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.

<u>Goal 1: Utilize a collaborative process to select MPAs</u>

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

<u>Goal 2: Maximize biological benefits</u>

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.

<u>Goal 3: Minimize adverse social and economic effects</u>

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.

<u>Goal 4: Maximize MPA enforceability</u>

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).

<u>NOAA Fisheries, Southeast Regional Office, Southeast Fisheries Science Center:</u>
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

<u>Marine Resources Monitoring, Assessment, and Prediction (MARMAP) & Southeast Fishery-Independent Survey (SEFIS):</u>
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

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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
<u>Mapping needs</u>
• Map the proposed Type 2 MPAs.

<u>Research and monitoring needs</u>
• 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
    - Personnel
    - Equipment
- Acquire several fully equipped large offshore patrol vessels
- Recurring operational costs
    - Fuel
    - Maintenance
    - Dockage
    - 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)

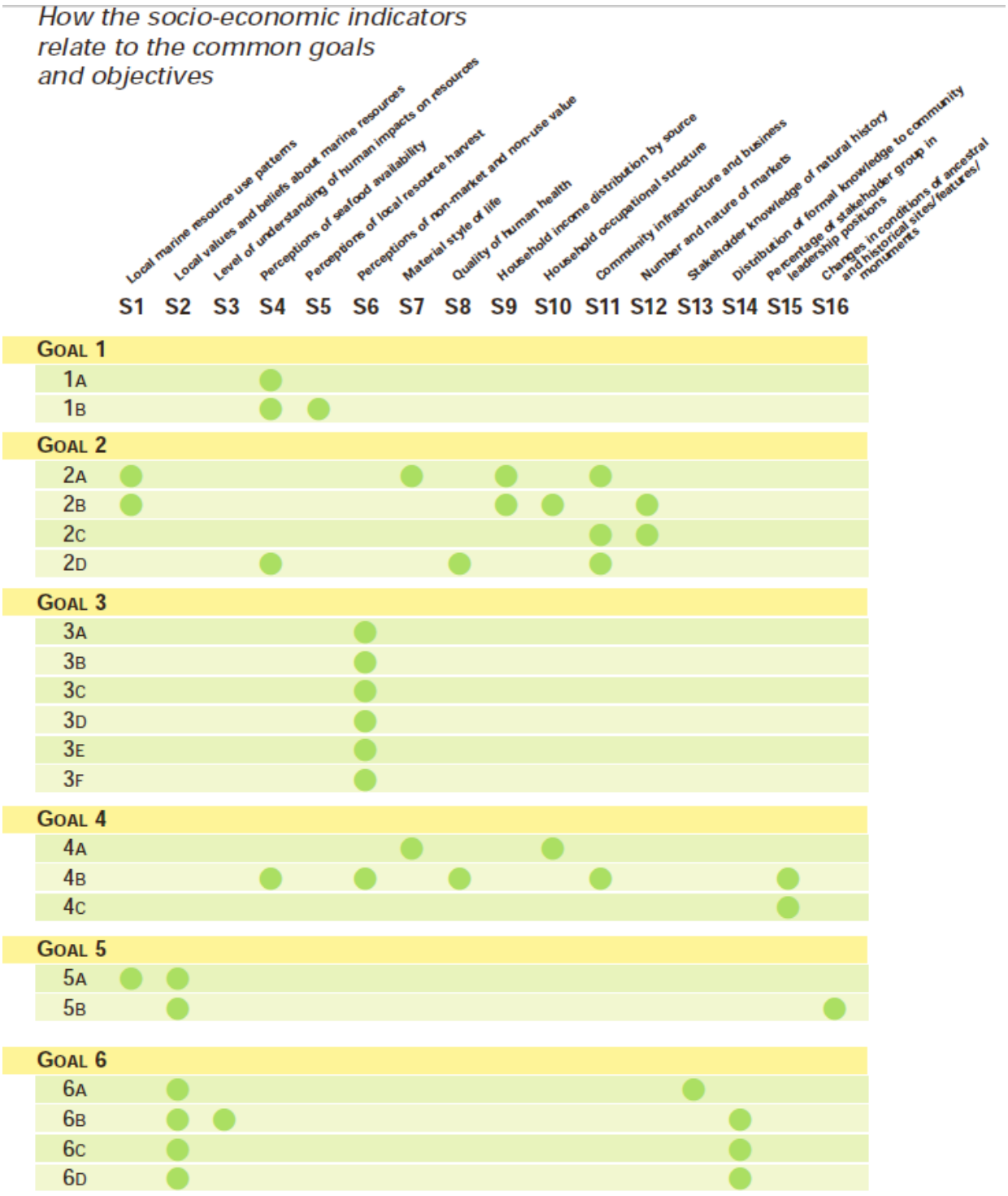
GOAL 1	**Marine resources sustained or protected**
1A	*Populations of target species for extractive or non-extractive use restored to or maintained at desired reference points*
1B	*Losses to biodiversity and ecosystem functioning and structure prevented*
1C	*Populations of target species for extractive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

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

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

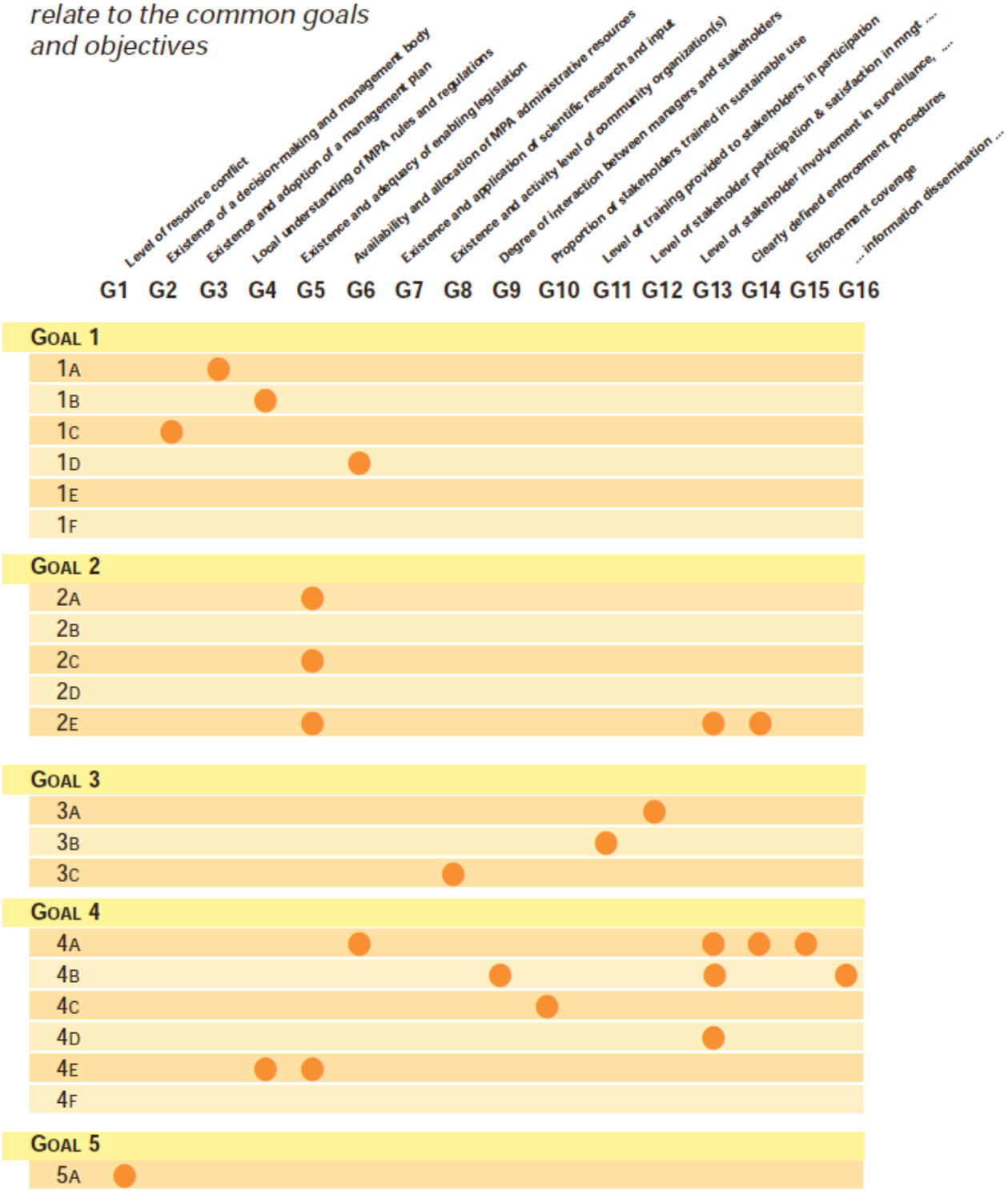
GOAL 1	**Food security enhanced or maintained**
1A	*Nutritional needs of coastal residents met or improved*
1B	*Improved availability of locally caught seafood for public consumption*
GOAL 2	**Livelihoods enhanced or maintained**
2A	*Economic status and relative wealth of coastal residents and/or resource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

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