveys have documented habitat in some proposed Type 2 MPAs that hold species such as vermilion snapper, red porgy, gag, scamp, and others. Therefore, additional benefits include: protecting the size and age structure of species that suffer high release mortality at depths greater than 165 feet (50 meters) (e.g., vermilion snapper, red porgy, gag, scamp, red snapper, red grouper, gray triggerfish, black sea bass, and others) and protecting areas where commercially important reef fish species are known to spawn (e.g., red porgy, vermilion snapper, gray triggerfish, red snapper, scamp, gag, red grouper, gray triggerfish, and others).

Objective C. *Protect some areas where spawning activity of snapper grouper has been recorded.*
The Marine Resources Monitoring, Assessment, and Prediction Program (MARMAP) has noted locations where fish (e.g., snowy grouper, golden tilefish, speckled hind, red porgy, vermilion snapper, gray triggerfish, red snapper, scamp, gag, red grouper, gray triggerfish, and others) were caught in spawning condition. This information, in part, was used to site the MPAs to maximize the biological benefits.

Objective D. *Protect some areas known to be nursery areas for deepwater species.*
Submersible work has documented the presence of age-0 snowy grouper in shelf edge (170 to 220 feet) habitat in many of the proposed Type 2 MPAs. Fishery-independent data, fishery-dependent data, and submersible work have documented the presence of juvenile speckled hind and Warsaw grouper in the same shelf edge habitat. The greatest abundance of speckled hind is currently in shelf edge habitat. This information, in part, was used to site the Type 2 MPAs to maximize the biological benefits to deepwater species.

Goal 3: Minimize adverse social and economic effects

Objective E. *Minimize impact on fishermen in MPAs that do not target snapper grouper species.* Many of the locations appropriate for protecting snapper grouper species are also popular fishing sites for pelagic species such as dolphin, wahoo, and mackerel. The Council felt it important to minimize the negative social and economic impacts MPAs could have on individuals fishing for non-snapper grouper species and promote stakeholder buy-in, while providing protection to the species most vulnerable to overfishing (deepwater snapper grouper species). Therefore, the alternatives proposed in this amendment are Type 2 MPAs where the harvest and possession of snapper species are prohibited within their borders (however, the prohibition on possession does not apply to a person aboard a vessel that is in transit with fishing gear appropriately stowed as defined in Appendix F).

Objective F. *Orient the MPAs in a manner that provides consideration to the way that fishermen fish.* Many commercial fishermen fish along the continental shelf break, which is parallel to the shoreline. Alternatives are provided that include closed areas parallel to the shelf break to minimize disruption to fishing activity when undergoing transit to different locations.

Objective G. *Consider boater safety when designating proposed closed areas.* The Council avoided detailed consideration of sites that would significantly affect boater safety. Overly large sites and the placement of sites adjacent to major fishing ports were avoided, as both would hinder a vessel's return to port during adverse weather.

Goal 4: Maximize MPA enforceability

Objective H. *Consider the seven criteria from the Law Enforcement AP's report when determining suitable MPA sites.* The Council's Law Enforcement Advisory Panel, in 1998, submitted a report (Appendix B) that outlined criteria that should be considering when determining attributes of MPA. These included: (1) a marine reserve should be configured in a square or rectangle; (2) the bigger the better; (3) the boundaries should be delineated in latitude and longitude; (4) must be in an acceptable format to be included and identified on NOAA charts; (5) allowable activities in the marine reserve should be limited; (6) locate marine reserves away from highly populated areas; and (7) provide for on-site enforcement capability. To maximize the efforts of law enforcement and fishermen compliance, the Council considered these criteria when developing the Type 2 MPAs.

Goal 5: Maximize research and monitoring capabilities

Objective I. *Utilize available fishery-independent and fishery-dependent data to provide locations suitable to satisfy the need for MPAs.* Closing areas to snapper grouper fishing is expected to result in changes in the community structure, species composition, sex ratio, reproductive potential, and size/age structure of species within the closed areas. Some proposed Type 2 MPAs have been sampled annually by fishery-independent surveys. More recently, additional baseline data from within proposed Type 2 MPAs have been collected using ROVs, submersible, and from commercial fishermen through cooperative funding. Documented information on the presence of snapper grouper species was considered when siting the Type 2 MPAs to maximize the biological benefits. It is anticipated that existing, long-term fishery independent surveys will continue in the proposed Type 2 MPAs to document any changes that occur.

Objective J. *Utilize traditional knowledge, in part, to provide locations suitable to satisfy the need for MPAs.* As fishery independent data are often scarce and fishery dependent information is collected on a large spatial scale, the Council frequently relied on local knowledge of fishermen and state agency personnel to propose suitable locations.
Information on spawning locations of deepwater snapper and grouper species is also limited and utilization of anecdotal knowledge is appropriate. While data has been collected in most of the proposed Type 2 MPAs, the extent of available habitat, particularly for deep-water species, is not known. It is anticipated that additional sampling will be conducted to better map available habitat and document species composition within the proposed Type 2 MPAs so that changes in community structure, sex ratio, and size/age structure can be documented. This effort would include commercial fishermen who may have knowledge of hard bottom locations. Through cooperative research, fishermen and scientists would work together to map available habitat within the proposed Type 2 MPAs and identify species composition. It is anticipated that additional funding would be provided to map the Type 2 MPAs with side scan sonar and visit potential hardbottom locations with ROV and submersible. Once additional hardbottom habitat is located, it would be monitored through fishery independent and fishery-dependent efforts.

Appendix IV. Research, Outreach, and Enforcement Needs (Amendment 14 2009)
The following are the Research, Outreach, and Enforcement needs from Sections 4.11-4.13 in Amendment 14 (2009).

4.11 Research Needs
Mapping needs
• Map the proposed Type 2 MPAs.

Research and monitoring needs
• Model coupled biological and physical properties as well as relevant chemical/nutrient and physiological characteristics.
• Determine and monitor the effect of the Type 2 MPAs on deepwater snapper grouper species' distribution and status.
    - Assess spawning aggregations of deepwater snapper grouper species.
    - Track fish movement.
    - Identify fish population demographics (e.g., size and age structure, sex ratio, etc.) within the Type 2 MPAs.
    - Determine pre-closure distribution of dominant harvested species in and outside the Type 2 MPAs, in order to provide historical context for subsequent assessments.
    - Determine age distribution, nursery grounds, migratory patterns, and mortality rates for dominant harvested fish stocks.
• Identify stressors affecting the Deepwater Type 2 MPAs.
    - Identify natural and anthropogenic stressors (i.e., disease, gear impacts, poaching, enforcement, etc.)
• Identify key trophodynamic functional groups.
    - Identify food web structure and dynamics.
    - Determine impact of lionfish invasion on recovery potential of deepwater

snapper grouper species within the Type 2 MPAs.

Assessment needs

• Determine the effect of management measures in the Type 2 MPAs on the status of deepwater snapper grouper fishery stocks:

- Characterize deepwater snapper grouper species within the Type 2 MPAs compared to reference sites (including distribution and abundance patterns, size and age distribution, spawning aggregation presence, sex ratios, etc.).
- Characterize fish communities, inside and out, including habitat utilization patterns, trophic interactions, ontogenetic changes, predator prey relationships, etc.
- Connectivity to the broader seascape (larval sources and sinks, spill-over effects).

• Determine how oceanographic conditions and episodic events affect fish stock condition, reproduction, and growth:

- Quantify the extent, intensity, and frequency of episodic events (upwelling, storms, etc).
- Assess the impact of episodic events (upwelling, storms, etc).

4.12 Outreach Needs

The list of outreach needs included in this section is modified from the outreach component of the Council's 2005 Oculina Experimental Closed Area (OECA) Evaluation Plan. For additional information about the OECA Evaluation Plan and efforts used to develop the outreach component of the plan, visit: http://www.safmc.net/HabitatManagement/DeepwaterCorals/Oculina/tabid/246/Default.aspx.

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.

GOAL: Increase awareness and understanding of the Deepwater Type 2 MPAs among fishermen, citizens, and visitors in the South Atlantic region and the U.S. public.

Project 1: Provide SAFMC regulation brochures to area fishermen.

• *Tasks:* reprint updated federal regulation brochure to include the Type 2 MPAs and distribute to federal, state, and local law enforcement offices for distribution.

• *Justification:* the regulations brochure will provide a summary of regulations and information for the Type 2 MPAs as well as an identification chart for snapper/grouper species found in the area.

Project 2: Work with fishing chart manufacturers (both printed and electronic) and/or vendors to improve available information for the Deepwater Type 2 MPAs

• *Tasks:* identify manufacturers of more 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 Type 2 MPAs.

Project 3: Develop and distribute news releases (coordinating with local contacts) to focus on law enforcement activities, research and monitoring projects, and the ecological importance of the Type 2 MPAs.
• *Tasks:* work closely with law enforcement agencies (state and federal) to highlight law enforcement activities and cases; 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.

Project 4: Develop Powerpoint presentations about Deepwater Type 2 MPAs; distribute on CD, post at Web site, and present to fishing clubs, environmental groups, local governments, etc.
• *Tasks:* design and create a PowerPoint presentation using existing photos, video, maps, and other information to highlight Type 2 MPAs, history of management, research and monitoring activities, law enforcement, etc.
• *Justification:* provides a quick method to distribute information for use by various audiences, can be readily updated.

Project 5: Develop and distribute posters and rack cards/informational brochures at area bait and tackle shops, marinas, fish houses, boating stores, fishing tournaments, boat shows, etc.
• *Tasks:* contract design layout and printing for poster and complimentary rack cards and/or brochure, distribute to targeted businesses and fishing tournament directors.
• *Justification:* effectively designed poster and brochures and/or rack cards would draw attention to the Type 2 MPAs and provide quick access to general information about habitat, fish species, maps, regulations, and law enforcement contacts.

Project 6: Expand the Council's web site to provide comprehensive education and outreach products (e.g., regulations, publications, research and monitoring information, law enforcement activities, news releases, high resolution video and photographs, maps, etc.). Publicize availability of information by having links posted on other fishing/Non-Governmental Organizations/tourism related web sites.
• *Tasks:* enhance the Council website 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.

Project 7: Develop education products for teachers (K-12) and informal educators, post on SAFMC Web site, and develop packet for distribution to science teachers.
• *Tasks:* Identify, develop, and produce education products
• *Justification:* This was identified as a need at area constituent meetings held to address outreach needs for the OECA Evaluation Plan and determined a priority item by the Information

and Education Advisory Panel. Initial ground work will be needed to identify local education needs.

Project 8: Develop TV documentaries working with environmental TV outlets (e.g., Discovery Channel, Public TV, and independent media contractors).
• *Tasks:* produce documentaries for television that feature the Type 2 MPAs; possibly tie in with interest in the proposed Deepwater Coral Habitat Areas of Particular Concern and the Council's approach to ecosystem-based management through the Fishery Ecosystem Plan and Comprehensive Amendment.
• *Justification:* TV is number one way to reach the public.

4.13 Enforcement Needs

There are two very large obstacles facing enforcement of these proposed Type 2 MPAs. The first is the great distance that the majority of these Type 2 MPAs are located from shore. The second is the fact that these are Type 2 areas which allow certain fishing activities to exist. Consequently, occasional flyovers by enforcement aircraft would not be an effective tool; therefore, an on-site enforcement presence will be necessary in order to determine whether the fishing activity is lawful or not.
Law Enforcement Advisory Panel Members representing the member States have evaluated their assets and categorized their ability to effectively patrol each MPA as either HIGH, MODERATE, or LOW. **This rating is based solely on the individual states assets and does not include the assets that their Federal partners may or may not have.**

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.

Each proposed Type 2 MPA is listed below by State. Comments on location options are listed as well as the ability of patrol rating.

<u>Florida</u>
1) **North Florida:** No option preference. Enforceability: **LOW**
2) **Sea Bass Rocks:** No location option. Enforceability: **MODERATE**
3) **East Hump:** No location option. Enforceability: **MODERATE**

<u>Georgia</u>
4) **Georgia MPA:** No option preference. Enforceability: **LOW**

South Carolina
5) **South Carolina A:** Location option #3. Enforceability: **LOW**
6) **South Carolina B:** Location option #2. Enforceability: **LOW**
7) **Deep Reef:** No location option. Enforceability: **LOW**

North Carolina
8) **Snowy Wreck:** No location option Enforceability: **LOW**

Meeting even the LOW rating will only be accomplished at the expense of some other enforcement priority. To accomplish any increase in the enforcement rating/presence would require a substantial funding increase to include:

- Hire, train, and equip additional law enforcement personnel
- Administrative support
    - o Personnel
    - o Equipment
- Acquire several fully equipped large offshore patrol vessels
- Recurring operational costs
    - o Fuel
    - o Maintenance
    - o Dockage
    - o Etc.
- Aircraft surveillance support costs

Appendix V. 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:

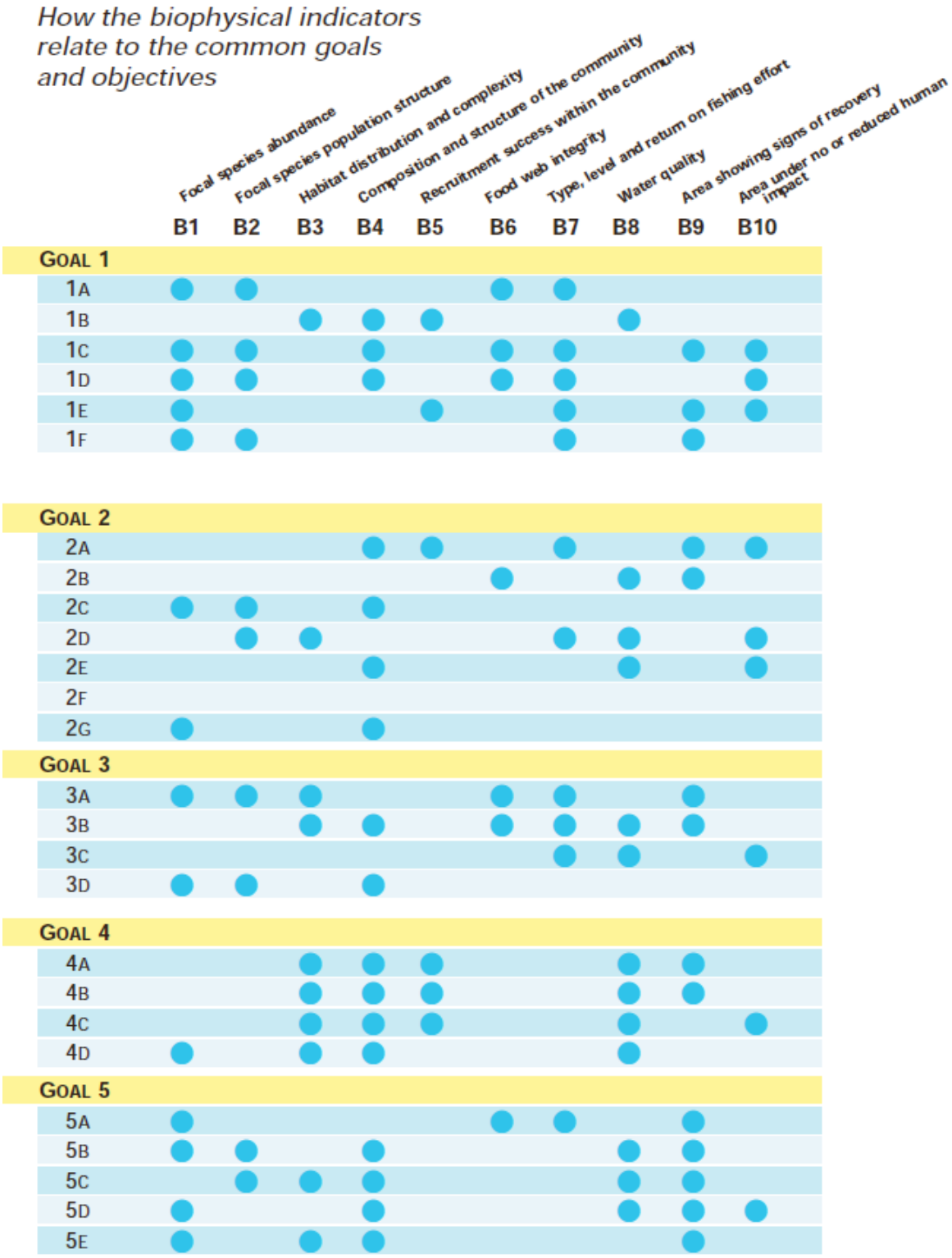
- Context indicators
- Planning indicators
- Input indicators
- Process indicators
- Output indicators
- Outcome indicators

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

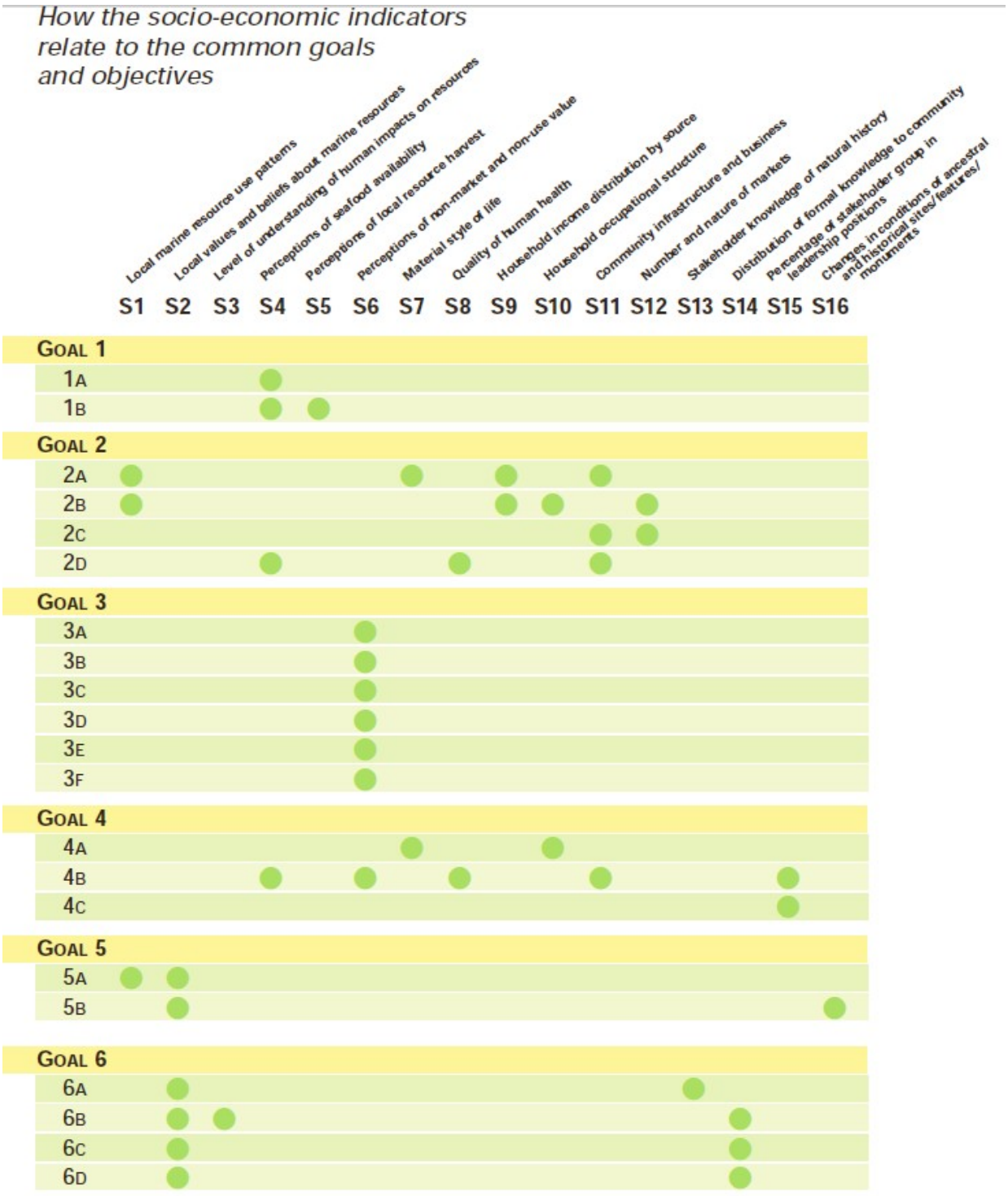
GOAL 1	**Marine resources sustained or protected**
1A	*Populations of target species for extractive or non-extractive use restored to or maintained at desired reference points*
1B	*Losses to biodiversity and ecosystem functioning and structure prevented*
1C	*Populations of target species for extractive 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



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

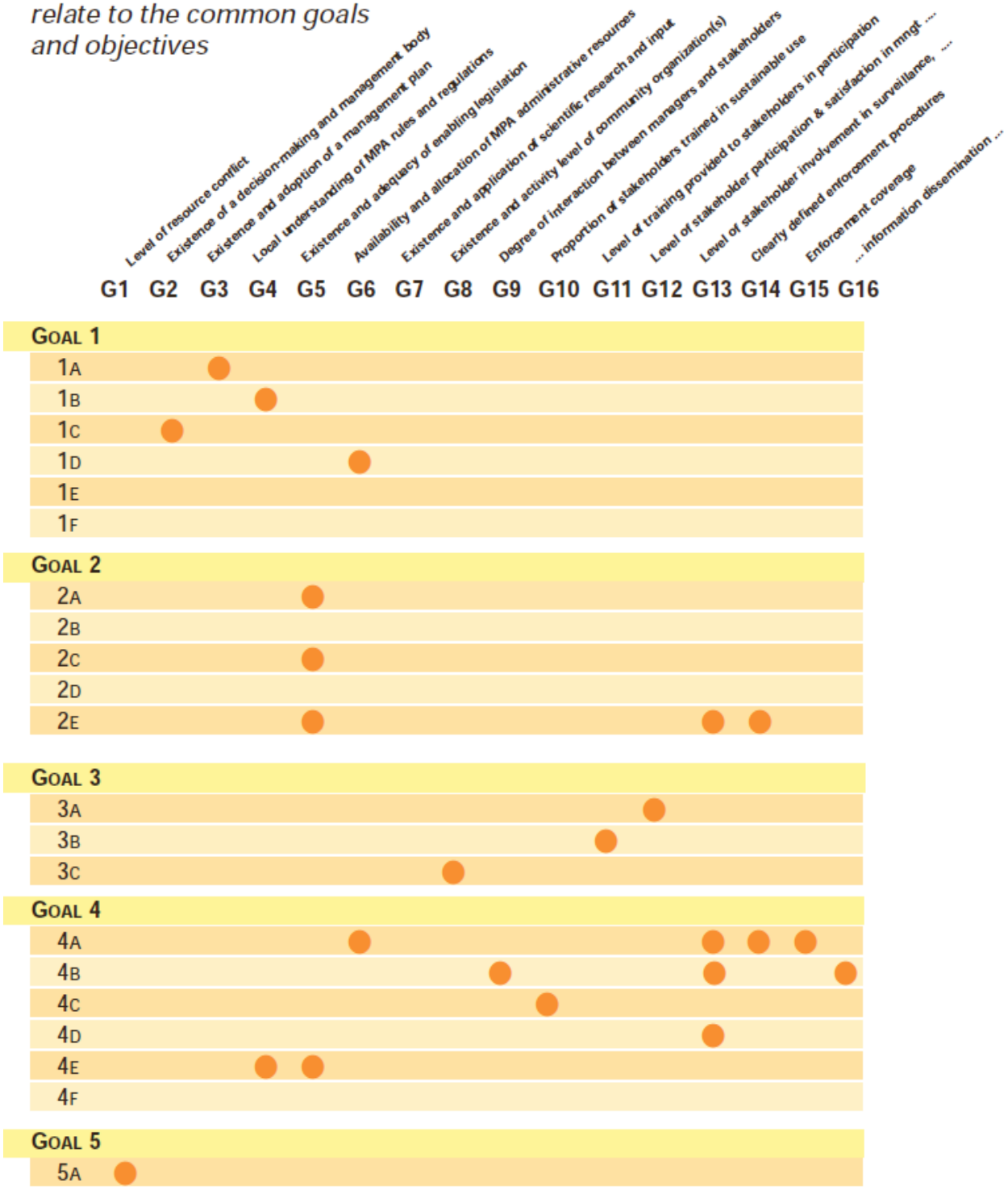
GOAL 1	**Food security enhanced or maintained**
1A	*Nutritional needs of coastal residents met or improved*
1B	*Improved availability of locally caught seafood for public consumption*
GOAL 2	**Livelihoods enhanced or maintained**
2A	*Economic status and relative wealth of coastal residents and/or resource 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*



Appendix VIII. 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



Appendix IX: List of Preparers

Michelle Meadows, Meadows Ecological, LLC

Ken Lindeman, PhD, Florida Institute of Technology (Member, MPA Expert Working Group)

2. Amendment 14 Overview

Overview

The purpose of the information is to guide individuals tasked with constructing the content of this section. The following includes quotes, suggestions, comments, and questions to consider while drafting content. Electronic copies of literature cited and relevant resources are provided.

The following includes content directly from the Final Amendment 14 document (SAFMC 2007). Decide on what information to include for the SMP or to only cite or summarize. Update information as appropriate.

The original purpose of Amendment 14 was

> "to employ a collaborative approach to identify sites for Type 2 marine protected areas (MPAs) with the potential to protect a portion of the population (including spawning aggregations) and habitat of long-lived, slow growing, deepwater snapper grouper species (speckled hind, snowy grouper, Warsaw grouper, yellowedge grouper, misty grouper, golden tilefish, and blueline tilefish) from directed fishing pressure to achieve a more natural sex ratio, age, and size structure within the proposed MPAs, while minimizing adverse social and economic effects" (SAFMC 2007).
>
> "Many snapper grouper species are vulnerable to overfishing because they are long-lived (e.g., snowy grouper, golden tilefish, red snapper, gag, scamp, red grouper, red porgy), protogynous, that is, change sex usually from females to males as they grow older/larger (e.g., snowy grouper, speckled hind, Warsaw grouper, yellowedge grouper, gag, scamp, red porgy, black sea bass), form spawning aggregations (e.g., snowy grouper, gag, scamp, red snapper), and suffer high release mortality in deepwater. Deepwater species (snowy grouper, golden tilefish, speckled hind, Warsaw grouper, blueline tilefish, and misty grouper) are most vulnerable to overfishing because they live for longer than 50 years, do not survive the trauma of capture, and are protogynous (groupers) or exhibit sexual dimorphism, that is males and females grow at different rates (tilefishes). Data deficiencies make it difficult for fishery scientists and managers to develop management measures that can be trusted to sustain stocks over time, particularly for those species that are very vulnerable to overfishing while attempting to minimize, to the extent practicable, the adverse socioeconomic impacts of management measures on fishing communities." (SAFMC 2007).

Overview

The Final Amendment 14 (SAFMC 2007) details the Council's history of MPA use and consideration, dating back to 1990. Since this information exists already, a summary of events may be sufficient. *Decide to include this text either directly from A14 (SAFMC 2007, Sections 1.1 - 1.3) in this section of the SMP (see below), as an appendix, or as a brief summary*). The Snapper Grouper Fishery Management Unit (FMU) currently consists of 60 species managed under the Snapper Grouper Fishery Management Plan, including seven "deepwater complex" species: snowy grouper, misty grouper, speckled hind, yellowedge grouper, Warsaw grouper, golden tilefish, and blueline tilefish (SAFMC 2007; SAFMC 2015). *Consider utilizing a graphical timeline of the events establishing the MPAs in lieu of using the text below (Fig. 1, SAFMC 2009).*

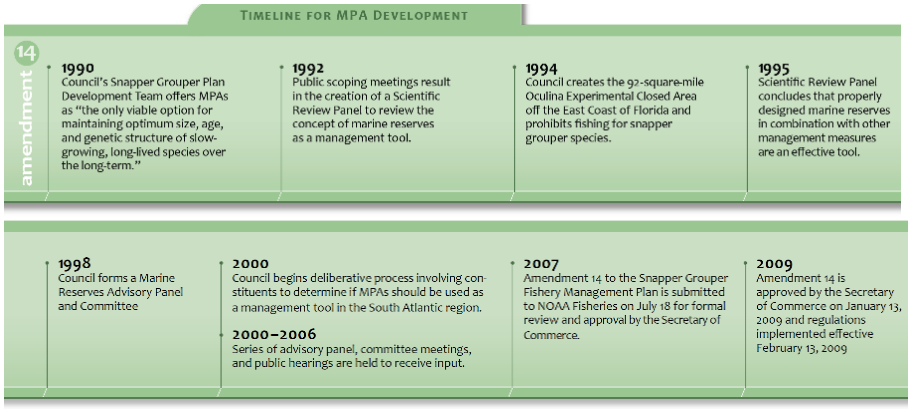


Figure 1. Timeline for MPA Development (SAFMC 2009).

"1.1 History of the Council's Consideration of MPAs

The Snapper Grouper Fishery Management Unit (FMU) is a complex of 73 species managed under the Snapper Grouper Fishery Management Plan by the South Atlantic Fishery Management Council. The FMU is very diverse and contains snappers, groupers, jacks, porgies, tilefishes, grunts, and sea basses. Seven snapper grouper species make up the "deepwater complex": snowy grouper, misty grouper, speckled hind, yellowedge grouper, Warsaw grouper, golden tilefish, and blueline tilefish. The fishery has been under management since 1983, and the original FMP has been amended 13 times. Management measures currently in place include bag limits, size limits, gear prohibitions, seasonal closures, a commercial limited entry program, and quotas.

Michelle Tishler 4/9/2015 1:10 PM
Comment [1]: Now 60 species

The potential for using Marine Protected Areas (MPAs) as a management tool for the snapper grouper fishery first originated with the Council's Snapper Grouper Plan Development Team (PDT). This technical group prepared a report (PDT 1990a) entitled "The Potential of Marine Fishery Reserves for Reef Fish Management in the U.S. South Atlantic." The Plan Development Team offered this approach because they believed it was the only viable option for maintaining

Overview

optimum size, age, and genetic structure of slow growing, long-lived species over the long-term. The Council received an extensive briefing on marine reserves at the February 1990 Council meeting. This provided an opportunity for the Council to discuss marine reserves as a concept and to hear about experiences with reserves in other parts of the world.

Marine reserves were initially considered as a possible option in early discussions on Amendment 4 to the Snapper Grouper Fishery Management Plan, however the Council determined the reserve concept should be addressed separately and scheduled scoping meetings in each of the states. During 1992 the Council held scoping meetings. During the 1992 scoping process support for and against the concept surfaced. The Council reviewed the scoping information at the January 1993 meeting and decided to: (1) recommend to National Marine Fisheries Service that they convene a Scientific Review Panel to review the concept of MPAs and (2) drop consideration of the marine reserve concept at that time.

A scientific review of the 1990 Snapper Grouper Plan Development Team report was completed by the Scientific Review Panel (NOAA 1995) as requested by the Council. The panel consisted of international experts with different experience in fishery science, marine reserves, ecology, fish genetics, sociology, and economics. The Scientific Review Panel concluded that properly designed marine reserves, in combination with other management measures, can be an effective management tool for reef fish resources in the U.S. South Atlantic region subject to the following conditions: (1) biological, ecological, social, and economic objectives of the marine reserves are clearly specified; (2) the relative biological, ecological, and economic impacts of marine reserves in the context of other fishery management measures have been estimated for various constituents; and (3) the development of marine reserve proposals proceed with the involvement of all constituencies and stakeholders.

Also the scientific review panel concluded that recognizing the alarming declines in stocks of key fishery species, the panel would urge that marine reserves options be considered immediately as part of a comprehensive fisheries management plan to prevent irreversible loss to species and fisheries.

In further developing Snapper Grouper Amendment 8 (and later Amendment 9), the Council realized that severe impacts would be felt by fishermen if necessary percentage reductions in catches of overfished species were imposed to achieve the mandated fishery management goals. Marine reserves once again surfaced as a potential alternative to fisheries closures.

In 1998 after deciding to reconsider the possibilities of marine reserves, the Council proceeded to take steps to initiate a fact-finding process using the Marine Reserves Committee and Advisory Panel (AP). An Action Plan was then developed that included three phases: (1) Phase I. Planning/Criteria Development, during which criteria where developed and questions were raised about the proper

size, placement, and regulations within any potential marine reserves; (2) Phase II. Decision Phase in which the Council, drawing on input from 3 rounds of scoping meetings, a Marine Reserves Workshop, and the Marine Reserves AP made the decision that marine reserves were a necessary management tool for snapper grouper management; and (3) Phase III. Implementation, which includes the Council's development of this amendment.

When the informal meetings were held in 2000, the Council's intent was to begin a dialogue with stakeholders about the possibilities of using marine reserves as a management tool for snapper grouper species and not discuss specific management measures or specific sites. The meetings were not held by the Council, but Council members and staff made themselves available to meet with any group that made a request. Between January and March of 2000, Council members and staff attended 15 meetings including commercial fishing groups, recreational fishing groups, and conservation organizations. A total of 291 people attended these meetings. Through the informal meeting process, the Council was able to gauge public support for marine reserves and discuss all possible options for managing overfished snapper grouper species to determine whether marine reserves were a tool the Council should consider using.

During May and June 2000, the Council held another round of eight scoping meetings on marine reserves to give the public an opportunity to comment before the Council developed a position on whether or not to move forward with developing marine reserves as a management tool. As with the informal meetings, the Council had not yet discussed specific boundary options but was ready to make a decision on the general concept of marine reserves.

Stakeholders voiced many different opinions on the use of marine reserves. There was an equal amount of support and opposition for no-take marine reserves, but many different variations were offered from all sides. Many groups were in support of protecting known spawning areas from fishing and creating artificial habitats and prohibiting fishing in these areas.

As a result of the input received from the 2000 scoping meetings, the Marine Reserves Workshop, advice from the Marine Reserves Areas Advisory Panel, the Scientific and Statistical Committee, and the Snapper Grouper Assessment Group, the Council voted to move forward with using marine reserves.

After deciding that marine reserves were a management tool that was needed to help recover overfished snapper grouper species, the Council then needed to determine the appropriate locations to site marine reserves and the appropriate regulations within the boundaries. Continuing with the Council's philosophy of building support for marine reserves from the ground up, the Council looked to stakeholders to suggest where marine reserves should be placed (scoping process). In the Spring of 2001 the Council held a final nine scoping meetings. The public were provided charts that showed known hardbottom areas off the

South Atlantic coast and were asked to use their experience and knowledge of snapper grouper species (specifically deepwater snapper grouper species) to suggest areas the Council may want to consider designating as marine reserves. As a part of this scoping process, the Marine Reserves Advisory Panel was asked to also suggest areas. As a result of this process over 40 sites were suggested and originally considered as potential marine reserves (sites not analyzed in detail and proposed as management measures in this document are listed and discussed briefly in **Appendix A**).

At their February 2001 meeting, the Council's Marine Reserves Committee discussed the difficulty managers and stakeholders were facing given that many different agencies were looking at marine reserves, marine sanctuaries, marine protected areas, etc. The different nomenclature associated with this management tool made things very confusing to the public and managers alike. The Committee determined that the term "marine reserves" was coming to imply an area that allowed no fishing. This was contrary to the Council's definition and intent. In order to be more consistent with national definitions the Council adopted the term Marine Protected Areas (MPAs).

Marine Protected Areas, as defined in Presidential Executive Order 13158, means any area of the marine environment that has been reserved by federal, state, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein.

The Council further defines MPAs within its jurisdiction as a network of specific areas of marine environments reserved and managed for the primary purpose of aiding in the recovery of overfished stocks and to ensure the persistence of healthy fish stocks, fisheries, and habitats. Such areas may be over natural or artificial bottom and may include prohibition of harvest on a permanent or lesser time period to accomplish needed conservation goals.

Another aspect of the development of appropriate MPA alternatives was deciding which activities if any would be allowed in any areas designated as an MPA. The PDT report presented to the Council in 1990 suggested that these areas be set aside for nonconsumptive uses. Later when the Council began seriously looking at the use of MPAs as a management tool they purposely crafted a broad definition of the tool (marine reserves are specific areas of marine environment managed for the primary purpose of aiding in the recovery of overfished stocks and to ensure the persistence of healthy fish stocks, fisheries, and habitats). This definition allowed the Council, its advisors, and the public to discuss and analyze the costs and benefits of allowing varying activities in the future proposed MPAs. The Council considered and presented to the public the following types of actions that they considered in designating MPAs.

Type 1 - Permanent closure/no-take
Type 2 - Permanent closure/some take allowed

Overview

Type 3 - Limited duration closure/no-take
Type 4 - Limited duration closure/some take allowed

Ultimately the Council narrowed its focus for this round of MPAs and determined the greatest need for this management tool at this time was to protect deepwater snapper grouper species. After that decision was made the Council determined that both the social and economic costs of prohibiting all fishing were greater than the benefits (more effective law enforcement). The majority of the proposed MPAs (designed to protect deepwater snapper grouper species) are also very popular trolling spots for the pelagic fisheries. Therefore the Council choose to move forward with designating the proposed MPAs as Type 2 MPAs where the harvest and possession of snapper species would be prohibited within their borders (however, the prohibition on possession does not apply to a person aboard a vessel that is in transit with fishing gear appropriately stowed as defined in Appendix F).

Considerations for Type 1 vs. Type 2 Marine Protected Areas

Benthic-pelagic linkages

The net ecological effect of allowing fishing for pelagic species (e.g., billfish, tunas, dolphin, wahoo, and others) in a Type 2 MPA designated to protect deep-water snapper grouper species (e.g., snowy grouper, tilefish, queen snapper, and others) is anticipated to be minimal for two reasons. First, there may not be a strong ecological link between pelagic species and benthic top predators in the proposed Type 2 MPAs, as those in one depth stratum rarely consume those of the other (Wahle *et al.* 2006). Deepwater snapper grouper species are generally found less than two meters from the substrate. Pelagic species are usually found in the top 30 meters of the water column and their interaction with benthic species is minimal. While there may not be a direct, strong ecological link between pelagic species and deepwater snapper grouper, food web models indicate there are trophic relationships between the two groups (Weaver and Sedberry 2005). Furthermore, some pelagic species, such as greater amberjack, occur throughout the water column, including the benthos and are taken with trolling and bottom tending gear. Greater amberjack have been collected in many of the proposed Type 2 MPAs and have been observed on the bottom from a submersible in several of the proposed Type 2 MPAs (Sedberry *et al.* 2005). While greater amberjack is not a direct predator of deepwater snapper grouper species, it probably shares food resources. There is also evidence other pelagic species such as swordfish, bluefin tuna, yellowfin tuna, and various shark species follow isolumes and occur in deepwater during daylight hours; however, these species are usually found offshore of the proposed Type 2 MPAs (Brill and Lutcavage 2001; Loefer *et al.* 2005). Although there is some trophic interaction, pelagic species and deepwater snapper grouper species generally take advantage of spatially distinct food and habitat resources and usually remain in close proximity to their set of resource needs.

Overview

Pelagic species such as marlins and tunas are not likely to be strongly affected by the proposed Type 2 MPAs because these species may swim in and out of the small protected areas frequently and would continue to be vulnerable to fishing outside of the closed area. Any impacts pelagic species such as marlins and tunas may indirectly have on the deepwater snapper grouper species is therefore unlikely to be affected by the establishment of the proposed Type 2 MPAs, even if fishing for the former were still allowed in the closed area (Wahle *et al.* 2006).

Bycatch of snapper grouper species in fishery for pelagic species such as marlins and tunas Pelagic species are generally captured by trolling (i.e., towing artificial or live bait behind the wake of a vessel) at depths of 10 – 30 meters from the surface (Everhart and Youngs 1981). The proposed Type 2 MPAs are at depths ranging from 60-700 meters. However, methods used to troll for coastal migratory pelagics can access deep reef fishes. NOAA Fisheries researchers used a variety of gear types and techniques to assess the susceptibility of reef fish to trolling using downriggers at 200-400 feet in the Madison- Swanson MPA in the Gulf of Mexico (David 2003). Reef fish (gag, speckled hind, red snapper, Warsaw grouper, scamp, and greater amberjack) were captured at a rate of one fish every 100 minutes. Therefore, a Type 2 MPA where fishing for non-snapper grouper pelagic species is allowed could result in bycatch of snapper grouper species, including some deepwater species targeted for protection in this amendment.

Problems with enforcement of the proposed Type 2 MPAs
The main enforcement concern with the proposed MPAs is their Type 2 status. When no fishing is allowed in an area (as in a Type 1 MPA or marine reserve), and a vessel monitoring system (VMS) shows a vessel has been in the closed area, enforcement can potentially use this information along with other information to determine whether a violation has occurred. However, in a Type 2 MPA where some fishing is allowed, it is more difficult to determine whether a violation has occurred. In this situation, the only purpose served by VMS is to alert the agent that someone is in the area, not to document wrongdoing. Because the proposed MPAs are far offshore, the transit time required from when law enforcement learns someone is in an MPA to when law enforcement arrives at the site in question may be substantial, and the violator may be gone before enforcement is able to respond to a potential violation.

During 2001 and into 2002 the Council, with help from its advisors, began working to determine which of the 40 sites suggested through scoping would best meet the Council's management objective to protect deepwater snapper grouper species. In August of 2001 the Council held an unprecedented "Mega-AP" meeting of the Habitat, Coral, Snapper Grouper, MPA, Law Enforcement, and Wreckfish Advisory Panels (APs). The APs were asked to help the Council select sites that would be the most beneficial to the overfished, deepwater snapper grouper species using their various and vast knowledge, understanding that the Council's intent was to look at sites that protect more inshore snapper grouper species further down the line.

Overview

Later in 2001 the Snapper Grouper Assessment Group, the Scientific and Statistical Committee, and the Snapper Grouper AP met with the Council's Snapper Grouper Committee to provide additional input on the possible MPA sites. Based on input from the SSC, APs, and the Snapper Grouper Committee, the Council then instructed staff to develop an options paper for Snapper Grouper Amendment 14 with an initial level of analysis of sites the Council felt met the criteria of protecting overfished, deepwater snapper grouper species.

The sites that met the criteria of protecting overfished, deepwater snapper grouper species were included in the Informational Public Hearing Document and taken out to public hearings in early 2004. At those public hearings social and economic data were collected to help staff refine sites and analyze the impacts of the proposed sites. The information gathered at the Informational Public Hearings was useful in helping staff begin to assess the social and economic impacts of each individual site and is summarized under the discussion of each management measure in Section 4.

The Council produced a source document that includes much of the material prepared during development and consideration of MPA (SAFMC 2005). This material is available on the Council's website.

1.2 Considerations for MPA Design

There is a large body of recommendations for design of marine reserves and MPAs, based on scientific hypotheses and observations from current projects. Specific design considerations are summarized in the report of the Plan Development Team (1990). Questions about the proper size, placement, and regulations for potential reserves were considered by the Scientific Review Panel convened by NOAA in 1990 to review the concept of MPAs, and by the Council's Marine Reserves Committee and Advisory Panel in writing their Action Plan in 1998. The Council has focused on the presence of deepwater snapper grouper species and their habitat as the primary biological criteria for a deepwater Type 2 MPA.

While biological considerations alone may suggest certain MPA design characteristics, the social and economic impacts of MPAs on fishing communities must also be taken into consideration, for two reasons. First, National Standard 8 of the Magnuson-Stevens Act requires the Council to "take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities." Second, research shows "a fundamental lesson learned from experience throughout the world is that attempts to implement MPAs in the absence of general community support invariably fail. Inclusion of "bottom-up" or "grass-roots" approaches to planning, design, and implementation of MPAs offers the best opportunity to develop plans with the endorsement of local communities (NRC 2001)." This type of "bottom-

up" approach has been the goal of the Council since the outset of their deliberations on MPAs in the South Atlantic, and its implementation has allowed them to successfully balance biological considerations with public concerns when determining the characteristics of their proposed MPAs.

Due to the complex nature of ecosystems and the limitations of traditional fisheries management methods, fisheries management may benefit from multiple management components as part of an overall plan. The proposed Type 2 MPAs are intended to augment, not replace, existing management. Lauck *et al*. (1998) suggests ". . . MPAs can serve to hedge against inevitable uncertainties, errors, and biases in fisheries management." The proposed Type 2 MPAs are expected to perform this function, among others, for the management of deepwater snapper grouper species in the South Atlantic.

1.3 Purpose and Need

Recent stock assessments indicate snowy grouper, golden tilefish, vermilion snapper, and black sea bass are experiencing overfishing (NMFS 2005b). Snowy grouper, black sea bass, and red porgy are overfished (NMFS 2005b). While we do not know the status of all snapper grouper species, it is a safe presumption based on the data we do have that the size, age, and genetic structure of many snapper grouper species has been altered by fishing pressure. Amendment 13C included management measures that end overfishing of snowy grouper, golden tilefish, vermilion snapper, and black sea bass. Amendment 15 will specify rebuilding plans for snowy grouper, black sea bass, and red porgy.

Many snapper grouper species are vulnerable to overfishing because they are long-lived (e.g., snowy grouper, golden tilefish, red snapper, gag, scamp, red grouper, and red porgy), protogynous, i.e., change sex usually from female to males as they grow older/larger (e.g., snowy grouper, speckled hind, Warsaw grouper, yellowedge grouper, gag, scamp, red porgy, and black sea bass), form spawning aggregations (e.g., snowy grouper, gag, scamp, and red snapper), and suffer high release mortality in deepwater. Deepwater species (snowy grouper, golden tilefish, speckled hind, Warsaw grouper, blueline tilefish, and misty grouper) are most vulnerable to overfishing because they live for longer than 50 years, do not survive the trauma of capture, and are protogynous (groupers) or exhibit sexual dimorphism, i.e., males and females grow at different rates (tilefishes). Data deficiencies make it difficult for fishery scientists and managers to develop management measures that can be trusted to sustain stocks over time, particularly for those species that are very vulnerable to overfishing while attempting to minimize, to the extent practicable, the adverse socioeconomic impacts of management measures on fishing communities.

The primary purpose of these actions is to employ a collaborative approach to identify MPA sites with the potential to protect a portion of the population (including spawning aggregations) and habitat of long-lived, slow growing, deepwater snapper grouper species (speckled hind, snowy grouper, Warsaw

grouper, yellowedge grouper, misty grouper, golden tilefish, and blueline tilefish) from directed fishing pressure to achieve a more natural sex ratio, age, and size structure within the proposed Type 2 MPAs, while minimizing adverse social and economic effects. The proposed Type 2 MPAs are the most effective fishery management tool that allows deepwater snapper grouper species to reach their natural size and age, protect spawning locations, and provide a refuge for early developmental stages of fish species."

Overview

Legislative Authority

Decide whether to include this text directly from Amendment 14 (SAFMC 2007, Section 3.4), as an appendix, or as a brief summary and citation. Consider using an organogram to represent the regulatory agencies in charge of implementing the system management plan and managing the MPAs.

"3.4 Administrative Environment
3.4.1 The Fishery Management Process and Applicable Laws
3.4.1.1 Federal Fishery Management

Federal fishery management is conducted under the authority of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) (16 U.S.C. 1801 et seq.), originally enacted in 1976 as the Fishery Conservation and Management Act and recent reauthorization in January 2007. The MSFCMA claims sovereign rights and exclusive fishery management authority over most fishery resources within the U.S. Exclusive Economic Zone (EEZ), an area extending 200 nautical miles from the seaward boundary of each of the coastal states, and authority over U.S. anadromous species and continental shelf resources that occur beyond the U.S. EEZ.

Responsibility for Federal fishery management decision-making is divided between the U.S. Secretary of Commerce and eight regional Fishery Management Councils that represent the expertise and interests of constituent states. Fishery Management Councils are responsible for preparing, monitoring, and revising management plans for fisheries needing management within their jurisdiction. The Secretary of Commerce (Secretary) is responsible for collecting and providing the data necessary for the Councils to prepare fishery management plans and for promulgating regulations to implement proposed plans and amendments after ensuring that management measures are consistent with the MSFCMA and with other applicable laws summarized in Section 8.0. In most cases, the Secretary has delegated this authority to NOAA Fisheries Service (NMFS).

The South Atlantic Fishery Management Council is responsible for conservation and management of fishery resources in Federal waters of the U.S. South Atlantic. These waters extend from 3 to 200 miles offshore from the seaward boundary of the States of North Carolina, South Carolina, Georgia, and east Florida to Key West. The Council has thirteen voting members: one each from the state fishery agencies of North Carolina, South Carolina, Georgia, and Florida; eight public members appointed by the Secretary; and one from NOAA Fisheries Service. On the South Atlantic Council there are two public members from each of the four South Atlantic States. Non-voting members include representatives of the U.S. Fish and Wildlife Service, U.S. Coast Guard, State Department, and Atlantic States Marine Fisheries Commission (ASMFC). The South Atlantic Council has adopted procedures whereby the non-voting members serving on Council committees have full voting rights at the committee level but not at the full Council level. Council members serve three-year terms and are recommended by

Overview

State Governors and appointed by the Secretary of Commerce from lists of nominees submitted by State governors. Appointed members may serve a maximum of three consecutive terms.

Public interests also are involved in the fishery management process through participation on Advisory Panels and through council meetings, which, with few exceptions for discussing personnel matters, are open to the public. The Council uses a Scientific and Statistical Committee to review the data and science being used in assessments and fishery management plans/amendments. In addition, the regulatory process is in accordance with the Administrative Procedures Act, in the form of "notice and comment" rulemaking.

3.4.1.2 State Fishery Management

The State governments of North Carolina, South Carolina, Georgia, and Florida have the authority to manage fisheries that occur in waters extending three nautical miles from their respective shorelines. North Carolina's marine fisheries are managed by the Division of Marine Fisheries within the North Carolina Department of Environment and Natural Resources. The Marine Resources Division of the South Carolina Department of Natural Resources regulates South Carolina's marine fisheries. Georgia's marine fisheries are managed by the Coastal Resources Division of the Department of Natural Resources. The Division of Marine Fisheries within the Florida Fish and Wildlife Conservation Commission is responsible for managing Florida's marine fisheries. Each state fishery management agency has a designated seat on the South Atlantic Council. The purpose of state representation at the Council level is to ensure state participation in Federal fishery management decision-making and to promote the development of compatible regulations in State and Federal waters.

The South Atlantic States are also involved through the Atlantic States Marine Fisheries Commission (ASMFC) in management of marine fisheries. This commission was created to coordinate state regulations and develop management plans for interstate fisheries. It has significant authority, through the Atlantic Striped Bass Conservation Act and the Atlantic Coastal Fisheries Cooperative Management Act, to compel adoption of consistent State regulations to conserve coastal species. The ASFMC also is represented at the Council level, but does not have voting authority at the Council level.

NOAA Fisheries Service's State-Federal Fisheries Division is responsible for building cooperative partnerships to strengthen marine fisheries management and conservation at the State, inter-regional, and national levels. This division implements and oversees the distribution of grants for two national (Inter-jurisdictional Fisheries Act and Anadromous Fish Conservation Act) and two regional (Atlantic Coastal Fisheries Cooperative Management Act and Atlantic Striped Bass Conservation Act) programs. Additionally, it works with the ASMFC to develop and implement cooperative State-Federal fisheries regulations.

Overview

3.4.2 Enforcement

There is a perception by some fishery stakeholders that a lack of enforcement is a major impediment to successful fishery management in the South Atlantic region (The Heinz Center 2000). As discussed below, multiple agencies provide enforcement assets to Federal fisheries concerns in the South Atlantic region.

Both the National Oceanic and Atmospheric Administration (NOAA) Fisheries Office for Enforcement (NOAA/OLE) and the United States Coast Guard (USCG) have the authority and the responsibility to enforce South Atlantic Council regulations. NOAA/OLE agents, who specialize in living marine resource violations, provide fisheries expertise and investigative support for the overall fisheries mission. The USCG is a multi-mission agency, which provides at-sea patrol services for the fisheries mission.

Neither NOAA/OLE nor the USCG can provide a continuous law enforcement presence in all areas due to the limited resources of NOAA/OLE and the priority tasking of the USCG. To supplement at-sea and dockside inspections of fishing vessels, NOAA entered into Cooperative Enforcement Agreements with all but one of the States in the Southeast Region, which grants authority to State officers to enforce the laws for which NOAA/OLE has jurisdiction. In recent years, the level of involvement by the States has increased through Joint Enforcement Agreements, whereby States conduct patrols that focus on Federal priorities and, in some circumstances, prosecute resultant violators through the State when a State violation has occurred. The State of North Carolina does not currently participate; their State constitution first needs to be modified to allow them to participate.

NOAA General Counsel issued a revised Southeast Region Magnuson-Stevens Act Penalty Schedule in June 2003, which addresses all Magnuson-Stevens Act violations in the Southeast Region. In general, this Penalty Schedule increases the amount of civil administrative penalties that a violator may be subject to up to the current statutory maximum of $120,000 per violation."

"Because the targeted species live a long time and grow slowly, it is likely that the desired changes in sex ratio, size, and age structure resulting from establishment of the Type 2 MPAs will not be apparent in the short-term. For example, Roberts *et al*. (2001) found the lag time between establishment of a marine reserve and occurrence of record-size specimens of spotted sea trout, red drum, and black drum corresponded closely to the species longevity, with record-size specimens of longer-lived species taking longer to occur. It follows that, since the mean age at sexual maturity of golden tilefish is 24 years (SEDAR 4 2004), the generations of golden tilefish which are protected from fishing by the Type 2 MPAs will not reproduce until many years after the MPAs are implemented. Desired demographic changes may not be detectable at the population level for many years, and would therefore be considered long-term effects of the Type 2 MPAs.

Overview

However, it is possible that some short-term effects such as more and larger fish would be seen on a timeframe closer to 10 years as Koenig (2001) found with groupers in the Oculina Experimental Closed Area" (SAFMC 2007).

Regulations

All eight of the Amendment 14 deepwater MPAs are Type 2 MPAs, which are permanent closures with some fishing activities permitted within their boundaries (SAFMC 2006, SAFMC 2009; Fig. 2). The following are *prohibited* within the borders of these MPAs:
-Harvest or possession of snapper-grouper species.
-Shark bottom longlines to protect deepwater species and associated habitat.

The following are *permitted* within the MPAs:
-Trolling for pelagic species (e.g., dolphin, tuna, wahoo, billfish, mackerel, etc.).
-Transit through the MPAs with snapper-grouper species onboard with associated fishing gear properly stowed.

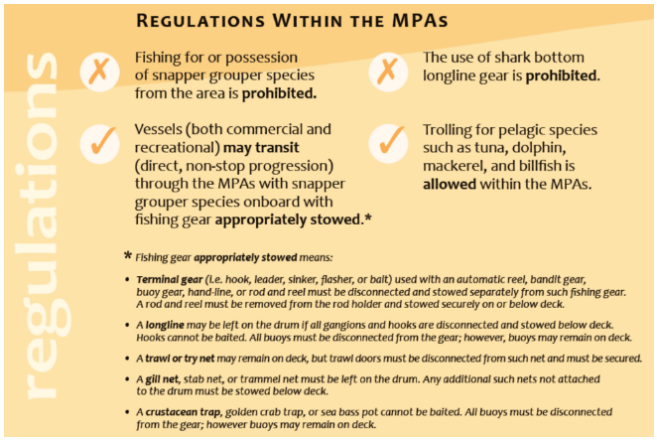


Figure 2. Summary of Amendment 14 deepwater MPA regulations (from SAFMC 2009).

Overview

Literature Cited and Resources Consulted

The literature cited from the quoted text is not included in this section.

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

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

SAFMC. 2006. Public Hearing Draft, Snapper Grouper Amendment 14. South Atlantic Fishery Management Council, Charleston, South Carolina. 440 p.

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

SAFMC. 2015. Regulations by species. http://safmc.net/fish-id-and-regs/regulations-species (Accessed 01/27/2015).

SMP Outline: System management plan outline for the SAFMC Amendment 14 MPAs. 2013. Report for the SAFMC Briefing Book September 2013, 29 p.

U.S. Department of Commerce. 2007. Florida Keys National Marine Sanctuary: Revised management plan. National Oceanic and Atmospheric Administration. Office of National Marine Sanctuaries. Silver Spring, MD. 369 p.

Overview

3.1 GOALS AND OBJECTIVES

Biophysical Goals and Objectives

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 within the MPA.
1b. Populations of target species for extractive or non-extractive use protected from harvest at sites and/or life history states where they become vulnerable.
1c. Overexploitation of living and/or non-living marine resources minimized, prevented, or prohibited entirely.
1d. Catch yields improved or sustained in fishing areas adjacent to the MPA.
1e. Replenishment rate of fishery stocks increased or sustained within the MPA. IPT: clarify and determine if should be included; taling numbers or biomass.

Goal 2. Biological diversity protected.

2a. Rare, localized, or endemic species protected; Species of particular concern (e.g., speckled hind and warsaw grouper).
2b. Areas protected that are essential for life history phases of species.
2c. Unnatural threats and human impacts eliminated or minimized inside the MPA.
2d. Alien and invasive species (e.g., lionfish) 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 local species' survival restored or maintained.
3c. Unnatural threats and human impacts eliminated or minimized inside the MPA.
3d. Alien and invasive species (e.g., lionfish) and genotypes removed <u>from</u> <u>area</u> or prevented from becoming established.

Goal 4. Habitat protected.

4a. Habitat quality and/or quantity restored or maintained.
4b. Unnatural threats and human impacts eliminated or minimized inside the MPA.
4c. Alien and invasive species (e.g., lionfish) and genotypes removed or prevented from becoming established.

Socioeconomic Goals and Objectives

Goal 1. Non-monetary benefits to society enhanced or maintained. IPT: Keep for now but difficult to measure.

1a. Existence value enhanced or maintained.
1b. Ecological services values enhanced or maintained.

Goal 2. Benefits from the MPA equitably distributed.

2a. Monetary benefits distributed equitably to and through coastal communities.
2b. Non-monetary benefits distributed equitably to and through coastal communities.

Goal 3. Environmental awareness and knowledge enhanced. IPT: Seems this is Outreach.

3a. Respect for an/or understanding of local knowledge enhanced.
3b. Public's understanding of environmental and social 'sustainability' improved.
3c. Level of scientific knowledge held by the pubic increased.
3d. Scientific understanding expanded through research and monitoring.

Governance Goals and Objectives

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 recognized 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 federal and state rights and obligations maximized or ensured.
- 2c. 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. IPT: Need a SMP Advisory Panel.

Goal 4. Management plan compliance by resource users enhanced.
- 4a. Surveillance and monitoring of coastal areas improved.
- 4b. Compliance with regulations. IPT: assessment with number of NOVA's, etc.
- 4c. User participation in surveillance, monitoring, and enforcement increased.
- 4d. Application of law and regulations adequately maintained or improved.

Note: IPT suggested that research vessels should record when vessels are observed within MPAs; satellites could also be used to document vessels within MPAs.

Goal 5. Resource use conflicts managed and reduced.
- 5a. User conflicts managed and/or reduced: (1) within and between user groups, (2) between user groups and the local community or between the community and people outside it, and/or (3) user groups and managers can examine comments on proposed rules and minutes from public hearings.
- 5b. Assess with an Opinion Survey: look at type of violations.

Outreach Goals and Objectives

Goal 1. Environmental awareness and knowledge enhanced.

- 1a. Understanding of local knowledge enhanced.
- 1b. Public's understanding of environmental and social 'sustainability' improved.
- 1c. Level of scientific knowledge held by the public increased.

Goal 2. Effective stakeholder participation and representation ensured.

- 2a. Collaborative management systems ensured through equity of representation and efficacy in management practices.
- 2b. Co-management supported by effective strategies that improve resource user capacity.
- 3c. Community organizing and participation strengthened and enhanced.

Goal 3: Management plan compliance by resource users enhanced through effective communication.

- 3a. Communication products accessible to the public in various formats.
- 3b. Management plan development delivered through transparent and open process.
- 3c. Compliance with the management plan is fostered through targeted communication.

Resource Protection

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 MPAs is one of the most controversial and concerning aspects of this type of area based management. The Council has been advised throughout the entire process of developing MPAs 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 MPAs. Because the Council chose to allow some fishing (Type 2 MPAs) and transit through the MPAs, enforcement continues to be very challenging.

The authority to enforce MPA regulations comes from the Magnuson-Stevens Act and is granted to the USCG and NMFS (Table xx). 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 MPA regulations if a North Carolina licensed vessel is found in violation of the federal regulations.

Table xx. Natural resource enforcement agency's role and authority for enforcement of regulations for the deepwater MPAs 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 to better enforce the deepwater MPAs.
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 deepwater MPA regulations.
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 deepwater MPA regulations.
NCDENR	North Carolina does not have a Joint Enforcement Agreement with NOAA Fisheries. The state currently has one vessel that could patrol the deepwater MPA off North Carolina but funding for the vessel is uncertain.

Law enforcement partners were requested to update information on the enforceability of the MPAs and available assets that could be used to monitor the MPAs. Enforceability ratings were given by state agencies and USCG for each of the deepwater MPAs. Two very large obstacles continue to limit enforcement of some deepwater MPAs: (1) distance from shore of the majority of MPAs 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.

In 2015, the FWC revised the enforceability rating of the MPAs off Florida from a Low rating (in Amendment 14) to a High rating. This is due to the shift in enforcement assets that FWC performed in 2014 to better service offshore closed areas along Florida's east coast. Off North Carolina, the Snowy Grouper Wreck MPA was rated as Moderate by the USCG. The USCG did not provide enforceability ratings for the deepwater MPAs in Amendment 14. The remaining MPAs continue to have a Low enforceability rating as originally considered in Amendment 14. The current ratings were 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 xx. The enforceability rating of the deepwater MPAs in the South Atlantic. State Ratings were developed by state enforcement agency in the closest state.

MPA	Closest State	Amendment 14 Rating	State Rating (2015)	USCG Rating (2015)
North Florida	Florida	Low	High	Low
St. Lucie Hump	Florida	Moderate	High	Low
East Hump	Florida	Moderate	High	Low
Georgia	Georgia	Low	Low	Low
Northern South Carolina	South Carolina	Low	Low	Low
Edisto	South Carolina	Low	Low	Low
Charleston Deep Artificial Reef	South Carolina	Low	Low	Low
Snowy Grouper Wreck	North Carolina	Low	Low	Moderate

The MPAs became effective in February 2009 and information was provided by the USCG and FWC……

Table xx. Patrols of the deepwater MPAs.

Year	Lead Agency	MPA	Hours	Transit Hrs	# of sorties/patrols	# of vessels sighted	# of vessels boarded
2009							
2010							
2011							
2012							
2013							
2014							

The available assets to monitor the deepwater MPAs vary by state and agency. GADNR does not a have vessel capable of traveling 60 miles offshore to the Georgia MPA or other nearby MPAs. NCDENR currently has one vessel capable of traveling to the Snowy Wreck MPA; 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 xx).

Table xx. USCG enforcement assets available for monitoring the deepwater MPAs.

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

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

Governance Goal 2: Effective legal structures and strategies for management maintained

c. Enforceability of arrangements ensured

Governance Goal 4: Management plan compliance by resource users enhanced

a. Surveillance and monitoring of coastal areas improved
d. User participation in surveillance, monitoring, and enforcement increased
e. Application of law and regulations adequately maintained or improved
f. Access to and transparency and simplicity of management plan ensured and compliance fostered

Top Priorities:

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 MPA patrols and investigations.

Tasks:

- Schedule MPA enforcement activities and challenges to be reported at LEAP annual meeting to coordinate MPA patrols and investigations.

Justification:
Deliverables:
Schedule:
Budget:
Potential Partners/roles: NMFS, Law Enforcement Partners

Tasks:

- Continue to have officers train at the USGC 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 MPAs.
Deliverables:
Schedule:
Budget:
Potential Partners/roles: USCG, NOAA OLE, FWC, GADNR, NCDENR, SCDNR

Tasks:

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

Action Item 2: Maintain the "high" enforceability rating for the Florida MPAs and increase the enforceability rating to at least "moderate" for the other MPAs.

Tasks:

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

Justification: Protection of the deepwater MPAs is crucial to their success. Fishing incursions into MPAs could remove individuals from the population and prevent maintenance of a natural sex ratio, age structure, and size structure.
Deliverables:
Schedule: Med/Long-term (with funding)
Budget:
Potential Partners/roles: Law Enforcement Partners

Action Item 3: Patrol MPAs with aerial and at-sea assets

Tasks:

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

Justification: A deterrent presence is needed in the deepwater MPAs to reduce incursions into the areas. Fishing incursions may prevent attaining the stated biological goals of the MPAs.
Deliverables:
Schedule:
Budget:
Potential Partners/roles: Law Enforcement Partners

Action Item 4: Initiate a remote monitoring program for the deepwater MPAs.

Tasks:

- Review methods for remote monitoring in offshore areas.

Justification: Patrols in the deepwater MPA are expensive and can occupy an entire day for officers involved in the patrol. Frequently when patrols occur in the MPAs, 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:
Potential Partners/roles: NMFS MPA Center, NMFS SEFSC, SECOORA, NOS, SAFMC Staff

Tasks:

- Apply to possible funding sources for remotely monitoring offshore sites

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.
Deliverables: Grant/Funding requests for monitoring offshore areas.
Schedule: Long-term
Budget:

Potential Partners/roles:

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

Tasks:

- Identify potential partners (federal and state resource agencies, NGOs, academic institutions) to seek funding for a cooperative research/citizen science program focusing on MPA 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:
Budget:
Potential Partners/roles: SAFMC, NMFS SEFIS, FWC, GADNR, NCDNR, SCDNR

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

Tasks:

- Report quarterly/semi-annually/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: Quarterly enforcement reports
Schedule: Short-term
Budget:
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 deepwater MPAs while on patrol in the deepwater MPA and outreach and education events.

Justification:
Deliverables:
Schedule:
Budget:
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:
Schedule: Short-term
Budget: $0
Potential Partners/roles: SAFMC

Action Item 9: Potential for adjudication issues.
Tasks:
Justification:
Deliverables:
Schedule:
Budget:
Potential Partners/roles: Law Enforcement Partners

Research and Monitoring Action Plan

Scientific research and stakeholder collaboration was heavily incorporated into the decision making process of selecting the eight MPAs created by Amendment 14 (SAFMC 2007). This research, along with new research and monitoring, will continue to inform decision-makers during consideration of the existing and potential new protected areas (MPA Expert Workgroup 2012, 2013), and Special Management Zones (SMZs, A36).

The purpose of the Research and Monitoring Action Plan is to provide a guide for data collection and research activities inside the MPAs, 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 mapping, monitoring and assessment. 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 MPAs and environmental stressors in habitats in and adjacent to MPAs. There are finite resources available to execute the Research and Monitoring Plan; the best returns for both scientific and financial considerations are included below.

Mapping Needs

Action Item 1: Complete multibeam surveys of the MPAs.

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 MPAs.

Priority: High

Deliverables: High resolution GeoTIFFs

Projects Completed or Underway:

- NOAA Fisheries, Southeast Fisheries Science Center (SEFSC), Panama City Lab has been collecting multibeam data inside several of the MPAs since 2004 including:

Snowy Wreck, Northern South Carolina, Edisto, Georgia, North Florida, and East Hump.

- The NOAA Fisheries SEFSC Southeast Fishery-Independent Survey (SEFIS) group has collected multibeam data inside the North Florida MPA since 2010.
- NOAA Ocean Exploration (Sedberry) conducted sonar surveys between 2001 and 2003 in the North Florida and Northern South Carolina MPAs (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 encompass the entire North Florida MPA. 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 at the North Florida and East Hump MPAs (Reed et al., 2014).
- Note: We will include a figure displaying all the mapping that has been completed in and around the MPAs in the next draft.

Action Item 2: Complete multibeam surveys of areas adjacent to, but outside the MPAs (within a 20 nautical mile radius of the MPAs).

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 MPAs. Mapping these areas will support comparisons inside vs. outside the MPAs.

Priority: High

Deliverables: High resolution GeoTIFFs

Projects Completed or Underway:

- NOAA Fisheries, Southeast Fisheries Science Center, Panama City Lab has been collecting multibeam data adjacent to several of the MPAs since 2004 including: Snowy Wreck, Northern South Carolina, Edisto, Georgia, North Florida, and East Hump.
- NOAA Southeast Fishery-Independent Survey (SEFIS) has been collecting multibeam data outside several of the MPAs since 2010 including: Snowy Wreck, Northern South Carolina, Edisto, Georgia, and North Florida.
- NOAA Ocean Exploration (Sedberry) conducted sonar surveys between 2001 and 2003 adjacent to the North Florida and Northern South Carolina MPAs (Schobernd and Sedberry, 2009; Fraser and Sedberry, 2008).

- The US Navy contracted for a large multibeam survey off NE Florida in 2010. The locations mapped include surrounding areas north and south of the North Florida MPA. 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 outside the North Florida and East Hump MPAs (Reed et al., 2014).

Action Item 3: Ground-truth bathymetric data for habitat classification.

Justification: Acoustic bathymetry and backscatter data is useful for detecting features which may provide habitat for targeted reef fish, however visual data is 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.

Priority: Medium

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

Projects Completed or Underway:

- NOAA Fisheries, Southeast Fisheries Science Center, Panama City Lab has been collecting multibeam data with ROV groundtruthing inside and outside several of the MPAs since 2004 including: Snowy Wreck, Northern South Carolina, Edisto, Georgia, North Florida, and East Hump.
- Southeast Reef Fish Survey (SERFS), which is a collaboration of SEFIS and MARMAP, have been collecting multibeam data with trap and stationary camera groundtruthing inside and outside several of the MPAs since 2010 including: Snowy Wreck, Northern South Carolina, Edisto, Georgia, North Florida, and St. Lucie Hump.
- NOAA Ocean Exploration (Sedberry) conducted sonar surveys with submersible groundtruthing between 2001 and 2003 in and around North Florida and Northern South Carolina MPAs (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 which encompass the entire North Florida MPA and includes surrounding areas north and south of the MPA. Both areas are used for anti-submarine warfare training and encompass areas containing EFH and deep reefs. They also conducted ROV groundtruthing throughout the mapped area.

- NOAA's SE-DSCTP project completed mapping in 2011 inside and around the North Florida and East Hump MPAs (Reed et al., 2014).

Action Item 4: 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 if does require inputs of acoustic and visual data which themselves are acquired at relatively high cost.

Priority: Low

Deliverables: GIS map displaying the distribution of habitat types for all areas where multibeam surveys have been conducted.

Projects Completed or Underway: None

Research and Monitoring Needs

The main objective is to determine and monitor the effect of MPAs on deepwater snapper grouper species' distribution and status. The most significant benefit of MPAs 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 MPAs with the first step being collection of baseline data to compare to subsequent assessments.

Action Item 1: Determine pre-closure distribution and abundance of dominant harvested species in and outside the MPAs, 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.

Priority: High

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

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 distribution and abundance 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 data on distribution and abundance 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 Ocean Exploration conducted video surveys of fish species composition from submersible dives on shelf edge reefs at North Florida MPA and Northern South Carolina MPA from 2001-2003 (Schobernd and Sedberry, 2009; Fraser and Sedberry, 2008).
- North Carolina Sea Grant conducted acoustic surveys to measure reef fish relative abundance at Snowy Wreck MPA between 2007 and 2008 (Rudershausen et al., 2010).

Action Item 2: Maintain an annual monitoring program to collect data inside and outside the MPAs. Data collected should include: distribution, abundance, size and age structure, and sex ratios 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 MPAs. The deepwater grouper, snapper, and tilefish that are protected by these MPAs 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.

Priority: High

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

Projects 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 inside and outside several of the MPAs including: Snowy Wreck, Northern South Carolina, Edisto, Georgia, North Florida, and East Hump.

- Southeast Reef Fish Survey (SERFS), which is a collaboration of SEFIS and MARMAP, have been collecting distribution, abundance, size and age structure, and sex ratio data from trap and stationary camera surveys inside and outside several of the MPAs including: Snowy Wreck, Northern South Carolina, Edisto, Georgia, North Florida, and St. Lucie Hump.

Action Item 3: Identify fish population demographics (e.g. size and age structure, sex ratio, etc.) within and adjacent to the MPAs.

Justification: A major objective of the MPAs is to provide areas where fish population demographics can recover to levels that are capable of providing a reproductive haven and contribute to recruitment outside the protected areas. Evaluation of size and age structure of fishery species inside vs. outside the MPAs provides an indication of whether or not the MPA is protecting reproductively active individuals, particularly larger and older fish that are the most productive spawners.

Priority: High

Potential Methods: Fish size can be measured underwater with stereo cameras or lasers attached to submersibles and ROVs. Age must be determined from captured fish using either otoliths or spines and rays. Sex ratios can be determined from gonad biopsies unless the species has sexually dimorphic characteristics.

Deliverables: Demographic data on fishery species.

Projects Underway:

- Marine Resources Monitoring, Assessment, and Prediction (MARMAP) have been collecting size, age and reproductive data 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 size, age and reproductive data from trap surveys inside and outside several of the MPAs since 2010 including: Snowy Wreck, Northern South Carolina, Edisto, Georgia, and North Florida (Bacheler et al, 2013).

Action Item 4: Locate spawning aggregations of deepwater 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.

Priority: Medium

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 gonad investigation.

Deliverables: Locations of target fishery species spawning aggregations.

Projects 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).

Action Item 5: Track movement of adult fish.

Justification: Having knowledge of the temporal and spatial movements of key fishery species makes it easier to protect them. In order to provide complete protection, MPAs must be large enough to encompass the home range of targeted species. If fish readily move in and out of the closed areas, recovery of fish populations will not occur as fish will be lost to fishing in the portion of their range that are not protected.

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) are too rare to be able to tag or track enough of them to decipher movement patterns.

Potential methods: Telemetry or tag and recapture.

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

Projects Completed:

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

Action Item 6: 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.

Priority: Low

Deliverables: Physical Models

Projects Underway or Completed:

- 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".

Assessment Needs

The purpose of monitoring is to establish a 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 coral reef ecosystem.

Action Item 1: Characterize deepwater snapper grouper species within the MPAs compared to reference sites. This includes: distribution and abundance patterns, size and age distribution, spawning aggregation presence, and sex ratios.

Justification: Comparison of these parameters for deepwater snapper grouper species inside vs. outside the MPAs provides a means to evaluate the efficacy of the protected areas. Ideally, a higher abundance of key fishery species would be observed inside the MPAs given enough time following implementation of fishing restrictions. Evaluation of

size and age structure of fishery species inside vs. outside the MPAs provides an indication of whether or not the MPA 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 MPAs if fishing mortality is eliminated (or significantly reduced) and the MPAs are large enough to encompass the home range of the fish.

Priority: High

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.

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

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 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 distribution, abundance, size, age and reproductive data from trap surveys inside and outside several of the MPAs since 2010 including: Snowy Wreck, Northern South Carolina, Edisto, Georgia, and North Florida.
- NOAA Fisheries, Southeast Fisheries Science Center, Panama City Lab has been collecting data on distribution and abundance 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.
- NOAA's SE-DSCTP project collected data on distribution and abundance of all fish species from ROV dives conducted in 2011 inside and around the North Florida and East Hump MPAs (Reed et al., 2014).

Action Item 2: Characterize fish communities, inside and out of the MPAs, 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.

Priority: Medium

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.

Deliverables: Comparison of fish communities inside the MPAs to reference areas outside the MPAs.

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).

Literature Cited

Bacheler, 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.

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.

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.

McGovern, J.C., G.R. Sedberry, H.S. Meister, T.M. Westendorff, D.M. Wyanski, and P.J. Harris. 2005. A tag and recapture study of gag, *Mycteroperca microlepis*, off southeastern U.S. Bulletin of Marine Science. 76(1):47-59.

Reed, J. K. 1983. Nearshore and shelf-edge *Oculina* coral reefs: The effects of upwelling on coral growth and on the associated faunal communities. Pp. 119-124 In M. Reaka (ed.), The Ecology of Deep and Shallow Coral Reefs, Symposia Series for Undersea Research, Vol 1, NOAA.

Reed, J.K., S. Harter, S. Farrington, and A. David. 2014. Characterization and interrelationships of deepwater coral/sponge habitats and fish communities off Florida. Pp. 51-82 In S. Bortone (ed.), Interrelationships Between Corals and Fisheries. CRC Press.

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.

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

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.

3.4.3 Outreach Action Items

IPT Member: Amber Von Harten

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 modified from the outreach component of the Amendment 14 to the SG FMP (SAFMC 2007), SAFM Public Hearing Draft (2006), and the Council's *Oculina* Experimental Closed Area (OECA) Evaluation Plan (2005).

"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).

As of 2015, the SAFMC in collaboration with project partners produced the following outreach items:

- Deepwater MPA Regulation brochures with updated type II MPA content, in collaboration with the S.C. Sea Grant Extension Program (SAFMC 2009).
- Information about MPAs and Deepwater MPAs on the SAFMC website (http://www.safmc.net/managed-areas/marine-protected-areas).

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

Goal 1. Environmental awareness and knowledge enhanced.

Objective 1a.	Understanding of local knowledge enhanced.
Objective 1b.	Public's understanding of environmental and social 'sustainability' improved.
Objective 1c.	Level of scientific knowledge held by the public increased.

Goal 2. Effective stakeholder participation and representation ensured.

Objective 2a.	Collaborative management systems ensured through equity of representation and efficacy in management practices.
Objective 2b.	Co-management supported by effective strategies that improve resource user capacity.

Objective 2c. Community organizing and participation strengthened and enhanced.

Goal 3: Management plan compliance by resource users enhanced through effective communication.

Objective 3a. Communication products accessible to the public in various formats.

Objective 3b. Management plan development delivered through transparent and open process.

Objective 3c. Compliance with the management plan is fostered through targeted communication.

The following ten 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 Deepwater Type 2 MPAs.

- *Tasks:* identify manufacturers of more 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 Type 2 MPAs.
- *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 OECA, HAPC, and MPA boundaries and regulations can be included in a new proposed digital overlay of marine protection boundaries.

Action Item 2: Develop area-specific rack cards (Northern and Southern MPAs) 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 MPAs (Carolinas/Georgia) and one for the Southern MPAs (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 Type 2 MPAs 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 MPAs (Carolinas/Georgia) and one for the Southern MPAs (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 Information & Education Advisory Panel; Harbor Branch Oceanographic Institute; National Undersea Research Center; U.S. Coast Guard; Florida Fish and Wildlife Commission; NOAA Fisheries; and Sea Grant.

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

- *Tasks:* new area specific rack cards – one for the Northern MPAs and one for the Southern MPAs – 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:* SAFMC outreach staff; mobile app developer (Verona Solutions); website management company (Nassau Web Design).

Action Item 4: Develop a mechanism or delegate a point of contact to coordinate and share news and activities within the MPA sites (research, monitoring, educators, and law enforcement) with Council staff for use in outreach and media events (e.g., social media, blogs, newsletters, etc.).

- *Tasks:* enhance communication efforts regarding news and activities within the SAFMC MPAs through a communication portal (either a web portal or point of contact).
- *Justification:* To date, there has not been a point person or host site to share information about activities and news from the MPA sites. Establishing this portal mechanism would ensure that information is gathered and shared in a timely manner among all partners involved in MPA research, monitoring, enforcement and outreach.
- *Deliverables:* Portal (web-based forum or web page) and point of contact for communicating and sharing news and activities.
- *Schedule:* Year 1, work with partners and Councils I&E AP to identify appropriate strategy and mechanism for an MPA portal; Year 2, develop and implement portal and quarterly information exchange with designated point of contact.
- *Budget:* Year 1, staff time; Year 2, dependent on approach to the MPA portal.

- *Potential Partners/roles:* SAFMC outreach staff, National Undersea Research Center; NOAA Fisheries' Southeast Fisheries Science Center (SEFSC); Florida Fish and Wildlife Commission; Florida Fish and Wildlife Research Institute (FWRI); US Geological Service; and NOAA Office for Law Enforcement.

Action Item 5: Provide SAFMC Deepwater MPA regulation brochures to area fishermen.

- *Tasks:* reprint a limited number of updated Deepwater MPA Regulation brochures to include the new content regarding *Oculina* (once Coral Amendment 8 is implemented) and distribute to federal, state, and local law enforcement offices for distribution.
- *Justification:* the regulations brochure will provide a summary of regulations and information for the Type 2 MPAs as well as an information on changes to the Oculina HAPC (once Coral Amendment 8 is implemented), and identification chart for snapper/grouper species found in the area. The brochure will also be available on the SAFMC website and the mobile application, *SA Fishing Regulations*.
- *Deliverables:* Updated *Deepwater MPA* SAFMC regulation brochures.
- *Schedule:* Year 1, revise existing MPA brochure and receive input from the Council's I&E AP; Year 2, print and distribute MPA 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; SAFMC Information & Education Advisory Panel; NOAA Fisheries' Southeast Fisheries Science Center (SEFSC); Florida Fish and Wildlife Commission; Florida Fish and Wildlife Research Institute (FWRI); possible contractual graphic designer (if not produced in-house).

Action Item 6: 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 7: Develop PowerPoint presentations about the deepwater Type 2 MPAs; distribute on CD, post on the Web site, 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 Type 2 MPAs, history of management, research and monitoring activities, law enforcement, etc.
- *Justification:* provides a quick method to distribute information for use by various audiences that can be readily updated.
- *Deliverables:* PowerPoint presentation on CD and Web site.
- *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; NOAA Fisheries Southeast Fisheries Science Center; Florida Fish and Wildlife Commission; Sea Grant; and National Undersea Research Center.

Action Item 8: Expand the Council's existing MPA web pages to provide comprehensive education and outreach products (e.g., regulations, publications, research and monitoring information, law enforcement activities, news releases, high-resolution video and photographs, maps, etc.). Publicize availability of information by having links posted on other fishing/Non-Governmental Organizations/tourism related web sites.

- *Tasks:* enhance the Council's MPA 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:* National Undersea Research Center; NOAA Fisheries' Southeast Fisheries Science Center (SEFSC); Florida Fish and Wildlife Commission; Florida Fish and Wildlife Research Institute (FWRI); US Geological Service; and NOAA Office for Law Enforcement.

Action Item 9: : Collaborate with agencies and organizations that specialize in developing and conducting teacher workshops/materials on outreach aimed at highlighting the Council's managed areas (MPAs, *Oculina*, SMZs, etc.).

- *Tasks*: identify educational partners and suitable workshops for incorporating curriculum on all existing protected areas designated by the SAFMC (including current MPAs, SMZs, HAPCs, etc.) to disseminate to the public and to potential partners to collaborate on conducting outreach workshops.
- *Justification:* identified as a need at both *Oculina* constituent meetings and determined a priority item by the Information and Education Advisory Panel for *Oculina*. Initial groundwork will be needed to identify local education needs.
- *Deliverables:* education materials as identified.

- *Schedule:* Year 1, identify key partnership opportunities through targeted discussions with educational partners (agencies and existing workshop programs); Years 2-5, work with partners to develop and deliver MPA-related materials for workshops.
- *Budget:* Year 1, staff time; Years 2-5, staff time and also dependent on approach and number of materials produced.
- *Potential Partners/roles:* Centers for Ocean Sciences Education Excellence (COSEE) in South Carolina and Florida; Sea Grant; Project Oceanica; and local school systems and teacher partners. Identify and develop education materials for children.

Action Item 10: 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 deepwater MPA sites to target outreach efforts and materials.

- *Tasks:* enhance targeted communication and outreach efforts about the MPAs through development of a database of key contacts in coastal communities in close proximity to deepwater MPA 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 deepwater MPA 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, National Undersea Research Center; NOAA Fisheries' Southeast Fisheries Science Center (SEFSC); Florida Fish and Wildlife Commission; Florida Fish and Wildlife Research Institute (FWRI); US Geological Service; and NOAA Office for Law Enforcement.

Table 1. Summary matrix of Outreach Action Items (AI) that address the Outreach Goals and Objectives.*

Outreach Action Items (AI):	Goal 1:			Goal 2:			Goal 3:		
	Obj a	Obj b	Obj c	Obj a	Obj b	Obj c	Obj a	Obj b	Obj c
AI 1: Work with fishing chart manufacturers to improve paper and electronic charts									
AI 2: Develop area specific rack cards									
AI 3: New rack cards into mobile app, SA Fishing Regulations									
AI 4: Mechanism / Point of contact to share MPA and other SAFMC protected areas news/activities									
AI 5: Provide SAFMC Deepwater regulation brochures to area fishermen									
AI 6: Develop and distribute news releases on research related to the A14 MPAs									
AI 7: Develop PowerPoint presentations and distribute									
AI 8: Expand website to provide extensive outreach and educational materials									
AI 9: Collaborate with agencies and organizations that specialize in developing and conducting teacher workshops/materials aimed at highlighting the Council's managed areas (MPAs, Oculina, SMZs, etc.).									
AI 10: List of key contacts to target for outreach efforts & materials									

*Note: Outreach Goals and Objectives below.

Goal 1. Environmental awareness and knowledge enhanced.

1a. Understanding of local knowledge enhanced.

1b. Public's understanding of environmental and social 'sustainability' improved.

1c. Level of scientific knowledge held by the public increased.

Goal 2. Effective stakeholder participation and representation ensured.

2a. Collaborative management systems ensured through equity of representation and efficacy in management practices.

2b. Co-management supported by effective strategies that improve resource user capacity.

2c. Community organizing and participation strengthened and enhanced.

Goal 3: Management plan compliance by resource users enhanced through effective communication.

3a. Communication products accessible to the public in various formats.

3b. Management plan development delivered through transparent and open process.

3c. Compliance with the management plan is fostered through targeted communication.

Table 2. Summary table of the expected costs of the Action Items on an annual basis over 3 to 5 years. Highlighted items are high priority. *(Table adapted from the U.S. DOC FKNMS Revised Management Plan 2007).*

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	$1000	TBD	TBD	TBD	*$1000 but dependent on manufacturers approach.*
AI 2: Develop area specific rack cards	$0	$1500	$500	$250	$250	*$2500*
AI 3: New rack cards into mobile app, SA Fishing Regulations	$200	$0	$0	$0	$0	*$200*
AI 4: Mechanism / Point of contact to share MPA and other SAFMC protected areas news/activities	$0	$0	$0	$0	$0	*$0*
AI 5: Provide SAFMC Deepwater regulation brochures to area fishermen	$0	$5000	$0	$2000	$0	*$7000*
AI 6: Develop and distribute news releases on research related to the A14 MPAs	$0	$0	$0	$0	$0	*$0*
AI 7: Develop PowerPoint presentations and distribute	$0	$0	$0	$0	$0	*$0*
AI 8: Expand website to provide extensive outreach and educational materials	$0*	$0*	$0*	$0*	$0*	**Dependent on scope of expansion*
AI 9: Collaborate with agencies and organizations that specialize in developing and conducting teacher workshops/materials aimed at highlighting the Council's managed areas (MPAs, Oculina, SMZs, etc.).	$0	$2000	$500	$0	$0	*$2500; Dependent on scope of staff involvement.*
AI 10: List of key contacts to target for outreach efforts & materials	$0	$0	$0	$0	$0	*$0*
TOTAL Budget:	**$200**	**$8500**	**$1000**	**$2250**	**$250**	***$12,200***

Literature Cited and Resources Consulted

Meadows, M.S.T., and K.C. Lindeman. 2012. System Management Plan Outline for the SAFMC Amendment 14 MPAs. 29 p.

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.

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

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

SAFMC. 2006. Public Hearing Draft, Snapper Grouper Amendment 14. South Atlantic Fishery Management Council, Charleston, South Carolina. 440 p.

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

Salm, R.V., J. Clark, and E. Siirila (2000). *Marine and Coastal Protected Areas: A guide for planners and managers.* IUCN. Washington DC. xxi + 371pp.

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

Contributors/Authors:
Amber Von Harten
Kim Iverson
Michelle Tishler

System Management Plan for Amendment 14 MPAs

3.6 Management Effectiveness Evaluation

The purpose of this information is to guide individuals tasked with constructing the content of this section. The following includes recommendations, comments, questions, general information, and relevant tools/resources to consider while drafting content. Electronic copies of literature cited and relevant resources are provided.

The effectiveness and management of the SMP and eight Amendment 14 MPAs 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). Specifically, Pomeroy et al. (2004) addresses goals with a focus on linked social and ecological systems, and is the primary framework recommended for developing the evaluation. Adapt and utilize Pomeroy and colleague's (2004) handbook in addition to incorporating other frameworks to aid planning in constructing the management effectiveness evaluations for the Amendment 14 MPAs and SMP. The SMP evaluation should address research and monitoring, outreach, resource protection (enforcement), and administrative/financial components (e.g., SAFMC 2005, SAFMC 2006, USDOC 2007, and SMP Outline 2013). Conclusion of the goals and objectives from Section 3.1 of the SMP is recommended prior to constructing this section.

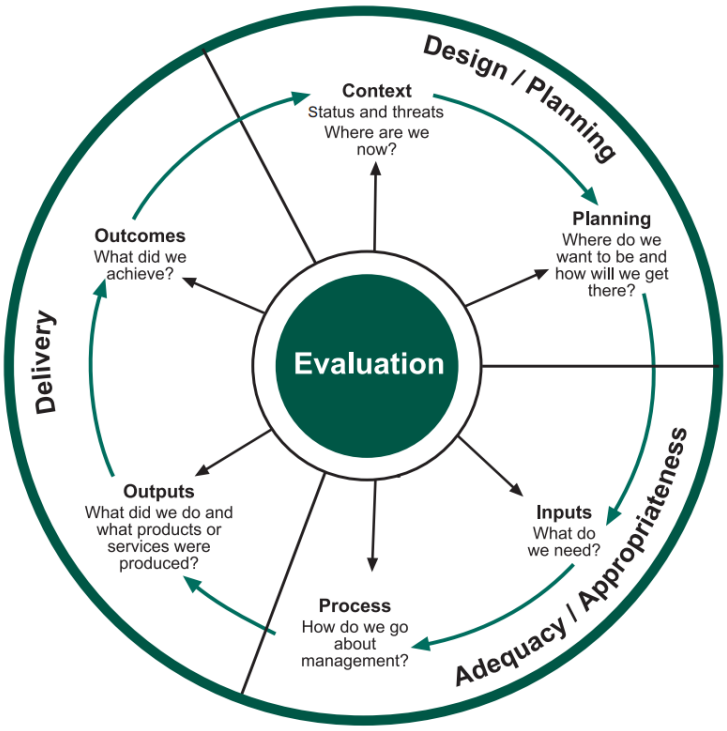


Figure 1. Management effectiveness framework for protected areas (Hockings et al. 2006).

Describe and elaborate on the following, utilizing cited frameworks and methodologies:

- The purpose of effectiveness evaluations for SAFMC MPAs (e.g., Pomeroy et al. 2004, Hockings et al. 2006, Day 2008, Leverington et al. 2010).
    - The general purpose of "effectiveness evaluations are to: enable and support an adaptive approach to management; assist in effective resource allocation; promote accountability and transparency; and help involve the community, build constituency and promote protected area values" (Hockings et al. 2006).
- The role of adaptive management for the Amendment 14 MPAs to acknowledge functioning management infrastructure and to improve as needed (e.g., Pomeroy et al. 2004, Day 2008, Leverington et al. 2010).
- Will this be an internal and/or external review (e.g., SAFMC 2005 and Hockings et al. 2006)?
- How will stakeholders be involved in the process? How will their input be considered for choosing evaluation indicators (e.g., Pomeroy et al. 2004, Hockings et al. 2006, Himes 2007, Pajaro et al. 2010, Gleason et al. 2010, and Heck et al. 2011)?
- How often to conduct formal reviews?
    - Recommend conducting an on-going general monitoring of the effectiveness, and formal evaluations every 3-5 years (Hockings et al. 2006).
- What will the funding and staff requirements entail, and how will these funds be secured (e.g., SAFMC 2005, California Department of Fish and Game 2008)?
- Agree on an evaluation strategy for the SMP and Amendment 14 MPAs, by adapting the Oculina Experimental Closed Area Evaluation Plan (SAFMC 2005), the Pomeroy et al. (2004) methodology (Fig. 2), the Hockings et al. (2006) assessment process (Fig. 3), and the California Department of Fish and Game (2008) MPA management plan.

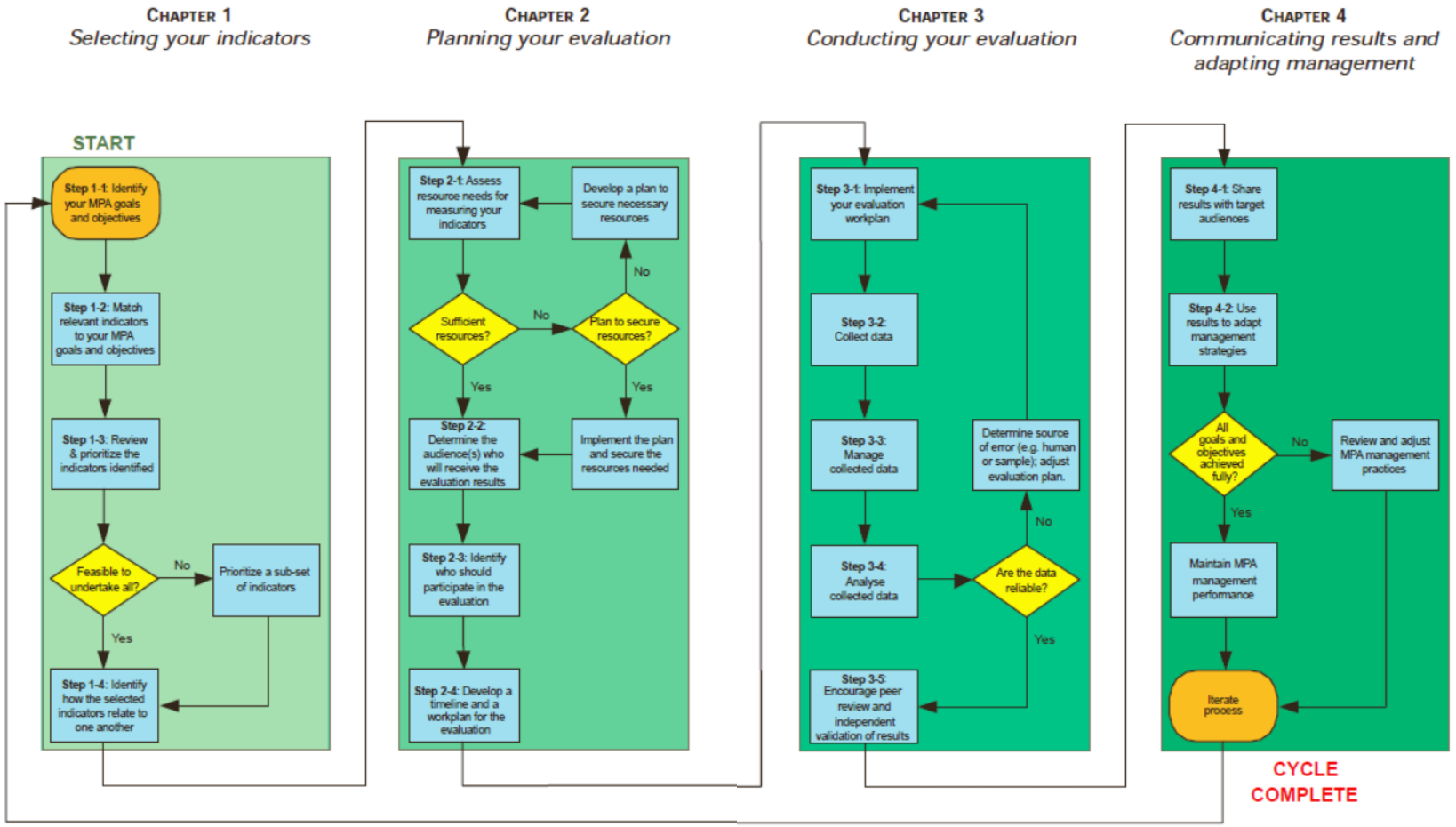


Figure 2. Flowchart of the MPA evaluation assessment process from tools to measure effectivness to conducting the evaluation (Pomeroy et al. (2004)

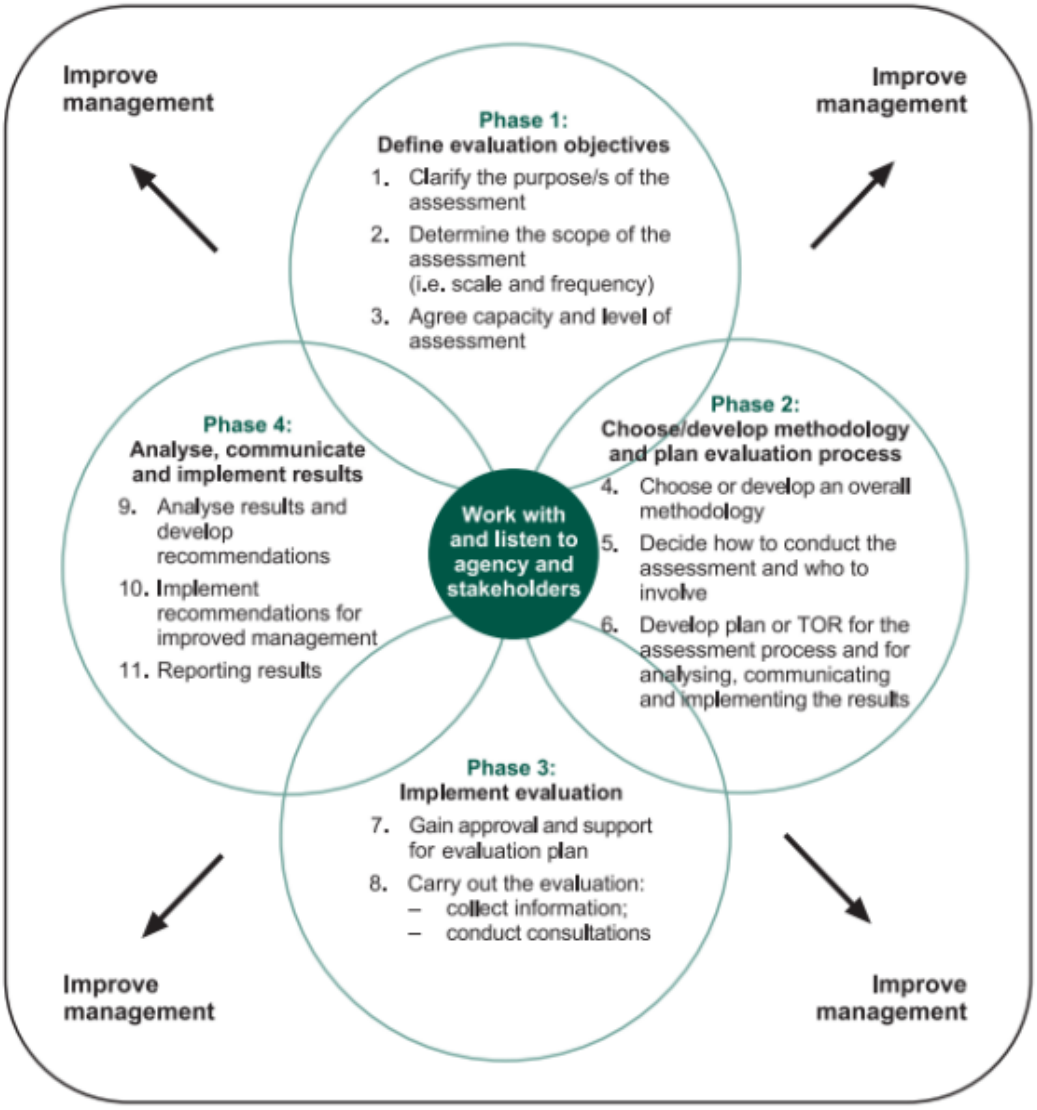


Figure 3. The four major phases of the assessment process from (Hockings et al. 200

Choosing indicators

Indicators provide a means to measure the success and overall management of the MPAs (Pomeroy et al. 2004, Hockings et al. 2006, California Department of Fish and Game 200 Pelletier 2004). Once the goals and objectives of the SMP (Figs. 4, 6, and 8) are identified IPT, coordinate selection of the appropriate indicators to evaluate and monitor for the eigh MPAs (Figs. 5, 7, 9). Identifying overlying indicators for all of the MPAs together versus individual MPAs may be more time and cost effective. Consider adding site-specific indic as-needed (e.g., California Department of Fish and Game 2008).

In a major IUCN and NOAA sponsored review and guidebook on measurement of MPA effectiveness, Pomeroy et al. (2004) identified three major categories of indicators: Biophysical, Socioeconomic, and Governance, with a total of 42 separate indicators that could potentially be measured. Many of these indicators require considerable resources to measure and the allocation of resources must be evaluated in a coordinated multi-stakeholder fashion.

Biophysical Indicators

Biophysical indicators for MPA effectiveness measurement following Pomeroy et al. (2004) (Fig. 5).

Indicator 1: Focal species abundance
Indicator 2: Focal species population structure
Indicator 3: Habitat distribution and complexity
Indicator 4: Composition and structure of the community
Indicator 5: Recruitment success within the community
Indicator 6: Food web integrity
Indicator 7: Type, level, and return on fishing effort
Indicator 8: Water quality
Indicator 9: Area showing signs of recovery
Indicator 10: Area under no or reduced human impact

Socioeconomic Indicators

Socioeconomic indicators for MPA effectiveness measurement following Pomeroy et al. (2004) (Fig. 7)

Indicator 1: Local marine resource use patterns
Indicator 2: Local values and beliefs about marine resources
Indicator 3: Level of understanding of human impacts on resources
Indicator 4: Perceptions of seafood availability
Indicator 5: Perceptions of local resource harvest
Indicator 6: Perceptions of non-market and non-use value
Indicator 7: Material style of life
Indicator 8: Quality of human health
Indicator 9: Household income and distribution by source
Indicator 10: Household occupational structure
Indicator 11: Community infrastructure and business
Indicator 12: Number and nature of markets
Indicator 13: Stakeholder knowledge of natural history
Indicator 14: Distribution of formal knowledge to community
Indicator 15: Percentage of stakeholder group in leadership positions
Indicator 16: Changes in conditions of ancestral and historical sites/features/monuments

Governance Indicators

Governance indicators based on Pomeroy et al. (2004) (Fig. 9).

Indicator 1: Level of resource conflict
Indicator 2: Existence of a decision-making and management body
Indicator 3: Existence and adoption of a management plan
Indicator 4: Local understanding of MPA rules and regulations
Indicator 5: Existence and adequacy of enabling legislation
Indicator 6: Availability and allocation of MPA administrative resources
Indicator 7: Existence and application of scientific research and input
Indicator 8: Existence and activity level of community organizations
Indicator 9: Degree of interaction between managers and stakeholders
Indicator 10: Proportion of stakeholders trained in sustainable use
Indicator 11: Level of training provided to stakeholders in participation
Indicator 12: Level of stakeholder participation and satisfaction in management processes and activities
Indicator 13: Level of stakeholder involvement in surveillance, monitoring, and enforcement
Indicator 14: Clearly defined enforcement procedures
Indicator 15: Enforcement coverage
Indicator 16: Degree of information dissemination to encourage stakeholder compliance

The following figures show the goals and objectives suggested for consideration by the IPT in conjunction with associated indicators to measure effectiveness to select as the SMP process moves forward.

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*

Figure 4. Biophysical goals and objectives (from Pomeroy et al. 2004) relevant to the SAFMC SMP, boxed below in red.

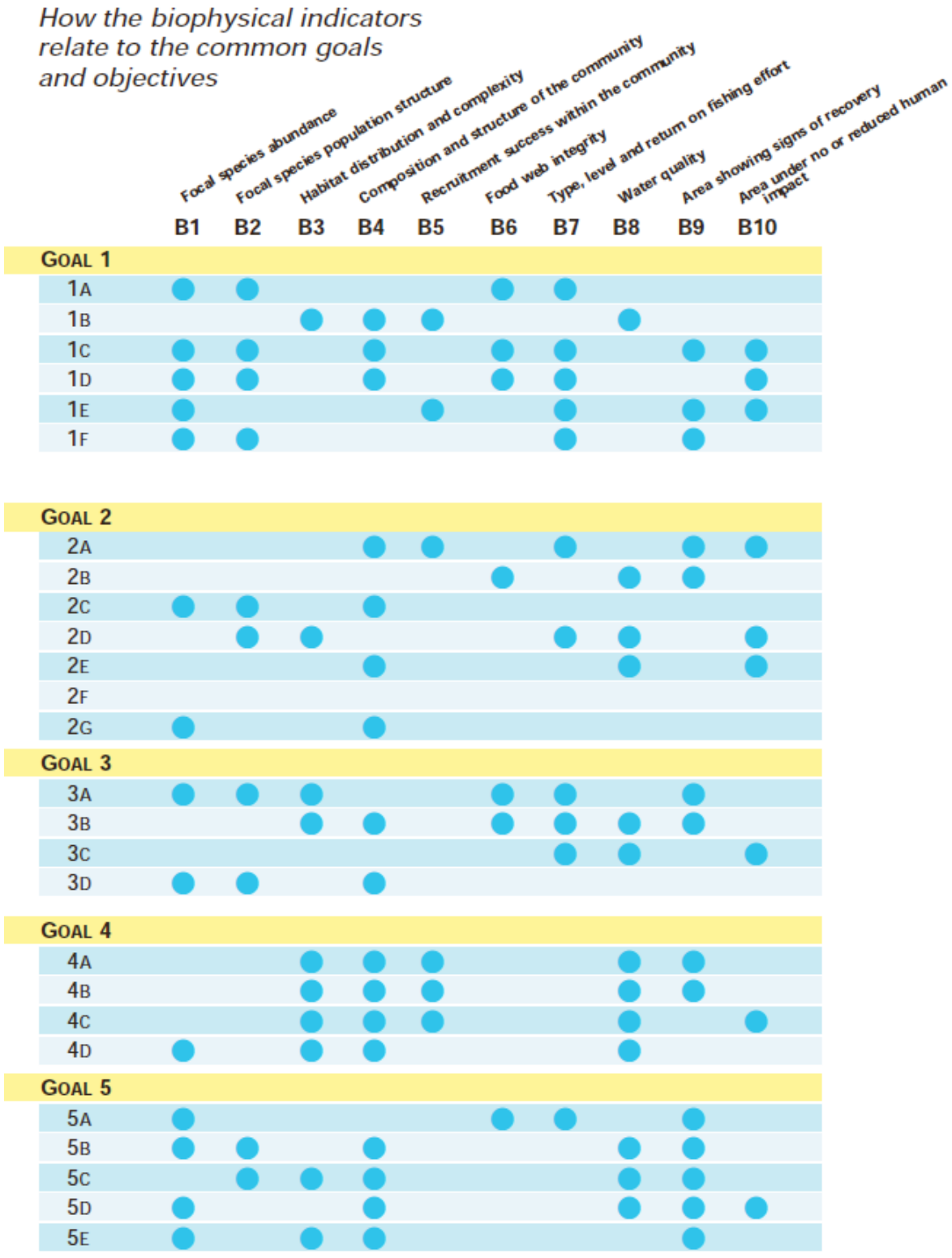


Figure 5. Biophysical indicators associated with the biophysical goals and objectives (from Pomeroy et al. 2004).

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*

Figure 6. Socioeconomic goals and objectives (from Pomeroy et al. 2004) relevant to the SAFMC SMP, boxed below in red.

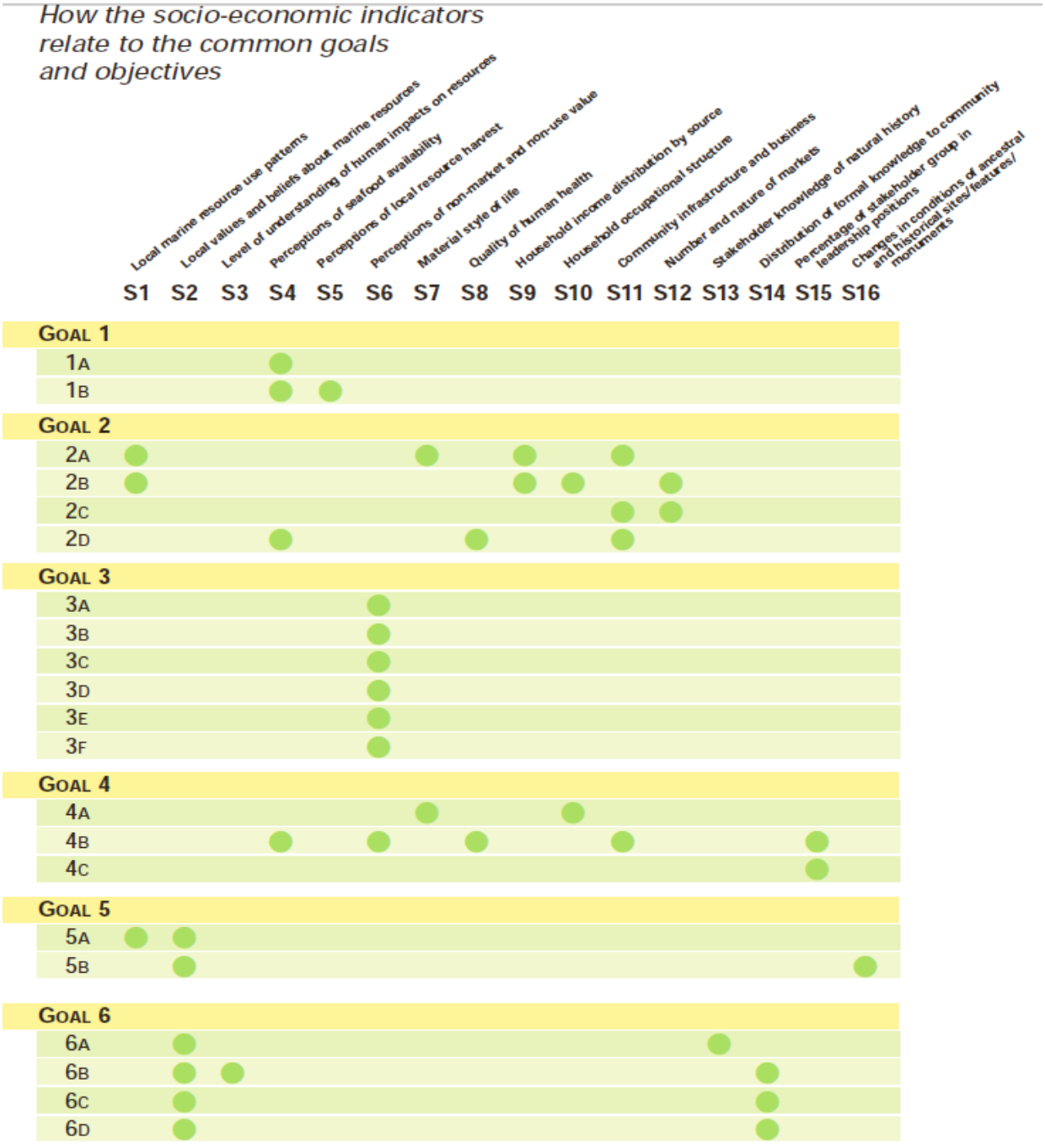


Figure 7. Socioeconomic indicators associated with the socioeconomic goals and objectives (from Pomeroy et al. 2004).

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*

Figure 8. Governance goals and objectives (from Pomeroy et al. 2004) relevant to the SAFMC SMP, boxed below in red.

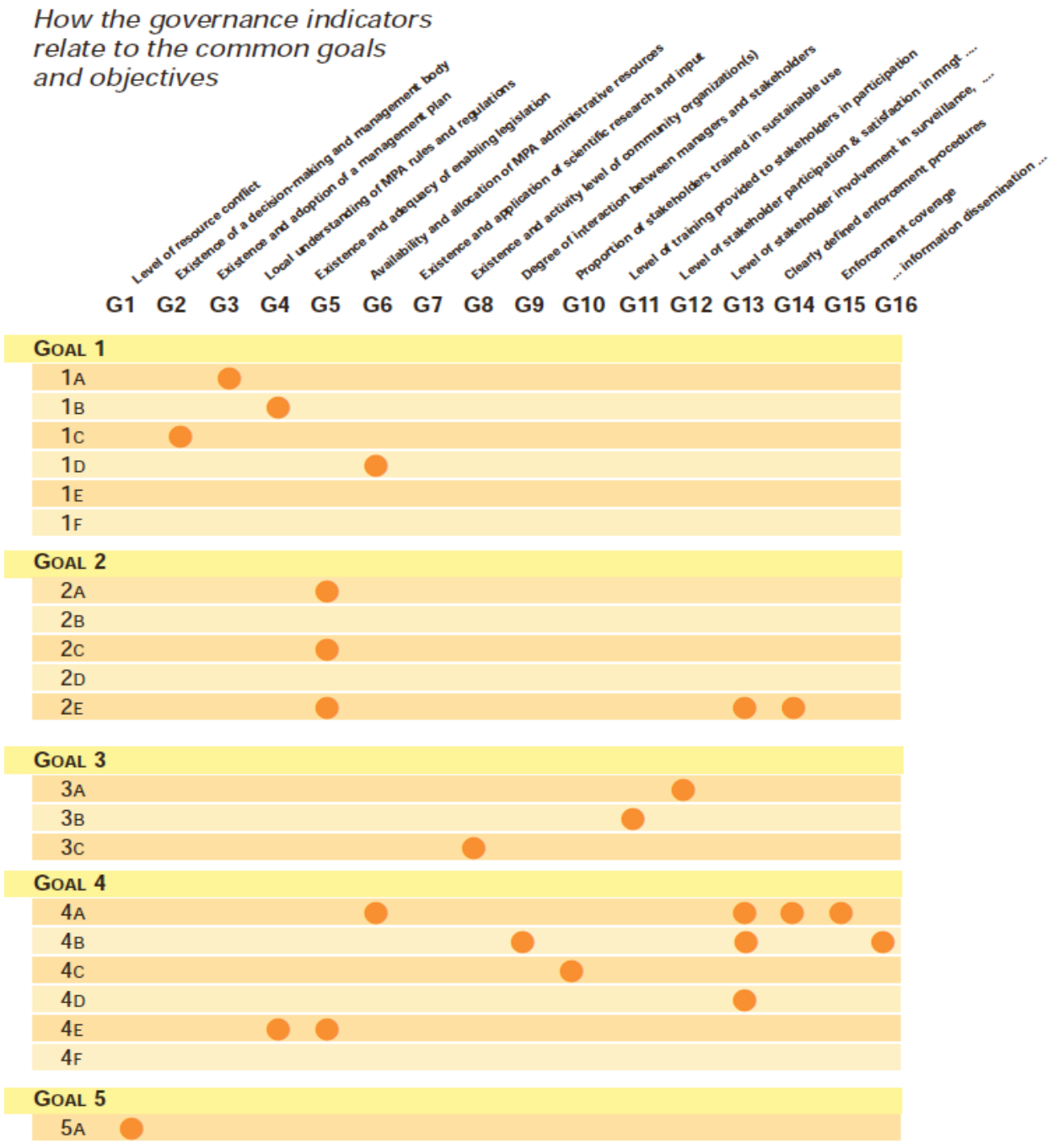


Figure 9. Governance indicators associated with the governance goals and objectives (from Pomeroy et al. 2004).

After finalizing the goals, objectives, and indicators, consider utilizing the assessment process from Pomeroy et al. (2004, Fig. 2) and Hockings et al. (2006, Fig. 3) to plan the next steps of the evaluation.

Literature Cited and Resources Consulted

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

California Ocean Science Trust and California Department of Fish and Wildlife (COST and CADFW). 2013. State of the California Central Coast: Results from Baseline Monitoring of Marine Protected Areas 2007–2012. California, USA.

Coastal Conservation and Education Foundation, Inc. 2011. MPA MEAT: Marine Protected Area Management Effectiveness Assessment Tool. Coral Triangle Initiative. Philippines.

Commission for Environmental Cooperation. 2011. A guide to ecological scorecards for marine protected areas in North America. Montreal, Canada.

Day, J. 2008. The need and practice of monitoring, evaluating, and adapting marine planning and management – lessons from the Great Barrier Reef. Marine Policy 32:823-831.

Ervin, J. 2003.WWF: Rapid Assessment and prioritization of Protected Area Management (RAPPAM) Methodology. WWF, Gland, Switzerland.

Gleason, M., S. McCreary, M. Miller-Henson, J. Ugoretz, E. Fox, M. Merrifield, W. McClintock, P. Serpa, and K. Hoffman. 2010. Science-based and stakeholder-driven marine protected area network planning: A successful case study from north central California. Ocean & Coastal Management: 1-17.

Heck, N., P. Dearden, A. McDonald, and S. Carver. 2011. Stakeholder opinions on the assessment of MPA effectiveness and their interests to participate at Pacific Rim National Park Reserve, Canada. Environmental management, 47(4), 603-616.

Himes, A. H. 2007. Performance indicators in MPA management: using questionnaires to analyze stakeholder preferences. Ocean & Coastal Management, 50(5), 329-351.

Hockings, M., S. Stolton, F. Leverington, N. Dudley, and J. Courrau. 2006. Evaluating Effectiveness: A framework for assessing management effectiveness of protected areas. 2nd edition. IUCN, Gland, Switzerland and Cambridge, UK. 105 pp.

Leverington, F., K.L. Costa, J. Courrau, H. Pavese, C. Nolte, M. Marr, L. Coad, N. Burgess, B. Bomhard, and M. Hockings. 2010. Management effectiveness evaluation in protected areas – a global study. 2nd edition. The University of Queensland, Gatton, TNC, WWF, IUCN- WCPA, Australia.

NOAA. 2007. Performance Evaluation Manual for the National Marine Sanctuary Program. Office of National Marine Sanctuaries. Silver Spring, Maryland.

NOAA. 2011. MPA Management Assessment Checklist. Coral Reef Conservation Program. Silver Spring, Maryland.

Pajaro, M.G., M.E. Mulrennan, J. Alder, and A.C. Vincent. 2010. Developing MPA effectiveness indicators: comparison within and across stakeholder groups and communities. Coastal Management, 38(2), 122-143.

Pelletier, D., J.A. García-Charton, J. Ferraris, G. David, O. Thébaud, Y. Letourneur, J. Claudet, M. Amand, M. Kulbicki, and R. Glazon. 2005. Designing indicators for assessing the effects of marine protected areas on coral reef ecosystems: A multidisciplinary standpoint. Aquatic Living Resources. 18: 15-33.

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.

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

SAFMC. 2006. Public Hearing Draft, Snapper Grouper Amendment 14. South Atlantic Fishery Management Council, Charleston, South Carolina. 440 p.

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

SMP Outline: System management plan outline for the SAFMC Amendment 14 MPAs. 2013. Report for the SAFMC Briefing Book September 2013, 29 p.

Stelzenmüller, V., P. Breen, T. Stamford, F. Thomsen, F. Badalamenti, Á. Borja, L. Buhl-Mortensen, J. Carlstöm, G. D'Anna, N. Dankers, S. Degraer, M. Dujin, F. Fiorentino, I. Galparsoro, S. Giakoumi, M. Gristina, K. Johnson, P.J.S. Jones, S. Katsanevakis, L. Knittweis, Z. Kyriazi, C. Pipitone, J. Piwowarczyk, M. Rabaut, T.K. Sørensen, J. van Dalfsen, V. Vassilopoulou, T.V. Fernández, M. Vincx, S. Vöge, A. Weber, N. Wijkmark, R. Jak, W. Qiu, and R. ter Hofstede. 2013. Monitoring and evaluation of spatially managed areas: a generic framework for implementation of ecosystem based marine management and its application. Marine Policy, 37, 149-164.

U.S. Department of Commerce. 2007. Florida Keys National Marine Sanctuary: Revised management plan. National Oceanic and Atmospheric Administration. Office of National Marine Sanctuaries. Silver Spring, MD. 369 p.

4. Site Characterization

Questions and comments are in red text. This section is incomplete and requires additional information. Please see the SMP Outline (2013) for additional information.

Overall

The eight Amendment 14 MPAs are positioned in deepwater, consisting of live bottom, hard bottom, and artificial habitats from low relief to high relief. Additionally, these sites range from 165 to 984 feet in depth, approximately 9 to 69 nautical miles off the coasts of North Carolina to south Florida from latitudes 33°35´N to 24°27.5´N (SAFMC 2007, 2009).

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

Briefly 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

Snowy Grouper Wreck MPA

Location and Zoning

The Snowy Grouper Wreck MPA is located about 55 nautical miles southeast of Southport and Cape Fear, NC and spans approximately 150 square nautical miles (15 x 10 nautical miles) in size (Fig. 1; SAFMC 2007, 2009).

*Northwest corner at **33°25´N, 77°4.75´W*** *Northeast corner at **33°34.75´N, 76°51.3´W***
*Southwest corner at **33°15.75´N, 77°W*** *Southeast corner at **33°25.5´N, 76°46.5´W***
(SAFMC 2007, 2009)

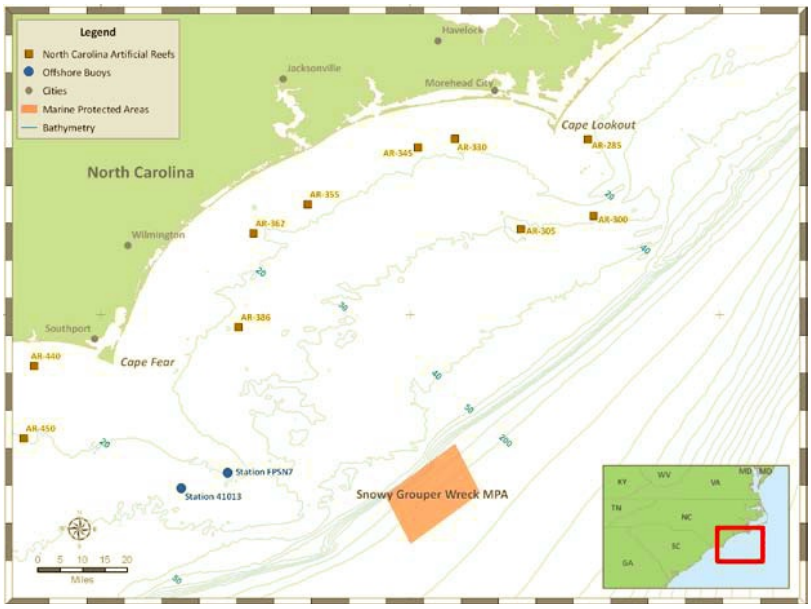


Figure 1. Snowy Grouper Wreck MPA, positioned southeast of Cape Fear, NC (SAFMC 2009).

Habitat and Managed Species Characterization

Describe the benthic habitat composition, geomorphological features, and other key features at this site. The Snowy-Grouper Wreck MPA is comprised of hard-bottom habitats, one primary wreck, and possible additional smaller wrecks, ranging in depth from 197 feet to 984 feet (Fig. 2; SAFMC 2007, 2009).

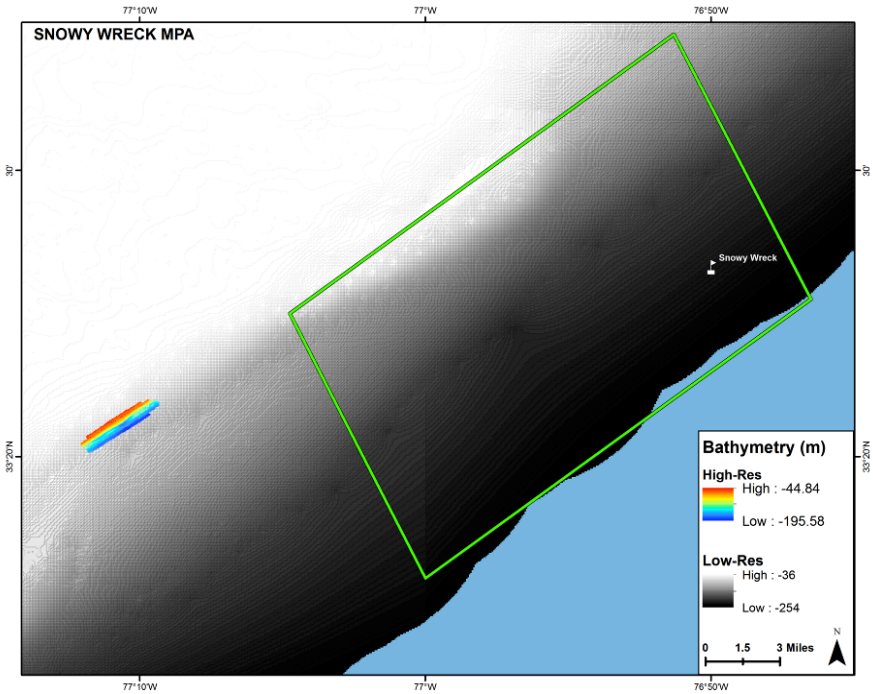


Figure 2. Bathymetry of the Snowy Grouper Wreck MPA (N. Farmer, 2014).

The prominent Snapper-Grouper species targeted at this site consist of include snowy grouper, speckled hind, gag grouper, and red porgy (SAFMC 2007). Other species caught less frequently include red grouper, graysby, and hogfish.

-Describe any potential spawning in the area and include temporal variation in occurrence.
-Describe any overall and/or site specific threats and status to the habitat and to the target species. A summary table or figure is recommended. In the late 1990s, a population of spawning snowy grouper were targeted and fished down over the wreck area encompassed within this MPA (SAFMC 2007, 2009).
- Describe current and historical commercial and recreational fishing activities at this site.

Northern South Carolina MPA

Location and Zoning

The Northern South Carolina MPA is located about 54 nautical miles southeast of Murrells Inlet, SC and spans approximately 50 square nautical miles (10 x 5 nautical miles) in size (Fig. 3; SAFMC 2007, 2009).

*Northwest corner at **32°53.5´N, 78°16.75´W***
*Southwest corner at **32°48.5´N, 78°16.75´W***
*Northeast corner at **32°53.5´N, 78°4.75´W***
*Southeast corner at **32°48.5´N, 78°4.75´W***
(SAFMC 2007; 2009)

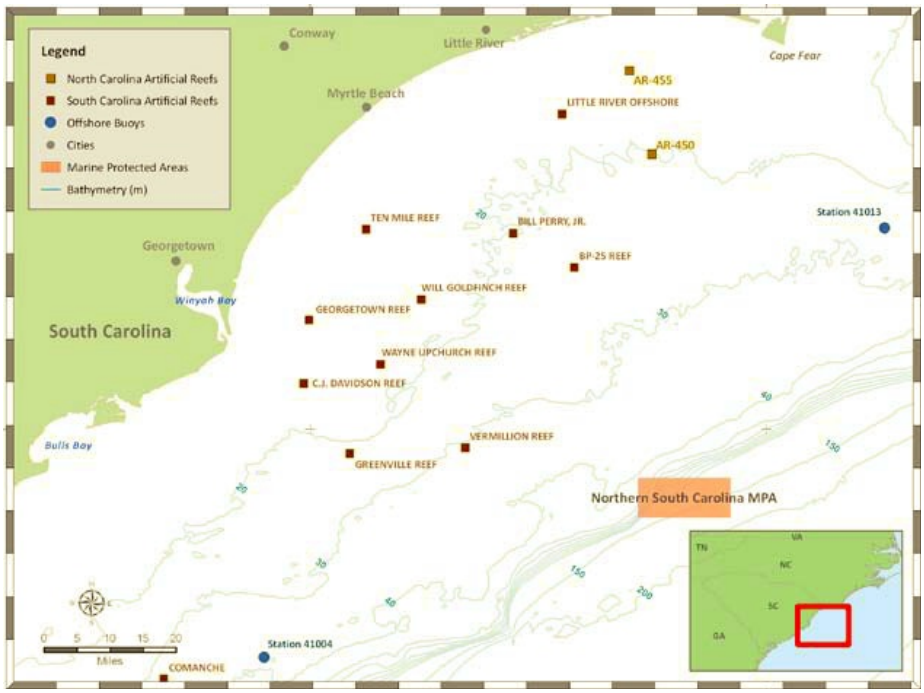


Figure 3. Northern South Carolina MPA, located southeast of Murrells Inlet, SC (SAFMC 2009).

Habitat and Managed Species Characterization

- Describe the benthic habitat composition, geomorphological features, and other key features at this site. This MPA is comprised of "hard-bottom habitat consisting of eroded rock in shelf-edge" at depths from 164 to 561 feet (SAFMC 2009; Fig. 4).

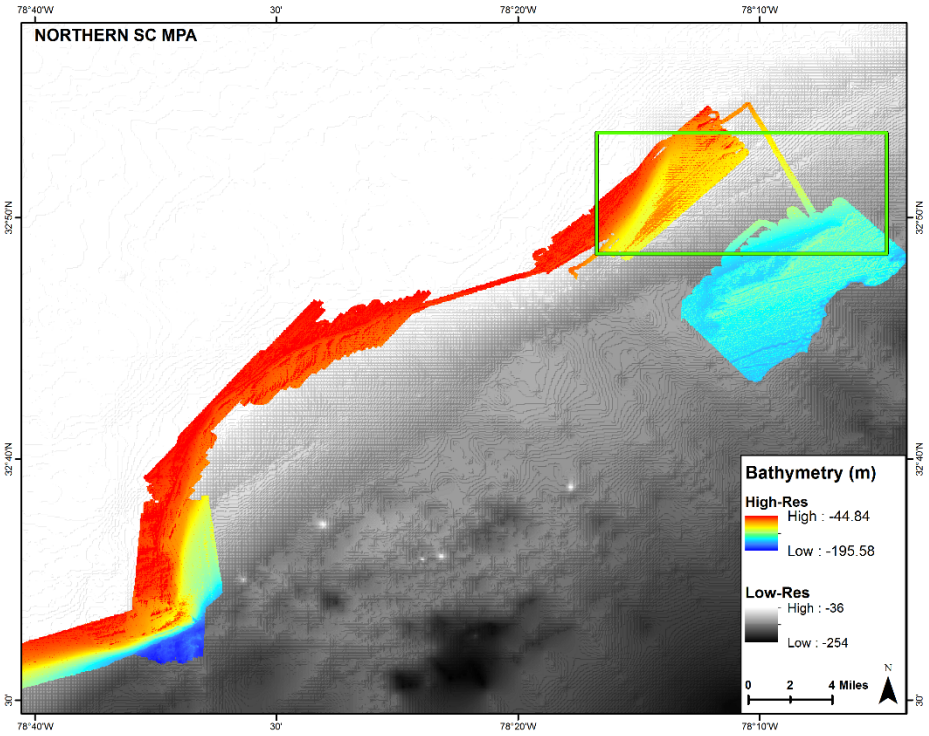


Figure 4. Low- and high-resolution bathymetry within and outside of the Northern South Carolina MPA (Provided by N. Farmer).

In reference to the Northern South Carolina MPA, "Fishermen refer to the area as "smurfville" because it holds many small vermilion snapper. Information received during the public input process indicated that this area is fished mostly in the winter and that it holds deepwater species like snowy grouper, yellowedge grouper, and speckled hind, as well as red porgy, triggerfish, and gag." (SAFMC 2007)

- Describe any potential spawning in the area and include temporal variation in occurrence.
- Describe any overall and/or site specific threats and status to the habitat and to the target species. A summary table or figure is recommended.
- Describe current and historical commercial and recreational fishing activities at this site.

Edisto MPA

Location and Zoning

The Edisto MPA is located about 45 nautical miles southeast of Charleston, SC and spans approximately 50 square nautical miles (10 x 5 nautical miles) in size (Fig. 5; SAFMC 2007, 2009).

*Northwest corner at **32°24´N, 79°6´W*** *Northeast corner at **32°24´N, 78°54´W***
*Southwest corner at **32°18.5´N, 79°6´W*** *Southeast corner at **32°18.5´N, 78°54´W***
(SAFMC 2007, 2009)

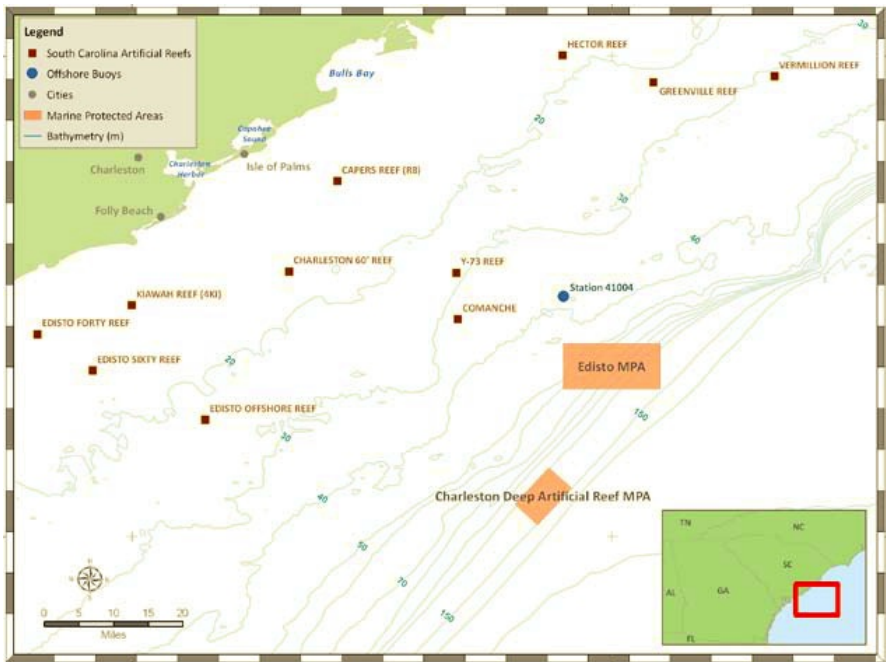


Figure 5. The Edisto and Charleston Deep Artificial Reef MPAs, located east of Charleston and Charleston Harbor, SC (SAFMC 2009).

Habitat and Managed Species Characterization

> "Oriented perpendicular to and southeast of the Charleston, SC, coastline, the area is heavily fished by both commercial and recreational fishermen. Water depths range from 262 ft. to 459 ft., with shallower areas from 148 ft. to 262 ft. The area includes shelf-edge habitat, home to species such as vermilion snapper, red porgy, gag, scamp, and black sea bass. Other deepwater species include: juvenile snowy grouper, speckled hind, and blueline tilefish. The large number of species found in this area may be related to regional circulation patterns: the MPA lies in an area where the Gulf Stream deflects, or bounces off, the "Charleston Bump," a deepwater bank made up of a series of steep scarps with rocky cliffs, overhangs, and caves. This deflection creates a series of persistent clockwise swirls and upwelling currents referred to as the "Charleston Gyre," resulting in nutrient rich

water beneficial to early life stages of fishes. Furthermore, the Charleston Gyre may serve to retain larvae offshore, as well as transport the larvae of some species such as gag and snowy grouper toward nursery areas in estuarine waters. Thus, the area may serve both as a source of larvae for surrounding regions and a sink to retain young fish that need to remain offshore to complete their development." (SAFMC 2009; Fig. 6).

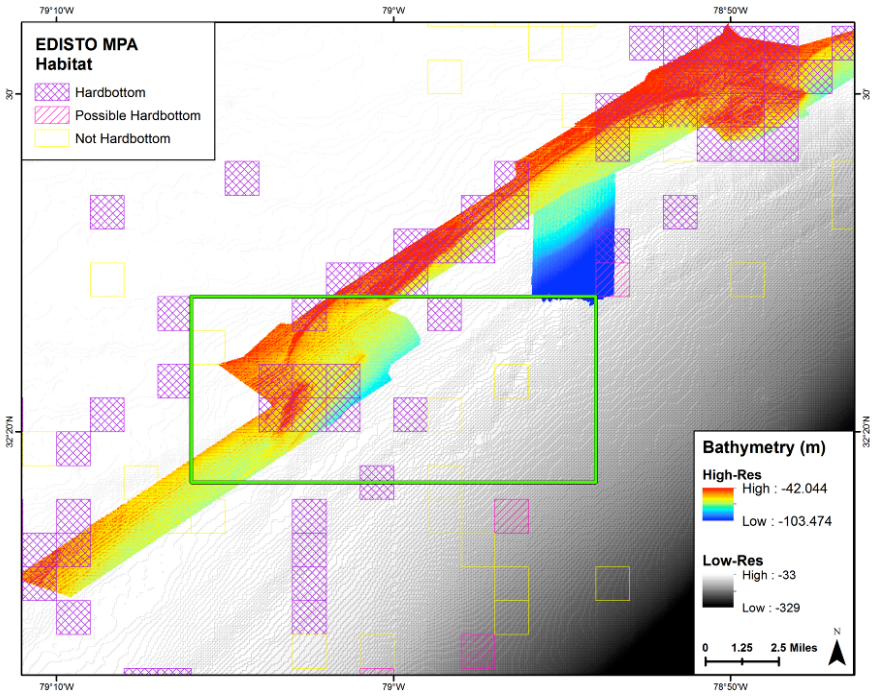


Figure 6. Low- and high-resolution bathymetry and habitat characterization within and outside of the Edisto MPA (Provided by N. Farmer).

5. Charleston Deep Artificial Reef MPA

Location and Zoning

The Charleston Deep Artificial Reef MPA is located about 50 nautical miles southeast of Charleston Harbor, SC and spans approximately 21 square nautical miles (3.5 x 6 nautical miles) in size (Figure 5; SAFMC 2007, 2009).

*Northwest corner at **32°04′ N, 79°12′W*** *Northeast corner at **32°8.5′N, 79°7.5′W***
*Southwest corner at **32°1.5′N, 79°9.3′W*** *Southeast corner at **32°6′N, 79°5′W***
(SAFMC 2007, 2009)

Habitat Characterization

"This area is proposed as an experimental artificial reef site as a result of public comment and support for creating artificial reefs. The area ranges in depth from

Site Characterization

328 ft. to 492 ft. There is no hard bottom in the area. Any biological benefits to deepwater species would accrue after artificial reef material (such as sunken ships, tanks, or highway materials) is added to improve habitat and attract fish. Study of this site in the long-term may provide important biological information about deepwater snapper grouper species and the effectiveness of deepwater artificial reefs." (SAFMC 2009; Fig. 7)

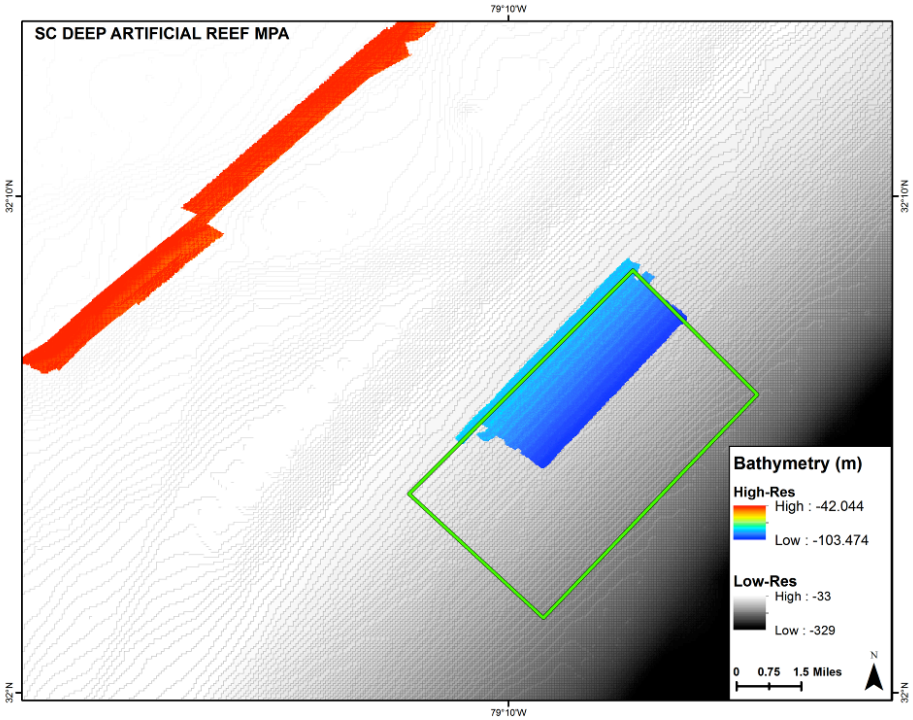


Figure 7. Low- and high-resolution bathymetry within and outside of the Charleston Deep Artificial Reef MPA (Provided by N. Farmer).

Georgia MPA

Location and Zoning

The Georgia MPA is located about 69 nautical miles southeast of Wassaw Sound, GA and spans approximately 100 square nautical miles (10 x 10 nautical miles) in size (Fig. 8; SAFMC 2007, 2009).

*Northwest corner at **31°43´N, 79°31´W*** *Northeast corner at **31°43´N, 79°21´W***
*Southwest corner at **31°34´N, 79°39´W*** *Southeast corner at **31°34´N, 79°29´W***
(SAFMC 2007, 2009)

> "The area consists of a mud-bottom habitat in waters 295 ft. to 984 ft. deep. Species such as snowy grouper and golden tilefish are often caught within the area, although most fishing is for pelagic species such as tuna and dolphin. This area is occasionally fished commercially for snapper grouper species but lies east of an area called the "Triple Ledge" that is an important area for commercial fishermen. Oriented parallel to the coast and shelf break, the area encompasses additional deepwater habitat." (SAFMC 2009)

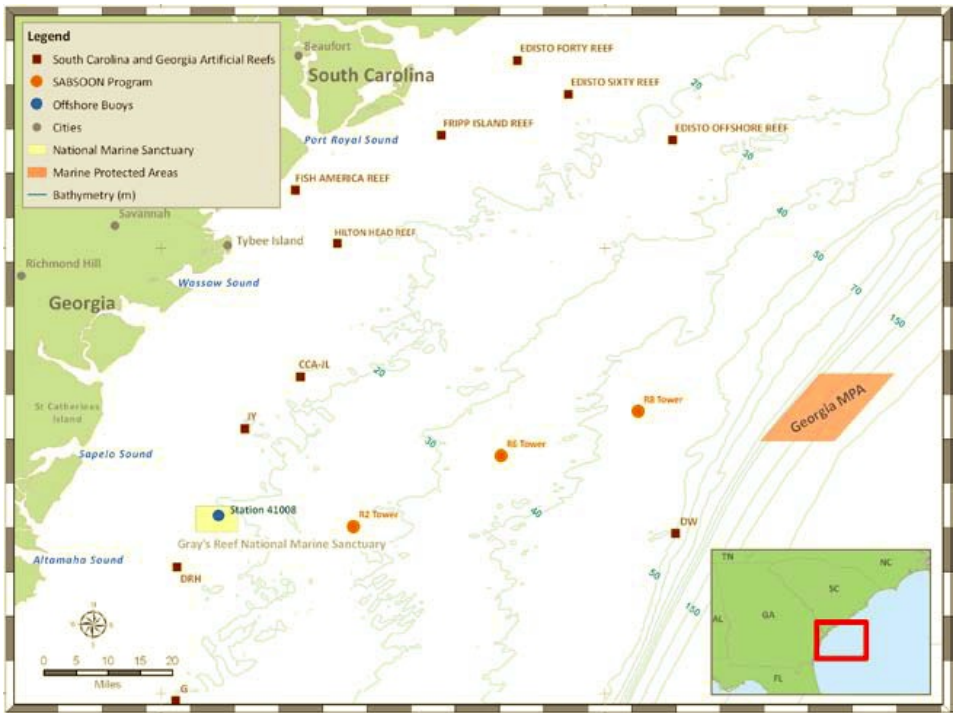


Figure 8. The Georgia MPA, located east of Wassaw Sound, GA (SAFMC 2009).

Habitat and Managed Species Characterization

- Describe the benthic habitat composition, geomorphological features, and other key features at this site (Fig. 9).
- Describe any potential spawning in the area and include temporal variation in occurrence.
- Describe any overall and/or site specific threats and status to the habitat and to the target species. A summary table or figure is recommended.
- Describe current and historical commercial and recreational fishing activities at this site.

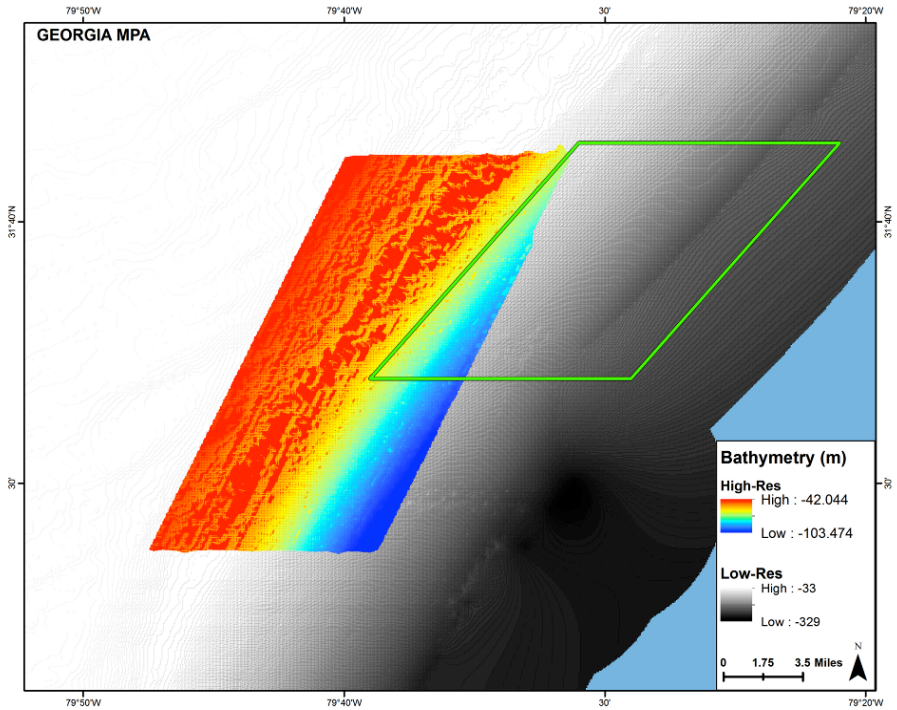


Figure 9. Low- and high-resolution bathymetry within and outside of the Georgia MPA (Provided by N. Farmer).

North Florida MPA

Location and Zoning

The North Florida MPA is located about 60 nautical miles off the St. John's River in Jacksonville, FL and spans approximately 100 square nautical miles (10 x 10 nautical miles) in size (Fig. 10; SAFMC 2007, 2009).

Northwest corner at 30°29′N, 80°14′W *Northeast corner at 30°29′N, 80°2′ W*
Southwest corner at 30°19′N, 80°14′W *Southeast corner at 30°19′N, 80°2′W*
(SAFMC 2007, 2009)

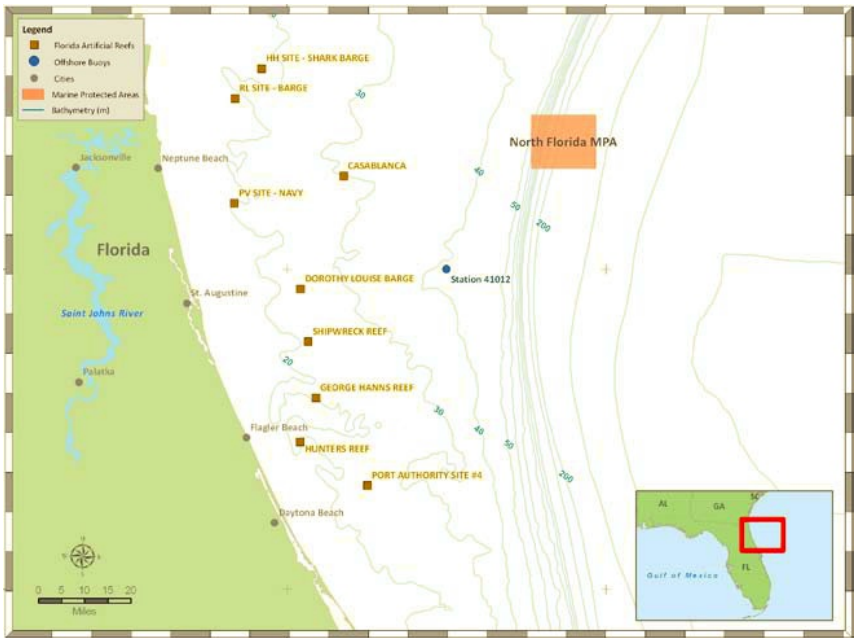


Figure 10. North Florida MPA located east of Neptune Beach, FL.

Habitat and Managed Species Characterization

"The MPA consists of varying water depths ranging from 197 ft. to 656 ft., with a deeper area up to 1,247 ft. The bottom habitat comprises some mud bottom habitat and shelf-edge reef of slab pavement, blocked boulders, and buried blocked boulders." (SAFMC 2009; Figs. 11 and 12)

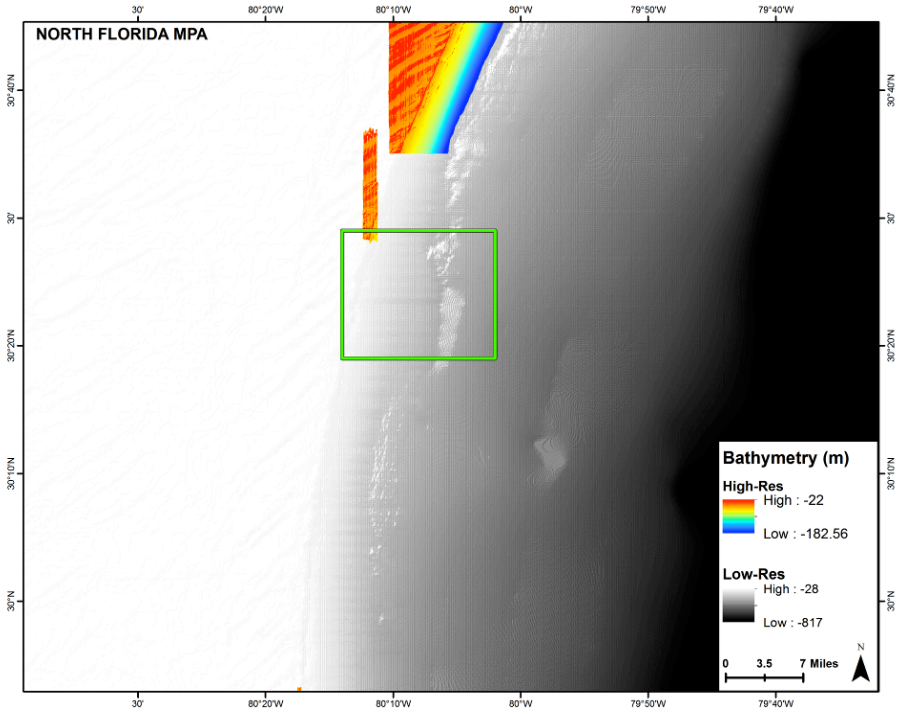


Figure 11. Low- and high-resolution bathymetry within and outside of the North Florida MPA (Provided by N. Farmer).

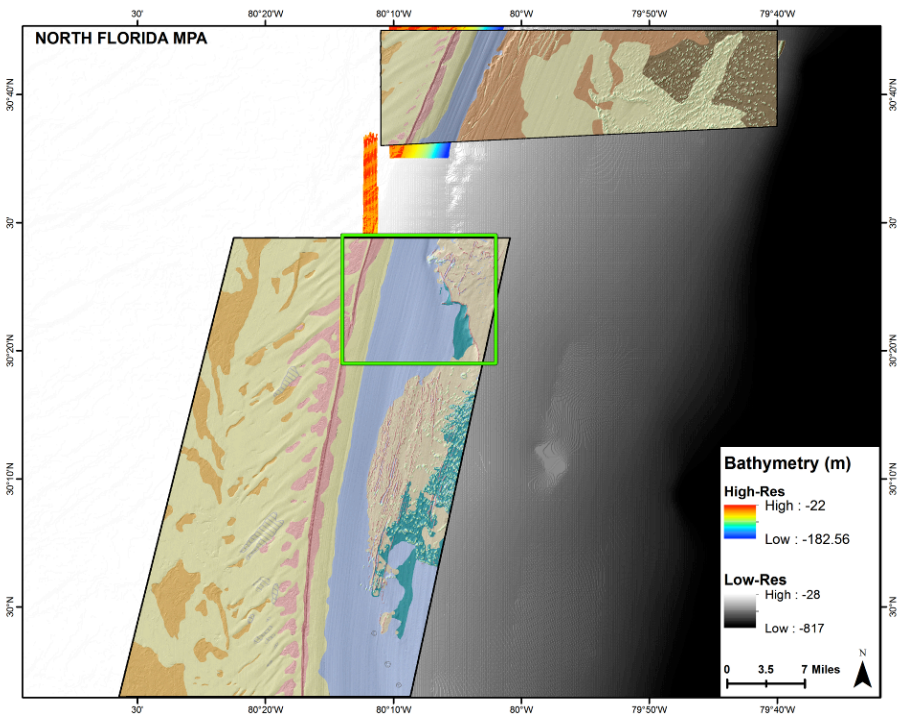


Figure 12. High-resolution habitat characterization within and outside of the North Florida MPA (Provided by N. Farmer).

> "Snowy grouper and speckled hind have been caught in the area and the mud bottom may also be habitat for golden tilefish. Some mid-shelf species that are also likely to inhabit the area include vermilion snapper, hogfish, scamp, red porgy, and tomtate. The location of this MPA represents a compromise between fishermen and the Habitat Advisory Panel in order to balance biological benefits with social and economic impacts." (SAFMC 2009)

St. Lucie Hump MPA

Location and Zoning

The St. Lucie MPA is located about 9 nautical miles southeast of the St. Lucie Inlet, FL and spans approximately 8 square nautical miles (4 x 2 nautical miles) in size (Fig. 13; SAFMC 2007, 2009).

*Northwest corner at **27°8′N, 80°W***
*Southwest corner at **27°4′N, 80°W***
*Northeast corner at **27°8′N, 79°58′W***
*Southeast corner at **27°4′N, 79°58′W***
(SAFMC 2007, 2009)

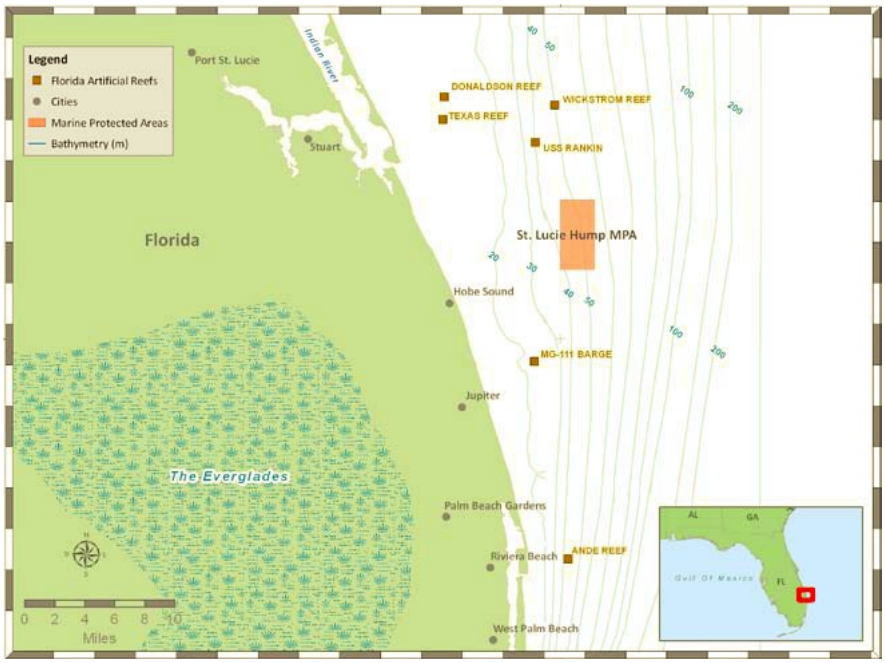


Figure 13. St. Lucie Hump MPA, located east of the St. Lucie Inlet, FL (SAFMC 2009).

Habitat and Managed Species Characterization

"This area, located east of Jupiter, FL, is habitat-rich and harbors speckled hind, juvenile snowy grouper, warsaw grouper, and mid-shelf species such as sea bass, red porgy, and red snapper. Water depths range from 216 ft. to 234 ft." (SAFMC 2009; Fig. 14)

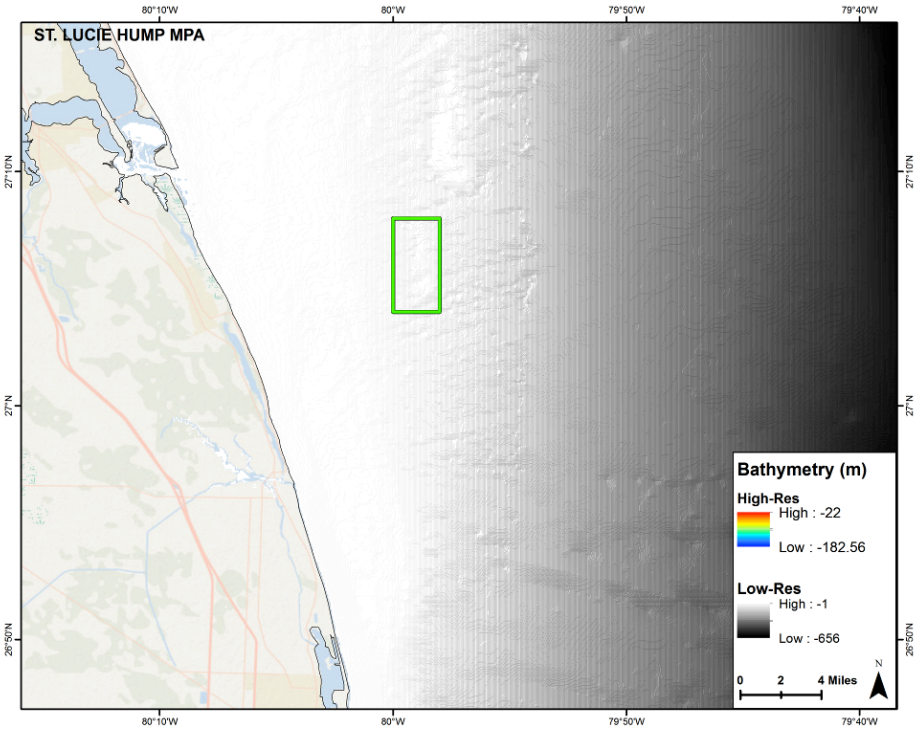


Figure 14. Low-resolution bathymetry of the St. Lucie Hump MPA (Provided by N. Farmer).

"The area is heavily targeted by fishermen trolling for pelagic species and experiences a high level of vessel traffic. This MPA is located between fishing areas to the north and south that are more popular or just as popular; it is anticipated this will help reduce the potential socio-economic impacts to fishermen. The area has high potential for protecting deepwater snapper grouper species as well as some mid-shelf species." (SAFMC 2009)

East Hump MPA

Location and Zoning

The East Hump MPA is located about 13 nautical miles southeast of Long Key, FL and spans approximately 50 square nautical miles (5 x 10 nautical miles) in size (Fig. 15; SAFMC 2007, 2009).

*Northwest corner at **24°36.5′N, 80°45.5′W***
*Southwest corner at **24°32.5′N, 80°48′W***
*Northeast corner at **24°32′N, 80°36′W***
*Southeast corner at **24°27.5′N, 80°38.5′W***
(SAFMC 2007, 2009)

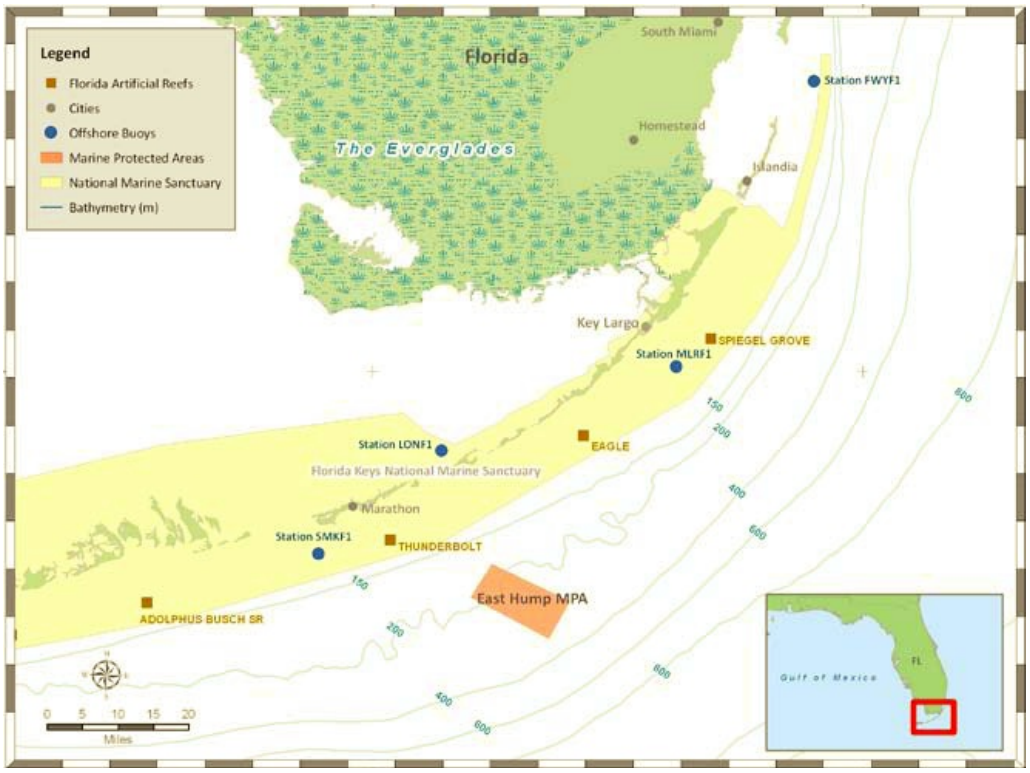


Figure 15. East Hump MPA, located southeast of Long Key, FL (SAFMC 2009).

Habitat and Managed Species Characterization

"Located near the popular fishing spot called the "Islamorada Hump," this site is located in waters ranging from 636 ft. to 971 ft. deep, with the tops of the

Site Characterization

"humps" at 509 ft. to 541 ft. The humps are pinnacle-like formations that consist primarily of hardened layers of sandy carbonate sediments and support a diverse array of marine plants and animals, including deepwater corals. The area contains abundant habitat for snapper grouper species, such as snowy grouper, golden tilefish, and warsaw grouper." (SAFMC 2009; Fig. 16)

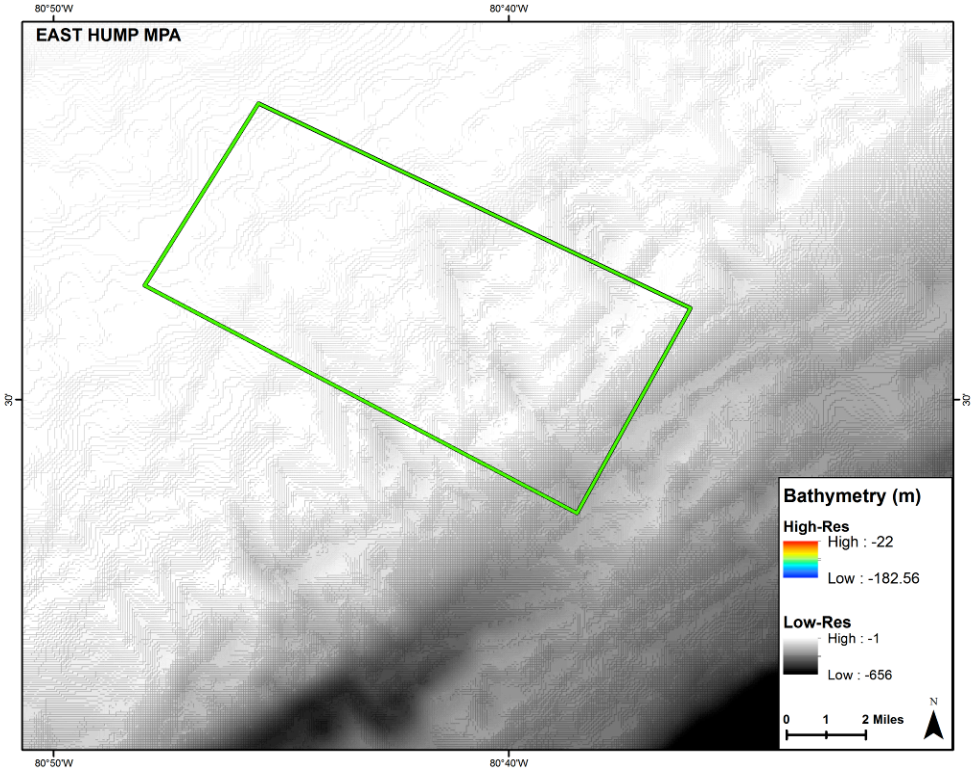


Figure 16. Low-resolution bathymetry of the East Hump MPA (Provided by N. Farmer).

Literature Cited & Resources Consulted

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

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

SMP Outline: System management plan outline for the SAFMC Amendment 14 MPAs. 2013. Report for the SAFMC Briefing Book September 2013, 29 p.