Appendix A. Considered But Rejected Alternatives

This section describes actions and alternatives that the South Atlantic Fishery Management Council (South Atlantic Council) considered in developing Amendment 29 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region (Amendment 29), but decided not to pursue. The description of each alternative is followed by a summary statement of why it was eliminated from Amendment 29.

There are no actions or alternatives that were considered but eliminated from further analysis.

Appendix B. Glossary

Acceptable Biological Catch (ABC): Maximum amount of fish stock than can be harvested without adversely affecting recruitment of other components of the stock. The ABC level is typically higher than the total allowable catch, leaving a buffer between the two.

ALS: Accumulative Landings System. NMFS database which contains commercial landings reported by dealers.

Biomass: Amount or mass of some organism, such as fish.

B_{MSY}: Biomass of population achieved in long-term by fishing at F_{MSY}.

Bycatch: Fish harvested in a fishery, but not sold or kept for personal use. Bycatch includes economic discards and regulatory discards, but not fish released alive under a recreational catch and release fishery management program.

Caribbean Fishery Management Council (CFMC): One of eight regional councils mandated in the Magnuson-Stevens Fishery Conservation and Management Act to develop management plans for fisheries in federal waters. The CFMC develops fishery management plans for fisheries off the coast of the U.S. Virgin Islands and the Commonwealth of Puerto Rico.

Catch Per Unit Effort (CPUE): The amount of fish captured with an amount of effort. CPUE can be expressed as weight of fish captured per fishing trip, per hour spent at sea, or through other standardized measures.

Charter Boat: A fishing boat available for hire by recreational anglers, normally by a group of anglers for a short time period.

Cohort: Fish born in a given year. (See year class.)

Control Date: Date established for defining the pool of potential participants in a given management program. Control dates can establish a range of years during which a potential participant must have been active in a fishery to qualify for a quota share.

Constant Catch Rebuilding Strategy: A rebuilding strategy where the allowable biological catch of an overfished species is held constant until stock biomass reaches B_{MSY} at the end of the rebuilding period.

Constant F Rebuilding Strategy: A rebuilding strategy where the fishing mortality of an overfished species is held constant until stock biomass reached BMSY at the end of the rebuilding period.

Directed Fishery: Fishing directed at a certain species or species group.

Discards: Fish captured, but released at sea.

Discard Mortality Rate: The percent of total fish discarded that do not survive being captured and released at sea.

Derby: Fishery in which the TAC is fixed and participants in the fishery do not have individual quotas. The fishery is closed once the TAC is reached, and participants attempt to maximize their harvests as quickly as possible. Derby fisheries can result in capital stuffing and a race for fish.

Effort: The amount of time and fishing power (i.e., gear size, boat size, horsepower) used to harvest fish.

Exclusive Economic Zone (EEZ): Zone extending from the shoreline out to 200 nautical miles in which the country owning the shoreline has the exclusive right to conduct certain activities such as fishing. In the United States, the EEZ is split into state waters (typically from the shoreline out to 3 nautical miles) and federal waters (typically from 3 to 200 nautical miles).

Exploitation Rate: Amount of fish harvested from a stock relative to the size of the stock, often expressed as a percentage.

F: Fishing mortality.

Fecundity: A measurement of the egg-producing ability of fish at certain sizes and ages.

Fishery Dependent Data: Fishery data collected and reported by fishermen and dealers.

Fishery Independent Data: Fishery data collected and reported by scientists who catch the fish themselves.

Fishery Management Plan: Management plan for fisheries operating in federal waters produced by regional fishery management councils and submitted to the Secretary of Commerce for approval.

Fishing Effort: Usually refers to the amount of fishing. May refer to the number of fishing vessels, amount of fishing gear (nets, traps, hooks), or total amount of time vessels and gear are actively engaged in fishing.

Fishing Mortality: A measurement of the rate at which fish are removed from a population by fishing. Fishing mortality can be reported as either annual or instantaneous. Annual mortality is the percentage of fish dying in one year. Instantaneous is that percentage of fish dying at any one time.

Fishing Power: Measure of the relative ability of a fishing vessel, its gear, and its crew to catch fishes, in reference to some standard vessel, given both vessels are under identical conditions.

$F_{30\%SPR}$: Fishing mortality that will produce a static SPR = 30%.

$F_{45\%SPR}$: Fishing mortality that will produce a static SPR = 45%.

F_{OY}: Fishing mortality that will produce OY under equilibrium conditions and a corresponding biomass of B_{OY}. Usually expressed as the yield at 85% of F_{MSY}, yield at 75% of F_{MSY}, or yield at 65% of F_{MSY}.

F_{MSY}: Fishing mortality that if applied constantly, would achieve MSY under equilibrium conditions and a corresponding biomass of B_{MSY}

Fork Length (FL): The length of a fish as measured from the tip of its snout to the fork in its tail.

Gear restrictions: Limits placed on the type, amount, number, or techniques allowed for a given type of fishing gear.

Growth Overfishing: When fishing pressure on small fish prevents the fishery from producing the maximum poundage. Condition in which the total weight of the harvest from a fishery is improved when fishing effort is reduced, due to an increase in the average weight of fishes.

Gulf of Mexico Fishery Management Council (GFMC): One of eight regional councils mandated in the Magnuson-Stevens Fishery Conservation and Management Act to develop management plans for fisheries in federal waters. The GFMC develops fishery management plans for fisheries off the coast of Texas, Louisiana, Mississippi, Alabama, and the west coast of Florida.

Head Boat: A fishing boat that charges individual fees per recreational angler onboard.

Highgrading: Form of selective sorting of fishes in which higher value, more marketable fishes are retained, and less marketable fishes, which could legally be retained are discarded.

Individual Fishing Quota (IFQ): Fishery management tool that allocates a certain portion of the TAC to individual vessels, fishermen, or other eligible recipients.

Longline: Fishing method using a horizontal mainline to which weights and baited hooks are attached at regular intervals. Gear is either fished on the bottom or in the water column.

Magnuson-Stevens Fishery Conservation and Management Act: Federal legislation responsible for establishing the fishery management councils and the mandatory and discretionary guidelines for federal fishery management plans.

Marine Recreational Fisheries Statistics Survey (MRFSS): Survey operated by NMFS in cooperation with states that collects marine recreational fisheries data.

Marine Recreational Information Program (MRIP): Survey operated by NMFS in cooperation with states that collects marine recreational fisheries data. It replaced the MRFSS survey.

Maximum Fishing Mortality Threshold (MFMT): The rate of fishing mortality above which a stock's capacity to produce MSY would be jeopardized.

Maximum Sustainable Yield (MSY): The largest long-term average catch that can be taken continuously (sustained) from a stock or stock complex under average environmental conditions.

Median: The midpoint of a frequency distribution of observed values or quantities, such that there is an equal probability of falling above or below it.

Minimum Stock Size Threshold (MSST): The biomass level below which a stock would be considered overfished.

Modified F Rebuilding Strategy: A rebuilding strategy where fishing mortality is changed as stock biomass increases during the rebuilding period.

Multispecies fishery: Fishery in which more than one species is caught at the same time and location with a particular gear type.

National Marine Fisheries Service (NMFS): Federal agency within NOAA responsible for overseeing fisheries science and regulation.

National Oceanic and Atmospheric Administration: Agency within the Department of Commerce responsible for ocean and coastal management.

Natural Mortality (M): A measurement of the rate at which fish are removed from a population by natural causes. Natural mortality can be reported as either annual or instantaneous. Annual mortality is the percentage of fish dying in one year. Instantaneous is that percentage of fish dying at any one time.

Optimum Yield (OY): The amount of catch that will provide the greatest overall benefit to the nation, particularly with respect to food production and recreational opportunities and taking into account the protection of marine ecosystems.

Overfished: A stock or stock complex is considered overfished when stock biomass falls below the minimum stock size threshold (MSST) (e.g., current biomass < MSST = overfished).

Overfishing: Overfishing occurs when a stock or stock complex is subjected to a rate of fishing mortality that exceeds the maximum fishing mortality threshold (e.g., current fishing mortality rate > MFMT = overfishing).

Quota: Percent or annual amount of fish that can be harvested.

Recruitment (R): Number or percentage of fish that survives from hatching to a specific size or age.

Recruitment Overfishing: The rate of fishing above which the recruitment to the exploitable stock becomes significantly reduced. This is characterized by a greatly reduced spawning stock, a decreasing proportion of older fish in the catch, and generally very low recruitment year after year.

Scientific and Statistical Committee (SSC): Fishery management advisory body composed of federal, state, and academic scientists, which provides scientific advice to a fishery management council.

Selectivity: The ability of a type of gear to catch a certain size or species of fish.

South Atlantic Fishery Management Council (SAFMC): One of eight regional councils mandated in the Magnuson-Stevens Fishery Conservation and Management Act to develop management plans for fisheries in federal waters. The SAFMC develops fishery management plans for fisheries off North Carolina, South Carolina, Georgia, and the east coast of Florida.

Spawning Potential Ratio (Transitional SPR): Formerly used in overfished definition. The number of eggs that could be produced by an average recruit in a fished stock divided by the number of eggs that could be produced by an average recruit in an unfished stock. SPR can also be expressed as the spawning stock biomass per recruit (SSBR) of a fished stock divided by the SSBR of the stock before it was fished.

% Spawning Per Recruit (Static SPR): Formerly used in overfishing determination. The maximum spawning per recruit produced in a fished stock divided by the maximum spawning per recruit, which occurs under the conditions of no fishing. Commonly abbreviated as %SPR.

Spawning Stock Biomass (SSB): The total weight of those fish in a stock which are old enough to spawn.

Spawning Stock Biomass Per Recruit (SSBR): The spawning stock biomass divided by the number of recruits to the stock or how much spawning biomass an average recruit would be expected to produce.

Total Allowable Catch (TAC): The total amount of fish to be taken annually from a stock or stock complex. This may be a portion of the Allowable Biological Catch (ABC) that takes into consideration factors such as bycatch.

Total Length (TL): The length of a fish as measured from the tip of the snout to the tip of the tail.

Appendix C. Essential Fish Habitat and Move to Ecosystem Based Management

South Atlantic Fishery Management Council Habitat Conservation, Ecosystem Coordination and Collaboration

The Council, using the Essential Fish Habitat Plan as the cornerstone, adopted a strategy to facilitate the move to an ecosystem-based approach to fisheries management in the region. This approach required a greater understanding of the South Atlantic ecosystem and the complex relationships among humans, marine life, and the environment including essential fish habitat. To accomplish this, a process was undertaken to facilitate the evolution of the Habitat Plan into a Fishery Ecosystem Plan (FEP), thereby providing a more comprehensive understanding of the biological, social, and economic impacts of management necessary to initiate the transition from single species management to ecosystem-based management in the region.

Moving to Ecosystem-Based Management

The Council adopted broad goals for Ecosystem-Based Management to include maintaining or improving ecosystem structure and function; maintaining or improving economic, social, and cultural benefits from resources; and maintaining or improving biological, economic, and cultural diversity. Development of a regional FEP (SAFMC 2009a) provided an opportunity to expand the scope of the original Council Habitat Plan and compile and review available habitat, biological, social, and economic fishery and resource information for fisheries in the South Atlantic ecosystem. The South Atlantic Council views habitat conservation as the core of the move to EBM in the region. Therefore, development of the FEP was a natural next step in the evolution and expands and significantly updates the SAFMC Habitat Plan (SAFMC 1998a) incorporating comprehensive details of all managed species (SAFMC, South Atlantic States, ASMFC, and NOAA Fisheries Highly Migratory Species and Protected Species) including their biology, food web dynamics, and economic and social characteristics of the fisheries and habitats essential to their survival. The FEP therefore serves as a source document and presents more complete and detailed information describing the South Atlantic ecosystem and the impact of fisheries on the environment. This FEP updated information on designated Essential Fish Habitat (EFH) and EFH-Habitat Areas of Particular Concern; expanded descriptions of biology and status of managed species; presented information that will support ecosystem considerations for managed species; and described the social and economic characteristics of the fisheries in the region. In addition, it expanded the discussion and description of existing research programs and needs to identify biological, social, and economic research needed to fully address ecosystem-based management in the region. It is anticipated that the FEP will provide a greater degree of guidance by fishery, habitat, or major ecosystem consideration of bycatch reduction, prey-predator interactions, maintaining biodiversity, and spatial management needs. This FEP serves as a living source document of biological, economic, and social information for all Fishery Management Plans (FMP). Future Environmental Assessments and Environmental Impact Statements associated with subsequent amendments to Council FMPs will draw from or cite by reference the FEP.

The Fishery Ecosystem Plan for the South Atlantic Region encompasses the following volume structure:

FEP Volume I - Introduction and Overview of FEP for the South Atlantic Region
FEP Volume II - South Atlantic Habitats and Species
FEP Volume III - South Atlantic Human and Institutional Environment
FEP Volume IV - Threats to South Atlantic Ecosystem and Recommendations
FEP Volume V - South Atlantic Research Programs and Data Needs
FEP Volume VI - References and Appendices

Comprehensive Ecosystem-Based Amendment (CE-BA) 1 (SAFMC 2009b) is supported by this FEP and updated EFH and EFH-HAPC information and addressed the Final EFH Rule (e.g., GIS presented for all EFH and EFH-HAPCs). Management actions implemented in CE-BA 1 established deepwater Coral HAPCs to protect what is thought to be the largest continuous distribution (>23,000 square miles) of pristine, deepwater coral ecosystems in the world.

The Fishery Ecosystem Plan, slated to be revised every 5 years, will again be the vehicle to update and refine information supporting designation and future review of EFH and EFH-HAPCs for managed species. Planning for the update is being conducted in cooperation with the Habitat Advisory Panel during the fall and winter of 2013 with initiation during 2014.

Ecosystem Approach to Deepwater Ecosystem Management

The South Atlantic Council manages coral, coral reefs and live/hard bottom habitat, including deepwater corals, through the Fishery Management Plan for Coral, Coral Reefs and Live/Hard Bottom Habitat of the South Atlantic Region (Coral FMP). Mechanisms exist in the FMP, as amended, to further protect deepwater coral and live/hard bottom habitats. The SAFMC's Habitat and Environmental Protection Advisory Panel and Coral Advisory Panel have supported proactive efforts to identify and protect deepwater coral ecosystems in the South Atlantic region. Management actions in Comprehensive Ecosystem-Based Amendment (CE-BA 1) (SAFMC 2009b) established deepwater coral HAPCs (C- HAPCs) to protect what is thought to be the largest continuous distribution (>23,000 square miles) of pristine deepwater coral ecosystems in the world. In addition, CE-BA 1 established areas within the CHAPC, which provide for traditional fishing in limited areas, which do not impact deepwater coral habitat. CE-BA 1, supported by the FEP, also addressed non-regulatory updates for existing EFH and EFH- HAPC information and addressed the spatial requirements of the Final EFH Rule (i.e., GIS presented for all EFH and EFH-HAPCs). Actions in this amendment included modifications in the management of the following: octocorals; special management zones (SMZs) off the coast of South Carolina; and sea turtle release gear requirements for snapper grouper fishermen. The amendment also designated essential fish habitat (EFH) and EFH-Habitat Areas of Particular Concern (EFH-HAPCs).

CE-BA 2 established annual catch limits (ACL) for octocorals in the South Atlantic as well as modifying the Fishery Management Unit (FMU) for octocorals to remove octocorals off the coast of Florida from the FMU (SAFMC 2011). The amendment also limited the possession of

managed species in the SMZs off South Carolina to the recreational bag limit for snapper grouper and coastal migratory pelagic species; modified sea turtle release gear requirements for the snapper grouper fishery based upon freeboard height of vessels; amends Council fishery management plans (FMPs) to designate or modify EFH and EFH-HAPCs, including the FMP for Pelagic Sargassum Habitat; amended the Coral FMP to designate EFH for deepwater Coral HAPCs designated under CE-BA 1; and amended the Snapper Grouper FMP to designate EFH-HAPCs for golden and blueline tilefish and the deepwater Marine Protected Areas. The final rule was published in the federal register on December 30, 2011, and regulations became effective on January 30, 2012.

Building from a Habitat to an Ecosystem Network to Support the Evolution

Starting with our Habitat and Environmental Protection Advisory Panel, the Council expanded and fostered a comprehensive Habitat network in our region to develop the Habitat Plan of the South Atlantic Region completed in 1998 to support the EFH rule. Building on the core regional collaborations, the Council facilitated an expansion to a Habitat and Ecosystem network to support development of the FEP and CE-BA as well as coordinate with partners on other regional efforts.

Integrated Ocean Observing System (IOOS) and Southeast Coastal and Ocean Observing Regional Association (SECOORA)

The Integrated Ocean Observing System (IOOS®) is a partnership among federal, regional, academic, and private sector parties that works to provide new tools and forecasts to improve safety, enhance the economy, and protect our environment. IOOS supplies critical information about our Nation's oceans, coasts, and Great Lakes. Scientists working to understand climate change, governments adapting to changes in the Arctic, municipalities monitoring local water quality, and industries affected by coastal and marine spatial planning all have the same need: reliable, timely, and sustained access to data and information that inform decision making. Improving access to key marine data and information supports several purposes. IOOS data sustain national defense, marine commerce, and navigation safety. Scientists use these data to issue weather, climate, and marine forecasts. IOOS data are also used to make decisions for energy siting and production, economic development, and ecosystem-based resource management. Emergency managers and health officials need IOOS information to make decisions about public safety. Teachers and government officials rely on IOOS data for public outreach, training, and education.

SECOORA is one of 11 Regional Associations established nationwide through the US IOOS whose primary source of funding is through a 5-year cooperative agreement titled "Coordinated Monitoring, Prediction, and Assessment to Support Decision-Makers Needs for Coastal and Ocean Data and Tools". However, SECOORA was recently awarded funding via a NOAA Regional Ocean Partnership grant through the Governors' South Atlantic Alliance. SECOORA is the regional solution to integrating coastal and ocean observing data in the Southeast United States to inform decision makers and the general public. The SECOORA region encompasses 4 states, over 42 million people, and spans the

coastal ocean from North Carolina to the west Coast of Florida and is creating customized products to address these thematic areas: Marine Operations; Coastal Hazards; Ecosystems, Water Quality, Living Marine Resources; and Climate Change. The Council is a voting member and Council staff was recently re-elected to serve on the Board of Directors for the Southeast Coastal Regional Ocean Observing Association (SECOORA) to guide and direct priority needs for observation and modeling to support fisheries oceanography and integration into stock assessments through SEDAR. Cooperation through SECOORA is envisioned to facilitate the following:

- Refining current or water column designations of EFH and EFH-HAPCs (e.g., Gulf Stream and Florida Current).
- Providing oceanographic models linking benthic, pelagic habitats, and food webs.
- Providing oceanographic input parameters for ecosystem models.
- Integration of OOS information into Fish Stock Assessment process in the SA region.
- Facilitating OOS system collection of fish and fishery data and other research necessary to support the Council's use of area-based management tools in the SA Region including but not limited to EFH, EFH-HAPCs, Marine Protected Areas, Deepwater Coral Habitat Areas of Particular Concern, Special Management Zones, and Allowable Gear Areas.
- Integration of OOS program capabilities and research Needs into the South Atlantic Fishery Ecosystem Plan.
- Collaboration with SECOORA to integrate OOS products with information included in the Council's Habitat and Ecosystem Web Services and Atlas to facilitate model and tool development.
- Expanding Map Services and the Regional Habitat and Ecosystem Atlas in cooperation with SECOORAs Web Services that will provide researchers access to data or products including those collected/developed by SA OOS partners.

SECOORA researchers are developing a comprehensive data portal to provide discovery of, access to, and metadata about coastal ocean observations in the southeast US. Below are various ways to access the currently available data.

One project recently funded by SECOORA initiated development of species specific habitat models that integrate remotely sensed and in situ data to enhance stock assessments for species managed by the Council. The project during 2013/2014 was initiated to address red porgy, gray triggerfish, black seabass, and vermilion snapper. Gray triggerfish and red porgy are slated for assessment through SEDAR in 2014/15 and 2015/16 respectively.

National Fish Habitat Plan and Southeast Aquatic Resource Partnership (SARP)

In addition, the Council serves on the National Habitat Board and, as a member of the Southeast Aquatic Resource Partnership (SARP), has highlighted this collaboration by including the Southeast Aquatic Habitat Plan (SAHP) and associated watershed conservation restoration targets into the FEP. Many of the habitat, water quality, and water quantity conservation needs identified in the threats and recommendations Volume of the FEP are directly addressed by on-

the-ground projects supported by SARP. This cooperation results in funding fish habitat restoration and conservation intended to increase the viability of fish populations and fishing opportunity, which also meets the needs to conserve and manage
Essential Fish Habitat for Council managed species or habitat important to their prey. To date, SARP has funded 53 projects in the region through this program. This work supports conservation objectives identified in the SAHP to improve, establish, or maintain riparian zones, water quality, watershed connectivity, sediment flows, bottoms and shorelines, and fish passage, and addresses other key factors associated with the loss and degradation of fish habitats. SARP also developed the Southern Instream Flow Network (SIFN) to address the impacts of flow alterations in the Southeastern US aquatic ecosystems which leverages policy, technical experience, and scientific resources among partners based in 15 states. Maintaining appropriate flow into South Atlantic estuarine systems to support healthy inshore habitats essential to Council managed species is a major regional concern and efforts of SARP through SIFN are envisioned to enhance state and local partners ability to maintain appropriate flow rates.

Governor's South Atlantic Alliance (GSAA)

Initially discussed as a South Atlantic Eco-regional Compact, the Council has also cooperated with South Atlantic States in the formation of a Governor's South Atlantic Alliance (GSAA). This will also provide regional guidance and resources that will address State and Council broader habitat and ecosystem conservation goals. The GSAA was initiated in 2006. An Executive Planning Team (EPT), by the end of 2007, had created a framework for the Governors South Atlantic Alliance. The formal agreement between the four states (NC, SC, GA, and FL) was executed in May 2009. The Agreement specifies that the Alliance will prepare a "Governors South Atlantic Alliance Action Plan" which will be reviewed annually for progress and updated every five years for relevance of content. The Alliance's mission and purpose is to promote collaboration among the four states, and with the support and interaction of federal agencies, academe, regional organizations, non-governmental organizations, and the private sector, to sustain and enhance the region's coastal and marine resources. The Alliance proposes to regionally implement science-based actions and policies that balance coastal and marine ecosystems capacities to support both human and natural systems. The GSAA Action Plan was released in December 2010 and describes the four Priority Issue Areas that were identified by the Governors to be of mutual importance to the sustainability of the region's resources: Healthy Ecosystems; Working Waterfronts; Clean Coastal and Ocean Waters; and Disaster-Resilient Communities. The goals, objectives, actions, and implementation steps for each of these priorities were further described in the GSAA Implementation Plan released in July 2011. The final Action Plan was released on December 1, 2010 and marked the beginning of intensive work by the Alliance Issue Area Technical Teams (IATTs) to develop implementation steps for the actions and objectives. The GSAA Implementation Plan was published July 6, 2011, and the Alliance has been working to implement the Plan through the IATTs and two NOAA-funded Projects. The Alliance also partners with other federal agencies, academia, non-profits, private industry, regional organizations, and others. The Alliance supports both national and state-level ocean and coastal policy by coordinating federal, state, and local entities to ensure the sustainability of the region's economic, cultural, and natural resources. The Alliance has organized itself around the founding principles outlined in the

GSAA Terms of Reference and detailed in the GSAA Business Plan. A team of natural resource managers, scientists, and information management system experts have partnered to develop a Regional Information Management System (RIMS) and recommend decision support tools that will support regional collaboration and decision-making. In addition to regional-level stakeholders, state and local coastal managers and decision makers will also be served by this project, which will enable ready access to new and existing data and information. The collection and synthesis of spatial data into a suite of visualization tools is a critical step for long-term collaborative planning in the South Atlantic region for a wide range of coastal uses. The Council's Atlas presents the spatial representations of Essential Fish Habitat, managed areas, regional fish and fish habitat distribution, and fishery operation information and it can be linked to or drawn on as a critical part of the collaboration with the RIMS.

South Atlantic Landscape Conservation Cooperative

One of the more recent collaborations is the Council's participation as Steering Committee member for the newly establish South Atlantic Landscape Conservation Cooperative (SALCC). Landscape Conservation Cooperatives (LCCs) are applied conservation science partnerships focused on a defined geographic area that informs on-the-ground strategic conservation efforts at landscape scales. LCC partners include DOI agencies, other federal agencies, states, tribes, non-governmental organizations, universities, and others. The newly formed Department of Interior Southeast Climate Services Center (CSC) has the LCCs in the region as their primary clients. One of the initial charges of the CSCs is to downscale climate models for use at finer scales.

The SALCC developed a Strategic Plan through an iterative process that began in December 2011. The plan provides a simple strategy for moving forward over the next few years. An operations plan was developed under direction from the SALCC Steering Committee to redouble efforts to develop version 1.0 of a shared conservation blueprint by spring-summer of 2014. The SALCC is developing the regional blueprint to address the rapid changes in the South Atlantic including but not limited to climate change, urban growth, and increasing human demands on resources which are reshaping the landscape. While these forces cut across political and jurisdictional boundaries, the conservation community does not have a consistent cross-boundary, cross-organization plan for how to respond. The South Atlantic Conservation Blueprint will be that plan. The blueprint is envisioned to be a spatially-explicit map depicting the places and actions need to sustain South Atlantic LCC objectives in the face of future change. The steps to creating the blueprint include development of: indicators and targets (shared metrics of success); the State of the South Atlantic (past, present, and future condition of indicators); and a Conservation Blueprint. Potential ways the blueprint could be used include: finding the best places for people and organizations to work together; raising new money to implement conservation actions; guiding infrastructure development (highways, wind, urban growth, etc.); creating incentives as an alternative to regulation; bringing a landscape perspective to local adaptation efforts; and locating places and actions to build resilience after major disasters (hurricanes, oil spills, etc.). Integration of connectivity, function, and threats to river, estuarine and marine systems supporting Council managed species is supported by the SALCC and enhanced by the Council being a voting member of

its Steering Committee. In addition, the Council's Regional Atlas presents spatial representations of Essential Fish Habitat, managed areas, regional fish and fish habitat distribution, and fishery operation information and it be linked to or drawn on as a critical part of the collaboration with the recently developed SALCC Conservation Planning Atlas.

Building Tools to support EBM in the South Atlantic Region

The Council has developed a Habitat and Ecosystem Section of the website http://www.safmc.net/ecosystem/Home/EcosystemHome/tabid/435/Default.aspx and, in cooperation with the Florida Wildlife Research Institute (FWRI), developed a Habitat and Ecosystem Internet Map Server (IMS). The IMS was developed to support Council and regional partners' efforts in the transition to EBM. Other regional partners include NMFS Habitat Conservation, South Atlantic States, local management authorities, other Federal partners, universities, conservation organizations, and recreational and commercial fishermen. As technology and spatial information needs evolved, the distribution and use of GIS demands greater capabilities. The Council has continued its collaboration with FWRI in the now evolution to Web Services provided through the regional SAFMC Habitat and Ecosystem Atlas (http://ocean.floridamarine.org/safmc_atlas/) and the SAFMC Digital Dashboard (http://ocean.floridamarine.org/safmc_dashboard/). The Atlas integrates services for the following:

Species distribution and spatial presentation of regional fishery independent data from the SEAMAP-SA, MARMAP, and NOAA SEFIS systems; SAFMC Fisheries: (http://ocean.floridamarine.org/SA_Fisheries/)

Essential Fish Habitat and Essential Fish Habitat Areas of Particular Concern; SAFMC EFH: (http://ocean.floridamarine.org/sa_efh/)

Spatial presentation of managed areas in the region; SAFMC Managed Areas: (http://ocean.floridamarine.org/safmc_managedareas/)

An online life history and habitat information system supporting Council managed, State managed, and other regional species was developed in cooperation with FWRI. The Ecospecies system is considered dynamic and presents, as developed, detailed individual species life history reports and provides an interactive online query capability for all species included in the system: http://atoll.floridamarine.org/EcoSpecies

Web Services System Updates:

- Essential Fish Habitat (EFH) – displays EFH and EFH-HAPCS for SAFMC managed species and NOAA Fisheries Highly Migratory Species.
- Fisheries - displays Marine Resources Monitoring, Assessment, and Prediction (MARMAP) and Southeast Area Monitoring and Assessment Program South Atlantic (SEAMAP-SA) data.
- Managed Areas - displays a variety of regulatory boundaries (SAFMC and Federal) or management boundaries within the SAFMC's jurisdiction.
- Habitat – displays habitat data collected by SEADESC, Harbor Branch Oceanographic Institute (HBOI), and Ocean Exploration dives, as well as the SEAMAP shallow and ESDIM deepwater bottom mapping projects, multibeam imagery, and scientific cruise data.
- Multibeam Bathymetry - displays a variety of multibeam data sources and scanned bathymetry charts.
- Nautical Charts – displays coastal, general, and overview nautical charts for the SAFMC's jurisdictional area.

Ecosystem Based Action, Future Challenges and Needs

The Council has implemented ecosystem-based principles through several existing fishery management actions including establishment of deepwater Marine Protected Areas for the Snapper Grouper fishery, proactive harvest control rules on species (e.g., dolphin and wahoo) which are not overfished, implementing extensive gear area closures which in most cases eliminate the impact of fishing gear on Essential Fish Habitat, and use of other spatial management tools including Special Management Zones. Pursuant to development of the Comprehensive Ecosystem-Based Amendment, the Council has taken an ecosystem approach to protect deepwater ecosystems while providing for traditional fisheries for the Golden Crab and Royal Red shrimp in areas where they do not impact deepwater coral habitat. The stakeholder based process taps in on an extensive regional Habitat and Ecosystem network. Support tools facilitate Council deliberations and with the help of regional partners, are being refined to address long-term ecosystem management needs.

One of the greatest challenges to the long-term move to EBM in the region is funding high priority research, including but not limited to, comprehensive benthic mapping and ecosystem model and management tool development. In addition, collecting detailed information on fishing fleet dynamics including defining fishing operation areas by species, species complex, and season, as well as catch relative to habitat is critical for assessment of fishery, community, and habitat impacts and for Council use in place based management measures. Additional resources need to be dedicated to expand regional coordination of modeling, mapping, characterization of species use of habitats, and full funding of regional fishery independent surveys (e.g., MARMAP, SEAMAP, and SEFIS) which are linking directly to addressing high priority management needs. Development of ecosystem information systems to support Council management should build on existing tools (e.g., Regional Habitat and Ecosystem GIS and Arc Services) and provide resources to regional cooperating partners for expansion to address long-term Council needs.

The FEP and CE-BA 1 complement, but do not replace, existing FMPs. In addition, the FEP serves as a source document to the CE-BAs. NOAA should support and build on the regional coordination efforts of the Council as it transitions to a broader management approach. Resources need to be provided to collect information necessary to update and refine our FEP and support future fishery actions including but not limited to completing one of the highest priority needs to support EBM, the completion of mapping of near-shore, mid-shelf, shelf edge, and deepwater habitats in the South Atlantic region. In developing future FEPs, the Council will draw on SAFEs (Stock Assessment and Fishery Evaluation reports) which NMFS is required to provide the Council for all FMPs implemented under the Magnuson-Stevens Act. The FEP, which has served as the source document for CE-BAs, could also meet some of the NMFS SAFE requirements if information is provided to the Council to update necessary sections.

EFH and EFH-HAPC Designations Translated to Cooperative Habitat Policy Development and Protection

The Council actively comments on non-fishing projects or policies that may impact fish habitat. **Appendix A** of the Comprehensive Amendment Addressing Essential Fish Habitat in Fishery Management Plans of the South Atlantic Region (SAFMC 1998b) outlines the Council's comment and policy development process and the establishment of a four-state Habitat Advisory Panel. Members of the Habitat Advisory Panel serve as the Council's habitat contacts and professionals in the field. AP members bring projects to the Council's attention, draft comment letters, and attend public meetings. With guidance from the Advisory Panel, the Council has developed and approved policies on:

1. Energy exploration, development, transportation, and hydropower re-licensing;
2. Beach dredging and filling and large-scale coastal engineering;
3. Protection and enhancement of submerged aquatic vegetation;
4. Alterations to riverine, estuarine, and nearshore flows;
5. Marine aquaculture;
6. Marine Ecosystems and Non-Native and Invasive Species: and
7. Estuarine Ecosystems and Non-Native and Invasive Species.

NOAA Fisheries, State and other Federal agencies apply EFH and EFH-HAPC designations and protection policies in the day-to-day permit review process. The revision and updating of existing habitat policies and the development of new policies is being coordinated with core agency representatives on the Habitat and Coral Advisory Panels. Existing policies are included at the end of this Appendix.

The Habitat and Environmental Protection Advisory Panel, as part of their role in providing continued policy guidance to the Council, is during 2013/14, reviewing and proposing revisions and updates to the existing policy statements and developing new ones for Council consideration. The effort is intended to enhance the value of the statements and support cooperation and collaboration with NOAA Fisheries Habitat Conservation Division and State and Federal partners in better addressing the Congressional mandates to the Council associated with designation and conservation of EFH in the region.

South Atlantic Bight Ecopath Model

The Council worked cooperatively with the University of British Columbia and the Sea Around Us project to develop a straw-man and preliminary food web models (Ecopath with Ecosim) to characterize the ecological relationships of South Atlantic species, including those managed by the Council. This effort was envisioned to help the Council and cooperators in identifying available information and data gaps while providing insight into ecosystem function. More importantly, the model development process provides a vehicle to identify research necessary to better define populations, fisheries, and their interrelationships. While individual efforts are still underway in the South Atlantic, only with significant investment of new resources through other programs will a comprehensive regional model be further developed.

The latest collaboration builds on the previous Ecopath model developed through the Sea Around Us project for the South Atlantic Bight with a focus on beginning a dialogue on the implications of potential changes in forage fish populations in the region that could be associated with environmental or climate change or changes in direct exploitation of those populations.

Essential Fish Habitat and Essential Fish Habitat Areas of Particular Concern

Following is a summary of the current South Atlantic Council's EFH and EFH-HAPCs. Information supporting their designation was updated (pursuant to the EFH Final Rule) in the Council's Fishery Ecosystem Plan and Comprehensive Ecosystem Amendment:

Snapper Grouper FMP

Essential fish habitat for snapper grouper species includes coral reefs, live/hard bottom, submerged aquatic vegetation, artificial reefs, and medium to high profile outcroppings on and around the shelf break zone from shore to at least 600 feet (but to at least 2,000 feet for wreckfish) where the annual water temperature range is sufficiently warm to maintain adult populations of members of this largely tropical complex. EFH includes the spawning area in the water column above the adult habitat and the additional pelagic environment, including *Sargassum*, required for larval survival and growth up to and including settlement. In addition the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse snapper grouper larvae.

For specific life stages of estuarine dependent and nearshore snapper grouper species, essential fish habitat includes areas inshore of the 100-foot contour, such as attached macroalgae; submerged rooted vascular plants (seagrasses); estuarine emergent vegetated wetlands (saltmarshes, brackish marsh); tidal creeks; estuarine scrub/shrub (mangrove fringe); oyster reefs and shell banks; unconsolidated bottom (soft sediments); artificial reefs; and coral reefs and live/hard bottom.

Areas which meet the criteria for EFH-HAPCs for species in the snapper-grouper management unit include medium to high profile offshore hard bottoms where spawning normally occurs; localities of known or likely periodic spawning aggregations; nearshore hard bottom areas; The

Point, The Ten Fathom Ledge, and Big Rock (North Carolina); The Charleston Bump (South Carolina); mangrove habitat; seagrass habitat; oyster/shell habitat; all coastal inlets; all state-designated nursery habitats of particular importance to snapper grouper (e.g., Primary and Secondary Nursery Areas designated in North Carolina); pelagic and benthic *Sargassum*; Hoyt Hills for wreckfish; the *Oculina* Bank Habitat Area of Particular Concern; all hermatypic coral habitats and reefs; manganese outcroppings on the Blake Plateau; and Council-designated Artificial Reef Special Management Zones (SMZs). In addition, the Council through CEBA 2 (SAFMC 2011) designated the deepwater snapper grouper MPAs and golden tilefish and blueline tilefish habitat as EFH-HAPCs under the Snapper Grouper FMP as follows:

> EFH-HAPCs for golden tilefish to include irregular bottom comprised of troughs and terraces inter-mingled with sand, mud, or shell hash bottom. Mud-clay bottoms in depths of 150-300 meters are HAPC. Golden tilefish are generally found in 80-540 meters, but most commonly found in 200-meter depths.
>
> EFH-HAPC for blueline tilefish to include irregular bottom habitats along the shelf edge in 45-65 meters depth; shelf break or upper slope along the 100-fathom contour (150-225 meters); hardbottom habitats characterized as rock overhangs, rock outcrops, manganese-phosphorite rock slab formations, or rocky reefs in the South Atlantic Bight; and the Georgetown Hole (Charleston Lumps) off Georgetown, SC.
>
> EFH-HAPCs for the snapper grouper complex to include the following deepwater Marine Protected Areas (MPAs) as designated in Snapper Grouper Amendment 14: Snowy Grouper Wreck MPA, Northern South Carolina MPA, Edisto MPA, Charleston Deep Artificial Reef MPA, Georgia MPA, North Florida MPA, St. Lucie Hump MPA, and East Hump MPA.
>
> Deepwater Coral HAPCs designated in Comprehensive Ecosystem-Based Amendment 1 are designated as Snapper Grouper EFH-HAPCs: Cape Lookout Coral HAPC, Cape Fear Coral HAPC, Blake Ridge Diapir Coral HAPC, Stetson-Miami Terrace Coral HAPC, and Pourtalés Terrace Coral HAPC.

Shrimp FMP

For penaeid shrimp, Essential Fish Habitat includes inshore estuarine nursery areas, offshore marine habitats used for spawning and growth to maturity, and all interconnecting water bodies as described in the Habitat Plan. Inshore nursery areas include tidal freshwater (palustrine), estuarine, and marine emergent wetlands (e.g., intertidal marshes); tidal palustrine forested areas; mangroves; tidal freshwater, estuarine, and marine submerged aquatic vegetation (e.g., seagrass); and subtidal and intertidal non- vegetated flats. This applies from North Carolina through the Florida Keys.

For rock shrimp, essential fish habitat consists of offshore terrigenous and biogenic sand bottom habitats from 18 to 182 meters in depth with highest concentrations occurring between 34 and 55 meters. This applies for all areas from North Carolina through the Florida Keys. Essential fish habitat includes the shelf current systems near Cape Canaveral, Florida, which provide

major transport mechanisms affecting planktonic larval rock shrimp. These currents keep larvae on the Florida Shelf and may transport them inshore in spring. In addition, the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse rock shrimp larvae.

Essential fish habitat for royal red shrimp include the upper regions of the continental slope from 180 meters (590 feet) to about 730 meters (2,395 feet), with concentrations found at depths of between 250 meters (820 feet) and 475 meters (1,558 feet) over blue/black mud, sand, muddy sand, or white calcareous mud. In addition, the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse royal red shrimp larvae.

Areas which meet the criteria for EFH-HAPCs for penaeid shrimp include all coastal inlets, all state-designated nursery habitats of particular importance to shrimp (for example, in North Carolina this would include all Primary Nursery Areas and all Secondary Nursery Areas), and state-identified overwintering areas.

Coastal Migratory Pelagics FMP

Essential fish habitat for coastal migratory pelagic species includes sandy shoals of capes and offshore bars, high profile rocky bottom, and barrier island ocean-side waters, from the surf to the shelf break zone, but from the Gulf Stream shoreward, including *Sargassum*. In addition, all coastal inlets and all state-designated nursery habitats of particular importance to coastal migratory pelagics (for example, in North Carolina this would include all Primary Nursery Areas and all Secondary Nursery Areas).

For Cobia essential fish habitat also includes high salinity bays, estuaries, and seagrass habitat. In addition, the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse coastal migratory pelagic larvae.

For king and Spanish mackerel and cobia essential fish habitat occurs in the South Atlantic and Mid-Atlantic Bights.

Areas which meet the criteria for EFH-HAPCs include sandy shoals of Capes Lookout, Cape Fear, and Cape Hatteras from shore to the ends of the respective shoals, but shoreward of the Gulf stream; The Point, The Ten-Fathom Ledge, and Big Rock (North Carolina); The Charleston Bump and Hurl Rocks (South Carolina); The Point off Jupiter Inlet (Florida); *Phragmatopoma* (worm reefs) reefs off the central east coast of Florida; nearshore hard bottom south of Cape Canaveral; The Hump off Islamorada, Florida; The Marathon Hump off Marathon, Florida; The "Wall" off of the Florida Keys; Pelagic *Sargassum*; and Atlantic coast estuaries with high numbers of Spanish mackerel and cobia based on abundance data from the ELMR Program. Estuaries meeting this criteria for Spanish mackerel include Bogue Sound and New River, North Carolina; Bogue Sound, North Carolina (Adults May-September salinity >30 ppt); and New River, North Carolina (Adults May-October salinity >30 ppt). For Cobia they include Broad River, South Carolina; and Broad River, South Carolina (Adults & juveniles May-July salinity >25ppt).

Golden Crab FMP

Essential fish habitat for golden crab includes the U.S. Continental Shelf from Chesapeake Bay south through the Florida Straits (and into the Gulf of Mexico). In addition, the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse golden crab larvae. The detailed description of seven essential fish habitat types (a flat foraminferan ooze habitat; distinct mounds, primarily of dead coral; ripple habitat; dunes; black pebble habitat; low outcrop; and soft-bioturbated habitat) for golden crab is provided in Wenner et al. (1987). There is insufficient knowledge of the biology of golden crabs to identify spawning and nursery areas and to identify HAPCs at this time. As information becomes available, the Council will evaluate such data and identify HAPCs as appropriate through the framework.

Spiny Lobster FMP

Essential fish habitat for spiny lobster includes nearshore shelf/oceanic waters; shallow subtidal bottom; seagrass habitat; unconsolidated bottom (soft sediments); coral and live/hard bottom habitat; sponges; algal communities (*Laurencia*); and mangrove habitat (prop roots). In addition the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse spiny lobster larvae.

Areas which meet the criteria for EFH-HAPCs for spiny lobster include Florida Bay, Biscayne Bay, Card Sound, and coral/hard bottom habitat from Jupiter Inlet, Florida through the Dry Tortugas, Florida.

Coral, Coral Reefs, and Live/Hard Bottom Habitats FMP

Essential fish habitat for corals (stony corals, octocorals, and black corals) incorporate habitat for over 200 species. EFH for corals include the following:

A. Essential fish habitat for hermatypic stony corals includes rough, hard, exposed, stable substrate from Palm Beach County south through the Florida reef tract in subtidal waters to 30 m depth; subtropical (15°-35° C), oligotrophic waters with high (30-35$^{o}/_{oo}$) salinity and turbidity levels sufficiently low enough to provide algal symbionts adequate sunlight penetration for photosynthesis. Ahermatypic stony corals are not light restricted and their essential fish habitat includes defined hard substrate in subtidal to outer shelf depths throughout the management area.

B. Essential fish habitat for *Antipatharia* (black corals) includes rough, hard, exposed, stable substrate, offshore in high (30-35$^{o}/_{oo}$) salinity waters in depths exceeding 18 meters (54 feet), not restricted by light penetration on the outer shelf throughout the management area.

C. Essential fish habitat for octocorals excepting the order Pennatulacea (sea pens and sea pansies) includes rough, hard, exposed, stable substrate in subtidal to outer shelf depths within a wide range of salinity and light penetration throughout the management area.

D. Essential fish habitat for Pennatulacea (sea pens and sea pansies) includes muddy, silty bottoms in subtidal to outer shelf depths within a wide range of salinity and light penetration.

Areas which meet the criteria for EFH-HAPCs for coral, coral reefs, and live/hard bottom include: The 10-Fathom Ledge, Big Rock, and The Point (North Carolina); Hurl Rocks and The Charleston Bump (South Carolina); Gray's Reef National Marine Sanctuary (Georgia); The *Phragmatopoma* (worm reefs) reefs off the central east coast of Florida; Oculina Banks off the east coast of Florida from Ft. Pierce to Cape Canaveral; nearshore (0-4 meters; 0-12 feet) hard bottom off the east coast of Florida from Cape Canaveral to Broward County); offshore (5-30 meter; 15-90 feet) hard bottom off the east coast of Florida from Palm Beach County to Fowey Rocks; Biscayne Bay, Florida; Biscayne National Park, Florida; and the Florida Keys National Marine Sanctuary. In addition, the Council through CEBA 2 (SAFMC 2011) designated the Deepwater Coral HAPCs as EFH-HAPCs under the Coral FMP as follows:

> Deepwater Coral HAPCs designated in Comprehensive Ecosystem-Based Amendment 1 as Snapper Grouper EFH-HAPCs: Cape Lookout Coral HAPC, Cape Fear Coral HAPC, Blake Ridge Diapir Coral HAPC, Stetson-Miami Terrace Coral HAPC, and Pourtalés Terrace Coral HAPC.

Dolphin and Wahoo FMP

EFH for dolphin and wahoo is the Gulf Stream, Charleston Gyre, Florida Current, and pelagic *Sargassum*. This EFH definition for dolphin was approved by the Secretary of Commerce on June 3, 1999 as a part of the South Atlantic Council's Comprehensive Habitat Amendment (SAFMC 1998b) (dolphin was included within the Coastal Migratory Pelagics FMP at that time).

Areas which meet the criteria for EFH-HAPCs for dolphin and wahoo in the Atlantic include The Point, The Ten-Fathom Ledge, and Big Rock (North Carolina); The Charleston Bump and The Georgetown Hole (South Carolina); The Point off Jupiter Inlet (Florida); The Hump off Islamorada, Florida; The Marathon Hump off Marathon, Florida; The "Wall" off of the Florida Keys; and Pelagic *Sargassum*. This EFH-HAPC definition for dolphin was approved by the Secretary of Commerce on June 3, 1999 as a part of the South Atlantic Council's Comprehensive Habitat Amendment (dolphin was included within the Coastal Migratory Pelagics FMP at that time).

Pelagic *Sargassum* Habitat FMP

The Council through CEBA 2 (SAFMC 2011) designated the top 10 meters of the water column in the South Atlantic EEZ bounded by the Gulfstream, as EFH for pelagic Sargassum.

Actions Implemented That Protect EFH and EFH-HAPCs

Snapper Grouper FMP

- Prohibited the use of the following gears to protect habitat: bottom longlines in the EEZ inside of 50 fathoms or anywhere south of St. Lucie Inlet, Florida; bottom longlines in the wreckfish fishery; fish traps; bottom tending (roller- rig) trawls on live bottom habitat; and entanglement gear.
- Established the *Oculina* Experimental Closed Area where the harvest or possession of all species in the snapper grouper complex is prohibited.
- Established deepwater Marine Protected Areas (MPAs) as designated in Snapper Grouper Amendment 14: Snowy Grouper Wreck MPA, Northern South Carolina MPA, Edisto MPA, Charleston Deep Artificial Reef MPA, Georgia MPA, North Florida MPA, St. Lucie Hump MPA, and East Hump MPA.

Shrimp FMP

- Prohibition of rock shrimp trawling in a designated area around the *Oculina* Bank,
- Mandatory use of bycatch reduction devices in the penaeid shrimp fishery,
- Mandatory Vessel Monitoring System (VMS) in the Rock Shrimp Fishery.
- A mechanism that provides for the concurrent closure of the EEZ to penaeid shrimping if environmental conditions in state waters are such that the overwintering spawning stock is severely depleted.

Pelagic Sargassum Habitat FMP

- Prohibited all harvest and possession of *Sargassum* from the South Atlantic EEZ south of the latitude line representing the North Carolina/South Carolina border (34° North Latitude).
- Prohibited all harvest of *Sargassum* from the South Atlantic EEZ within 100 miles of shore between the 34° North Latitude line and the Latitude line representing the North Carolina/Virginia border.
- Harvest of *Sargassum* from the South Atlantic EEZ is limited to the months of November through June.
- Established an annual Total Allowable Catch (TAC) of 5,000 pounds landed wet weight.
- Required that an official observer be present on each *Sargassum* harvesting trip. Require that nets used to harvest *Sargassum* be constructed of four inch stretch mesh or larger fitted to a frame no larger than 4 feet by 6 feet.

Coastal Migratory Pelagics FMP

- Prohibited of the use of drift gillnets in the coastal migratory pelagic fishery.

Golden Crab FMP

- In the northern zone, golden crab traps can only be deployed in waters deeper than 900 feet; in the middle and southern zones traps can only be deployed in waters deeper than 700 feet.

Northern zone - north of the 28°N. latitude to the North Carolina/Virginia border;
Middle zone - 28°N. latitude to 25° N. latitude; and
Southern zone - south of 25°N. latitude to the border between the South Atlantic and Gulf of Mexico Fishery Management Councils.

Coral, Coral Reefs and Live/Hard Bottom FMP

- Established an optimum yield of zero and prohibiting all harvest or possession of these resources which serve as essential fish habitat to many managed species.
- Designated the *Oculina* Bank Habitat Area of Particular Concern.
- Expanded the *Oculina* Bank Habitat Area of Particular Concern (HAPC) to an area bounded to the west by 80°W. longitude, to the north by 28°30' N. latitude, to the south by 27°30' N. latitude, and to the east by the 100 fathom (600 feet) depth contour.
- Established the following two Satellite *Oculina* HAPCs: (1) Satellite *Oculina* HAPC #1 is bounded on the north by 28°30'N. latitude, on the south by 28°29'N. latitude, on the east by 80°W. longitude, and on the west by 80°3'W. longitude; and (2) Satellite *Oculina* HAPC #2 is bounded on the north by 28°17'N. latitude, on the south by 28°16'N. latitude, on the east by 80°W. longitude, and on the west by 80°3'W. longitude.
- Prohibited the use of all bottom tending fishing gear and fishing vessels from anchoring or using grapples in the *Oculina* Bank HAPC.
- Established a framework procedure to modify or establish Coral HAPCs.
- Established the following five deepwater CHAPCs:
    - Cape Lookout Lophelia Banks CHAPC;
    - Cape Fear Lophelia Banks CHAPC;
    - Stetson Reefs, Savannah and East Florida Lithoherms, and Miami Terrace (Stetson- Miami Terrace) CHAPC;
    - Pourtales Terrace CHAPC; and
    - Blake Ridge Diapir Methane Seep CHAPC.
- Within the deepwater CHAPCs, the possession of coral species and the use of all bottom damaging gear are prohibited including bottom longline, trawl (bottom and mid-water), dredge, pot or trap, or the use of an anchor, anchor and chain, or grapple and chain by all fishing vessels.

South Atlantic Council Policies for Protection and Restoration of Essential Fish Habitat

SAFMC Habitat and Environmental Protection Policy

In recognizing that species are dependent on the quantity and quality of their essential habitats, it is the policy of the SAFMC to protect, restore, and develop habitats upon which fisheries species depend; to increase the extent of their distribution and abundance; and to improve their productive capacity for the benefit of present and future generations. For purposes of this policy, "habitat" is defined as the physical, chemical, and biological parameters that are necessary for continued productivity of the species that is being managed. The objectives of the SAFMC policy will be accomplished through the
recommendation of no net loss or significant environmental degradation of existing habitat. A long-term objective is to support and promote a net-gain of fisheries habitat through the restoration and rehabilitation of the productive capacity of habitats that have been degraded, and the creation and development of productive habitats where increased fishery production is probable. The SAFMC will pursue these goals at state, Federal, and local levels. The Council shall assume an aggressive role in the protection and enhancement of habitats important to fishery species, and shall actively enter Federal, decision making processes where proposed actions may otherwise compromise the productivity of fishery resources of concern to the Council.

SAFMC EFH Policy Statements

In addition to implementing regulations to protect habitat from fishing related degradation, the Council in cooperation with NOAA Fisheries, actively comments on non-fishing projects or policies that may impact fish habitat. The Council adopted a habitat policy and procedure document that established a four-state Habitat Advisory Panel and adopted a comment and policy development process. Members of the Habitat Advisory Panel serve as the Council's habitat contacts and professionals in the field. With guidance from the Advisory Panel, the Council has developed and approved a number of habitat policy statements which are available on the Habitat and Ecosystem section of the Council website (http://www.safmc.net/ecosystem/Home/EcosystemHome/tabid/435/Default.aspx).

References:

SAFMC (South Atlantic Fishery Management Council). 1998a. Habitat Plan for the South Atlantic Region. South Atlantic Fishery Management Council, 1 Southpark Cir., Ste 306, Charleston, S.C. 29407-4699.

SAFMC (South Atlantic Fishery Management Council). 1998b. Comprehensive Amendment Addressing Essential Fish Habitat in Fishery Management Plans of the South Atlantic Region. South Atlantic Fishery Management Council, 1 Southpark Cir., Suite 306, Charleston, S.C. 29407-4699.

SAFMC (South Atlantic Fishery Management Council). 2009a. Fishery Ecosystem Plan for the South Atlantic Region. South Atlantic Fishery Management Council, 4055 Faber Place, Ste 201, North Charleston, S.C. 29405.

SAFMC (South Atlantic Fishery Management Council). 2009b. Comprehensive Ecosystem-Based Amendment 1 for the South Atlantic Region. South Atlantic Fishery Management Council, 4055 Faber Place Drive, Suite 201; North Charleston, SC 29405.

SAFMC (South Atlantic Fishery Management Council). 2011. Comprehensive Ecosystem-Based Amendment 2 for the South Atlantic Region. South Atlantic Fishery Management Council, 4055 Faber Place Drive, Suite 201; North Charleston, SC 29405.

Wenner, E. L., G. F. Ulrich, and J. B. Wise. 1987. Exploration for golden crab, Geryon fenneri, in the south Atlantic Bight: distribution, population structure, and gear assessment. Fishery Bulletin 85:547-560.

Appendix D. History of Management

History of Management of the South Atlantic Snapper Grouper Fishery

The snapper grouper fishery is highly regulated; some of the species included in this amendment have been regulated since 1983. The following table summarizes actions in each of the amendments to the original FMP, as well as some events not covered in amendment actions.

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
FMP (1983)	08/31/83	PR: 48 FR 26843 FR: 48 FR 39463	-12" total length (TL) limit – red snapper, yellowtail snapper, red grouper, Nassau grouper -8" limit – black sea bass -4" trawl mesh size -Gear limitations – poisons, explosives, fish traps, trawls -Designated modified habitats or artificial reefs as Special Management Zones (SMZs)
Regulatory Amendment #1 (1987)	03/27/87	PR: 51 FR 43937 FR: 52 FR 9864	-Prohibited fishing in SMZs except with hand-held hook-and-line and spearfishing gear. -Prohibited harvest of goliath grouper in SMZs.
Amendment #1 (1988a)	01/12/89	PR: 53 FR 42985 FR: 54 FR 1720	-Prohibited trawl gear to harvest fish south of Cape Hatteras, NC and north of Cape Canaveral, FL. -Directed fishery defined as vessel with trawl gear and ≥200 lbs s-g on board. -Established rebuttable assumption that vessel with s-g on board had harvested such fish in the exclusive economic zone (EEZ).
Regulatory Amendment #2 (1988b)	03/30/89	PR: 53 FR 32412 FR: 54 FR 8342	-Established 2 artificial reefs off Ft. Pierce, FL as SMZs.
Notice of Control Date	09/24/90	55 FR 39039	-Anyone entering federal wreckfish fishery in the EEZ off S. Atlantic states after 09/24/90 was not assured of future access if limited entry program developed.
Regulatory Amendment #3 (1989)	11/02/90	PR: 55 FR 28066 FR: 55 FR 40394	-Established artificial reef at Key Biscayne, FL as SMZ. Fish trapping, bottom longlining, spear fishing, and harvesting of Goliath grouper prohibited in SMZ.
Amendment #2 (1990a)	10/30/90	PR: 55 FR 31406 FR: 55 FR 46213	-Prohibited harvest/possession of goliath grouper in or from the EEZ -Defined overfishing for goliath grouper and other species

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
Emergency Rule	8/3/90	55 FR 32257	-Added wreckfish to the fishery management unit (FMU) -Fishing year beginning 4/16/90 -Commercial quota of 2 million pounds -Commercial trip limit of 10,000 pounds per trip
Fishery Closure Notice	8/8/90	55 FR 32635	- Fishery closed because the commercial quota of 2 million pounds was reached
Emergency Rule Extension	11/1/90	55 FR 40181	-extended the measures implemented via emergency rule on 8/3/90
Amendment #3 (1990b)	01/31/91	PR: 55 FR 39023 FR: 56 FR 2443	-Added wreckfish to the FMU -Defined optimum yield and overfishing -Required permit to fish for, land or sell wreckfish -Required catch and effort reports from selected, permitted vessel; -Established control date of 03/28/90 -Established a fishing year for wreckfish starting April 16 -Established a process to set annual quota, with initial quota of 2 million pounds; provisions for closure -Established 10,000 pound trip limit -Established a spawning season closure for wreckfish from January 15 to April 15 -Provided for annual adjustments of wreckfish management measures
Notice of Control Date	07/30/91	56 FR 36052	-Anyone entering federal snapper grouper fishery (other than for wreckfish) in the EEZ off S. Atlantic states after 07/30/91 was not assured of future access if limited entry program developed.

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
Amendment #4 (1991)	01/01/92	PR: 56 FR 29922 FR: 56 FR 56016	-Prohibited gear: fish traps except black sea bass traps north of Cape Canaveral, FL; entanglement nets; longline gear inside 50 fathoms; bottom longlines to harvest wreckfish; powerheads and bangsticks in designated SMZs off S. Carolina -defined overfishing/overfished and established rebuilding timeframe: red snapper and groupers ≤ 15 years (year 1 = 1991); other snappers, greater amberjack, black sea bass, red porgy ≤ 10 years (year 1 = 1991) -Required permits (commercial & for-hire) and specified data collection regulations -Established an assessment group and annual adjustment procedure (framework) -Permit, gear, and vessel id requirements specified for black sea bass traps -No retention of snapper grouper spp. caught in other fisheries with gear prohibited in snapper grouper fishery if captured snapper grouper had no bag limit or harvest was prohibited. If had a bag limit, could retain only the bag limit -8" TL limit – lane snapper -10" TL limit – vermilion snapper (recreational only) -12" TL limit – red porgy, vermilion snapper (commercial only), gray, yellowtail, mutton, schoolmaster, queen, blackfin, cubera, dog, mahogany, and silk snappers -20" TL limit – red snapper, gag, and red, black, scamp, yellowfin, and yellowmouth groupers. -28" fork length (FL) limit – greater amberjack (recreational only) -36" FL or 28" core length – greater amberjack (commercial only) -bag limits – 10 vermilion snapper, 3 greater amberjack -aggregate snapper bag limit – 10/person/day, excluding vermilion snapper and allowing no more than 2 red snappers -aggregate grouper bag limit – 5/person/day, excluding Nassau and goliath grouper, for which no retention (recreational & commercial) is allowed -spawning season closure – commercial harvest greater amberjack > 3 fish bag prohibited in April south of Cape Canaveral, FL -spawning season closure – commercial harvest mutton snapper >snapper aggregate prohibited during May and June -charter/headboats and excursion boat possession limits extended

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
Amendment #5 (1992a)	04/06/92	PR: 56 FR 57302 FR: 57 FR 7886	-Wreckfish: established limited entry system with individual transferable quotas (ITQs); required dealer to have permit; rescinded 10,000 lb. trip limit; required off-loading between 8 am and 5 pm; reduced occasions when 24-hour advance notice of offloading required for off-loading; established procedure for initial distribution of percentage shares of total allowable catch (TAC)
Emergency Rule	8/31/92	57 FR 39365	-Black Sea Bass (bsb): modified definition of bsb pot; allowed multi-gear trips for bsb; allowed retention of incidentally-caught fish on bsb trips
Emergency Rule Extension	11/30/92	57 FR 56522	-Black Sea Bass: modified definition of bsb pot; allowed multi-gear trips for bsb; allowed retention of incidentally-caught fish on bsb trips
Regulatory Amendment #4 (1992b)	07/06/93	FR: 58 FR 36155	-Black Sea Bass: modified definition of bsb pot; allowed multi-gear trips for bsb; allowed retention of incidentally-caught fish on bsb trips
Regulatory Amendment #5 (1992c)	07/31/93	PR: 58 FR 13732 FR: 58 FR 35895	-Established 8 SMZs off S. Carolina, where only hand-held, hook-and-line gear and spearfishing (excluding powerheads) was allowed
Amendment #6 (1993)	07/27/94	PR: 59 FR 9721 FR: 59 FR 27242	-Set up separate commercial TAC levels for golden tilefish and snowy grouper -Established commercial trip limits for snowy grouper, golden tilefish, speckled hind, and warsaw grouper -Included golden tilefish in grouper recreational aggregate bag limits -Prohibited sale of warsaw grouper and speckled hind -100% logbook coverage upon renewal of permit -Creation of the *Oculina* Experimental Closed Area -Data collection needs specified for evaluation of possible future individual fishing quota system
Amendment #7 (1994a)	01/23/95	PR: 59 FR 47833 FR: 59 FR 66270	-12" FL – hogfish -16" TL – mutton snapper -Required dealer, charter and headboat federal permits -Allowed sale under specified conditions -Specified allowable gear and made allowance for experimental gear -Allowed multi-gear trips in NC -Added localized overfishing to list of problems and objectives -Adjusted bag limit and crew specs. for charter and head boats -Modified management unit for scup to apply south of Cape Hatteras, NC -Modified framework procedure
Regulatory Amendment #6 (1994b)	05/22/95	PR: 60 FR 8620 FR: 60 FR 19683	-Established actions which applied only to EEZ off Atlantic coast of FL: Bag limits – 5 hogfish/person/day (recreational only), 2 cubera snapper/person/day > 30" TL; 12" TL – gray triggerfish
Notice of Control Date	04/23/97	62 FR 22995	-Anyone entering federal bsb pot fishery off S. Atlantic states after 04/23/97 was not assured of future access if limited entry program developed

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
Amendment #8 (1997)	12/14/98	PR: 63 FR 1813 FR: 63 FR 38298	-Established program to limit initial eligibility for snapper grouper fishery: Must demonstrate landings of any species in the snapper grouper (SG) FMU in 1993, 1994, 1995 or 1996; and have held valid SG permit between 02/11/96 and 02/11/97 -Granted transferable permit with unlimited landings if vessel landed ≥ 1,000 pounds (lbs) of snapper grouper species in any of the years -Granted non-transferable permit with 225 lb trip limit to all other vessels -Modified problems, objectives, optimum yield (OY), and overfishing definitions -Expanded Council's habitat responsibility -Allowed retention of snapper grouper species in excess of bag limit on permitted vessel with a single bait net or cast nets on board -Allowed permitted vessels to possess filleted fish harvested in the Bahamas under certain conditions.
Regulatory Amendment #7 (1998a)	01/29/99	PR: 63 FR 43656 FR: 63 FR 71793	-Established 10 SMZs at artificial reefs off South Carolina.
Interim Rule Request	1/16/98		-Council requested all Amendment 9 measures except black sea bass pot construction changes be implemented as an interim request under the Magnuson-Stevens Act
Action Suspended	5/14/98		-NMFS informed the Council that action on the interim rule request was suspended
Emergency Rule Request	9/24/98		-Council requested Amendment 9 be implemented via emergency rule
Request not Implemented	1/22/99		-NMFS informed the Council that the final rule for Amendment 9 would be effective 2/24/99; therefore they did not implement the emergency rule

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
Amendment #9 (1998b)	2/24/99	PR: 63 FR 63276 FR: 64 FR 3624	-Red porgy: 14" TL (recreational and commercial); 5 fish rec. bag limit; no harvest or possession > bag limit, and no purchase or sale, in March and April -Black sea bass: 10" TL (recreational and commercial); 20 fish rec. bag limit; required escape vents and escape panels with degradable fasteners in bsb pots -Greater amberjack: 1 fish rec. bag limit; no harvest or possession > bag limit, and no purchase or sale, during April; quota = 1,169,931 lbs; began fishing year May 1; prohibited coring -Specified size limits for several snapper grouper species (indicated in parentheses in inches TL): including yellowtail snapper (12), mutton snapper (16), red snapper (20); red grouper, yellowfin grouper, yellowmouth grouper, and scamp (20) -Vermilion snapper: 11" TL (recreational), 12" TL commercial -Gag: 24" TL (recreational); no commercial harvest or possession > bag limit, and no purchase or sale, during March and April -Black grouper: 24" TL (recreational and commercial); no harvest or possession > bag limit, and no purchase or sale, during March and April -Gag and Black grouper: within 5 fish aggregate grouper bag limit, no more than 2 fish may be gag or black grouper (individually or in combination) -All snapper grouper without a bag limit: aggregate recreational bag limit 20 fish/person/day, excluding tomtate and blue runner -Vessels with longline gear aboard may only possess snowy, warsaw, yellowedge, and misty grouper, and golden, blueline and sand tilefish
Amendment #9 (1998b) resubmitted	10/13/00	PR: 63 FR 63276 FR: 65 FR 55203	-Commercial trip limit for greater amberjack
Emergency Interim Rule	09/08/99, expired 08/28/00	64 FR 48324 and 65 FR 10040	-Prohibited harvest or possession of red porgy
Emergency Action	9/3/99	64 FR 48326	-Reopened the Amendment 8 permit application process
Amendment #10 (1998c)	07/14/00	PR: 64 FR 37082 and 64 FR 59152 FR: 65 FR 37292	-Identified essential fish habitat (EFH) and established habitat areas of particular concern (HAPC) for species in the snapper grouper FMU

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
Amendment #11 (1998d)	12/02/99	PR: 64 FR 27952 FR: 64 FR 59126	-Maximum sustainable yield (MSY) proxy: goliath and Nassau grouper = 40% static spawning potential ratio (SPR); all other species = 30% static SPR -OY: hermaphroditic groupers = 45% static SPR; goliath and Nassau grouper = 50% static SPR; all other species = 40% static SPR -Overfished/overfishing evaluations: BSB: overfished (minimum stock size threshold (MSST)=3.72 mp, 1995 biomass=1.33 mp); undergoing overfishing (maximum fishing mortality threshold (MFMT)=0.72, F1991-1995=0.95) Vermilion snapper: overfished (static SPR = 21-27%). Red porgy: overfished (static SPR = 14-19%). Red snapper: overfished (static SPR = 24-32%) Gag: overfished (static SPR = 27%) Scamp: no longer overfished (static SPR = 35%) Speckled hind: overfished (static SPR = 8-13%) Warsaw grouper: overfished (static SPR = 6-14%) Snowy grouper: overfished (static SPR = 5-15%) White grunt: no longer overfished (static SPR = 29-39%) Golden tilefish: overfished (couldn't estimate static SPR) Nassau grouper: overfished (couldn't estimate static SPR) Goliath grouper: overfished (couldn't estimate static SPR) -overfishing level: goliath and Nassau grouper = F>F40% static SPR; all other species: = F>F30% static SPR Approved definitions for overfished and overfishing. MSST = [(1-M) or 0.5 whichever is greater]*B_{MSY}. MFMT = F_{MSY}
Regulatory Amendment #8 (2000a)	11/15/00	PR: 65 FR 41041 FR: 65 FR 61114	-Established 12 SMZs at artificial reefs off Georgia; revised boundaries of 7 existing SMZs off Georgia to meet CG permit specs; restricted fishing in new and revised SMZs
Amendment #12 (2000b)	09/22/00	PR: 65 FR 35877 FR: 65 FR 51248	-Red porgy: MSY=4.38 mp; OY=45% static SPR; MFMT=0.43; MSST=7.34 mp; rebuilding timeframe=18 years (1999=year 1); no sale of red porgy during Jan-April; 1 fish bag limit; 50 lb. bycatch comm. trip limit May-December; modified management options and list of possible framework actions
Amendment #13A (2003)	04/26/04	PR: 68 FR 66069 FR: 69 FR 15731	-Extended for an indefinite period the regulation prohibiting fishing for and possessing snapper grouper spp. within the *Oculina* Experimental Closed Area
Notice of Control Date	10/14/05	70 FR 60058	-The Council is considering management measures to further limit participation or effort in the commercial fishery for snapper grouper species (excluding wreckfish)
Amendment #13C (2006)	10/23/06	PR: 71 FR 28841 FR: 71 FR 55096	- End overfishing of snowy grouper, vermilion snapper, black sea bass, and golden tilefish. Increase allowable catch of red porgy. Year 1 = 2006. 1. Snowy Grouper Commercial: Quota = 151,000 lbs

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
			gutted weight (gw) in year 1, 118,000 lbs gw in year 2, and 84,000 lbs gw in year 3 onwards. Trip limit = 275 lbs gw in year 1, 175 lbs gw in year 2, and 100 lbs gw in year 3 onwards Recreational: Limit possession to one snowy grouper in 5 grouper per person/day aggregate bag limit. 2. Golden Tilefish Commercial: Quota of 295,000 lbs gw, 4,000 lbs gw trip limit until 75% of the quota is taken when the trip limit is reduced to 300 lbs gw. Do not adjust the trip limit downwards unless 75% is captured on or before September 1. Recreational: Limit possession to 1 golden tilefish in 5 grouper per person/day aggregate bag limit. 3. Vermilion Snapper Commercial: Quota of 1,100,000 lbs gw. Recreational: 12" TL size limit. 4. Black Sea Bass Commercial: Commercial quota of 477,000 lbs gw in year 1, 423,000 lbs gw in year 2, and 309,000 lbs gw in year 3 onwards. Require use of at least 2" mesh for the entire back panel of black sea bass pots effective 6 months after publication of the final rule. Require black sea bass pots be removed from the water when the quota is met. Change fishing year from calendar year to June 1 – May 31. Recreational: Recreational allocation of 633,000 lbs gw in year 1, 560,000 lbs gw in year 2, and 409,000 lbs gw in year 3 onwards. Increase minimum size limit from 10" to 11" in year 1 and to 12" in year 2. Reduce recreational bag limit from 20 to 15 per person per day. Change fishing year from the calendar year to June 1 through May 31. 5. Red Porgy Commercial and recreational: 1. Retain 14" TL size limit and seasonal closure (retention limited to the bag limit); 2. Specify a commercial quota of 127,000 lbs gw and prohibit sale/purchase and prohibit harvest and/or possession beyond the bag limit when quota is taken and/or during January through April; 3. Increase commercial trip limit from 50 lbs ww to 120 red porgy (210 lbs gw) during May through December; 4. Increase recreational bag limit from one to three red porgy per person per day.
Notice of Control Date	3/8/07	72 FR 60794	-The Council may consider measures to limit participation in the snapper grouper for-hire sector
Amendment #14 (2007)	2/12/09	PR: 73 FR 32281 FR: 74 FR 1621	-Establish eight deepwater Type II marine protected areas (MPAs) to protect a portion of the population and habitat of long-lived deepwater snapper grouper species
Amendment #15A (2008a)	3/14/08	73 FR 14942	- Establish rebuilding plans and status determination criteria for snowy grouper, black sea bass, and red porgy
Amendment #15B (2008b)	2/15/10	PR: 74 FR 30569 FR: 74 FR 58902	-Prohibit the sale of bag-limit caught snapper grouper species -Reduce the effects of incidental hooking on sea turtles

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
			and smalltooth sawfish -Adjust commercial renewal periods and transferability requirements -Implement plan to monitor and assess bycatch -Establish reference points for golden tilefish -Establish allocations for snowy grouper (95% com & 5% rec) and red porgy (50% com & 50% rec)
Amendment #16 (SAFMC 2009a)	7/29/09	PR: 74 FR 6297 FR: 74 FR 30964	-Specify status determination criteria for gag and vermilion snapper -For gag: Specify interim allocations 51% com & 49% rec; rec & com shallow water grouper spawning closure January through April; directed com quota= 352,940 lbs gw; -reduce 5-fish aggregate grouper bag limit, including tilefish species, to a 3-fish aggregate -Captain and crew on for-hire trips cannot retain the bag limit of vermilion snapper and species within the 3-fish grouper aggregate -For vermilion snapper: Specify interim allocations 68% com & 32% rec; directed com quota split Jan-June=315,523 lbs gw and 302,523 lbs gw July-Dec; reduce bag limit from 10 to 5 and a rec closed season November through March -Require dehooking tools
Amendment #19 (Comprehensive Ecosystem-Based Amendment 1; SAFMC 2009b)	7/22/10	PR: 75 FR 14548 FR: 75 FR 35330	-Provide presentation of spatial information for EFH and EFH-HAPC designations under the Snapper Grouper FMP - Designation of deepwater coral HAPCs
Amendment #17A (SAFMC 2010a)	12/3/10 red snapper closure; circle hooks March 3, 2011	PR: 75 FR 49447 FR: 75 FR 76874	-Required use of non-stainless steel circle hooks when fishing for snapper grouper species with hook-and-line gear north of 28 deg. N latitude in the South Atlantic EEZ -Specify an ACL and an AM for red snapper with management measures to reduce the probability that catches will exceed the stocks' ACL -Specify a rebuilding plan for red snapper -Specify status determination criteria for red snapper -Specify a monitoring program for red snapper
Emergency Rule	12/3/10	75 FR 76890	- Delay the effective date of the area closure for snapper grouper species implemented through Amendment 17A
Amendment #17B (SAFMC 2010b)	January 31, 2011	PR: 75 FR 62488 FR: 75 FR 82280	-Specify ACLs, ACTs, and AMs, where necessary, for 9 species undergoing overfishing -Modify management measures as needed to limit harvest to the ACL or ACT -Update the framework procedure for specification of total allowable catch -Prohibited harvest of 6 deepwater species seaward of 240 feet to curb bycatch of speckled hind and warsaw grouper

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
Notice of Control Date	12/4/08	74 FR 7849	-Establishes a control date for the golden tilefish portion of the snapper grouper fishery in the South Atlantic
Notice of Control Date	12/4/08	74 FR 7849	-Establishes control date for black sea bass pot sector in the South Atlantic
Regulatory Amendment #10 (SAFMC 2010c)	5/31/11	PR: 76 FR 9530 FR: 76 FR 23728	-Eliminate closed area for snapper grouper species approved in Amendment 17A
Regulatory Amendment #9 (SAFMC 2011a)	Bag limit: 6/22/11 Trip limits: 7/15/11	PR: 76 FR 23930 FR: 76 FR 34892	- Establish trip limits for vermilion snapper and gag, increase trip limit for greater amberjack, and reduce bag limit for black sea bass
Regulatory Amendment #11 (2011b)	5/10/12	PR: 76 FR 78879 FR: 77 FR 27374	- Eliminate 240 ft harvest prohibition for six deepwater species
Amendment # 25 (Comprehensive ACL Amendment) (SAFMC 2011c)	4/16/12	PR: 76 FR 74757 Amended PR: 76 FR 82264 FR: 77 FR 15916	-Establish acceptable biological catch (ABC) control rules, establish ABCs, annual catch limits (ACLs), and accountability measures (AMs) for species not undergoing overfishing -Remove some species from South Atlantic FMU and designate others as ecosystem component species -Specify allocations between the commercial and, recreational sectors for species not undergoing overfishing -Limit the total mortality for federally managed species in the South Atlantic to the ACLs
Amendment #24 (SAFMC 2011d)	7/11/12	PR: 77 FR 19169 FR: 77 FR 34254	-Specify MSY, rebuilding plan (including ACLs, AMs, and OY), and allocations for red grouper
Amendment #23 (Comprehensive Ecosystem-based Amendment 2; SAFMC 2011e)	1/30/12	PR: 76 FR 69230 FR: 76 FR 82183	- Designate the Deepwater MPAs as EFH-HAPCs - Limit harvest of snapper grouper species in SC SMZs to the bag limit - Modify sea turtle release gear
Amendment #18A (SAFMC 2012a)	7/1/12	PR: 77 FR 16991 FR: 77FR3 2408	- Limit participation and effort in the black sea bass sector - Modifications to management of the black sea bass pot sector - Improve the accuracy, timing, and quantity of fisheries statistics
Amendment #20A (SAFMC 2012b)	10/26/12	PR: 77 FR 19165 FR: 77 FR 59129	-Redistribute latent shares for the wreckfish ITQ program.

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
Regulatory Amendment #12 (SAFMC 2012c)	10/9/12	FR: 77 FR 61295	-Adjust the ACL and OY for golden tilefish -Consider specifying a commercial Annual Catch Target (ACT) -Revise recreational AMs for golden tilefish
Amendment #18B (SAFMC 2013a)	5/23/13	PR: 77 FR 75093 FR: 77 FR 23858	-Limit participation and effort in the golden tilefish commercial sector through establishment of a longline endorsement -Modify trip limits -Specify allocations for gear groups (longline and hook and line)
Regulatory Amendment #13 (SAFMC 2013b)	7/17/13	PR: 78 FR 17336 FR: 78 FR 36113	-Revise the ABCs, ACLs (including sector ACLs), and ACTs implemented by the Comprehensive ACL Amendment (SAFMC 2011c). The revisions may prevent a disjunction between the established ACLs and the landings used to determine if AMs are triggered.
Regulatory Amendment #15 (SAFMC 2013c)	9/12/13	PR: 78 FR 31511 FR: 78 FR 49183	-Modify the existing specification of OY and ACL for yellowtail snapper in the South Atlantic -Modify the existing gag commercial ACL and AM for gag that requires a closure of all other shallow water groupers (black grouper, red grouper, scamp, red hind, rock hind, graysby, coney, yellowmouth grouper, and yellowfin grouper) in the South Atlantic when the gag commercial ACL is met or projected to be met
Amendment #27 (SAFMC 2014)	1/27/14	FR: 78 FR 78770	-Establish the South Atlantic Council as the responsible entity for managing Nassau grouper throughout its range including federal waters of the Gulf of Mexico -Modify the crew member limit on dual-permitted snapper grouper vessels -Modify the restriction on retention of bag limit quantities of some snapper grouper species by captain and crew of for-hire vessels -Minimize regulatory delay when adjustments to snapper grouper species' ABC, ACLs, and ACTs are needed as a result of new stock assessments -Address harvest of blue runner by commercial fishermen who do not possess a South Atlantic Snapper Grouper Permit
Amendment #28 (SAFMC 2013d)	8/23/13	PR: 78 FR 25047 FR: 78 FR 44461	-Establish regulations to allow harvest of red snapper in the South Atlantic
Regulatory Amendment #18 (SAFMC 2013e)	9/5/13	PR: 78 FR 26740 FR: 78 FR 47574	-Adjust ACLs for vermilion snapper and red porgy, and remove the 4-month recreational closure for vermilion snapper

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
Regulatory Amendment #19 (SAFMC 2013f)	ACL: 9/23/13 Pot closure: 10/23/13	PR: 78 FR 39700 FR: 78 FR 58249	-Adjust the ACL for black sea bass and implement an annual closure on the use of black sea bass pots from November 1 to April 30
Amendment #20B	TBD	TBD	-Update wreckfish ITQ according to reauthorized Magnuson-Stevens Act
Regulatory Amendment #14	TBD	PR: 79 FR 22936	-Modify the fishing year for greater amberjack -Modify the fishing year for black sea bass -Revise the AMs for vermilion snapper and black sea bass -Modify the trip limit for gag
Amendment # 26 (Comprehensive Ecosystem-Based Amendment 3)	TBD	TBD	-Modify bycatch and discard reporting for commercial and for-hire vessels
Regulatory Amendment #16	TBD	TBD	-Consider removal of the November-April prohibition on the use of black sea bass pots
Amendment #36	TBD	TBD	-Establish special management zones to enhance protection for snapper-grouper species in spawning condition including speckled hind and warsaw grouper
Amendment #22	TBD	TBD	-Establish a recreational tagging program for snapper grouper species with small ACLs
Amendment #32	TBD	TBD	-Adjust management measures and ACLs for blueline tilefish
Regulatory Amendment #20	TBD	TBD	-Adjust management measures and ACLs for snowy grouper
Regulatory Amendment #22	TBD	TBD	-Adjust management measures and ACLs for gag and wreckfish

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
Amendment #35	TBD	TBD	-Remove four species from the Snapper Grouper FMP and address golden tilefish longline endorsement issue

References:

SAFMC (South Atlantic Fishery Management Council). 1983. Fishery Management Plan, Regulatory Impact Review and Final Environmental Impact Statement for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 1 Southpark Circle, Suite 306, Charleston, South Carolina, 29407-4699.

SAFMC (South Atlantic Fishery Management Council). 1987. Regulatory Amendment 1 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 1 Southpark Cir., Suite 306, Charleston, S.C. 29407-4699.

SAFMC (South Atlantic Fishery Management Council). 1988a. Amendment Number 1 and Environmental Assessment and Regulatory Impact Review to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 1 Southpark Cir., Suite 306, Charleston, S.C. 29407-4699. 63 pp.

SAFMC (South Atlantic Fishery Management Council). 1988b. Regulatory Amendment 2 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 1 Southpark Cir., Suite 306, Charleston, S.C. 29407-4699.

SAFMC (South Atlantic Fishery Management Council). 1989. Regulatory Amendment 3 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 1 Southpark Cir., Suite 306, Charleston, S.C. 29407-4699.

SAFMC (South Atlantic Fishery Management Council). 1990a. Amendment Number 2, to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 1 Southpark Cir., Suite 306, Charleston, S.C. 29407-4699.

SAFMC (South Atlantic Fishery Management Council). 1990b. Amendment Number 3, Regulatory Impact Review, Initial Regulatory Flexibility Analysis and Environmental Assessment for the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 1 Southpark Cir., Suite 306, Charleston, S.C. 29407-4699.

SAFMC (South Atlantic Fishery Management Council). 1991. Amendment Number 4, Regulatory Impact Review, Initial Regulatory Flexibility Analysis and Environmental Assessment for the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 1 Southpark Cir., Suite 306, Charleston, S.C. 29407-4699. 200 pp.

SAFMC (South Atlantic Fishery Management Council). 1992a. Amendment 5 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 1 Southpark Cir., Suite 306, Charleston, S.C. 29407-4699.

SAFMC (South Atlantic Fishery Management Council). 1992b. Regulatory Amendment 4 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 1 Southpark Cir., Suite 306, Charleston, S.C. 29407-4699.

SAFMC (South Atlantic Fishery Management Council). 1992c. Regulatory Amendment 5 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 1 Southpark Cir., Suite 306, Charleston, S.C. 29407-4699.

SAFMC (South Atlantic Fishery Management Council). 1993. Amendment Number 6, Regulatory Impact Review, Initial Regulatory Flexibility Analysis and Environmental Assessment for the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 1 Southpark Cir., Suite 306, Charleston, S.C. 29407-4699. 155 pp.

SAFMC (South Atlantic Fishery Management Council). 1994a. Amendment Number 7, Regulatory Impact Review, Social Impact Assessment, Initial Regulatory Flexibility Analysis and Supplemental Environmental Impact Statement for the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 1 Southpark Cir., Ste 306, Charleston, S.C. 29407-4699. 110 pp.

SAFMC (South Atlantic Fishery Management Council). 1994b. Regulatory Amendment 6 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 1 Southpark Cir., Suite 306, Charleston, S.C. 29407-4699.

SAFMC (South Atlantic Fishery Management Council). 1997. Amendment Number 8, Regulatory Impact Review, Social Impact Assessment, Initial Regulatory Flexibility Analysis and Supplemental Environmental Impact Statement for the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 1 Southpark Cir., Ste 306, Charleston, S.C. 29407-4699. 124 pp.

SAFMC (South Atlantic Fishery Management Council). 1998a. Regulatory Amendment 7 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 1 Southpark Cir., Suite 306, Charleston, S.C. 29407-4699.

SAFMC (South Atlantic Fishery Management Council). 1998b. Amendment 9, Final Supplemental Environmental Impact Statement, Initial Regulatory Flexibility Analysis/Regulatory Impact Review, and Social Impact Assessment/Fishery Impact Statement for the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region.

South Atlantic Fishery Management Council, 1 Southpark Cir., Suite 306, Charleston, S.C. 29407-4699. 246 pp.

SAFMC (South Atlantic Fishery Management Council). 1998c. Comprehensive Amendment Addressing Essential Fish Habitat in Fishery Management Plans of the South Atlantic Region (Amendment 10 to the Snapper Grouper Fishery Management Plan). South Atlantic Fishery Management Council, 1 Southpark Cir., Suite 306, Charleston, S.C. 29407-4699.

SAFMC (South Atlantic Fishery Management Council). 1998d. Comprehensive Amendment Addressing Sustainable Fishery Act Definitions and Other Required Provisions in Fishery Management Plans of the South Atlantic Region (Amendment 11 to the Snapper Grouper Fishery Management Plan). South Atlantic Fishery Management Council, 1 Southpark Cir., Suite 306, Charleston, S.C. 29407-4699. 151 pp.

SAFMC (South Atlantic Fishery Management Council). 2000a. Regulatory Amendment 8 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 1 Southpark Cir., Suite 306, Charleston, S.C. 29407-4699.

SAFMC (South Atlantic Fishery Management Council). 2000b. Amendment Number 12, Regulatory Impact Review, Social Impact Assessment, Initial Regulatory Flexibility Analysis and Supplemental Environmental Impact Statement for the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 1 Southpark Cir., Ste 306, Charleston, S.C. 29407-4699.

SAFMC (South Atlantic Fishery Management Council). 2003. Amendment Number 13A, Regulatory Impact Review, Initial Regulatory Flexibility Analysis and Environmental Assessment for the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 1 Southpark Cir., Suite 306, Charleston, S.C. 29407-4699.

SAFMC (South Atlantic Fishery Management Council). 2006. Amendment 13C, Final Environmental Assessment, Initial Regulatory Flexibility Analysis/Regulatory Impact Review, and Social Impact Assessment/Fishery Impact Statement for the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 1 Southpark Cir., Ste 306, Charleston, S.C. 29407-4699. 631 pp.

SAFMC (South Atlantic Fishery Management Council). 2007. Amendment 14, Final Environmental Impact Statement, Initial Regulatory Flexibility Analysis/Regulatory Impact Review, and Social Impact Assessment/Fishery Impact Statement for the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 4055 Faber Place, Ste 201, North Charleston, S.C. 29405.

SAFMC (South Atlantic Fishery Management Council). 2008a. Amendment 15A, Final Environmental Impact Statement, Initial Regulatory Flexibility Analysis/Regulatory Impact Review, and Social Impact Assessment/Fishery Impact Statement for the Fishery Management

Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 4055 Faber Place, Ste 201, North Charleston, S.C. 29405.

SAFMC (South Atlantic Fishery Management Council). 2008b. Amendment 15B, Final Environmental Impact Statement, Initial Regulatory Flexibility Analysis/Regulatory Impact Review, and Social Impact Assessment/Fishery Impact Statement for the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 4055 Faber Place, Ste 201, North Charleston, S.C. 29405.

SAFMC (South Atlantic Fishery Management Council). 2009a. Amendment 16, Final Environmental Impact Statement, Initial Regulatory Flexibility Analysis/Regulatory Impact Review, and Social Impact Assessment/Fishery Impact Statement for the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 4055 Faber Place, Ste 201, North Charleston, S.C. 29405.

SAFMC (South Atlantic Fishery Management Council). 2009b. Comprehensive Ecosystem Based Amendment 1, Final Environmental Impact Statement, Initial Regulatory Flexibility Analysis/Regulatory Impact Review, and Social Impact Assessment/Fishery Impact Statement for South Atlantic Region (Amendment 19 to the Snapper Grouper FMP). South Atlantic Fishery Management Council, 4055 Faber Place, Ste 201, North Charleston, S.C. 29405. 286 pp.

SAFMC (South Atlantic Fishery Management Council). 2010a. Amendment 17A, Final Environmental Impact Statement, Initial Regulatory Flexibility Analysis/Regulatory Impact Review, and Social Impact Assessment/Fishery Impact Statement for the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 4055 Faber Place Drive, Ste 201, Charleston, S.C. 29405.

SAFMC (South Atlantic Fishery Management Council). 2010b. Amendment 17B, Final Environmental Impact Statement, Initial Regulatory Flexibility Analysis/Regulatory Impact Review, and Social Impact Assessment/Fishery Impact Statement for the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 4055 Faber Place, Ste 201, North Charleston, S.C. 29405.

SAFMC (South Atlantic Fishery Management Council). 2010c. Regulatory Amendment 10, Final Environmental Assessment, Regulatory Flexibility Analysis/Regulatory Impact Review, and Social Impact Assessment/Fishery Impact Statement for the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 4055 Faber Place, Ste 201, North Charleston, S.C. 29405.

SAFMC (South Atlantic Fishery Management Council). 2011a. Regulatory Amendment 9, Final Environmental Assessment, Regulatory Flexibility Analysis/Regulatory Impact Review, and Social Impact Assessment/Fishery Impact Statement for the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 4055 Faber Place, Ste 201, North Charleston, S.C. 29405.

SAFMC (South Atlantic Fishery Management Council). 2011c. Regulatory Amendment 11, Final Environmental Assessment, Regulatory Flexibility Analysis/Regulatory Impact Review, and Social Impact Assessment/Fishery Impact Statement for the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 4055 Faber Place, Ste 201, North Charleston, S.C. 29405.

SAFMC (South Atlantic Fishery Management Council). 2011c. Comprehensive Annual Catch Limit (ACL) Amendment (Amendment 25 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region). South Atlantic Fishery Management Council, 4055 Faber Place, Ste 201, North Charleston, S.C. 29405.

SAFMC (South Atlantic Fishery Management Council). 2011d. Amendment 24 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 4055 Faber Place, Ste 201, North Charleston, S.C. 29405.

SAFMC (South Atlantic Fishery Management Council). 2011e. Comprehensive Ecosystem Based Amendment 2, Final Environmental Assessment, Regulatory Flexibility Analysis/Regulatory Impact Review, and Social Impact Assessment/Fishery Impact Statement for the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. (Amendment 23 to the Snapper Grouper FMP). South Atlantic Fishery Management Council, 4055 Faber Place, Ste 201, North Charleston, S.C. 29405.

SAFMC (South Atlantic Fishery Management Council). 2012a. Amendment 18A to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 4055 Faber Place, Ste 201, North Charleston, S.C. 29405.

SAFMC (South Atlantic Fishery Management Council). 2012b. Amendment 20A to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 4055 Faber Place, Ste 201, North Charleston, S.C. 29405.

SAFMC (South Atlantic Fishery Management Council). 2012c. Regulatory Amendment 12, Final Environmental Assessment, Regulatory Flexibility Analysis/Regulatory Impact Review, and Social Impact Assessment/Fishery Impact Statement for the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 4055 Faber Place, Ste 201, North Charleston, S.C. 29405.

SAFMC (South Atlantic Fishery Management Council). 2013a. Amendment 18B to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region with Final Environmental Impact Statement, Initial Regulatory Flexibility Analysis, Regulatory Impact Review, and Social Impact Assessment/Fishery Impact Statement. South Atlantic Fishery Management Council, 4055 Faber Place Drive, Ste 201, Charleston, S.C. 29405.

SAFMC (South Atlantic Fishery Management Council). 2013b. Regulatory Amendment 13 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region . South Atlantic Fishery Management Council, 4055 Faber Place Drive, Ste 201, Charleston, S.C. 29405.

SAFMC (South Atlantic Fishery Management Council). 2013c. Regulatory Amendment 15 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region . South Atlantic Fishery Management Council, 4055 Faber Place Drive, Ste 201, Charleston, S.C. 29405.

SAFMC (South Atlantic Fishery Management Council). 2013d. Amendment 28 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region . South Atlantic Fishery Management Council, 4055 Faber Place Drive, Ste 201, Charleston, S.C. 29405.

SAFMC (South Atlantic Fishery Management Council). 2013e. Regulatory Amendment 18 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region . South Atlantic Fishery Management Council, 4055 Faber Place Drive, Ste 201, Charleston, S.C. 29405.

SAFMC (South Atlantic Fishery Management Council). 2013f. Regulatory Amendment 19 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 4055 Faber Place Drive, Ste 201, Charleston, S.C. 29405.

SAFMC (South Atlantic Fishery Management Council). 2014. Amendment 27 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 4055 Faber Place Drive, Ste 201, Charleston, S.C. 29405.

Appendix E. Other Applicable Laws

1.1 Administrative Procedure Act (APA)

All federal rulemaking is governed under the provisions of the APA (5 U.S.C. Subchapter II), which establishes a "notice and comment" procedure to enable public participation in the rulemaking process. Under the APA, the National Marine Fisheries Service (NMFS) is required to publish notification of proposed rules in the *Federal Register* and to solicit, consider and respond to public comment on those rules before they are finalized. The APA also establishes a 30-day wait period from the time a final rule is published until it takes effect, with some exceptions. Regulatory Amendment 14 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region (Regulatory Amendment 14) complies with the provisions of the APA through the South Atlantic Fishery Management Council's (South Atlantic Council) extensive use of public meetings, requests for comments and consideration of comments. The proposed rule associated with this amendment will have a request for public comments, which complies with the APA, and upon publication of the final rule, there will be a 30-day wait period before the regulations are effective.

1.2 Information Quality Act (IQA)

The IQA (Section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Public Law 106-443)) which took effect October 1, 2002, directed the Office of Management and Budget (OMB) to issue government-wide guidelines that "provide policy and procedural guidelines to federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information disseminated by federal agencies." OMB directed each federal agency to issue its own guidelines, establish administrative mechanisms allowing affected persons to seek and obtain correction of information that does not comply with OMB guidelines, and report periodically to OMB on the number and nature of complaints. The NOAA Section 515 Information Quality Guidelines require a series of actions for each new information product subject to the IQA. Amendment 28 has used the best available information and made a broad presentation thereof. The information contained in this document was developed using best available scientific information. Therefore, this document is in compliance with the IQA.

1.3 Coastal Zone Management Act (CZMA)

Section 307(c)(1) of the federal CZMA of 1972 requires that all federal activities that directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable. While it is the goal of the South Atlantic Council to have management measures that complement those of the states, federal and state administrative procedures vary and regulatory changes are unlikely to be fully instituted at the same time. The South Atlantic Council believes this document is consistent to the maximum extent practicable with the Coastal Zone Management Plans of Florida, Georgia, South Carolina, and North Carolina. This determination will be submitted to the responsible state agencies under Section 307 of the CZMA administering approved Coastal Zone Management Programs in the States of Florida, South Carolina, Georgia, and North Carolina.

1.4 Endangered Species Act (ESA)

The ESA of 1973 (16 U.S.C. Section 1531 et seq.) requires that federal agencies must ensure actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered species or the habitat designated as critical to their survival and recovery. The ESA requires NMFS to consult with the appropriate administrative agency (itself for most marine species, and the U.S. Fish and Wildlife Service for all remaining species) when proposing an action that may affect threatened or endangered species or adversely modify critical habitat. Consultations are necessary to determine the potential impacts of the proposed action. They are concluded informally when proposed actions may affect but are "not likely to adversely affect" threatened or endangered species or designated critical habitat. Formal consultations, resulting in a biological opinion, are required when proposed actions may affect and are "likely to adversely affect" threatened or endangered species or adversely modify designated critical habitat. NMFS completed a biological opinion (NMFS 2006) in 2006 evaluating the impacts of the continued authorization of the South Atlantic snapper grouper fishery under the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region (Snapper Grouper FMP) and Amendment 13C to the Snapper Grouper FMP on ESA-listed species (see **Chapter 3**). The opinion stated the fishery was not likely to adversely affect North Atlantic right whale critical habitat, seabirds, or marine mammals (see NMFS 2006 for discussion on these species). However, the opinion did state that the snapper grouper fishery would adversely affect sea turtles and smalltooth sawfish, but would not jeopardize their continued existence. An incidental take statement was issued for green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles, as well as smalltooth sawfish. Reasonable and prudent measures to minimize the impact of these incidental takes were specified, along with terms and conditions to implement them. See NMFS (2006) for a full discussion of impacts to smalltooth sawfish.

Sea turtles are vulnerable to capture by bottom longline and vertical hook-and-line gear. The magnitude of the interactions between sea turtles and the South Atlantic snapper grouper fishery was evaluated in NMFS (2006) using data from the Supplementary Discard Data Program (SDDP). Three loggerheads and three unidentified sea turtles were caught on vertical lines; one leatherback and one loggerhead were caught on bottom longlines, all were released alive. The effort reported in the program represented between approximately 5% and 14% of all South Atlantic snapper-grouper fishing effort. These data were extrapolated in NMFS (2006) to better estimate the number of interactions between the entire snapper-grouper fishery and ESA-listed sea turtles. The extrapolated estimate was used to project future interactions (**Table E-1**).

Table E-1. Three-year South Atlantic anticipated takes sea turtles in the snapper grouper fishery.

Species	Amount of Take	Total
Green	Total Take	39
	Lethal Take	14
Hawksbill	Total Take	4
	Lethal Take	3
Kemp's Ridley	Total Take	19
	Lethal Take	8
Leatherback	Total Take	25
	Lethal Take	15
Loggerhead	Total Take	202
	Lethal Take	67

Source: NMFS 2006. NMFS (National Marine Fisheries Service). 2006. Endangered Species Act Section 7 consultation on the continued authorization of snapper grouper fishing under the Snapper Grouper FMP and Proposed Amendment 13C. Biological Opinion. June 7.

The SDDP does not provide data on recreational fishing interactions with ESA-listed sea turtle species. However, anecdotal information indicates that recreational fishermen occasionally take sea turtles with hook-and-line gear. The biological opinion also used the extrapolated data from the SDDP to estimate the magnitude of recreational fishing on sea turtles (**Table E-1**).

Regulations implemented through Amendment 15B to the Snapper Grouper FMP (74 FR 31225; June 30, 2009) required all commercial or charter/headboat vessels with a South Atlantic snapper grouper permit, carrying hook-and-line gear on board, to possess required literature and release gear to aid in the safe release of incidentally caught sea turtles and smalltooth sawfish. These regulations are thought to decrease the mortality associated with accidental interactions with sea turtles and smalltooth sawfish.

Subsequent to the June 7, 2006, biological opinion, elkhorn and staghorn coral (*Acropora cervicornis* and *Acropora palmata*) were listed as threatened. In a consultation memorandum dated July 9, 2007, NMFS concluded the continued authorization of the South Atlantic snapper grouper fishery is not likely to adversely affect these *Acropora* species. On November 26, 2008, an *Acropora* critical habitat was designated. In a consultation memorandum dated December 2, 2008, NMFS concluded the continued authorization of the snapper grouper fishery is not likely to adversely affect *Acropora* critical habitat.

On September 22, 2011, NMFS and the U.S. Fish and Wildlife Service determined the loggerhead sea turtle population consists of nine distinct population segments (DPSs) (76 FR 58868). Previously, loggerhead sea turtles were listed as threatened species throughout their global range. The snapper-grouper fishery interacts with loggerhead sea turtles from what is now considered the Northwest Atlantic (NWA) DPS, which remains listed as threatened. Five DPSs of Atlantic sturgeon were also listed since the completion of the 2006 biological opinion. In a consultation memorandum dated February 15, 2012, NMFS concluded the continued authorization of the South Atlantic snapper grouper fishery is not likely to adversely affect the Atlantic sturgeon. The February 15, 2012, memorandum also stated that because the 2006 biological opinion had evaluated the impacts of the fishery on the

loggerhead subpopulations now wholly contained within the NWA DPS, the opinion's conclusion that the fishery is not likely to jeopardize the continued existence of loggerhead sea turtles remains valid.

On July 10, 2014, NMFS published its final rule designating critical habitat for the Northwest Atlantic Ocean (NWA) loggerhead sea turtle DPS (79 FR 39856). The Final Rule designated 38 marine areas within the Atlantic Ocean and Gulf of Mexico that contained the primary constituent elements (PCEs) (i.e., the physical or biological features) essential for the conservation of the loggerhead sea turtle. In a consultation memorandum dated September 16, 2014, NMFS concluded the continued authorization of the South Atlantic snapper grouper fishery would either not affect or was not likely to adversely affect any of the PCEs of loggerhead critical habitat.

On September 10, 2014, NMFS published its final rule maintaining elkhorn coral (*Acropora palmata*) and staghorn coral (*A. cervicornis*) as threatened and listing the following corals as threatened under the ESA: pillar coral (*Dendrogyra cylindrus*), rough cactus coral (*Mycetophyllia ferox*), lobed star coral (*Orbicella annularis*), mountainous star coral (*O. faveolata*), and boulder star coral (*O. franksi*). In a consultation memorandum dated September 11, 2014, NMFS concluded the continued authorization of the South Atlantic snapper grouper fishery was not likely to adversely affect listed-*Acropora* species and was not likely to adversely affect the five newly listed species.

1.5 Executive Order 12612: Federalism

E.O. 12612 requires agencies to be guided by the fundamental federalism principles when formulating and implementing policies that have federalism implications. The purpose of the Order is to guarantee the division of governmental responsibilities between the federal government and the states, as intended by the framers of the Constitution. No federalism issues have been identified relative to the actions proposed in this document and associated regulations. Therefore, preparation of a Federalism assessment under E.O. 13132 is not necessary.

1.6 Executive Order 12866: Regulatory Planning and Review

E.O. 12866, signed in 1993, requires federal agencies to assess the costs and benefits of their proposed regulations, including distributional impacts, and to select alternatives that maximize net benefits to society. To comply with E.O. 12866, NMFS prepares a Regulatory Impact Review (RIR) for all fishery regulatory actions that implement a new fishery management plan (FMP) or that significantly amend an existing plan. RIRs provide a comprehensive analysis of the costs and benefits to society associated with proposed regulatory actions, the problems and policy objectives prompting the regulatory proposals, and the major alternatives that could be used to solve the problems. The reviews also serve as the basis for the agency's determinations as to whether proposed regulations are a "significant regulatory action" under the criteria provided in E.O. 12866 and whether proposed regulations will have a significant economic impact on a substantial number of small entities in compliance with the Regulatory Flexibility Act. A regulation is significant if it is likely to result in an annual effect on the economy of at least $100,000,000 or if it has other major economic effects.

In accordance with E.O. 12866, the following is set forth by the South Atlantic Council: (1) this rule is not likely to have an annual effect on the economy of more than $100 million or to adversely affect in a material way the economy, a sector of the economy, productivity, jobs, the environment, public health

or safety, or state, local, or tribal governments or communities; (2) this rule is not likely to create any serious inconsistencies or otherwise interfere with any action taken or planned by another agency; (3) this rule is not likely to materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights or obligations of recipients thereof; (4) this rule is not likely to raise novel or policy issues arising out of legal mandates, or the principles set forth in the Executive Order; and (5) this rule is not controversial.

This amendment includes the RIR as **Appendix I**.

1.7 Executive Order 12898: Environmental Justice

E.O. 12898 requires that "to the greatest extent practicable and permitted by law…each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority populations and low-income populations in the United States and its territories and possessions…"

The alternatives being considered in this document are not expected to result in any disproportionate adverse human health or environmental effects to minority populations or low-income populations of Florida, North Carolina, South Carolina, or Georgia, rather the impacts would be spread across all participants in the snapper grouper fishery regardless of race or income. A detailed description of the communities impacted by the actions contained in this document and potential socioeconomic impacts of those actions are contained in **Chapters 3** and **4** of this document.

1.8 Executive Order 12962: Recreational Fisheries

E.O. 12962 requires federal agencies, in cooperation with states and tribes, to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities through a variety of methods. Additionally, the Order establishes a seven-member National Recreational Fisheries Coordination Council responsible for, among other things, ensuring that social and economic values of healthy aquatic systems that support recreational fisheries are considered by federal agencies in the course of their actions, sharing the latest resource information and management technologies, and reducing duplicative and cost-inefficient programs among federal agencies involved in conserving or managing recreational fisheries. The National Recreational Fisheries Coordination Council also is responsible for developing, in cooperation with federal agencies, states and tribes, a Recreational Fishery Resource Conservation Plan - to include a five-year agenda. Finally, the Order requires NMFS and the U.S. Fish and Wildlife Service to develop a joint agency policy for administering the ESA.

The alternatives considered in this document are consistent with the directives of E.O. 12962.

1.9 Executive Order 13089: Coral Reef Protection

E.O. 13089, signed by President William Clinton on June 11, 1998, recognizes the ecological, social, and economic values provided by the Nation's coral reefs and ensures that federal agencies are protecting these ecosystems. More specifically, the Order requires federal agencies to identify actions

that may harm U.S. coral reef ecosystems, to utilize their program and authorities to protect and enhance the conditions of such ecosystems, and to ensure that their actions do not degrade the condition of the coral reef ecosystem.

The alternatives considered in this document are consistent with the directives of E.O. 13089.

1.10 Executive Order 13158: Marine Protected Areas (MPAs)

E.O. 13158 was signed on May 26, 2000, to strengthen the protection of U.S. ocean and coastal resources through the use of Marine Protected Areas. The E.O. defined MPAs as "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". It directs federal agencies to work closely with state, local and non- governmental partners to create a comprehensive network of MPAs "representing diverse U.S. marine ecosystems, and the Nation's natural and cultural resources".

The alternatives considered in this document are consistent with the directives of E.O. 13158.

1.11 Marine Mammal Protection Act (MMPA)

The MMPA established a moratorium, with certain exceptions, on the taking of marine mammals in U.S. waters and by U.S. citizens on the high seas. It also prohibits the importing of marine mammals and marine mammal products into the United States. Under the MMPA, the Secretary of Commerce (authority delegated to NMFS) is responsible for the conservation and management of cetaceans and pinnipeds (other than walruses). The Secretary of the Interior is responsible for walruses, sea otters, polar bears, manatees, and dugongs. Part of the responsibility that NMFS has under the MMPA involves monitoring populations of marine mammals to make sure that they stay at optimum levels. If a population falls below its optimum level, it is designated as "depleted". A conservation plan is then developed to guide research and management actions to restore the population to healthy levels.

In 1994, Congress amended the MMPA, to govern the taking of marine mammals incidental to commercial fishing operations. This amendment required the preparation of stock assessments for all marine mammal stocks in waters under U.S. jurisdiction; development and implementation of take-reduction plans for stocks that may be reduced or are being maintained below their optimum sustainable population levels due to interactions with commercial fisheries; and studies of pinniped-fishery interactions. The MMPA requires a commercial fishery to be placed in one of three categories, based on the relative frequency of incidental serious injuries and mortalities of marine mammals. Category I designates fisheries with frequent serious injuries and mortalities incidental to commercial fishing; Category II designates fisheries with occasional serious injuries and mortalities; and Category III designates fisheries with a remote likelihood or no known serious injuries or mortalities.

Under the MMPA, to legally fish in a Category I and/or II fishery, a fisherman must take certain steps. For example, owners of vessels or gear engaging in a Category I or II fishery, are required to obtain a marine mammal authorization by registering with the Marine Mammal Authorization Program (50 CFR 229.4). They are also required to accommodate an observer if requested (50 CFR 229.7(c)) and they must comply with any applicable take reduction plans. The commercial hook-and-line

components of the South Atlantic snapper grouper fishery (i.e., bottom longline, bandit gear, and handline), which targets snapper grouper species are listed as part of a Category III fishery (78 FR 53336, August 29, 2013) because there have been no documented interactions between these gear and marine mammals. The black sea bass pot component of the South Atlantic snapper grouper fishery is part of the Atlantic mixed species trap/pot fishery, a Category II fishery, in the final 2014 LOF (79 FR 14418, March 14, 2014). The Atlantic mixed species trap/pot fishery designation was created in 2003 (68 FR 41725, July 15, 2003), by combining several separately listed trap/pot fisheries into a single group. This group was designated Category II as a precaution because of known interactions between marine mammals and gear similar to those included in this group. Prior to this consolidation, the black sea bass pot fishery in the South Atlantic was a part of the "U.S. Mid-Atlantic and Southeast U.S. Atlantic Black Sea Bass Trap/Pot" fishery (Category III). There has never been a documented interaction between marine mammals and black sea bass trap/pot gear in the South Atlantic. The actions in this EA are not expected to negatively impact the provisions of the MMPA.

1.12 National Environmental Policy Act (NEPA)

This document has been written and organized in a manner that meets NEPA requirements, and thus is a consolidated NEPA document, including an EA, as described in NOAA Administrative Order (NAO) 216- 6, Section 6.03.a.2.

Purpose and Need for Action

The purpose and need for this action are described in **Chapter 1**.

Alternatives

The alternatives for this action are described in **Chapter 2**.

Affected Environment

The affected environment is described in **Chapter 3**.

Impacts of the Alternatives

The impacts of the alternatives on the environment are described in **Chapter 4**.

1.13 National Marine Sanctuaries Act (NMSA)

Under the NMSA (also known as Title III of the Marine Protection, Research and Sanctuaries Act of 1972), as amended, the U.S. Secretary of Commerce is authorized to designate National Marine Sanctuaries to protect distinctive natural and cultural resources whose protection and beneficial use requires comprehensive planning and management. The National Marine Sanctuary Program is administered by the Sanctuaries and Reserves Division of NOAA. The NMSA provides authority for comprehensive and coordinated conservation and management of these marine areas. The National Marine Sanctuary Program currently comprises 13 sanctuaries around the country, including sites in American Samoa and Hawaii. These sites include significant coral reef and kelp forest habitats, and

breeding and feeding grounds of whales, sea lions, sharks, and sea turtles. The three sanctuaries in the South Atlantic exclusive economic zone are the USS Monitor, Gray's Reef, and Florida Keys National Marine Sanctuaries.

The alternatives considered in this document are not expected to have any adverse impacts on the resources managed by the National Marine Sanctuaries.

1.14 Paperwork Reduction Act (PRA)

The purpose of the PRA is to minimize the burden on the public. The PRA is intended to ensure that the information collected under the proposed action is needed and is collected in an efficient manner (44 U.S.C. 3501 (1)). The authority to manage information collection and record keeping requirements is vested with the Director of the Office of Management and Budget (OMB). This authority encompasses establishment of guidelines and policies, approval of information collection requests, and reduction of paperwork burdens and duplications. The PRA requires NMFS to obtain approval from the OMB before requesting most types of fishery information from the public. Actions in this document are not expected to affect PRA.

1.15 Regulatory Flexibility Act (RFA)

The RFA of 1980 (5 U.S.C. 601 et seq.) requires federal agencies to assess the impacts of regulatory actions implemented through notice and comment rulemaking procedures on small businesses, small organizations, and small governmental entities, with the goal of minimizing adverse impacts of burdensome regulations and record-keeping requirements on those entities. Under the RFA, NMFS must determine whether a proposed fishery regulation would have a significant economic impact on a substantial number of small entities. If not, a certification to this effect must be prepared and submitted to the Chief Counsel for Advocacy of the Small Business Administration. Alternatively, if a regulation is determined to significantly impact a substantial number of small entities, the RFA requires the agency to prepare an initial and final Regulatory Flexibility Analysis to accompany the proposed and final rule, respectively. These analyses, which describe the type and number of small businesses, affected, the nature and size of the impacts, and alternatives that minimize these impacts while accomplishing stated objectives, must be published in the *Federal Register* in full or in summary for public comment and submitted to the chief counsel for advocacy of the Small Business Administration. Changes to the RFA in June 1996 enable small entities to seek court review of an agency's compliance with the RFA's provisions.

As NMFS has determined whether a proposed fishery regulation would have a significant economic impact on a substantial number of small entities, a certification to this effect will be prepared and submitted to the Chief Counsel for Advocacy of the Small Business Administration.

This amendment includes the RFA as **Appendix J**.

1.16 Small Business Act (SBA)

Enacted in 1953, the SBA requires that agencies assist and protect small-business interests to the extent possible to preserve free competitive enterprise. The objectives of the SBA are to foster business

ownership by individuals who are both socially and economically disadvantaged; and to promote the competitive viability of such firms by providing business development assistance including, but not limited to, management and technical assistance, access to capital and other forms of financial assistance, business training, and counseling, and access to sole source and limited competition federal contract opportunities, to help firms achieve competitive viability. Because most businesses associated with fishing are considered small businesses, NMFS, in implementing regulations, must make an assessment of how those regulations will affect small businesses.

1.17 Public Law 99-659: Vessel Safety

Public Law 99-659 amended the Magnuson-Stevens Fishery Conservation and Management Act to require that a FMP or FMP amendment must consider, and may provide for, temporary adjustments (after consultation with the U.S. Coast Guard and persons utilizing the fishery) regarding access to a fishery for vessels that would be otherwise prevented from participating in the fishery because of safety concerns related to weather or to other ocean conditions. No vessel would be forced to participate in South Atlantic fisheries under adverse weather or ocean conditions as a result of the imposition of management regulations proposed in this amendment. No concerns have been raised by South Atlantic fishermen or by the U.S. Coast Guard that the proposed management measures directly or indirectly pose a hazard to crew or vessel safety under adverse weather or ocean conditions.

Appendix F. Bycatch Practicability Analysis (BPA)

1.1 Population Effects for the Bycatch Species

Background

Amendment 29 to the Fishery Management Plan (FMP) for the Snapper Grouper Fishery of the South Atlantic Region (Amendment 29) considers updating the acceptable biological catch (ABC) control rule, adjusting ABCs for unassessed snapper grouper species based on the revised ABC control rule, modifying annual catch limits (ACLs) based on the revised ABCs, and modifying management measures for gray triggerfish. This amendment would modify the ABC control rule for unassesesd species using the Only Reliable Catch Stocks (ORCS) method recommended by the South Atlantic Fishery Management Council (South Atlantic Council) Scientific and Statistical Committee (SSC). There are 59 species in the snapper grouper fishery management unit (FMU), many of which co-exist with each other, and are encountered by fishers. Therefore, this BPA includes landings and discard information for species in the snapper grouper FMU, in addition to the fifteen species (Bar Jack, Margate, Red Hind, Cubera Snapper, Yellowedge Grouper, Silk Snapper, Atlantic Spadefish, Gray Snapper, Lane Snapper, Rock Hind, Tomtate, White Grunt, Scamp, Gray Triggerfish) considered in Amendment 29 (**Table 1**).

Based on methodology in *Calculating Acceptable Biological Catch for Stocks That Have Reliable Catch Data Only (Only Reliable Catch Stocks – ORCS)* (Berkson et al. 2011), the South Atlantic Council's SSC recommended an approach to compute the ABC for unassessed stocks with only reliable catch data. The approach involved selection of a "catch statistic", a scalar to denote the risk of overexploitation for the stock, and a scalar to denote the management risk level. The SSC provided the first two criteria for each stock, but the South Atlantic Council must specify their risk tolerance level for each stock. Amendment 29 proposes alternatives for the risk tolerance level for each select unassesed species including Bar Jack, Margate, Red Hind, Cubera Snapper, Yellowedge Grouper, Silk Snapper, Atlantic Spadefish, Gray Snapper, Lane Snapper, Rock Hind, Tomtate, White Grunt, Scamp, Gray Triggerfish.

Amendment 29 also proposes revising ACLs based on the adjusted ABCs. The Council added alternatives to set the ACL equal to ABC (both current and revised ABC) as well as alternatives that would provide a buffer between ABC and ACL.

Amendment 29 also proposes management measures for gray triggerfish including modifying the size limit, implementing a split season and a revised trip limit. These measures are necessary to diminish and/or prevent derby conditions, and ensure that overfishing does not occur pending a new assessment of the gray triggerfish stock in the South Atlantic region.

Commercial Sector

During 2008-2012, regulations (50 C.F.R. § 622.176) required participants in the South Atlantic snapper grouper fishery who were selected by the Science and Research Director (SRD) to maintain and submit a fishing record on forms provided by the SRD. Fishermen in the snapper grouper fishery were also required to submit logbooks with trip and effort information.

For the fifteen species in Amendment 29, commercial landings (pounds whole weight, lbs ww) during 2008-2012 were dominated by gray triggerfish (400,273 lb ww), followed by scamp (221,922 lb ww), white grunt (126,477 lbs ww), and gray snapper (113,992 lbs ww). All other species in the amendment had commercial landings of less than 100,000 lbs ww (**Table 1**). Commercial discards (number of fish) during 2008-2012 were highest for gray snapper (40,381) followed by tomate (2,441), scamp (2,204) and gray triggerfish (2,097). All other species had discards of less than 348 fish (**Table 1**). For snapper grouper species not considered in Amendment 29, commercial landings were high for yellowtail snapper, followed by vermilion snapper, greater amberjack, gag, and blueline tilefish (**Table 1**).

Currently, discard data are collected using a supplemental form that is sent to a 20% stratified random sample of the active permit holders in the snapper grouper fishery. However, in the absence of any observer data, there are concerns about the accuracy of logbook data in collecting bycatch information. Biases associated with logbooks primarily result from inaccuracy in reporting of species that are caught in large numbers or are of little economic interest (particularly of bycatch species), and from low compliance rates. Actions that could help resolve some of these issues are currently being considered in an amendment being developed by the South Atlantic Council and the Gulf of Mexico Fishery Management Council (Gulf of Mexico Council), which would allow for commercial logbook data (including discard information) to be entered electronically.

Release mortality estimates for fish species are compiled from the most recent stock assessments using Southeast Fishery Science Center's (SEFSC) SEDAR process. With the exception of gray triggerfish, no species in this amendment has been the subject of a stock assessment and release mortality estimates have not been specified. For gray triggerfish, the commercial release mortality estimate is 12.5% (SEDAR 32 2013). See the "Finfish Bycatch Mortality" and "Practicability of Management Measures in Directed Fisheries Relative to their Impact on Bycatch and Bycatch Mortality" sections of this BPA for more details.

Recreational Sector

For the recreational sector during 2008-2012, estimates of the number of recreational discards were available from Marine Recreational Fisheries Statistical Survey (MRFSS) and the NMFS Southeast Headboat Survey. The MRFSS system classified recreational catch into three categories:

- Type A - Fishes that were caught, landed whole, and available for identification and enumeration by the interviewers.

- Type B - Fishes that were caught but were either not kept or not available for identification:

    - Type B1 - Fishes that were caught and filleted, released dead, given away, or disposed of in some way other than Types A or B2.

    - Type B2 - Fishes that were caught and released alive.

Recent improvements have been made to the MRFSS program, now called the Marine Recreational Information Program (MRIP). Beginning in 2013, samples were drawn from a known universe of fishermen rather than randomly dialing coastal households. Other improvements have been and will be made that should result in better estimating recreational catches and the variances around those catch estimates. MRIP methods have been used to recalculate previous MRFSS estimates dating back to 1986.

During 2008-2012, information for charter trips came from two sources. Charter vessels for the snapper grouper fishery were selected to report by the SRD to maintain a fishing record for each trip, or a portion of such trips as specified by the SRD, and on forms provided by the SRD. Harvest and bycatch information was monitored by MRFSS/MRIP. Since 2000, a 10% sample of charter vessel captains were called weekly to obtain trip level information, such as date, fishing location, target species, etc. In addition, the standard dockside intercept data were collected from charter vessels and charter vessel clients were sampled through the standard random digital dialing of coastal households. Precision of charter vessel effort estimates has improved by more than 50% due to these changes (Van Voorhees et al. 2000).

Harvest from headboats was monitored by NMFS-SEFSC Beaufort Laboratory. Collection of discard data began in 2004. Daily catch records (trip records) were filled out by the headboat operators, or in some cases by NMFS approved headboat samplers based on personal communication with the captain or crew. Headboat trips were subsampled for data on species lengths and weights. Biological samples (scales, otoliths, spines, reproductive tissues, and stomachs) were obtained as time allowed. Lengths of discarded fish were occasionally obtained but these data were not part of the headboat database.

During 2008-2012, private recreational landings and subsequent discards (numbers of fish, N) for species in Amendment 29 were dominated by gray snapper, white grunt, Atlantic spadefish, and gray triggerfish. For these species, discards were often much higher than the landings recorded (**Table 1**). Gray snapper catch was 1,434,333 fish with 229,482 landed and 1,204,852 listed as discards. Similar patterns are exhibited for Atlantic spadefish, white grunt, and gray triggerfish. Other species including black sea bass also show very high recreational discards with landings at 275,845 and discards of 2,598,008. In the for-hire category, charterboats landed mostly gray triggerfish (32,706) and white grunt (34,665) (**Table 1**). Discards in the charterboat category were highest for tomtate, white grunt and gray triggerfish (**Table 1**). For headboats, landings were highest for white grunt, gray triggerfish, and gray snapper. Discards for the headboat sector were highest for tomtate, white grunt and gray triggerfish (**Table 1**). For snapper grouper species not included in Amendment 29, landings and discards in all recreational categories were high for black sea bass, blue runner, yellowtail snapper, and vermilion snapper (**Table 1**).

Table 1. Mean headboat, MRIP (charter and private), and commercial estimates of landings and discards of snapper grouper species in the South Atlantic (2008-2012). Headboat, MRIP (charter and private) landings are in numbers of fish (N); commercial landings are in pounds whole weight (lbs ww). Discards represent numbers of fish that were caught and released alive. Species considered in Amendment 29 are in boldface.

Species	HEADBOAT			MRIP CHARTER			MRIP PRIVATE			COMMERCIAL	
	Catch (N)	Landings (N)	Discards (N)	Catch (N)	Landings (N)	Discards (N)	Catch (N)	Landings (N)	Discards (N)	Landings (lbs ww)	Discards (N)
Almaco jack	3,576	3,337	240	3,858	2,592	1,266	9,416	3,688	5,728	204,422	869
Atlantic spadefish	**158**	**128**	**30**	**236**	**188**	**48**	**267,887**	**110,718**	**157,169**	**26,936**	**0**
Banded rudderfish	19,008	16,651	2,357	5,634	3,159	2,475	13,703	6,847	6,855	60,615	142
Bank sea bass	5,788	5,788	0	2,913	691	2,222	10,413	2,393	8,020	387	4
Bar jack	**290**	**230**	**59**	**261**	**76**	**186**	**11,222**	**2,805**	**8,417**	**4,111**	**17**
Black grouper	1,622	315	1,307	9,755	1,422	8,334	31,487	7,760	23,727	50,001	2,006
Black sea bass	629,922	166,255	463,667	250,778	63,803	186,974	2,873,854	275,845	2,598,008	486,316	29,772
Black snapper	0	0	0	0	0	0	0	0	0	213	7
Blackfin snapper	119	51	68	101	101	0	1,843	1,843	0	1,616	1
Blue runner	22,821	17,484	5,337	25,885	11,601	14,284	1,325,020	610,399	714,621	227,946	854
Blueline tilefish	3,085	3,013	73	18,503	18,055	448	8,569	8,324	245	370,077	244
Coney	121	70	51	37	33	4	1,314	1,100	214	34	0
Cottonwick	17	17	0	0	0	0	148	148	0	0	0
Cubera snapper	**377**	**359**	**17**	**4**	**4**	**0**	**2,907**	**2,631**	**275**	**5,060**	**0**
Dog snapper	92	64	28	57	57	0	954	822	133	395	0
Gag	15,489	10,214	5,276	19,365	2,983	16,382	131,170	21,430	109,740	495,064	9,490
Golden tilefish	0	0	0	493	493	0	3,123	3,123	0	421,923	26
Gray snapper	**46,371**	**40,624**	**5,747**	**5,220**	**5,024**	**196**	**1,434,333**	**229,482**	**1,204,852**	**113,992**	**40,381**
Gray triggerfish*	**67,258**	**55,192**	**12,066**	**39,155**	**32,706**	**6,449**	**226,603**	**110,045**	**116,558**	**400,273**	**2,097**

Species	HEADBOAT			MRIP CHARTER			MRIP PRIVATE			COMMERCIAL	
	Catch (N)	Landings (N)	Discards (N)	Catch (N)	Landings (N)	Discards (N)	Catch (N)	Landings (N)	Discards (N)	Landings (lbs ww)	Discards (N)
Graysby	3,001	2,041	960	1,049	919	131	10,074	3,049	7,025	192	29
Greater amberjack	6,614	4,710	1,904	25,898	20,209	5,689	58,129	22,383	35,746	859,929	3,353
Hogfish	260	169	91	32	29	3	30,321	27,550	2,770	45,169	55
Jolthead porgy	7,050	6,913	137	2,232	2,232	0	12,594	11,869	725	3,853	11
Knobbed porgy	5,584	5,439	145	832	832	0	6,838	6,398	441	23,726	1
Lane snapper	**23,340**	**20,227**	**3,112**	**11,993**	**8,882**	**3,111**	**166,037**	**42,246**	**123,791**	**3,526**	**210**
Lesser amberjack	22	17	6	12	12	0	393	393	0	17,044	34
Longspine porgy	3	3	0	0	0	0	460	290	170	0	0
Mahogany snapper	32	30	2	0	0	0	35	35	0	30	0
Margate	**856**	**662**	**195**	**265**	**206**	**59**	**9,512**	**3,559**	**5,952**	**3,725**	**30**
Misty grouper	0	0	0	0	0	0	0	0	0	971	1
Mutton snapper	17,683	13,996	3,687	31,630	18,609	13,021	294,792	111,060	183,732	74,212	1,636
Ocean triggerfish	473	473	0	363	285	77	7,366	3,454	3,912	0	0
Queen snapper	0	0	0	1	1	0	0	0	0	3,734	107
Red grouper	11,559	1,629	9,930	9,138	3,647	5,491	81,675	31,172	50,503	367,462	3,610
Red hind	**383**	**313**	**70**	**86**	**86**	**0**	**2,588**	**928**	**1,660**	**9,865**	**88**
Red porgy	41,064	23,659	17,405	20,579	12,733	7,845	38,282	24,793	13,489	169,468	27,818
Rock hind	**2,150**	**1,509**	**642**	**132**	**92**	**40**	**4,087**	**908**	**3,179**	**15,839**	**14**
Rock sea bass	0	0	0	415	177	238	11,477	4,287	7,190	453	49
Sailors choice	123	123	0	732	23	709	32,818	14,324	18,494	0	0
Sand tilefish	1,712	895	817	4,053	484	3,568	23,983	6,091	17,891	0	238
Saucereye porgy	228	228	1	0	0	0	1,034	1,034	0	0	0

Species	HEADBOAT			MRIP CHARTER			MRIP PRIVATE			COMMERCIAL	
	Catch (N)	Landings (N)	Discards (N)	Catch (N)	Landings (N)	Discards (N)	Catch (N)	Landings (N)	Discards (N)	Landings (lbs ww)	Discards (N)
Scamp	**5,602**	**3,195**	**2,407**	**4,631**	**2,771**	**1,860**	**8,852**	**5,108**	**3,745**	**221,922**	**2,204**
Schoolmaster	344	344	0	2	2	0	7,251	4,427	2,824	181	0
Scup	11,364	9,531	1,833	246	219	28	1,086	596	490	0	0
Silk Snapper	**1,371**	**1,249**	**122**	**1,379**	**1,209**	**171**	**1,141**	**153**	**988**	**11,379**	**8**
Snowy grouper	123	72	50	1,684	1,388	295	969	550	419	85,047	273
Tomtate	**119,474**	**49,453**	**70,021**	**19,269**	**11,868**	**7,401**	**331,321**	**84,819**	**246,502**	**212**	**2,441**
Vermilion snapper	282,092	176,802	105,290	63,968	41,150	22,818	169,085	70,051	99,034	1,010,587	38,174
White grunt*	**179,271**	**144,826**	**34,445**	**42,015**	**34,665**	**7,349**	**419,442**	**193,338**	**226,104**	**126,477**	**348**
Whitebone porgy	4,836	4,577	258	1,833	1,784	49	11,919	10,710	1,209	14	31
Yellowedge grouper	**7**	**4**	**3**	**27**	**27**	**0**	**44**	**44**	**0**	**16,080**	**13**
Yellowfin grouper	20	14	5	0	0	0	97	97	0	3,780	6
Yellowmouth grouper	22	17	5	15	15	0	0	0	0	290	0
Yellowtail snapper	134,179	100,724	33,454	199,283	134,871	64,412	967,208	362,141	605,067	1,123,532	90,695

Sources: MRIP data from SEFSC Recreational ACL Dataset (May 2013), Headboat data from SEFSC Headboat Logbook CRNF files (expanded; May 2013), Commercial landings data from SEFSC Commercial ACL Dataset (July 10, 2013) with discard estimates from expanded SEFSC Commercial Discard Logbook (Jun 2013).
Note: Estimates of commercial discards are highly uncertain and are for vertical line gear only.
*Commercial gray triggerfish includes "triggerfishes, unclassified" category; commercial white grunt includes "grunts, unclassified" category.
Goliath grouper, Nassau grouper, Warsaw grouper, Speckled hind, and Red snapper are excluded from Table 1 since they are prohibited species, and landings records are not available for all the years 2007-2011. Wreckfish landings are confidential.

Finfish Bycatch Mortality

Release mortality estimates are compiled from the most recent stock assessments using Southeast Fishery Science Center's SEDAR process. With the exception of gray triggerfish, no species in this amendment have been the subject of a stock assessment and do not have release mortality estimates specified. A stock assessment for gray triggerfish is underway, and the commercial and recreational release mortality estimate is 12.5% (SEDAR 32 2013).

Practicability of Management Measures in Directed Fisheries Relative to their Impact on Bycatch and Bycatch Mortality

Species most closely associated with directed fisheries for gray triggerfish are vermilion snapper (**Table 2**, SERO-LAPP-2010-06). Gray snapper are caught with lane snapper. Fishermen could harvest one of these species and return co-occurring species to the water as "regulatory discards" (e.g., if the fish are under the size limit) or if undesirable. A portion of the discarded fish would not survive.

Table 2. Top five associated stocks and level of association (parenthesis) for snapper grouper species considered in Amendment 29, evaluated in **Table A6** of **Appendix O** in the Comprehensive ACL Amendment (SAFMC 2011). Species groups were evaluated using cluster association matrix with life history weighted equal to maximum from fishery data.

COMMON NAME	1	2	3	4	5
yellowedge grouper	snowy grouper (.4)	blueline tilefish (.24)	warsaw grouper (.17)	tilefish (.07)	silk snapper (.04)
silk snapper	yellowfin grouper (.34)	tilefish (.15)	wreckfish (.08)	snowy grouper (.07)	warsaw grouper (.03)
gray triggerfish	vermilion snapper (.38)	gag (.21)	lane snapper (.12)	red porgy (.1)	white grunt (.05)
red hind	rock hind (.24)	jolthead porgy (.15)	red grouper (.11)	whitebone porgy (.08)	tomtate (.08)
rock hind	red hind (.28)	knobbed porgy (.27)	jolthead porgy (.24)	bar jack (.06)	white grunt (.04)
tomtate	whitebone porgy (.38)	vermilion snapper (.33)	red hind (.08)	black sea bass (.08)	gray triggerfish (.02)
white grunt	jolthead porgy (.23)	red grouper (.13)	gray triggerfish (.1)	knobbed porgy (.09)	gag (.09)
bar jack	sand tilefish (.24)	jolthead porgy (.1)	knobbed porgy (.08)	rock hind (.08)	nassau grouper (.06)
gray snapper	lane snapper (.58)	yellowtail snapper (.37)	red porgy (.05)	warsaw grouper (.)	silk snapper (.)
lane snapper	gray snapper (.62)	gray triggerfish (.17)	yellowtail snapper (.11)	vermilion snapper (.06)	whitebone porgy (.02)

Sources: SERO-LAPP-2010-06.

The Preferred alternative under **Action 1** would update the ABC control rule to use the Only Reliable Catch Stocks (ORCS) approach to calculate ABC values for select unassessed stocks. Updating the ABC control rule as proposed in **Preferred Alternative 2** would not have any direct biological effects. This change would; however, indirectly effect the biological environment since an approved scientific methodology would be adopted to establish ABCs for

snapper grouper species that have not been assessed but for which there are reliable catch statistics.

Action 2 would apply the revised ABC control rule (under Action 1). The SSC provided the catch statistic and risk of overexploitation for each stock, but the South Atlantic Council must specify their risk tolerance level for each stock as described in **Action 2** alternatives and associated sub-alternatives. **Preferred Sub-alternative 2b** would apply risk tolerance scalars of 0.90 for stocks with low risk of overexploitation (bar jack). **Preferred Sub-alternative 3b** would apply risk tolerance scalars of 0.80 for stocks with moderate risk of overexploitation. Finally, **Preferred Sub-alternative 4a** would use scalar of 0.70 for stocks with moderately high risk of overexploitation.

Action 3 considers alternatives that would revise ACLs based on the adjusted ABCs in Action 2. The no action alternative would not change the ACLs from the status quo, regardless of what alternative is selected in **Action 2**. **Alternative 2, Preferred Sub-alternatives 2a-2e** and **2g** would set the ACL equal to the revised ABC selected in Action 2. **Alternatives 3-5** would provide a buffer between the ACL and revised ABC. **Preferred Sub-alternative 4f** under **Alternative 4** would establish a 10% buffer between the ACL and ABC for scamp.

Action 4 considers alternatives that would modify the minimum size limit of gray triggerfish. Currently the commercial and recreational minimum size limit for South Atlantic gray triggerfish is 12 inches total length (TL) in federal waters off east Florida and 12 inches fork length (FL) in east Florida state waters (**Alternative 1**). In the Gulf of Mexico, the commercial and recreational minimum size limit is 14 inches FL in state and federal waters off west Florida. The South Atlantic Council is considering alternatives to modify the minimum size limit.

A stock assessment of South Atlantic gray triggerfish (SEDAR 32 2013) has provided an equation to estimate from TL to FL. Based on this equation, a 12- inch TL gray triggerfish is equal to a 10.46 inch FL gray triggerfish. Based on the biological analysis in Section 4 of the amendment, **Preferred Alternative 3,** which would establish a minimum size limit of 12 inches fork length off Georgia, South Carolina, and North Carolina, would provide a slight reduction in harvest rates. **Preferred Alternative 5** would specify a size limit for gray triggerfish of 14 inches fork length off east Florida.

Action 5 considers alternatives that would divide the commercial fishing season for gray triggerfish into two time periods. The purpose of **Action 5** would be to provide opportunities to fish for gray triggerfish throughout South Atlantic and throughout the calendar year. With the specification of an ACL for gray triggerfish through the Comprehensive ACL Amendment (SAFMC 2011), and Regulatory Amendment 13 in 2013 (SAFMC 2013), in-season closures have taken place when the ACLs have been met. In 2012, when the commercial ACL was 305,262 lbs ww, commercial harvest of gray triggerfish closed on September 11, 2012, and reopened for a week in December. In 2013, the ACL was increased to 272,880 lbs ww, and commercial harvest for gray triggerfish was closed on July 7 and reopened from October 18 to November 14. **Action 3** proposes commercial ACLs for gray triggerfish based on the preferred alternative for ABC (**Preferred Sub-alternative 4a**) in **Action 2**.

By dividing the commercial ACL into two six-month fishing seasons, fishermen would be given the opportunity to fish for gray triggerfish at the beginning of the year, and during the summer. The divided commercial quota would provide fishermen in the northern and southern areas of the South Atlantic a chance to fish for gray triggerfish when weather conditions are favorable in their respective areas.

Action 6 considers alternatives for trip limits for gray triggerfish **Alternative 1 (No Action)** would not establish a trip limit for gray triggerfish. Currently, the commercial ACL is 272,880 lbs ww. **Action 3** proposes commercial ACLs for gray triggerfish based on the preferred alternative for ABC (**Preferred Sub-alternative 4a**) in **Action 2**.

In 2012, the commercial ACL was 306,262 lb ww, and gray triggerfish was closed on September 11, 2012. In 2013, the commercial ACL was 272,880 lbs ww, gray triggerfish was closed on July 7, 2013, but was reopened from October 28 to November 14. Thus, without a trip limit, commercial closures for gray triggerfish are expected.

The effects of trip limits proposed in **Preferred Alternatives 2** and **3** for 2008-2012 landings are based on logbook data. **Preferred Alternative 2** and associated Sub-alternatives would establish commercial trip limits ranging from 500 lbs ww to 1,500 lbs ww. Landings information from 2012 show that about 8% of the trips had landings greater than 500 lbs ww (**Sub-alternative 2a**), 2% of the trips had landings greater than 1,000 lbs ww (**Preferred Sub-alternative 2b**), and less than 1% of the trips had landings greater than 1,500 lbs ww (**Sub-alternative 2c**). Thus, commercial closures would still be expected under **Sub-alternatives 2a-2c**.

If the commercial ACL is increased to 312,325 lbs ww based on **Preferred Sub-alternative 4a**, a 33% reduction 2012 landings would be needed. Thus, if effort were to remain at the same levels as in 2012, a trip limit of 250 lbs ww (ACL = 272,880 lbs ww) or 300 lbs ww (312,325 lbs ww) would be needed to obtain the harvest reduction needed to keep the commercial sector open all year.

1.2 Ecological Effects Due to Changes in the Bycatch

The ecological effects of bycatch mortality are the same as fishing mortality from directed fishing efforts. If not properly managed and accounted for, either form of mortality could potentially reduce stock biomass to an unsustainable level and subsequently disrupt the ecological function of a species within the ecosystem. Species addressed in Amendment 29 are unassessed and the effects of bycatch mortality have not been specifically quantified.

As summarized in **Section 1.1** of this BPA, actions in Amendment 29 are not expected to result in significant changes in bycatch of the species in the amendment or co-occurring species. Preferred alternatives under Action 1, Action 2, and Action 3 would lead to an increase in the ACLs for most species. ACL increases would be most significant for Atlantic spadefish and gray snapper in for both the recreational and commercial sectors. Under **Action 3**, **Preferred Alternative 2**, the ACL would increase for commercial and recreational sectors of Snappers

Complex, Shallow Water Groupers Complex, bar jack, Atlantic spadefish, and gray triggerfish. The recreational ACL for the Grunts Complex would also increase. The commercial ACL for the Grunts Complex would decrease slightly as would the commercial and recreational ACLs for scamp. ACLs and AMs are in place for snapper grouper species to ensure overfishing does not occur, and expected bycatch has been taken into consideration when specifying catch levels. Although **Action 3** would result in an increase in the gray triggerfish ACL, the management measures proposed in **Actions 4-6** would reduce the rate at which the ACL would be met. Additionally, as stated in **Chapter 3,** and analyzed in detail in **Chapter 4**, the biological (and consequently ecological) effects due to changes in the bycatch would likely be negligible.

1.3 Changes in the Bycatch of Other Fish Species and Resulting Population and Ecosystem Effects

Amendment 29 is not expected to affect major changes in bycatch of other fish species. Species considered in Amendment 29 are caught with co-occurring species (**Table 2**) but previous amendments have been implemented that establish ACLs and AMs for snapper grouper species to ensure that overfishing does not occur (See Appendix D for a history of management). Therefore, bycatch and discards of closely associated species such as lane snapper, vermilion snapper, yellowfin grouper, and snowy grouper are not expected to be affected by the proposed actions in Amendment 29.

1.4 Effects on Marine Mammals and Birds

Under Section 118 of the Marine Mammal Protection Act (MMPA), a commercial fishery to must be placed in one of three categories, based on the relative frequency of incidental, serious injuries and mortalities of marine mammals. Category I designates fisheries with frequent, serious injuries and mortalities incidental to commercial fishing; Category II designates fisheries with occasional, serious injuries and mortalities; and Category III designates fisheries with a remote likelihood or no known serious injuries or mortalities.

Under the MMPA, to legally fish in a Category I and/or II fishery, a fisherman must take certain steps. For example, owners of vessels or gear engaging in a Category I or II fishery are required to obtain a marine mammal authorization by registering with the Marine Mammal Authorization Program (50 CFR 229.4). They are also required to accommodate an observer if requested (50 CFR 229.7(c)), and they must comply with any applicable take reduction plans.

The commercial hook-and-line components of the South Atlantic snapper-grouper fishery (i.e., bottom longline, bandit gear, and handline) are listed as part of a Category III fishery under the Proposed 2014 List of Fisheries (78 FR 73477; December 6, 2013) because there have been no documented interactions between these gear and marine mammals. Actions proposed in Amendment 29 are not expected to have increase interactions between fishing gear and marine mammals.

The Bermuda petrel and roseate tern occur within the action area. Bermuda petrels are occasionally seen in the waters of the Gulf Stream off the coasts of North and South Carolina

during the summer. Sightings are considered rare and only occurring in low numbers (Alsop 2001). Roseate terns occur widely along the Atlantic coast during the summer but in the southeast region, they are found mainly off the Florida Keys (unpublished U.S. Fish and Wildlife Service data). Interaction with fisheries has not been reported as a concern for either of these species.

Increasing fishing effort has the potential to increase interactions between the fishery and marine mammals and birds. Although, the Bermuda petrel and roseate tern occur within the action area, these species are not commonly found and neither has been described as associating with vessels or having had interactions with the snapper grouper fishery. Thus, it is believed that the snapper grouper fishery is not likely to negatively affect the Bermuda petrel and the roseate tern.

1.5 Changes in Fishing, Processing, Disposal, and Marketing Costs

The actions in Amendment 29 consider changes to ACLs for select snapper grouper species as well as management measures for gray triggerfish including modification to the size limit, trip limits, and a split season. It is likely that all four states (North Carolina, South Carolina, Georgia, and Florida) would be affected by actions in the amendment if implemented through rulemaking. Additionally, factors such as waterfront property values, availability of less expensive imports, etc. may affect economic decisions made by recreational and commercial fishermen who target these species.

Economic effects of the actions proposed in Amendment 29 are addressed in **Chapter 4**, as well as **Appendices I** (Regulatory Impact Review) and **J** (Regulatory Flexibility Act Analysis).

1.6 Changes in Fishing Practices and Behavior of Fishermen

Actions proposed in Amendment 29 could result in a modification of fishing practices by commercial and recreational fishermen. However, as discussed in **Sections 1.1** and **1.2** of this BPA, the magnitude of discards is not expected to be significantly affected by the proposed actions. It is difficult to quantify any of the measures in terms of reducing discards until bycatch has been monitored over several years. Commercial and recreational bycatch information is collected by NMFS, and that information will continue to be analyzed to determine what changes, if any, have taken place in terms of fishing practices and fishing behavior as a result of the actions implemented through this amendment.

Social effects of actions proposed in Amendment 29 are addressed in **Chapter 4** of this document. **Section 3.3.3** includes information on environmental justice.

1.7 Changes in Research, Administration, and Enforcement Costs and Management Effectiveness

Research and monitoring is ongoing to understand the effectiveness of proposed management measures and their effect on bycatch. In 1990, the SEFSC initiated a logbook program for vessels with federal permits in the snapper grouper fishery from the Gulf of Mexico and South Atlantic. Approximately 20% of commercial fishermen are asked to fill out discard information in logbooks; however, a greater percentage of fishermen could be selected with emphasis on individuals that dominate landings. The SEFSC is developing electronic logbooks, which could be used to enable fishery managers to obtain information on species composition, size distribution, geographic range, disposition, and depth of fishes that are released. Further, The Joint Commercial Logbook Reporting Amendment is being developed by the South Atlantic Council and the Gulf of Mexico Council, which would require electronic reporting of landings information by federally-permitted commercial vessels to increase the timeliness and accuracy of landings and discard data.

Recreational discards are obtained from MRIP and logbooks from the NMFS headboat program. Additional data collection activities for the recreational sector are being considered by the South Atlantic Council that could allow for a better monitoring of snapper grouper bycatch in the future. Some observer information has been provided by Marine Fisheries Initiative and Cooperative Research Programs (CRP), but more is desired for the snapper grouper fishery. In December 2012, the Southeast Region Headboat Survey underwent a transition from paper logbooks to electronic logbooks, which is expected to improve the quality of data in that sector. As of January 1, 2013, the paper logbook form has been replaced by a new electronic logbook. The form is available through a password protected Web site on the internet, which can be accessed by personal computer, computer tablet, or "smart phone". The South Atlantic Council approved the For-Hire Amendment at their March 2013 meeting, which was approved and implemented in January 2014. This amendment requires weekly electronic reporting by the headboat sector.

Cooperative research projects between science and industry are being used to a limited extent to collect bycatch information on the snapper grouper fishery in the South Atlantic. For example, Harris and Stephen (2005) characterized the entire (retained and discarded) catch of reef fishes from a selected commercial fisherman in the South Atlantic including total catch composition and disposition of fishes that were released. The Gulf and South Atlantic Fisheries Foundation, Inc. conducted a fishery observer program within the snapper grouper vertical hook-and-line (bandit rig) fishery of the South Atlantic United States. Through contractors they randomly placed observers on cooperating vessels to collect a variety of data quantifying the participation, gear, effort, catch, and discards within the fishery.

In the spring 2010, Archipelago Marine Research Ltd. worked with North Carolina Sea Grant and several South Atlantic Unlimited Snapper Grouper Permit holders to test the effectiveness of electronic video monitoring to measure catch and bycatch. A total of 93 trips were monitored with video monitoring, 34 by self-reported fishing logbooks, and 5 by observers. Comparisons between electronic video monitoring data and observer data showed that video monitoring was a reliable source of catch and bycatch data.

Research funds for observer programs, as well as gear testing and testing of electronic devices are also available each year in the form of grants from the Marine Fisheries Initiative, Saltonstall-Kennedy program, and the CRP. Efforts are made to emphasize the need for observer and logbook data in requests for proposals issued by granting agencies. A condition of funding for these projects is that data are made available to the Councils and NMFS upon completion of a study.

Additional administrative and enforcement efforts would help to implement and enforce fishery regulations. NMFS established the South East Fishery-Independent Survey in 2010 to strengthen fishery-independent sampling efforts in southeast U.S. waters, addressing both immediate and long-term fishery-independent data needs, with an overarching goal of improving fishery-independent data utility for stock assessments. Meeting these data needs is critical to improving scientific advice to the management process, ensuring overfishing does not occur, and successfully rebuilding overfished stocks on schedule.

1.8 Changes in the Economic, Social, or Cultural Value of Fishing Activities and Non-Consumptive Uses of Fishery Resources

The preferred management measures and any changes in economic, social, or cultural values are discussed in **Chapter 4** of Amendment 29. Further analysis can be found in **Appendices I** (Regulatory Impact Review) and **J** (Regulatory Flexibility Act Analysis).

1.9 Changes in the Distribution of Benefits and Costs

The distribution of benefits and costs expected from the action in Amendment 29 are expected to be negligible and discussed in **Chapter 3**. Economic and social effects of the actions proposed in Amendment 29 are addressed in **Chapter 4**.

1.10 Social Effects

The social effects of all the measures are described in **Chapter 4** of Amendment 29.

1.11 Conclusion

This section evaluates the practicability of taking additional action to minimize bycatch and bycatch mortality using the ten factors provided at 50 CFR 600.350(d)(3)(i). In summary, measures proposed in Amendment 29 consider updating the ABC control rule, adjusting ABCs for unassessed snapper grouper species based on the revised ABC control rule, and modifying management measures for gray triggerfish. As summarized in **Section 1.1** of this BPA, most

actions in Amendment 29 are not expected to result in significant changes in bycatch of the species impacted by this amendment, or co-occurring species. Furthermore, Amendment 29 is not expected to affect major changes in bycatch of other fish species.

References:

Alsop, III, F. J. 2001. Smithsonian Handbooks: Birds of North America eastern region. DK Publishing, Inc. New York, NY.

Harris, P.J. and J. Stephen. 2005. Final Report Characterization of commercial reef fish catch and bycatch off the southeast coast of the United States. CRP Grant No. NA03NMF4540416.

SAFMC (South Atlantic Fishery Management Council). 2011. Comprehensive Annual Catch Limits (ACL) Amendment. South Atlantic Fishery Management Council, 4055 Faber Place Drive, Ste 201, Charleston, S.C. 29405.

SAFMC (South Atlantic Fishery Management Council). 2013. Regulatory Amendment 13 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region with Final Environmental Assessment, Regulatory Flexibility Analysis, Regulatory Impact Review, and Social Impact Assessment/Fishery Impact Statement. South Atlantic Fishery Management Council, 4055 Faber Place Drive, Ste 201, Charleston, S.C. 29405. 125 pp. plus appendices.

SEDAR 32. 2013. Data Workshop Report. South Atlantic Gray Triggerfish. Available from the SEDAR website: www.sefsc.noaa.gov/sedar/

SERO-LAPP-2010-06: Species groupings for South Atlantic Fisheries Management Council Snapper-Grouper FMU. Available from the SAFMC's website : http://www.safmc.net/LinkClick.aspx?fileticket=l6R9brwfcfU%3D&tabid=683

Van Voorhees, D., J.W. Schlechte, D.M. Donaldson, T.R. Sminkey, K.J. Anson, J.R. O'Hop, M.D.B. Norris, J.A. Shepard, T. Van Devender, and R.F. Zales, II. 2000. The new Marine Fisheries Statistics Survey method for estimating charter boat fishing effort. Abstracts of the 53rd Annual Meeting of the Gulf and Caribbean Fisheries Institute.

Appendix G. Recreational Size Limit Analysis for Gray Triggerfish

Change the measurement method of gray triggerfish in the recreational sector to have consistency between state and federal waters.

Currently, the recreational minimum size limit for South Atlantic gray triggerfish is 12 inches total length (TL) in federal waters and 12 inches fork length (FL) in east Florida state waters. The Council is considering increasing the size limit from 12 inches TL to 12 inches FL in federal waters.

A recent stock assessment of South Atlantic gray triggerfish (SEDAR 32) is currently underway and provided the conversion equation to go from TL to FL (Table G-1). Using the conversion equation a 12 inch TL gray triggerfish converts to a 10.46 inch FL gray triggerfish.

Table G-1. Meristic conversions for South Atlantic gray triggerfish. Source: SEDAR 32.

Conversion	Model
Total Length (mm) to Fork Length (mm)	Total Length = 1.19*(Fork Length) – 11.42

SEDAR 32 determined the midrange of discard mortality to be 12.5%. In this analysis discard mortality was assumed to be 12.5%.

Recreational Sector

An ACL of 367,303 pounds whole weight (lbs ww) was implemented for the South Atlantic gray triggerfish recreational sector in the Comprehensive Annual Catch Limit Amendment on April 16, 2012. However, this ACL was based on Marine Recreational Fisheries Statistics Survey (MRFSS) data, and the recreational survey method was recently modified and changed to the Marine Recreational Information Program (MRIP). Regulatory Amendment 13 revised the gray triggerfish ACL using MRIP data which resulted in an ACL of 353,638 lbs ww. **Table G-2** provides historic recreational landings from 2008 to 2012 and compares them to the MRIP ACL. Historic landings would have exceeded the ACL however the most recent landings (2012) did not exceed the ACL.

Table G-2. Annual South Atlantic gray triggerfish recreational landings by area from 2008 to 2012. MRIP landings were provided with the headboat landings and compared to their respective ACLs in the "ACL %" column.

Year	NC, SC, and GA Federal Landings	NC, SC, and GA State Landings	Florida Federal	Florida State	Total Landings	ACL	ACL %
2008	348,934	3,113	77,467	126,958	556,471	353,638	157
2009	243,331	17,569	68,415	198,495	527,809	353,638	149
2010	213,784	62,387	115,909	70,555	462,636	353,638	131
2011	144,715	10,241	120,575	80,795	356,327	353,638	101
2012	202,868	25,241	22,633	97,858	348,599	353,638	99

The lengths of South Atlantic gray triggerfish in the recreational sector came from MRIP recreational survey and headboat datasets. The recreational survey length data came from the catch effort files and the headboat data came from the biological profile files. Data were from 2008 to 2012.

The average length of gray triggerfish increased from 2008 to 2012 (**Table G-3** and **Figure G-1**). Changes in the fish size overtime can influence the reduction of landings estimated from changes in the minimum size limit. To control for this impact only data from the previous three years (2010-2012) were used for size limit analysis. There are also the three most recent fishing years which will most likely represent future landings.

Table G-3. Average fork length of gray triggerfish for the South Atlantic recreational sector for each year. The recreational data comes from MRIP and headboat.

Year	Average Fork Length (inches)	n
2008	13.4	832
2009	13.5	1055
2010	13.6	1863
2011	13.8	1487
2012	13.8	1490

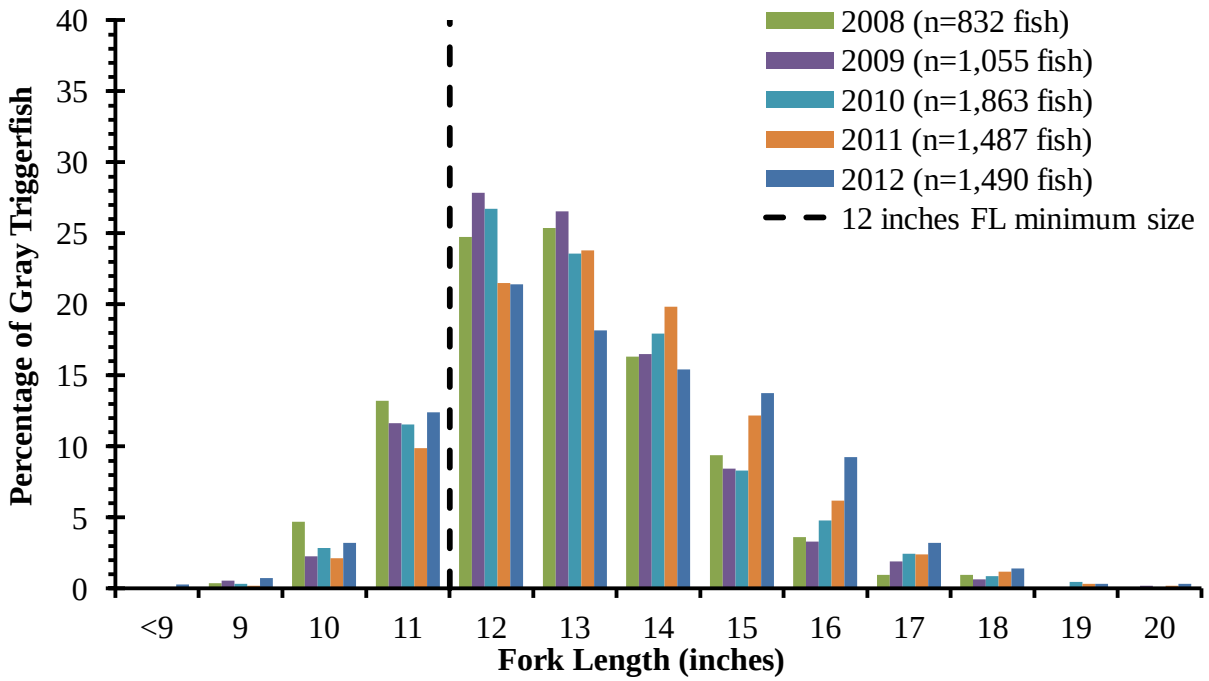

Figure G-1. Distribution of South Atlantic gray triggerfish lengths by year from the recreational sector. The data comes from 2008 to 2012 and contains both MRIP and headboat data.

Alternative 2

Alternative 2 changes the minimum size limit in federal waters of the east coast of Florida from 12 inches TL to 12 inches FL. This would be a change of a 10.46 inches FL to an increase to 12 inches FL.

The data were filtered so only length data from the east coast of Florida remained. From 2010-2012 there were lengths available for 146 gray triggerfish (75 in the charter sector and 71 in the private sector) in federal waters for the MRIP dataset. The headboat data was for the entire east coast of Florida, since federal and state waters fishing location information is not available, and contained lengths for 2,882 gray triggerfish.

The percent reduction from increasing the minimum size to 12 inches FL was calculated from the length data. The lengths were converted to weight and the reductions were calculated in terms of weight. Additional information on the details on calculating the percent reductions can be found at SERO-LAPP-2012-02. Since the MRIP length data had location details of state and federal waters the MRIP reductions were calculated specifically with data from federal waters. Figure 2 displays the lengths in federal versus state waters of east Florida. Additionally, the MRIP reductions were calculated for both private and charter sectors. Since location of harvest (federal vs. state waters) was not available for headboat the reductions generated from the headboat data were for the entire east coast of Florida. Monthly percent reductions were not possible with the MRIP dataset because the monthly sample sizes were small (<30 fish).

However, the monthly percent reductions were possible for the headboat dataset because each month had large samples sizes (>30 fish). Table G-4 provides the percent reduction results.

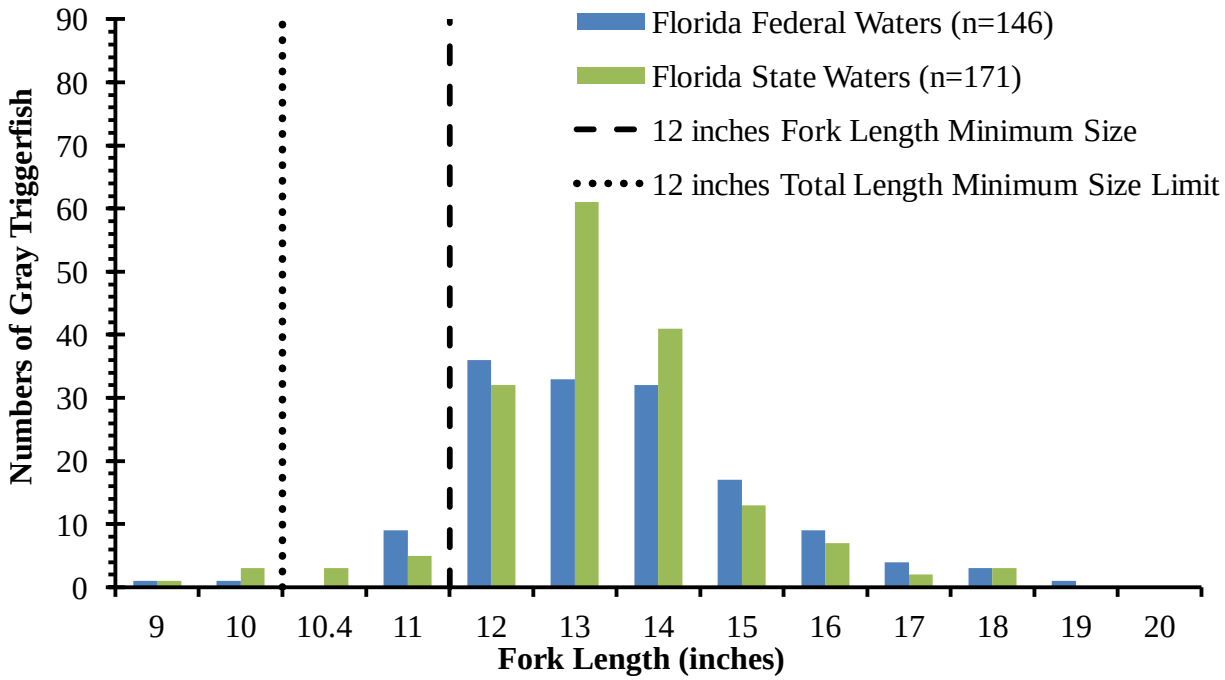

Figure G-2. Distribution of Florida east coast gray triggerfish lengths from the recreational sector separated by catches in federal and state waters. The data comes from 2010 to 2012 MRIP intercepts. The headboat length data was not included since it does not have information on location of catch in federal and state waters.

Table G-4. Percent reductions in South Atlantic recreational gray triggerfish landings for increasing the minimum size in Florida waters from 12 inches total length (10.46 inches FL) to 12 inches fork length.

MRIP		
	Charter	Private
12 inches FL	5.3	1.5
Headboat		
Month	Charter	
1	6.3	
2	13.7	
3	7.5	
4	10.1	

5	10.9
6	11.4
7	10.7
8	6.3
9	4.5
10	5.2
11	3
12	4.5

The reductions were calculated in terms of gray triggerfish weight (lbs) following SERO-LAPP-2012-02. The percent reductions for MRIP were calculated for federal waters. Headboat length data did have jurisdictional information on the catch location (federal or state waters) so the percent reductions reflect both federal and state waters combined. Monthly percent reductions were calculated for headboat data because there was sufficient samples sizes for each month.

Headboat landings, like the headboat length data, did not include the location of catch from federal or state waters. However, headboat catch-effort files (CRNF files) do have information on catch in federal or state waters. The headboat intercept file was used to determine the annual ratio of gray triggerfish caught in federal versus state waters. Then that ratio was applied to the annual headboat landings to separate them into state and federal waters.

To reflect the management change in **Alternative 2** the percent reductions were only applied to South Atlantic gray triggerfish landings from east of Florida in federal waters. Then the reduced Florida federal landings were then added to the Florida state water landings and the North Carolina, South Carolina, and Georgia gray triggerfish landings. This calculation was done for the annual landings from 2010 to 2012, and Table G-5 provides the results of the overall reduction of landings.

Table G-5. Percent reductions in annual South Atlantic recreational sector gray triggerfish landings from increasing the minimum size in Florida federal waters from 12 inches TL (10.46 inches FL) to 12 inches FL. The recreational landings include MRIP landings combined with headboat landings.

Year	% Reduction in Total Landings
2010	0.82
2011	1.07
2012	1.06

Alternative 3

Alternative 3 creates a minimum size limit of 12 inches FL for the federal waters off of North Carolina, South Carolina, Georgia, and east Florida. Currently there is no minimum size limit off North Carolina, South Carolina, and Georgia. However there is a minimum size limit in federal waters of Florida, which would be increased from 12 inches TL to 12 inches FL.

Alternative 3 used the same methods for Florida waters as Alternative 2, and additional analysis was conducted for implementing a 12-inch FL minimum size limit in federal waters off of North Carolina, South Carolina, and Georgia. Data from the three states were pooled and treated as one region. In South Atlantic federal waters off of North Carolina, South Carolina, and Georgia from 2010-2012 there were lengths available for 896 gray triggerfish (847 in the charter sector and 49 in the private sector) in the MRIP dataset and 712 gray triggerfish in the headboat dataset. The headboat dataset did not have information on the length of gray triggerfish caught in federal or state waters.

The percent reduction from increasing the minimum size to 12 inches FL was calculated from the length data. The lengths were converted to weight and the reductions were calculated in terms of weight. Additional information on the details on calculating the percent reductions can be found at SERO-LAPP-2012-02. Since the MRIP length data had location details of state and federal waters the MRIP reductions were calculated specifically with data from federal waters. Additionally, the MRIP reductions were calculated for both private and charter sectors. Since federal and state location was not available for headboat the reductions generated from the headboat data were for the entire coast from North Carolina to Georgia. Monthly percent reductions were not feasible with both the MRIP and headboat datasets because the majority of the months had very small samples sizes (<30 fish). **Table G-6** provides the percent reduction results.

Table G-6. Percent reductions in South Atlantic recreational sector gray triggerfish landings for implementing a minimum size limit off North Carolina, South Carolina, and Georgia waters to 12 inches FL.

	MRIP		Headboat
Mode	Charter	Private	Charter
12 inches FL	6.7	1.6	8

The reductions were calculated in terms of gray triggerfish weight (lbs). The percent reductions for MRIP were calculated for federal waters. Headboat length data did have jurisdictional information on the catch location (federal or state waters) so the percent reductions reflect both federal and state waters combined.

Headboat landings, like the headboat length data, did not include the location of catch from federal or state waters. However, headboat catch-effort files (CRNF files) do have information on catch from federal or state waters. The headboat intercept files were used to determine the annual ratio of gray triggerfish caught in federal versus state waters. Then that ratio was applied to the headboat landings to separate them into state and federal waters.

To reflect the management change in **Alternative 3** the percent reductions from **Alternative 2** were applied to federal waters on the east coast of Florida and the percent reductions generated for North Carolina, South Carolina, and Georgia were also incorporated into the analysis.

The reduced Florida federal landings and reduced North Carolina, South Carolina, and Georgia federal landings were then added to the North Carolina, South Carolina, Georgia, and Florida state water landings. This calculation was done for the annual landings from 2007 to 2011, and **Table G-7** provides the results of the overall reduction of landings.

Table G-7. Percent reductions in annual South Atlantic recreational sector gray triggerfish landings from implementing a 12 inch FL size limit in North Carolina, South Carolina, and Georgia federal waters and increasing the minimum size in Florida federal waters from 12 inches TL (10.46 inches FL) to 12 inches FL. The recreational landings include MRIP and headboat landings.

Year	% Reduction in Total Landings
2010	3.5
2011	3.7
2012	4.8

Alternative 4

Alternative 4 creates a minimum size limit of 14 inches FL for the federal waters off of North Carolina, South Carolina, Georgia, and east Florida. Currently there is no minimum size limit off North Carolina, South Carolina, and Georgia. However there is a minimum size limit in federal waters of Florida, which would be increased from 12 inches TL to 14 inches FL.

Alternative 4 used the same methods as **Alternative 3** but increased the size limit to 14 inches FL. The percent reduction from increasing the minimum size to 14 inches FL was calculated from the length data. The lengths were converted to weight and the reductions were calculated in terms of weight. Additional information on the details on calculating the percent reductions can be found at SERO-LAPP-2012-02. Since the MRIP length data had location details of state and federal waters the MRIP reductions were calculated specifically with data from federal waters (**Table G-8**). Additionally, the MRIP reductions were calculated for both private and charter sectors. Since federal and state location was not available for headboat the

reductions generated from the headboat data were for the entire coast from North Carolina to Georgia (**Table G-9**). Monthly percent reductions were only feasible for headboat data from the east coast of Florida. Monthly percent reductions were not feasible for the MRIP dataset for the entire South Atlantic area and the headboat dataset from North Carolina to Georgia because the majority of the months had very small samples sizes (<30 fish).

Table G-8. Percent reductions generated from MRIP data for the South Atlantic recreational sector gray triggerfish recreational fishery for implementing a 14 inches FL minimum size limit in federal waters of North Carolina, South Carolina, Georgia, and east Florida. Percent reductions were calculated in terms of gray triggerfish weight (lbs).

Location	Mode	
	Charter	Private
Federal FL Waters	41.8	36.8
Federal NC, SC, and GA Waters	37.1	21.4

Table G-9. Percent reductions generated from headboat data for the South Atlantic recreational sector gray triggerfish recreational fishery for implementing a 14 inches FL minimum size limit in North Carolina, South Carolina, Georgia, and east Florida. Percent reductions were calculated in terms of gray triggerfish weight (lbs). Headboat length data did not have jurisdictional information on the catch location (federal or state waters) so the percent reductions reflect both federal and state waters combined.

	Month	Charter
FL Waters	1	47.6
	2	50.4
	3	52.4
	4	48.9
	5	45.5
	6	54.7
	7	51.9
	8	46.6

	9	36.5
	10	38.1
	11	38.9
	12	38.1
NC, SC, and GA Waters	45.1	

Headboat landings, like the headboat length data, did not include the location of catch from federal or state waters. However, headboat catch-effort files (CRNF files) do have information on catch from federal or state waters. The headboat catch-effort files were used to determine the annual ratio of gray triggerfish caught in federal versus state waters. Then that ratio was applied to the headboat landings to separate them into state and federal waters.

To reflect the management change in **Alternative 4** the percent reductions were applied to federal waters on the east coast of Florida and the percent reductions generated for North Carolina, South Carolina, and Georgia were applied to the federal waters of those three states. The reduced east Florida federal landings and reduced North Carolina, South Carolina, and Georgia federal landings were then added to the North Carolina, South Carolina, Georgia, and east Florida state water landings. This calculation was done for the annual landings from 2010 to 2012, and **Table G-10** provides the results of the overall reduction of landings.

Table G-10. Percent reductions in annual South Atlantic recreational sector gray triggerfish landings from implementing a 14 inch FL size limit in North Carolina, South Carolina, and Georgia federal waters and increasing the minimum size in Florida federal waters from 12 inches TL (10.46 inches FL) to 14 inches FL.

Year	% Reduction in Total Landings
2010	22.3
2011	21.9
2012	28.0

Note: MRIP and headboat landings included.

References

SERO-LAPP-2012-02. Caribbean Parrotfish Size and Trip Limits. NOAA Fisheries Service. Southeast Regional Office. St. Petersburg, Florida. March 8 12, 2012.

Appendix H. Only Reliable Catch Stocks (Berkson et al. 2011) & Scientific And Statistical Committee ORCS Workshop Final Report

NOAA Technical Memorandum NMFS-SEFSC-616

CALCULATING ACCEPTABLE BIOLOGICAL CATCH FOR STOCKS THAT HAVE RELIABLE CATCH DATA ONLY (Only Reliable Catch Stocks – ORCS)

By:
Jim Berkson, NMFS SEFSC
Luiz Barbieri, Florida FWC
Steve Cadrin, University of Massachusetts at Dartmouth
Shannon Cass-Calay, NMFS SEFSC
Paul Crone, NMFS SWFSC
Martin Dorn, NMFS AFSC
Claudia Friess, Ocean Conservancy
Donald Kobayashi, NMFS PIFSC
Thomas J. Miller, U. Maryland Ctr Environmental Science
Wesley S. Patrick, NMFS OSF
Sarah Pautzke, Western Pacific Fishery Management Council
Stephen Ralston, NMFS SWFSC
Michael Trianni, CNMI Division of Fish and Wildlife

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Science Center
75 Virginia Beach Drive
Miami, Florida 33149

May 2011

NOAA Technical Memorandum NMFS-SEFSC-616

CALCULATING ACCEPTABLE BIOLOGICAL CATCH FOR STOCKS THAT HAVE RELIABLE CATCH DATA ONLY

(Only Reliable Catch Stocks – ORCS)

By:
Jim Berkson, NMFS SEFSC
Luiz Barbieri, Florida FWC
Steve Cadrin, University of Massachusetts at Dartmouth
Shannon Cass-Calay, NMFS SEFSC
Paul Crone, NMFS SWFSC
Martin Dorn, NMFS AFSC
Claudia Friess, Ocean Conservancy
Donald Kobayashi, NMFS PIFSC
Thomas J. Miller, U MD Ctr Environmental Science
Wesley S. Patrick, NMFS OSF
Sarah Pautzke, Western Pacific Fishery Management Council
Stephen Ralston, NMFS SWFSC
Michael Trianni, CNMI Division of Fish and Wildlife

U.S. DEPARTMENT OF COMMERCE
Gary Locke, Secretary

NATIONAL OCEANANIC AND ATMOSPHERIC ADMINISTRATION
Jane Lubchenco, Under Secretary for Oceans and Atmosphere

NATIONAL MARINE FISHERIES SERVICE
Eric Schwaab, Assistant Administrator for Fisheries

May 2011

NOTICE

The National Marine Fisheries Service (NMFS) does not approve, recommend or endorse any proprietary product or material mentioned in this publication. No reference shall be made to NMFS or to this publication furnished by NMFS, in any advertising or sales promotion which would imply that NMFS approves, recommends, or endorses any proprietary product or proprietary material mentioned herein which has as its purpose any intent to cause directly or indirectly the advertised product to be used or purchased because of this NMFS publication.

This report should be cited as follows:

Berkson, J., L. Barbieri, S. Cadrin, S. L. Cass-Calay, P. Crone, M. Dorn, C. Friess, D. Kobayashi, T. J. Miller, W. S. Patrick, S. Pautzke, S. Ralston, M. Trianni. 2011. Calculating Acceptable Biological Catch for Stocks That Have Reliable Catch Data Only (Only Reliable Catch Stocks – ORCS). NOAA Technical Memorandum NMFS-SEFSC-616, 56 P.

Copies of this report can be obtained from:

National Marine Fisheries Service
Southeast Fisheries Science Center
75 Virginia Beach Drive
Miami, FL 33149

or

National Technical Information Service
5825 Port Royal
Springfield, VA 22161
(703) 605-6000 or (800) 553-6847
http://www.ntis.gov/numbers.htm

EXECUTIVE SUMMARY

In response to the 2006 reauthorization of the Magnuson-Stevens Act (MSA), the National Marine Fisheries Service established National Standard 1 (NS1) Guidelines, which included a requirement to set an acceptable biological catch (ABC) that accounts for scientific uncertainty in the estimate of a stock's overfishing limit (OFL). This is an exceedingly difficult task for the large number of stocks for which reliable catch data are the only information available, as these stocks cannot be assessed with traditional stock assessment methods. For the purpose of this document, these stocks will be called "only reliable catch stocks" (ORCS). Despite the inherent problem of setting ABCs for ORCS, the MSA requirement remains.

At the second National SSC meeting November 10-13, 2009 in St. Thomas, USVI, an ad-hoc Working Group was established to identify, suggest, and evaluate alternative approaches for the setting of ABCs for ORCS. Working Group members represent seven of the eight SSCs, five of the six NMFS Science Centers, NMFS Headquarters, as well as a regional fishery management council, academic institutions, a state agency, and an NGO. The goal of the Working Group was to develop an approach for addressing ABCs in ORCS that could potentially be applied in all jurisdictions under a flexible framework.

This report reviews existing methods for setting catch limits for ORCS. Each approach is briefly summarized followed by a description of the required data, the major assumptions and consequent cautionary advice in utilizing the particular approach, its potential for use in a risk-based decision-making framework, the status of the approach along with examples of its implementation, and the pros and cons of using the approach as viewed by the Working Group.

The Working Group also presents its own approach, designed to build on existing approaches, while strengthening the biological and population dynamics underpinnings. The method provides additional flexibility and allows policymakers to set risk levels, as required under the NS1 guidelines.

Ultimately, the Working Group recommends that the following tiered approach be used when setting ABCs for ORCS:

- Apply depletion-based stock reduction analysis (DB-SRA) to a stock, if possible. The main limitation here is the requirement for a complete time series of historical catches, which is often not available.

- If it is not possible to apply DB-SRA, apply depletion-corrected average catch (DCAC) to a stock. DCAC's main limitation is that it is only appropriate for stocks with moderate to low natural mortality rates ($\leq 0.20\ yr^{-1}$).

- If DB-SRA and DCAC are not appropriate, apply the ORCS Working Group's Approach. The main limitation with this approach is that a number of critical decisions are required before it can be made operational. Some would also view this as an advantage, as it provides flexibility in its establishment.

- Finally, in some cases none of the above methods are practical for setting ABCs for an individual stock, as specific ORCS may not be capable of being effectively managed or monitored. In these cases, it may be best to use a stock complex approach. There are many limitations of applying a stock complex approach as described in this report, and the ORCS Working Group cautions against overusing or misusing this approach, as it may result in the converse of precautionary management, exactly what MSA was designed to avoid.

It is important to note that the methods for setting ABCs for ORCS are in various stages of development and will be better understood and improved upon over time. For that reason, a list of research recommendations is included in the report that highlights the most important activities that must be supported to make substantive progress in the future.

The Working Group emphasizes that none of the methods discussed in this report are a substitute for additional data and monitoring. Therefore, all of the methods impose a certain risk and imprecision that fisheries managers must acknowledge when using the results of these methods.

Table of Contents

List of Tables

List of Figures

Symbols and Abbreviations used in this Document

Δ	The expected proportional change in stock biomass from the first to the last year of the catch series in DCAC; the proportional reduction in biomass relative to K in DB-SRA
ABC	Acceptable biological catch
ACL	Annual catch limit
ACT	Annual catch target
AM	Accountability measure
B_*	Equilibrium biomass at some level of fishing mortality F_* in the Pella-Tomlinson production model
B_0	Virgin biomass
$B_{20\%}$	Biomass level that corresponds to 20% of the unfished biomass
B_{MSY}	Biomass that would produce MSY
B_{peak}	The ratio of B_{MSY} / K as used in DB-SRA
c	Natural variability factor used in natural mortality-based approach
CCAMLR	Convention on the Conservation of Antarctic Marine Living Resources
CFMC	Caribbean Fishery Management Council
CPUE	Catch per unit effort
DB-SRA	Depletion-based stock reduction analysis
DCAC	Depletion-corrected average catch
EC	Ecosystem Component
F_{MSY}	The fishing mortality that produces MSY
GMFMC	Gulf of Mexico Fishery Management Council
h	Steepness of the Beverton-Holt stock recruitment relationship
ICCAT	International Commission for the Conservation of Atlantic Tunas
K	Carrying capacity
M	Natural mortality
m	Maximum productivity (MSY) in the Pella-Tomlinson production model
MAY	Maximum average yield
MCY	Maximum constant yield
MFMT	Maximum fishing mortality threshold
MSST	Minimum stock size threshold
MSA	Magnuson-Stevens Act
MSE	Management strategy evaluation
MSY	Maximum sustainable yield
NEFMC	New England Fishery Management Council
NGO	Non-governmental organization
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration

NPFMC	North Pacific Fishery Management Council
NS1	National Standard 1
OFL	Overfishing limit
ORCS	Only reliable catch stocks
OY	Optimum yield
P*	Risk level; Probability of overfishing
PFMC	Pacific Fishery Management Council
PGY	Pretty good yield
PSA	Productivity Susceptibility Analysis
r	Intrinsic rate of increase
R_0	Virgin recruitment
SAFMC	South Atlantic Fishery Management Council
SD	Standard deviation
SSC	Scientific and Statistical Committee
TAC	Total allowable catch
Y_{AV}	Average catch used in natural mortality-based approach
Y_*	Annual equilibrium yield for the Pella-Tomlinson production model

Acknowledgements

Extremely helpful comments on an earlier draft were provided by E. J. Dick, Rick Methot, Joe Powers, and Erik Williams.

I. BACKGROUND

A. Requirement for ABC specifications and ACLs

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) of 1996 required Regional Fishery Management Councils (Councils) to end overfishing and rebuild overfished stocks. It strengthened US fisheries law by putting in place firm timelines for rebuilding and specified requirements for rebuilding plans. In 2006, however, the majority of overfished stocks were still not rebuilt and overfishing continued to be a widespread problem because fishery management plans failed to sufficiently reduce exploitation rates (Rosenberg et al. 2006). As a result, Congress amended the MSA during the 2006 reauthorization with requirements for annual catch limits (ACLs) and accountability measures (AMs) for each managed fishery by fishing year 2010 for all stocks experiencing overfishing and by fishing year 2011 for all other stocks in the fishery (DOC, 2007). The reauthorized MSA further strengthened the role of science in the fishery management process by requiring that ACLs set by Councils may not exceed the fishing level recommendations of the Councils' Scientific and Statistical Committees (SSCs).

In the 2009 National Standard 1 (NS1) guidelines, the National Marine Fisheries Service (NMFS) provided specific guidance on how to comply with the new requirements of the MSA, including limit and target reference points for fisheries (NMFS, 2009) (Figure 1). The OFL is the annual estimate of the catch that would be obtained if a stock were fished at a rate producing the long-term maximum sustainable yield (MSY); overfishing occurs when catch exceeds the OFL. The ABC is the upper limit at which Councils can set the ACL. The SSCs were designated with the responsibility to set the acceptable biological catch (ABC), which is the catch level that accounts for scientific uncertainty in the estimate of the overfishing limit (OFL) and other sources of scientific uncertainty. The NS1 guidelines further require each Council, in conjunction with its SSC, to establish an ABC control rule that specifies how ABC is calculated based on the scientific uncertainty in the OFL estimate and the Council's risk policy. These requirements apply to data-rich stocks that can be assessed through quantitative stock assessment models, as well as data-poor stocks that cannot be assessed with traditional stock assessment methods. This report focuses on the ABC requirements for stocks that have only catch history data available for estimating harvest limits. We refer to these stocks here as "Only Reliable Catch Stocks" (ORCS).

B. History of dealing with ORCS

The 1998 NS1 technical guidelines (Restrepo et al. 1998) recommended that Councils "*adopt a precautionary approach to specification of [optimum yield] OY,*" stemming from the 1996 MSA requirement to end overfishing and rebuild depleted fishery resources. The precautionary approach was implemented to reduce the risk of overfishing in circumstances where scientific evidence of overfishing was not available (Restrepo et al. 1998). As it was recognized that all

regions possessed data of varying states of quality for stock assessment and management purposes, subsequent guidance provided an array of precautionary control rules that could be used to set exploitation targets below the risk-neutral limits based on MSY-related benchmarks, such as the maximum fishing mortality threshold (MFMT) and minimum stock size threshold (MSST) or reasonable proxies for one or both of these status determination criteria (Restrepo et al., 1998; Restrepo and Powers, 1999).

In the absence of biomass and fishing mortality reference points, the 1998 Technical Guidance (Restrepo et al., 1998) for implementing the NS1 guidelines suggested using the historical average catch from a period during which there was no evidence of declining abundance as a proxy for MSY. This recent catch would be multiplied by a scalar (ranging from 25% to 75%) based on "informed judgment" regarding the qualitative estimate of stock size relative to B_{MSY} (stock biomass at maximum sustainable yield) and MSST to obtain the limit catch, but the performance of this recommendation was never investigated (Restrepo and Powers, 1999). From discussions among members of this Working Group, however, it appears that many Councils have used a constant scalar (e.g., 50%, 75%) as their precautionary approach regardless of the stock's size relative to B_{MSY} and MSST.

C. Unique problem for ORCS

The 2009 NS1 guidelines state that the ABC should be based, when possible, on the probability of overfishing, which cannot exceed and should be less than 50 percent. The guidelines further require that "*the ABC control rule must articulate how ABC will be set compared to the OFL based on the scientific knowledge about the stock or stock complex and the scientific uncertainty in the estimate of OFL and any other scientific uncertainty. The ABC control rule should consider uncertainty in factors such as stock assessment results, time lags in updating assessments, the degree of retrospective revision of assessment results, and projections*". Thus, the NS1 guidance for setting ABCs is clearly directed towards stocks that can be assessed through traditional stock assessment methods. Many stocks under US federal management, however, lack current stock assessments and are not likely to be assessed in the near future, due to substantial data limitations. For example, the 2009 Report to Congress on the Status of U.S. Fisheries reported that "*272 stocks or stock complexes have overfishing thresholds not defined or applicable, or are unknown with respect to their overfishing status*".[1] In these data-limited situations, the guidelines are vague with respect to factors that could be considered for setting ABCs and simply suggest the use of reasonable proxies.

Many of the ABC control rules that are currently being developed in the regions follow a tiered approach in which the size of the buffer between the OFL and ABC increases as the level of

[1] NMFS 2009 Report to Congress on U.S. Fisheries, May 2010. Available online at http://www.nmfs.noaa.gov/sfa/statusoffisheries/sos_full28_press.pdf

scientific uncertainty increases (Witherell, 2010). Since uncertainty is expected to increase with decreasing availability of reliable data, it follows that data-poor stocks should generally have larger buffers than data-rich stocks for the same desired risk of overfishing. Without a system in place that monitors key fishery indicators and responds to changes in these indicators, scientists and managers have no means of evaluating whether any newly established catch limits for ORCS are too conservative or too liberal.

D. Catch vs. landings

These two terms are not synonymous, since catch is considered the landed catch plus the total amount of dead discard (i.e., bycatch). Too often an evaluation of historical catch becomes an examination of historical landings. Bycatch levels in other fisheries, as well as discard rates and discard mortality levels, should be discussed and factored into the evaluation of historical catch. Anecdotal information, fishermen's knowledge, and local expertise should be considered in such cases.

E. Formation of the ORCS working group

At the second National SSC meeting November 10-13, 2009 in St. Thomas, USVI, an ad-hoc Working Group was established to address the question of how to develop ABCs for data-poor fisheries under the jurisdiction of Regional Councils, where traditional stock assessment techniques cannot be applied due to data deficiencies.

The Working Group was established to identify, suggest, and evaluate alternative approaches for the setting of ABCs for ORCS. Working Group members represent seven of the eight SSCs, five of the six NMFS Science Centers, NMFS Headquarters, as well as a regional fishery management council, academic institutions, a state agency, and an NGO. The Working Group has communicated general process-related comments, as well as stock assessment and management ideas through email and teleconference.

The overriding goal of the Working Group was to develop an approach for addressing ABCs in ORCS that could potentially be applied in all jurisdictions under a flexible framework process. To this end, the Working Group reviewed existing methods that have been used both nationally and internationally to address data-deficient fisheries, and developed a hierarchy of recommended models or techniques for use in a particular fishery, given only that the fishery possesses a time-series of reliable catch data.

F. Scientific and management uncertainty in ORCS

Unlike the 1998 NS1 guidelines, the 2009 guidelines make the distinction between two types of uncertainty that are to be considered in the catch-setting process: management and scientific. Management uncertainty arises from uncertainty in quantifying the true catch amount and uncertainty in the ability of managers to limit actual catches to the ACL. Councils have the

flexibility to account for management uncertainty by setting an annual catch target (ACT) at or below ACL. Scientific uncertainty has been discussed earlier, and deals with the estimate of the OFL and ABC.

While the two types of uncertainty are distinct, they are not independent because the realized catch affects abundance and consequently, future OFLs, which then feed back into ACLs (Shertzer et al. 2008). It is not always possible to distinguish between scientific and management uncertainty, especially in the case of ORCS, where total catches may be highly uncertain because of missing information regarding bycatch and discard mortality, affecting both scientific and management uncertainty. The NS1 guidelines allow for both scientific and management uncertainty to be incorporated into a single control rule, but ABCs by definition address only scientific uncertainty, which is the scope of this report.

G. Incorporating risk

It is the responsibility of stock assessment scientists and the SSCs to determine the level of scientific uncertainty that exists in an assessment or estimated level of sustainable yield, but it is the role of the Councils to determine the acceptable risk of overfishing given the scientific uncertainty. When the probability distribution around the OFL estimate can be computed and characterized, the median estimate of the OFL implies a risk level of 50 percent, which is the level of risk the NS1 guidelines state is not to be exceeded in setting ABC. When the OFL and its statistical distribution can be estimated, probability-based methods can be used to compute the ABC that corresponds to the Council-desired risk of overfishing (e.g., Prager and Shertzer 2010). In the case of most ORCS, quantitative estimates of reference points from assessment models are unavailable, and formal risk statements cannot be made because the uncertainty is often not quantifiable. In those cases, an adaptive approach to developing ABCs that involves monitoring key fishery indicators may need to be adopted.

H. Report outline

The report is divided into seven primary sections:

- Section I, which you are currently reading, provides background on ORCS, the need to set ABCs, and the difficulties specific to ORCS.

- Section II reviews existing national and international methods that are currently in use or in the process of being further developed. Each approach is briefly summarized followed by a description of the required data, the major assumptions and consequent cautionary advice in utilizing the particular approach, its potential for use in a risk-based decision-making framework, the status of the approach along with examples of its implementation, and finally, the pros and cons of using the approach as viewed by the Working Group.

- Section III introduces a new approach for setting ABCs for ORCS developed by the authors of this paper.

- Section IV examines the suitability of the previously described methods for setting ABCs for stock complexes and presents any necessary modifications, additional assumptions, or important caveats that need be considered prior to applying each approach to stock complexes.

- Section V provides a discussion of the topics raised in this paper.

- Section VI provides research recommendations to further our ability to understand, set ABCs for, and manage ORCS.

- The final section, Section VII, puts forth a set of recommendations to Councils and SSCs for moving forward in addressing the 2006 MSA mandate, under the 2009 NS1 guidelines, for ORCS.

II. REVIEW OF METHODS

A. Scalar approaches

1. Summary of approach

Scalar approaches involve specification of future catch by using simple scalar multipliers applied to current or historical catch patterns. The primary reference for this approach is Restrepo et al. (1998) who formalized the concept in their Technical Guidance document for the 1998 National Standard 1. Scalar approaches were presented in the sections of the document specifying catch targets and catch limits in data-poor situations (this is henceforth termed the Restrepo approach). Although Restrepo et al. (1998) is the primary citation for this particular set of scalar tiers, it is quite likely that the concept was widely used historically in fishery management. The Restrepo approach proposed scalar multipliers for catch targets ranging from 0.25 to 0.75, depending on the estimated stock status at the time. For example, if the stock was overfished and hence below the MSST, then the catch multiplier for the Restrepo approach was 0.25 with the intent to reduce fishing effort and allow the stock to rebuild. If the stock was above B_{MSY}, the multiplier was 0.75, which reflected the precautionary buffer between the catch target and catch limit, with the catch limit being status-quo catch levels in a presumed healthy fishery. For intermediate stock conditions the multiplier was 0.5.

2. Data needs

The Restrepo approach uses an average catch. In the original document this was defined as the average catch during a time period, not necessarily the most recent, for which there is evidence

of stable abundance. Ideally, there should be no quantitative or qualitative evidence of declining or increasing abundance trends in the selected time period. We note that approaches for deriving catch recommendations for stocks with decreasing trends are developed in sections II.E and F of this report. In an optimal situation there is an adequate catch data stream to objectively identify such a time period, and may vary temporally in location and span for particular stocks and fisheries. Since it was realized that stock status information is not available in many data-poor cases, it was suggested to explore several definitions of recent catch such as the mean or median catch during the last 5, 10, or 15 years. In minimal data situations, the Restrepo approach could be applied to a single year of fishery catch data, but this is obviously a tenuous application unless the single year of data was highly significant for some reason. A logical extension of the variable scalar multiplier would be to similarly reduce the value for shorter catch data streams owing to likely greater uncertainty.

3. Informed judgment

Some type of expert or otherwise informed judgment is required for the Restrepo approach if stock status information is lacking, which would likely be the case for any potential application of the approach. This judgment is critical because an overfished determination can result in catch limits that are adjusted downward to a third of what could conceivably be taken if stock status was not judged to be in an overfished condition. Such a declaration of stock status is generally difficult even with strong quantitative support. Scientific judgments should be supported with as much objective analysis as possible. Careful examination of all available biological and fishery indicators is warranted. Even if a formal stock assessment is lacking, a diverse assemblage of data (including qualitative and anecdotal information) can be evaluated in a meta-framework to infer stock status (e.g., Porch et al., 2006). The Restrepo et al. document mentions a variety of similar alternative approaches such as informed judgments, Delphi approaches, qualitative approaches, expert opinions, and consensus-building methods. In addition, Bayesian statistical methodology is an appropriate tool for heterogeneous data and variable prior knowledge.

4. Caveats

The primary assumptions of the Restrepo approach are that the fishery is at or near a sustainable equilibrium, the stock is stable, and some qualitative determination of stock status is possible. However, without adequate information, it can be difficult to judge stock status, and, likewise, without a protracted period of near-constant and/or sustainable fishing effort and catches, it can be difficult to verify stability. If fishing effort is highly variable or if a fishery is in development or experiencing overfishing, then the catch data stream will be problematic for the Restrepo approach.

5. Risk assignment

Restrepo et al. (1998) conducted simulation modeling to explore what an appropriate default target catch control rule for data-adequate stocks might look like and found that fishing at 75% F_{MSY} resulted in equilibrium yields of 94% MSY or higher and equilibrium biomass levels between 125% and 131% of B_{MSY} while reducing the probability that the stock would decline to ½ B_{MSY}. Based on these results, the recommended default target control rule became fishing at 75% F_{MSY}. The data-poor proxy of this default rule for stocks judged to be above B_{MSY} thus became 75% of recent catch. Additional risk can be built into the approach by simply reducing the scalar multipliers. This is analogous to the catch limit and catch target differential multipliers in the 1998 technical guidance document. Biological and/or fishery information can be incorporated into the approach by using natural mortality rate or risk assessments like the PSA (productivity susceptibility analysis; Patrick et al., 2009; 2010) inputs to the scalar specification. These potential improvements will be discussed in forthcoming sections of text.

6. Status of approach

The Restrepo approach and variants thereof are used in the management of many fisheries across the nation. Scalar multipliers range from 0.25 to 0.75 consistent with the original guidance. There is considerable variability in the time window of recent catch ranging from 1 year to 18 years. The location of this recent catch time window also varies considerably from recent years to over 30 years into the past. As pointed out earlier, these parameters for the recent catch specification will have to be tailored to individual stocks and fisheries on a case-by-case basis.

Some examples of current use for ORCS:

- *The Pacific Fishery Management Council (PFMC) coastal pelagics ABC is specified using a scalar multiplier of 0.25 applied to average catch and scaled by proportion of stock available in U.S. waters.*
- *The International Commission for the Conservation of Atlantic Tunas (ICCAT) specifies total allowable catch (TAC) to be no more than the product of scalars of 0.33 for white marlin and 0.50 for blue marlin applied to 1996 or 1999 landings, whichever is greater. These reference years were chosen because they were thought to be particularly reliable. The scalars reflect the understanding of the recent level of overfishing, particularly for white marlin.*
- *OY for some PFMC groundfish stocks is specified using a scalar multiplier of 0.50 applied to average catch.*
- *The North Pacific Fishery Management Council (NPFMC) specifies ABC using a scalar multiplier of 0.75 applied to average catch from 1978-1995.*
- *The Caribbean Fishery Management Council (CFMC) specifies ABC and ACL using a scalar multiplier of 0.85 applied to average catch from 1999-2005 or 2000-2005 depending on the management area.*

- *The New England Fishery Management Council (NEFMC) used a scalar of 1.0 for ABC of Atlantic herring because a provisional analysis suggested that the stock was not overfished and overfishing was not occurring.*
- *The NEFMC also used a scalar of 1.0 for ABC of red crab because there was no evidence of depletion since the beginning of the fishery.*

7. Pluses/minuses of approach as viewed by Working Group

Some advantages of the Restrepo approach are that it a) is straightforward and therefore easily explained and understood by scientists, policymakers and stakeholders, b) can easily be applied even by those not specifically trained in stock assessment procedures, and c) is broadly applicable across species with different biological characteristics. Some of the disadvantages are that a) the appropriateness and performance of the recommended multipliers has not been evaluated, b) the assumptions of a stable stock which is at or near sustainable equilibrium can often not be verified, c) it is not suitable for application to an ORCS stock that is very lightly exploited since it does not allow for a catch limit larger than recent average catch, d) it does not explicitly account for species differences in productivity, and e) continued application could ratchet catch downwards as the recent average catch was forced to decline. The method was intended to be used as a short-term fix, until either additional data could be collected or an improved method could be developed.

B. Scalar multiplied by the ABC of the target species, when ORCS are bycatch species

1. Summary of approach

In one international arena, ORCS species believed to be exploited well below MSY levels and caught incidentally in directed fisheries are regulated in concert with the targeted species, based on a proportion (or harvest cap) associated with the targeted stock's quota. In those cases, the targeted stock's ABC is multiplied by a scalar, for example 5%, to obtain the ABC of the bycatch species. Management for these bycatch species focuses on collecting additional information to elevate these fisheries to a formal assessment status as soon as possible and thereby allow what may have started as an exploratory fishery to safely expand to a targeted fishery.

2. Data needs

The only data required to carry out this management approach is a catch limit for the targeted species of the exploited assemblage.

3. Informed judgment

Judgment is needed for deciding what the proportion of the targeted species' catch limit should be that serves as the scalar for determining the ABC of the bycatch species which requires expert

opinion regarding the abundance of the bycatch stock relative to the target stock. The choice of scalars should be guided by the precautionary principle to avoid overfishing but should also allow for data collection and potential fishery expansion. Where this method has been applied, quotas have ranged from 5-16% of the targeted species' catch limit.

4. Caveats

The appropriateness of the chosen scalar cannot be known initially, and therefore, ongoing monitoring programs are imperative to the application of this general approach. Precise estimates of species composition from the landings, as well as observer data and fishery-independent survey data are necessary to ensure current proportional allocations for bycatch species are representative of recent resource/fishery dynamics and are ultimately sustainable.

5. Risk assignment

Although formal risk cannot be explicitly assigned in this straightforward method, the risk of overfishing bycatch species is considered to be relatively low by the management body implementing the approach. Higher landings caps imply higher risk of overfishing.

6. Status of approach

This approach is being implemented by the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR). In most cases, all bycatch species associated with the directed fisheries have recommended harvest levels that are defined in accordance with the CCAMLR.

7. Pluses/minuses of approach as viewed by Working Group

The approach is very simple to apply, as it involves multiplying a scalar by the quota of a targeted species. Given species are selected because they are believed to be underutilized, it is assumed that there is a relatively low risk of overfishing using this method, but ultimately, there is little information to inform the initial choice of any particular scalar. Since this method sets an ABC for a group of species rather than an individual stock, it is a special case of a stock complex approach, which is discussed in Section IV of this report. If implemented correctly, the method allows for fishery expansion to occur slowly and in a coordinated fashion.

C. Natural mortality-based approach

1. Summary of approach

The natural mortality-based approach (Anon 2009) is another variant of a scalar approach. It is based on the formula:

$$MCY = c\ Y_{AV}$$

Where MCY is the maximum constant yield, c is the natural variability factor (defined below) and Y_{AV} is the average catch over an appropriate period.

If the catch data are from a period when the stock was fully exploited (i.e., fishing mortality near the level that would produce MAY [= Maximum Average Yield]), then the method should provide a good estimate of MCY. In this case, Y_{AV} = MAY. If the population was under-exploited, the method gives a conservative estimate of MCY.

The natural variability factor is defined as in Table 2. It is assumed that because a stock with a higher mortality rate will have fewer age-classes, it will also suffer greater fluctuations in biomass. The deviations from values of c in the table are for stocks where there is evidence that recruitment variability is unusually high or low.

2. Data needs

Familiarity with stock demographics and the history of the fishery is necessary for the determination of an appropriate period on which to base estimates of Y_{AV}. The period chosen to perform the averaging will depend on the behavior of the fishing mortality or fishing effort time series, the prevailing management regime, the behavior of the catch time series, and the lifespan of the species.

The period should be selected so that it contains no systematic changes in fishing mortality (or fishing effort, if this can be assumed to be proportional to fishing mortality). The period chosen should also contain no systematic changes in catch. If the period shows a systematic upward (or downward) trend in catches then the MCY will be under-estimated (or over-estimated). It is desirable that the period be equal to at least half the exploited life span of the fish.

An estimate of natural morality is required to obtain the value of c, the natural variability factor. Knowledge of recruitment variability levels is needed to modify the natural variability factor, if necessary.

3. Informed judgment

In many cases informed judgment will be needed to select the period chosen to perform the averaging, as all of the information required to adequately select the period may not be available.

4. Caveats

The primary assumptions of the natural mortality-based approach are that the fishery is at or near a sustainable equilibrium and the stock is stable. However, it can be difficult to estimate stability without a protracted period of near-constant and/or sustainable fishing effort and catches. If fishing effort is highly variable or if a fishery is in development or experiencing overfishing, then the catch data stream will be problematic for this approach.

5. Risk assignment

Risk is incorporated through the use of the natural variability factor, which takes into account the natural mortality of the stock. It is assumed that because a stock with a higher mortality rate will have fewer age-classes it will also suffer greater fluctuations in biomass. In addition this can be modified where there is evidence that recruitment variability is unusually high or low.

6. Status of approach

The approach is currently being implemented for ORCS in New Zealand.

7. Pluses/minuses of approach as viewed by Working Group

The natural mortality-based approach has limited potential for application in the U.S. It is not designed for stocks that are currently in an overfished state. It is designed for stocks that have either been fully exploited or under exploited. It does not take into account cases where stocks have been over-exploited (overfished). Further, it requires a time period of stable catch, which may not be available for all stocks. Shorter life spans are viewed as inherently more risk prone and difficult to manage effectively, given they exhibit greater population fluctuations, requiring a smaller scalar to account for the increased risk. Other factors affecting risk are not incorporated into the method. The method has not been evaluated

D. Depletion-Corrected Average Catch (DCAC)

1. Summary of Approach

Restrepo et al. (1998) provide guidance on estimating sustainable catch in situations where only a catch time series is available, suggesting that a sequence of relatively constant catches is evidence that the average annual harvest is sustainable. Although this approach can be useful for providing catch advice for data-poor stocks, the inference of sustainability is only true if both fishing mortality and stock abundance are stable during the period in question. A constant catch could be produced during a period of increasing fishing mortality and decreasing stock abundance, in which case the catch may not be sustainable. Nonetheless, Restrepo et al. (1998) argued that an average catch taken from a time period of stable harvest is a useful proxy estimate of sustainable yield.

MacCall (2009) developed an approach that allows for changing population abundance during the period when catches are obtained. He described the method as "depletion-corrected average catch" (DCAC) because it accounts for the windfall augmentation of catch that occurs due to a one-time reduction in standing stock, also known as "fishing up." Conveniently, the method works just as well if a stock is increasing in abundance during the time interval. Fundamentally, DCAC is based on the premise that knowledge of natural mortality (M) is informative of F_{MSY}, a reasonable prior for relative B_{MSY} (B_{MSY} / B_0; B_0 = virgin biomass) is available, and some view of relative stock depletion can be obtained.

2. Data needs

The basic DCAC calculation requires: a) an average catch calculated over some period of years, b) an estimate of natural mortality, which may be obtained from the relationship between longevity and M developed by Hoenig (1983) or other indirect methods, c) an estimate of the ratio of F_{MSY} to M, which MacCall (2009) argues is typically in the range of 0.6–1.0, and d) an idea of how much stock abundance may have changed during the time period when catch statistics are summarized. This last input value is termed Δ and represents the relative decline (or increase) in stock size, with a larger value representing a greater decrement to the stock. In addition, the method has recently been generalized to include a prior distribution for relative B_{MSY} (Stock Assessment Toolbox; http://nft.nefsc.noaa.gov/index.html).

3. Informed judgment

The DCAC method is a generalization of the average catch approach because an adjustment is made for changes in stock size (Δ). This is, however, a quantity that is difficult to obtain, and expert opinion must be used to decide on relative stock status. Likewise, informed judgment may be helpful in deciding on the ratio of F_{MSY} to M and B_{MSY} to B_0. Prior distributions for Δ, ratio of F_{MSY} to M and B_{MSY} to B_0 could be based on meta-analysis for related stocks, rather than expert opinion.

4. Caveats

DCAC assumes that the catch statistics used in the calculation are unbiased. Also, the method is only appropriate for stocks with moderate to low natural mortality rates ($\leq 0.20\ yr^{-1}$) because the depletion correction becomes negligible at higher values of M. Moreover, in its initial implementation the calculation assumed that relative B_{MSY} occurs at 0.40. While this is a robust proxy supported by the simulations conducted by Clark (1991), the newest version of the calculation (i.e., the NOAA Fisheries Stock Assessment Toolbox) allows the user to specify a prior distribution for this quantity.

5. Risk assignment

Propagation of uncertainty is a strong point of the DCAC method, which is accomplished by Monte Carlo simulation based on draws from distributions of the key input quantities. In particular, the principal inputs (M, F_{MSY}/ M, B_{MSY}/ B_0, and Δ) are specified as distributions. Importantly, MacCall (2009) provides a variance statistic for M based on reanalysis of the data summarized in Hoenig (1983). The result of the algorithm is an output distribution of catch that would have been sustainable over the specified timeframe, conditional on the input distributions, which can be used as a basis for risk assessment (Figure 2).

6. Status of the approach

The NEFMC and its SSC evaluated an application of DCAC to deep-sea red crab and concluded that because it provides an estimate of a sustainable yield and not MSY, it was inappropriate to

use in calculating OFLs. Moreover, because survey information did not indicate that the population abundance of red crab had changed between 1974 and 2005, no depletion correction was required and an ABC was set based simply on average landings during that time period.

Because the DCAC calculation utilizes a sum of catches calculated over a period of years, the PFMC endorsed its use in developing OFLs for seven groundfish stocks that are characterized by erratic and/or incomplete catch histories. Those stocks included six rockfishes (*Sebastes* spp.) and one elasmobranch (i.e., blue rockfish, blackgill rockfish, gopher rockfish, honeycomb rockfish, Mexican rockfish, squarespot rockfish, and soupfin shark).

7. Pluses/minuses of approach as viewed by Working Group

There are a number of appealing features of the DCAC method, including: a) it is based principally on catch statistics and basic life history information, b) the catch time series need not be comprehensive, c) stock abundance is explicitly allowed to vary, d) the method's inputs are approximate and are specified as distributions as opposed to point estimates, and e) uncertainty is propagated to produce a distribution of sustainable yield. Some of the disadvantages of the approach are: a) the estimated yield is typically sustainable, but not maximal, b) expert opinion is required to characterize stock depletion, and c) the estimated yield may not be sustainable if the stock at the end of the time series is not representative of the production that occurred during the time series (i.e., it is severely depleted).

E. Depletion-Based Stock Reduction Analysis (DB-SRA)

1. Summary of Approach

Depletion-Based Stock Reduction Analysis (DB-SRA) is an extension of DCAC that incorporates full stock dynamics (Dick and MacCall, In press). At a basic level stock production is the product of *per capita* production (= productivity) scaled by the total size of the population. For example, under Beverton-Holt spawner-recruit dynamics these quantities are represented by steepness (h) and virgin recruitment (R_0), respectively. Likewise, under a Schaefer surplus production model they are equal to the intrinsic rate of increase (r) and the carrying capacity (K). The DB-SRA method relies on specifying a plausible range of "scaled" production parameters and depletion levels in the form of prior distributions. Then, given the availability of a comprehensive catch history to scale the problem, virgin biomass can be uniquely calculated, conditional on each draw from the input distributions.

2. Data needs

Because the DB-SRA method is fully dynamic, a complete history of removals is required, i.e., annual catches from the beginning of the fishery are needed. Moreover, the method, at least in its current form, has been implemented as a delay-difference production model (Quinn and Deriso, 1999) and age-at-maturity is used to lag recruitment relative to production. Beyond

those fixed inputs, the technique depends on the same four "prior" input distributions as DCAC, including: a) natural mortality (M), b) the ratio of F_{MSY} to M, c) the ratio of B_{MSY} to B_0, and d) stock depletion (Δ). The DB-SRA method is also formulated in a way that provides considerable independence between F_{MSY} and B_{MSY} by implementation of a generalized production function (Fletcher 1978; McAllister et al. 2000; Dick and MacCall, In press).

As with DCAC, F_{MSY} is scaled relative to the natural mortality rate, and the product of the scalar and M provides an estimate of F_{MSY}. By also drawing an estimate of relative B_{MSY} from its input distribution, production is then completely specified on a relative biomass basis. Next, the time series of catches and a random draw from the depletion distribution (Δ) are used to scale biomass and solve for the unique value of B_0 and current biomass that satisfy all conditions (Figure 3). Of course in some instances the time series of catches is impossible with the random draws from the input distributions and the population trajectory goes negative. Those realizations are considered biologically implausible and are dropped from the collection of feasible outcomes (see also Walters et al. 2006). The process is repeated numerous times and posterior distributions of B_0, $B_{current}$, MSY ($F_{MSY} \times B_{MSY}$) and OFL ($F_{MSY} \times B_{current}$) are summarized from the individual results.

3. Informed judgment

The DB-SRA method further generalizes DCAC and, like that method, requires expert opinion to provide a general idea of stock depletion at some point in the catch time series. However, the depletion distribution can be somewhat vague and/or uninformative without great loss in performance. Likewise, informed biological judgment is needed to provide the initial input distributions for the ratios of F_{MSY} to M and B_{MSY} to B_0. However uncertainty in those distributions can be captured explicitly in their variances and they are biological characteristics that can reasonably be informed by conventional scientific wisdom.

4. Caveats

Other than assumptions associated with generating the four key input distributions, the DB-SRA method is very general. In particular, the implementation of a generalized production function that uncouples F_{MSY} from B_{peak} allows a broad range of models to be explored. Also, the method is robust to stochastic variation in stock recruitment, as long as recruitment is not highly episodic or strongly autocorrelated. Nonetheless, the method requires the user to provide four distributional inputs, which can be difficult to specify. No doubt the most troubling of these is the depletion (Δ) distribution, which is perhaps the main output statistic obtained in a data-rich stock assessment; requiring it as an input would seem to undermine the utility of the DB-SRA approach. In practice, however, the same type of inference is required of all ORCS methods (see above), but with DB-SRA it is expressed quantitatively as a distribution. The obvious benefit of this is that the prior distribution of Δ can be vaguely specified, which is to say the variance about the mean of the distribution implies that not much is actually known about depletion. Also,

given that the approach incorporates depletion as an input, it is not an appropriate method for determining relative stock status; rather its strength is in yield estimation (MSY and OFL). Finally, the method requires a complete time series of total catch (landings + discards) to implement. To the extent that discards are underreported or not accounted for the method will produce biased results.

5. Risk assignment

Expression and depiction of uncertainty is a major goal of the DB-SRA method and is accomplished by Monte Carlo simulation of four input distributions through to the output distributions of management concern, i.e., current biomass, F_{MSY}, unfished biomass, and OFL. An example of how uncertainty and risk are characterized within the DB-SRA framework is given in Figure 4, which shows the probability of overfishing for brown rockfish (*Sebastes auriculatus*) from 1920 to the present, as well as the posterior distribution of OFL values for 2011 (Dick and MacCall, 2010). Given a distribution of OFL, it is possible to develop a control rule that maps ABC onto the probability of overfishing, a direct expression of scientific uncertainty.

6. Status of the approach

In 2010, the PFMC SSC endorsed the use of DB-SRA to estimate OFLs for 42 groundfish stocks, including 34 rockfishes (*Sebastes* sp.), four flatfishes (Pacific sanddab, rex sole, rock sole, and sand sole), one roundfish (kelp greenling), two elasmobranches (leopard shark and dogfish), and one complex (grenadiers). All data-poor rockfish stocks are managed within assemblages that are defined based on: a) distribution north or south of Cape Mendocino (lat. 40°10'N), and b) cross-shelf distribution (nearshore, shelf, or slope). These 42 stocks include approximately half of the species listed in the PFMC Groundfish Fishery Management Plan and the development of OFL estimates for these species represents a significant improvement in the scientific information used to manage these stocks.

The medians of the bias-corrected posterior distributions of OFL were used by the PFMC as stock-specific point estimates of OFL. These were aggregated into single OFLs for each assemblage, and a semi-quantitative estimate of scientific uncertainty was endorsed for the DCAC and DB-SRA methods by the Council's SSC (i.e., quadrupling the uncertainty of Tier 1, data-rich assessments). The Council also established a policy on buffering all groundfish ABCs below their OFLs by limiting the probability of overfishing (P*) to ≤ 0.45. Harvest specifications for the 2011-2012 biennial fishing cycle are being developed under this general paradigm.

The DB-SRA method has been coded in R (R Development Core Team, 2009) and is documented in two manuscripts. The first of these describes application of the method to 31 different Tier 1 stocks and compares estimates of OFL, MSY, and B_0 from DB-SRA to those

obtained from a full data-rich stock assessment, which have typically been conducted using the maximum likelihood based, integrated Stock Synthesis model (Dick and MacCall, In press). The second publication describes and documents the application of the DB-SRA method to the 42 data-poor, Tier 3 groundfish stocks listed above, including development of bias-corrections based on PSA and performance relative to data-rich stock assessments (Dick and MacCall, 2010).

7. Pluses/minuses of approach as viewed by Working Group

Like DCAC, DB-SRA is based principally on catch statistics and basic life history information, uses inputs that are approximate and are specified as distributions as opposed to point estimates, and allows for the propagation of uncertainty to produce a distribution of sustainable yield. The method was evaluated by comparison of OFL estimates from DB-SRA to those from 31 data-rich stock assessments. Results of that comparison showed that DB-SRA sometimes underestimates and sometimes overestimates OFL for individual stocks. As might be expected, the bias in OFL depended on PSA scores associated with each of the stocks. In particular, DB-SRA applied to flatfish generally underestimated OFL by a factor of 0.55. For high vulnerability non-flatfish stocks DB-SRA was largely unbiased, whereas for low vulnerability non-flatfish stocks the method underestimated OFL by a factor of 0.83. These biases were quantified and applied as an adjustment in estimating OFL for the 42 data-poor stocks by the PFMC. A primary disadvantage is that this method is rather time and resource-extensive and requires application by trained stock assessment scientists. In addition, for many ORCS species, it may not be possible to fully reconstruct catch history.

F. The Methot Table Conceptual Framework

1. Summary of approach

During the second National SSC meeting, NMFS's Rick Methot gave a presentation on the 2009 NS1 guidance regarding ACLs and the treatment of scientific uncertainty. In that presentation, a table was provided that showed an example of how ABCs might be set in catch-only situations. The original purpose of this conceptual framework was to generate discussion and inspire thought. The structured approach that it offered has since been used in discussions in different parts of the country to base ABC recommendations on, and the working group therefore deemed it appropriate to review the method here. The table, which we refer to here as "the Methot table conceptual framework", is based on the same basic concept as the Restrepo approach and requires an expert evaluation of fishery impact. The Methot table generates four fishery impact categories of historic catch: trivial, small, moderate, and moderately high and proposes a possible action for ABC determination for each (Table 1). The first impact category highlights the fact that trivial catches of non-targeted species are unlikely to affect the species population status and under these circumstances the Council should consider listing these species as "Ecosystem Components" (EC species) within their fishery management plan. EC species are not required to

specify OFL, ABC, or ACL thresholds; however, their catch levels should be monitored to ensure they are not targeted by the fishery in the future. If historic catches are judged to be small (the second impact category), it is assumed that the stock is not overfished and that the target catch could be set at the historic level while setting ABC and ACL above that. If historic catches are moderate, the fishery should be capped because any increase in catches might mean the stock could become overfished. If historic catches are moderately high, the stock might be overfished and recent catches should be considered as the limit. In that case, ABC would be set below recent catch levels to allow the stock to rebuild. The approach is fairly qualitative in that it does not provide specific methods for calculating the degree to which catch should be set above or below historic levels. Methot does suggest that a stock's vulnerability should be a consideration.

2. Data needs

The data needs for this method are similar to the Restrepo approach. Catch history is required along with any information that may help to determine stock status from the catch data. In addition, vulnerability information is recommended. Vulnerability can be determined through risk assessments such as the PSA analysis that evaluates a stock's productivity and susceptibility to the fishery (Patrick et al. 2009, 2010). The final vulnerability score could be a factor in the setting of a scalar used to multiply recent catch; the scalar would be lowest for the most vulnerable species and highest for the least vulnerable species, scaled to fit within some predetermined range. This relates the level of allowable catch directly to the biology of the species.

3. Informed judgments

At the onset, expert judgment is needed in order to assign species to one of the four impact categories, analogous to the judgment call needed for the Restrepo method for determining stock status with respect to MSST and B_{MSY}. In addition, informed judgment is needed to determine how much the ABC should be set above or below historic catch levels, and a judgment call is also needed to determine what the appropriate period of recent or historic catch is relative to which ABCs should be set.

4. Caveats

Although the Methot method does not make any explicit assumptions about stock stability or fishery equilibrium, the period of historic or recent catch used to determine future ABCs could have potentially large impacts on the final ABC that is calculated. Moreover, this method in its current state of development provides only qualitative statements about relative catch. Establishing absolute values or formulas for how much to increase or decrease OFL from historic catch in the case of low or moderately high impact, respectively, and how vulnerability is used as a relative scalar would still need to be fleshed out.

5. Risk assignment

Risk for this method could be assigned by setting boundaries on how much ABC can be increased or decreased from historic catch. For example, in the case of low historic catch, it would be less risk-prone to specify that ABC can be maximally 50% higher than historic catch instead of 100% higher. Similarly, in the case of moderately high historic catch, higher reductions in ABC translate into a higher probability that the stock will rebuild quickly than low reductions. Risk could also be assigned by deciding how much weight should be given to vulnerability. The PSA risk categories of low, medium and high could be converted into discrete scalars, and how much these scalars differ is a reflection of how much more risk one is willing to take for less vulnerable species.

6. Status of approach

A variation of this approach is currently being developed by the SSC of the Gulf of Mexico Fishery Management Council (GMFMC). The current Gulf ABC control rule consists of three tiers, the lowest of which contains the ORCS. The Gulf SSC is considering only two of the four dimensions from the Methot Table Conceptual Framework: small and moderately high impact (tier 3a and 3b, respectively). In the case of small impact, recent average catch over a stable period would be designated as the target catch, ABC would be set at either 0.5, 1, or 1.5 standard deviations (SDs) above the target, and OFL will be set at 2 SDs above that target. The rationale for setting OFL at 2 SDs above the mean is that this will result in only a 2.5% probability of catches in any given year exceeding and OFL so defined. The choice of SD level for ABC reflects a choice of risk because even though the SSC would recommend that target catch be set at the mean of recent average catch, the ultimate setting of ACT and ACL rests with the Council, and the Council could choose to set both equal to ABC, in which case an ABC of 0.5 SDs above the mean would constitute a less risk-prone upper limit than an ABC set at 1.5 SDs above the mean. In the case of moderately high impact, the GMFMC SSC approach would set OFL equal to the recent average catch and ABC would be set at 65%, 75%, 85%, or 100% of the OFL. Neither GMFMC tier 3a nor 3b currently use species vulnerability as part of their ABC considerations.

7. Pluses/minuses of approach as viewed by Working Group

The Methot Table Conceptual Framework represents a general approach for addressing ORCS and offers only qualitative advice for adjusting the magnitude of future catch limits with respect to recent catches. This can be advantageous in that it allows flexibility in regional application but it is also a drawback in its lack of specificity because it could result in potentially inappropriate application of the concept. As the GMFMC SSC has found out, the expression "the devil is in the details" seems to hold true, in taking an intuitive concept and making it operational. Like the Restrepo approach, the Methot Table Conceptual Framework is intuitive and easy to explain and therefore extremely useful for scientists, policymakers and stakeholders. Another advantage is that it takes into account species vulnerability, thereby acknowledging the

differences in resource response to exploitation. It can also be applied to stocks for which there is evidence that exploitation levels can be increased safely, and time and resources needed to apply this method are minimal because data needs are small and it does not require application by highly trained stock assessment scientists. The method's performance has not yet been tested in either simulations or application.

III. The ORCS Working Group Approach

A. Introduction

While this report has already summarized several control rules based on average catch scalars, the Working Group felt that the existing scalar approaches lacked a solid technical basis and that inadequate guidance had been provided for their application, leading to widespread misuse. Therefore, the Working Group developed a new control rule for the managers and scientists to address these issues. The proposed control rule for catch-only stocks builds on methods in Restrepo et al. (1998) and the Methot Table Conceptual Framework (summarized in Witherell 2010 and reviewed in section II F of this report). The Restrepo et al. (1998) approach assigns stocks to one of three status categories (less than MSST, between MSST and B_{MSY}, and above B_{MSY}) and uses a different average catch scalar for stocks in each category. The scalars are intended to be precautionary, so it would be difficult to use the Restrepo et al. (1998) approach in the new OFL/ABC framework where scientific uncertainty is explicitly taken into account. The new approach presented here also uses different scalars for three stock status categories, but defines the categories differently, and develops a scoring procedure for assigning stocks to these categories. Alternative buffers are proposed to account for scientific uncertainty in setting ABCs, since this is regarded as a policy decision.

The Working Group is fully aware that these methods rely heavily on assumptions and expert judgment, and are not intended to be a substitute for quantitative information on stock status and trend. Nevertheless there is a need for robust methods that provide useful scientific advice in less than ideal situations. Our goal is to improve on existing methods and provide a structured and transparent approach, but we recognize that further improvements are probably needed. With these caveats in mind, the basic approach is the following:

1. Assign stocks to one of three exploitation categories using an evidence-based scoring procedure;
2. Obtain an OFL by multiplying a statistical measure of historical catch (e.g., mean, median, maximum, minimum, percentile, etc.) by a scalar that depends on the exploitation category; and
3. Obtain an ABC as a proportion (< 1) of the OFL to reflect a policy decision on acceptable risk, which may depend on productivity of the stock (see Patrick et al., 2009; 2010).

B. Assigning stocks to exploitation categories

Stocks can be grouped into three broad exploitation categories for which different management objectives apply (Table 3): 1) lightly exploited; 2) moderately exploited; and 3) heavily exploited. For stocks that are considered lightly exploited, catches could generally be increased without harm to the stock. For stocks that are considered moderately exploited, management objectives will focus on maintaining status quo catch levels, and preventing non-sustainable increases. For stocks that are considered heavily exploited and possibly overfished, the management objective is to end overfishing and rebuild the stock to B_{MSY} levels as mandated by the MSA.

1. Background

The concept of 'pretty good' yield (PGY) provides a theoretical basis for broadly classifying stocks into exploitation categories. This concept, proposed by Alec MacCall and developed further by Hilborn (2010), is based on the observation that a large percentage of maximum sustainable yield (>80%) can be produced on a long-term basis over a broad range of stock sizes. This concept is particularly meaningful in data-limited situations, since it implies that successful management outcomes are possible even if stock status is not known precisely. To illustrate the PGY concept and to develop a technical basis for catch multipliers, a Pella-Tomlinson production model was used. The Pella-Tomlinson model duplicates the results of the more complex age-structured model used by Hilborn (2010), but allows equilibrium yield to be calculated directly for any percentage of unfished stock size.

Annual equilibrium yield (Y_*) for the Pella-Tomlinson production model is:

$$Y_* = \frac{\gamma\, m}{B_0} B_* - \frac{\gamma\, m}{B_0^n} B_*^n,$$

where:

$$\gamma = \frac{n^{n/(n-1)}}{n-1},$$

m is maximum productivity (MSY), B_0 is unfished biomass, and B_* is equilibrium biomass at some level of fishing mortality F_*, with $Y_* = F_*\ B_*$ (Quinn and Deriso 1999). Setting n = 1.2 results in a B_{MSY} that occurs at 40% of the unfished stock size, which is often considered a reasonable default value (Clark, 1991). For these assumptions, equilibrium stock abundance in a range from $B_{19\%}$ to $B_{65\%}$ of the unfished biomass provides at least 80% of the MSY yield on a

sustainable basis (Figure 5). Stocks above this range would be considered lightly exploited, while stocks below this range would be considered heavily exploited (i.e., overfished). These results are comparable to those obtained by Hilborn (2010) for an age-structured population. Special cases of the Pella-Tomlinson model are n=2, which becomes the Graham-Schaefer production model where B_{MSY} is 50% of unfished biomass, and $n \rightarrow 1$, which translates to the Fox production model where B_{MSY} is approximately 37% of unfished biomass.

2. Guidelines for assigning stock status

Status assignments based on historical catches will not have the benefit of a stock assessment, but will instead need to rely on 'expert' judgment. Experts in this context are those with experience conducting research, working on management issues, or participating in a fishery, and may include scientists, fishery managers, fishermen, and other involved parties. It will be important to be as comprehensive as possible when making status assignments and evaluate multiple lines of evidence. Given the absence of definitive information, the effort to generate these assignments may not be straightforward. It is important to note that that the overriding goal here is simply to assign stocks to very broad status categories with acceptable accuracy (e.g., say greater than a 70% success rate), recognizing that some inappropriate assignments will be inevitable.

An evidence-based scoring procedure (Table 4) has been developed to help assign stocks to the different status categories. This table incorporates some of the susceptibility elements in a PSA analysis (Patrick et al., 2010), as well as several new elements. The susceptibility scores in PSA evaluate the likelihood that a stock is captured in a fishery and the probable levels of fishing mortality, but PSA also includes productivity scores as a second dimension that takes into account the consequences of stock becoming overfished. In the framework we develop, productivity is considered separately when setting a buffer between OFL and ABC. While scoring procedures are a relatively recent development in fishery management, multi-attribute scoring algorithms have been used to evaluate the risk of species extinction (see Musick, 1999 and Dulvy et al., 2003). Multi-attribute scoring algorithms are also used in the medical field for making diagnoses and deciding treatment plans (Ebell, 2001). Elements of the evidence-based scoring procedure are described below.

Overall fishery exploitation based on assessed stocks. In general, the characteristics of the fishery in which the stock is caught are the most important factor to consider when assigning stocks to exploitation categories. If there are assessed stocks in the fishery, are they mostly overfished, moderately exploited, or are most lightly exploited? Unless there are reasons to think that the stock is more or less vulnerable than assessed stocks, it may be reasonable to assign it the same status as an associated stock that has been assessed. Certain habitats may have an overall level of exploitation that can be used to infer the status of unassessed stocks that live in that habitat.

Presence of natural or managed refugia. A stock that is fished throughout its range is more likely to be impacted by fishing than a stock that is fished only in a portion of its range. Species with extensive natural or managed refugia are unlikely to become severely depleted. This consideration would only apply to species that are not highly mobile as adults in relation to size of the refugia.

Schooling, aggregation, or other behavior responses affecting capture. This element encompasses both the behavioral response of individual fish to fishing gear and group behaviors that affect capture such as schooling or aggregating for spawning in known locations. Individual responses may include, for example, herding or gear avoidance behavior that would affect catchability.

Morphological characteristics affecting capture. This element pertains to the ability of the fishing gear to capture fish based on their morphological characteristics. For example, are there aspects of morphological characteristics affecting capture (i.e., large spines) that could make the fish more or less susceptible to capture? Because gear selectivity varies with size and age, this measure should be based on the age or size classes most representative of the entire stock.

Targeted species or Bycatch; and rarity. Targeting behavior by the fishery may help inform stock status assignments. Targeting may be inferred if a species has high commercial value or is considered highly desirable in a recreational fishery. Stocks that are caught primarily as bycatch in fisheries that target other stocks are likely to be lightly exploited relative to the targeted stock. However a non-targeted stock may still become overfished if it is much less productive than the targeted stock. Some stocks are simply too rare to be targeted, and would tend have low fishing impacts.

Natural mortality compared to targeted species in the fishery. This element provides a relative gauge of the stock's productivity compared to the dominant or targeted species in the fishery. Generally, for stocks subject to similar fishing mortality rates, those with low natural mortality have a higher likelihood of becoming overfished than those with higher natural mortality.

Value or desirability. Highly valued fish stocks are more susceptible to overfishing or becoming overfished by the recreational or commercial fishery due to targeting behavior with the goal of maximizing profits or non-market value. To identify the value of the fish, we suggest using the approach of Patrick et al. (2010) who used price per pound, or retention rates for recreational fisheries.

Trend in catches and effort. Finally, trends in historical catches may also be informative under some circumstances. If fishing effort is stable, a declining trend in catches may be an indicator

of stock depletion. Again, if effort is not increasing, stable or increasing catches are an indication that the stock is exhibiting resiliency and not likely being severely impacted by fishing, but caution is warranted when interpreting catch patterns in the absence of other indicators and sources of data. Qualitative measures of effort, such as the number of active vessels or employment in the fishery, are likely to be all that are available for data-poor stocks, but may be misleading if there are technological advancements in the fishery. Increasing catches could also be an indication of fishery expansion, i.e., a stock that is transitioning from lightly exploited to moderately or heavily exploited status.

The evidence-based scoring procedure provided (Table 4) includes default-scoring thresholds; however, we realize that revisions to the scoring procedure will likely be needed in different regional ecosystems and recommend that the scoring table be used flexibly. A starting point would be to assign status using the arithmetic mean of all attributes that can be scored, but weighting factors could be considered, or taking the geometric mean rather than the arithmetic mean. Careful consideration should be given to the logistics of scoring stocks. One possibility would be to assemble a core group of scientific experts that draws on information from formally appointed advisors that may include fishery managers, fishermen, and other knowledgeable individuals. Through trial and error techniques, it may also be useful to separate the scoring process into two steps by first ranking stocks along a continuum from lightly exploited to heavily exploited, and then identifying the break points between the lightly exploited, moderately exploited, and heavily exploited categories. Given management implications of identifying the break points, a higher-level science advisory body, such as the Regional Council's SSC, may be more appropriate for this task.

C. Determining an appropriate catch statistic for an OFL calculation

Calculating the OFL using the ORC methodology is based on two terms: a scalar (or multiplier) that is based on the stock status category (described above), and a catch statistic derived from a time series of historical catches. Ideally, historical catches should represent a period with a stable harvest rate, i.e., a harvest rate where fishing removals are balanced by stock production and the stock can be assumed to be in a steady state condition or at its long term equilibrium. Stability in catches should be considered relative to the longevity of the stock. Catches of a long-lived species can be stable over a long period even though the stock is declining during this period. Although historical catches can be very stable with low variability, more often they are highly variable, sometimes with large outliers, or could be characterized by alternate periods of stability and periods of high variability or strong trends. Catches of relatively uncommon stocks can vary for a number of reasons unrelated to increases or decreases in abundance. These stocks may be incidental catches in fisheries that target other stocks or are minor members in a multispecies complex. The greater or lesser occurrence of a stock in the catch could be a chance event, caused by changes in the spatial or ecological overlap between that stock and other stocks that are more actively targeted in the fishery. Furthermore, fishery sampling programs can

produce imprecise estimates of catches of stocks that are relatively uncommon. Evaluation of historical catch should include discussion of data quality and potential bias of catch estimates. If landings are highly variable, an attempt should be made to identify the reason for the variation and evaluate implications on the sustainability of historical catches. Other potential reasons for high fluctuations or outliers could be species misidentification, underreporting, effort variability, gear changes, or changes to the regulations for targeted species.

Although in many cases taking the arithmetic mean of historical catches is appropriate for an OFL calculation, the use of an alternative catch statistic may be needed in some situations to provide useful results. Several issues are described below, and suggestions presented for dealing with them are provided.

1. Outliers

In some cases, catch time series include extreme outliers that cannot be fully supported or rejected with available information. Several approaches to handling outliers are possible. First, a trimmed mean can be used (i.e., the inter-quartile mean) when the extreme values are considered unreliable. A similar approach would be to use the Winsorized mean, which is obtained by replacing all the values greater than or less than some quantile of catches by the largest (or smallest) of the remaining values. Usually 10 or 25 percent of the tails of the distribution are replaced. This approach would be appropriate when the extreme values are thought to carry some information about the catch quantity, but their actual values are considered unreliable.

2. Avoiding a ratchet effect

If catches are highly variable, the use of average catch as an OFL may be more constraining than is necessary, particularly when stocks are considered lightly or moderately exploited. When the management objective is to maintain current catch levels, setting the OFL equal to average catch could have the negative effect of depressing the mean level of the catch in the future, since presumably the management measures will need to prevent catches from exceeding the OFL, thereby truncating half of the distribution that was used to calculate the historical average. One possibility is to define the OFL to be some upper percentile of the historical catch, e.g., the 75% percentile of historical catch, with the rationale being that such a value would be exceeded on average one year in four if the fishery was prosecuted similar to historical patterns. Using the maximum catch is another alternative to average catch, but this should only be considered for non-target species with compelling evidence that they are lightly exploited. A similar approach has been proposed by the GMFMC SSC to, in some situations, base OFL on average catch plus two standard deviations (97.5 percentile), but it is unclear whether this approach provides sufficient constraint to prevent stocks from becoming depleted.

3. Recent trends

The theoretical development of average catch multipliers assumes that stocks are in equilibrium at some level of biomass, but this is necessarily an approximation to the real world, and in some cases it may be an inappropriate assumption from which to proceed. When there are downward trends in the landings, the safest approach (i.e., the most precautionary approach) would be to use an average based on the more recent lower values. However, if the downward trend in catches can be clearly linked to a reduction in effort, as when management restrictions are implemented for other species in a multi-species fishery, average catches from an earlier period may be more appropriate. If catches are trending upwards, using an average over all years may be the most reasonable approach.

D. Obtaining OFL scalars for different exploitation categories

When catch trends are stable and the stock is considered to be moderately exploited, setting the OFL to current catch levels is an appropriate action. For these stocks, a multiplier of 1.0 is recommended for the OFL.

For stocks that are considered to be heavily exploited, fishing mortality will need to be reduced to at least F_{MSY} to end overfishing and begin rebuilding the stock to levels closer to B_{MSY}. Since catch is proportional to fishing mortality for the Pella-Tomlinson model, a proportional reduction in catch will result in the same proportional reduction in fishing mortality for a given stock size. There is a time-dependency implicit in this recommendation, since a stock will immediately start to increase when fishing mortality is reduced to F_{MSY}. The Pella-Tomlinson model suggests that multipliers on average catch that reduce fishing mortality to F_{MSY} range from 0.17 when the stock is close to zero to 0.61 when the stock is at $B_{20\%}$ (Figure 6) The average of multipliers from $B_{5\%}$ to $B_{20\%}$ is 0.48. Stock levels below $B_{5\%}$ were excluded because it is unlikely that fishing mortality could be high enough to reduce stock size to such low levels. These results suggest that a multiplier of 0.5 is appropriate for the OFL when the stock is considered to be heavily exploited. Since increased yields should be possible once the stock rebuilds, use of a 0.5 multiplier for the OFL should be considered a temporary measure that will be re-evaluated periodically.

When the stock is considered lightly exploited, fishing mortality is lower than F_{MSY} and thus could potentially be increased. However a multiplier on catch would result in an immediate decrease in biomass so that that F_{MSY} would quickly be exceeded. An alternative multiplier when the stock is lightly exploited is a multiplier that would increase yield to *MSY*, so that annual catches of this amount would move the stock into the moderately exploited category without overfishing. The average of yield multipliers from $B_{66\%}$ to $B_{90\%}$ is 1.98 (Figure 7). Stock levels above $B_{90\%}$ were excluded because these stocks would likely be classified as ecosystem component species. These results indicate that a multiplier of 2.0 is appropriate for the OFL when the stock is lightly exploited. Comparisons between the Pella-Tomlinson model

with n = 1.2, the Graham-Schaefer model, and Fox model indicate that the recommended multipliers are reasonably robust to the shape of the production function. Due to the simple modeling approach used to derive these multipliers, we suggest using Table 5 as a starting point in discussions regarding appropriate OFLs.

Although three categories have been broadly defined in the above analysis, distinguishing between lightly exploited and moderately exploited stocks may be difficult in some circumstances (e.g., widely varying catch data). Under such circumstances, it may be more practical to combine these two categories and use a 1.0 scalar for both; however this would imply a decision to constrain the catch of stocks that may be lightly exploited.

E. Obtain an ABC as a proportion of the OFL

The last step in the control rule is determining the appropriate buffer between OFL and the ABC, which is based on the scientific knowledge about the stock and the uncertainty in the estimate of OFL (i.e., historical catch analysis). Since both risk policy and scientific uncertainty are involved in the choice of an ABC multiplier, input will be required from managers (i.e., Regional Fishery Management Councils) and science advisors (i.e., SSCs). Technical approaches to characterizing uncertainty are not yet possible for data-poor stocks, but it is clear that uncertainty is greater for these stocks than for data-rich assessed stocks. The size of the ABC multipliers derived from data-rich stocks provides a starting point for considering ABC multipliers for data-poor stocks. In developing ABCs, managers should consider distinguishing between high productivity stocks and low productivity stocks, the latter of which can be considered higher risk because they are more prone to becoming overfished and have long recovery times if they do become overfished. Assigning stocks to productivity categories is largely a scientific task, and can be done using productivity scores from a PSA analysis (Patrick et al., 2010) or other approaches. The degree to which different ABC multipliers are used for the productivity categories is more of a policy issue that should be decided by managers.

Table 6 lists some ABC options we developed as examples, but these are not meant to preclude managers from developing their own alternatives based on their risk preference. The alternatives in Table 6 have a greater or lesser degree of risk aversion, and contrast policy decisions to be more risk averse for low productivity stocks with those that do not. The most productive stocks tend to be coastal pelagic species such as anchovy and sardine, which have characteristics other than productivity that may be taken into account in setting the ABCs (or ACLs), such as decadal variability or importance as forage species. Other ways of grouping stocks into risk categories by productivity scores or some other characteristic are possible and should be considered.

IV. STOCK COMPLEXES

The National Standard One Guidelines (NMFS, 2009) describe the concept of a stock complex management, which is defined as a group of stocks that are managed as a single unit. Stock

complexes are considered an approach to deal with stocks that are harvested together and cannot be assessed separately because of insufficient data or resources. Stock complexes can include similar species (e.g., southeastern U.S. reef fishes) or distinct populations of the same species that support mixed-stock fisheries (e.g., the Georges Bank-Gulf of Maine stock complex of Atlantic herring). In all fishery management systems, priority is given to assessing and monitoring stocks with the highest economic value or ecological importance. Nevertheless, marine ecosystems are diverse, and become increasingly so at lower latitudes. Although there is a general need for additional stock assessments, the cost of monitoring and assessing some stocks could potentially exceed the value of landings, suggesting that there is a limit to how many stocks should be individually assessed and managed. Management of stock complexes is an approach to addressing complexity by managing stocks at a higher level than an individual stock. Whether management by stock complexes is considered successful depends on how well the approach achieves management objectives, which can be evaluated like any other management strategy. Stock complexes are likely to be useful in the same data-poor situations as average catch assessments. This section discusses the issues that should be considered when these two approaches are used together.

The formation of stock complexes should take into account life history, geographic distribution, depth distribution, and vulnerability to the fishery (NMFS, 2009). When stock complexes are formed using these criteria, it is assumed that 1) a single catch limit will be sustainable for all members of the stock complex, and 2) fishery impacts are relatively uniform across the members of stock complex (i.e., there is no targeting of individual stocks in the complex). NMFS (2009) also recommends the use of indicator stocks, which is a stock selected as being representative of the complex, and is assessed periodically as a proxy for the other members of the complex. Indicator stocks have been used in various fisheries (e.g., Hawaii Seamount and Bottomfish Fishery, Alaska Salmon Fishery, North Pacific Groundfish Fishery, etc.) and have shown various levels of success. Shertzer and Williams (2008) evaluated the utility of stock complexes and indicator stocks as a proxy of status for reef fisheries off the southeast United States coast. Two difficulties were encountered: 1) species did not group naturally into well-defined complexes based on a cluster analysis of catch data, and, 2) fishery CPUE trends of member stocks within complexes showed little synchrony, suggesting that a single stock could not be used as an indicator for the complex. This study did not distinguish between the utility of using stock complexes and indicator stocks to prevent overfishing, as opposed to being simply used for status determination. At this point, it is not possible to conclude that Shertzer and Williams (2008) results generally apply to other stock complexes, and the indicator stock approach warrants further evaluation (see Branton and Richardson, 2011). Preliminary work with Pacific Coast groundfish using the results of a PSA as well as geographic distribution in a clustering algorithm to define stock complexes shows promising results, but is not expected to be implemented until the next management cycle (Cope et al., In press).

A stock complex can be managed in-season by monitoring the aggregate landings of the complex relative to an annual catch limit as a way to control the fishing mortality experienced by the stock complex in its entirety. Determination of stock status relative to target or limit stock size could be done for the complex as whole, or for an indicator stock that is a member of the group. Determining stock status may be difficult or impossible for data-poor stocks, but a management system that successfully limits catch to sustainable levels would be expected to prevent any stock from becoming overfished. While an inability to determine whether stocks are below a critical threshold is a weakness of average catch assessments, a management system that is designed to be precautionary should accommodate this uncertainty with an appropriate response.

It is difficult to find examples where stock complexes have been implemented following the principles in NMFS (2009), most likely because the guidance is relatively new (earlier versions of the NS1 guidelines did not provide guidance on the formation of stock complexes). Stock complexes have often been established based on broad taxonomic groupings. For example, in the North Pacific, stock complexes have been established for squids and sculpins, while in New England, skates are managed as a complex despite large differences in productivity and susceptibility for members of the complex. In other cases, stock complexes are treated as a kind of warehouse for stocks that have not been dealt with using other assessment and management approaches. For an example, the "Other fish" complex used by PFMC includes several skate, shark, deepwater (e.g., finescale codling and Pacific rattail), and nearshore species (e.g., cabezon and kelp greenling). A more appropriate use of stock complexes is the PFMC management of minor rockfish species, which are grouped into complexes based on geographic distribution (north and south of 40°10" lat. N.), and depth distribution (nearshore, shelf, and slope). Another example is the "Shelf Demersal Rockfish" stock complex in the Gulf of Alaska, consisting of an assessed stock, yelloweye rockfish, and a number of other rockfish stocks occupying similar habitats that are not assessed. ABCs and OFLs are based on the assessed stock with an adjustment to account for the percent of the total catch of the stock complex consisting of other members of the complex.

Reef fishes in the Gulf of Mexico and U.S. Southeastern Atlantic Ocean were grouped into assemblages for management purposes based on multivariate statistical analyses conducted by the NMFS Southeast Regional Office. The analysis was based on landings associations, life history, and PSA. In the Gulf of Mexico, depth was the most important factor influencing assemblage composition. In the U.S. Southeastern Atlantic Ocean, depth and latitude were both important factors. Each identified assemblage contained at least one targeted, assessed species.

OFLs and ABCs for stock complexes can be specified for indicator stock(s) of the complex or set for the complex as a whole. When indicator species is not a feasible option, and OFLs and ABCs need to be set for the complex as a whole, average catches can be compiled for the complex and the OFL and ABC calculations can be done for the entire complex. This is because

the average catch of a complex is simply the sum of the average catches of the individual members of the complex. This approach would also be useful for stock complexes when estimates of the catch by species are unavailable, however some level of catch sampling is necessary to track the relative landings of stocks in a complex. Although the OFL and ABC of a stock complex can be the sum of the OFLs and ABCs for its individual stocks, the best scientific information available may not support the definition of stock-specific reference points. In the most data-poor situations, OFL and ABC may need to be based on the time series of aggregate stock catch.

The ABCs established for the indicator stocks for a complex as a whole should reflect the risk policy adopted by the Council. It is recommended by NMFS (2009) that indicator stocks be representative of the stocks within the complex with respect to their vulnerability to the fishery; otherwise the indicator stock should be chosen to represent the more vulnerable stocks in the complex. Similar rationale should be used when setting ABCs for the complex as a whole, which should take into account more vulnerable stocks within the complex. An important consideration in the use of stock complexes for management of data-poor species is that the catch of individual species within the complex is not monitored or controlled in-season. Consequently there is additional uncertainty associated with management by stock complexes that is not present when stocks are managed independently. If the objective is precautionary management, it may be necessary to build some additional conservatism into the system to account for the additional uncertainty associated with management using stock complexes. One approach would be to set an ACT for the stock complex that is less than ACL to account for management uncertainty.

V. DISCUSSION

This review of methods covers a wide range of scientific approaches to confront the challenges associated with recommending appropriate catch recommendations for data-poor stocks. Unlike previous guidance on data-poor stocks, we view the range of methods as a hierarchy, from the most informative to the most data-limited approaches, with the scalar approach recommended by Restrepo et al. (1998) for the bottom tier. A hierarchical approach to catch advice can be used for determining the most appropriate method for each stock in the short-term, depending on stock properties and data availability, as well as a broader perspective on how fishery and resource monitoring information can be improved to advance the catch advice to a more informative tier of methodology (e.g., Cadrin et al., 2004). The ORCS Working Group recognized these method-based tiers and developed an adaptive approach in which the appropriate method is hierarchical with the goal to eventually improve the scientific basis of catch limits.

The adaptive approach to determining appropriate methods for setting ABC accepts that lower-level approaches for the most data-poor stocks do not meet all of the needs of the mandated

management system or the desires of fishery stakeholders. Although it is beyond the scope of this report, the top-tier of scientific support is a stock assessment that incorporates and fully accounts for key sources of uncertainty to yield an estimate of the distribution of the OFL. Given this information on OFL and its statistical distribution, Fishery Management Councils can develop ABC control rules in which ABC is derived from an evaluation of scientific uncertainty and their acceptable probability of overfishing (see for example Ralston et al., In press). Several intermediate-tier methods (e.g., DB-SRA) support such a probabilistic approach to ABC and fully comply with NS1 guidelines. By contrast, lower tier methods (e.g., scalars of average catch) are not explicitly based on the Council's desired risk tolerance.

Lower tier methods are designed to provide catch advice so that the fishery will be sustainable, but the optimality of the derived catch and the probability of overfishing are not known. These deficiencies of the lower tier approaches can impose substantial costs in the form of larger uncertainty buffers and substantial foregone yield. The hierarchical and adaptive approach to data-poor methods for determining ABC provides incentives for improving the scientific information.

Ideally, the performance of each method in the tiered system should be evaluated for avoidance of overfishing and maintaining optimum yield (and any other potential benefits identified as management objectives) through simulation of an operating model that is tailored to the stock of interest. Furthermore, the entire tier system could be evaluated through management strategy evaluation if a decision rule is simulated for improving data and moving from lower to higher tiers.

While it is important to improve methods used to set ABCs for ORCS, even improved methods will never take the place of data and monitoring. Informed judgment plays a critical part in every ORCS approach. It cannot be avoided or assumed away. Data collection through research and monitoring are needed to eliminate the need for informed judgment.

VI. RESEARCH RECOMMENDATIONS

Due to the new requirements of the reauthorized Magnuson-Stevens Act (2006), development of methods to evaluate the status of data-poor stocks, including ORCS, is an active area of research. In particular, status determination and characterization of uncertainty are two focal study areas where significant advances are being achieved. In this regard, we believe that continued progress could be accomplished if additional research is conducted along the following lines:

- Develop and accept formal methods to elicit expert opinion from scientists, stakeholders, and managers.

- Conduct Management Strategy Evaluations (MSEs) to evaluate the robustness of methods used to characterize data-poor stocks and control rules for their management.
- Collect basic life history information on data-poor stocks, especially maximum age, to better inform estimation of natural mortality.
- Conduct stock delineation for fish species that occur over extensive ranges and/or overlapping jurisdictions.
- Improve the coverage and accuracy of catch sampling programs.
- As a basis for risk assessment, complete Productivity-Susceptibility Analyses (Patrick et al. 2009) for all stocks that are currently under fishery management plans.
- Increase the study of data-rich stocks within a meta-analytic framework to develop priors and proxies for application to data-poor stocks.
- Coordinate efforts to assemble regional landings statistics into databases in a comprehensive, thorough way.
- Monitor fishery indicators to provide additional information on sustainability of data-poor catch limits.

VII. CONCLUSIONS

The problem of setting appropriate catch levels (now called ABCs) for ORCS is not new, is not going away, and doesn't have an ideal solution. As discussed earlier, methods to deal with ORCS go back to the Restrepo et al. (1998) technical guidance. It is not realistic to assume that all, the majority of, or even many of these "data-limited" ORCS stocks will become "data-rich," allowing for comprehensive stock assessments. Past, present, and proposed methods all require the incorporation of "informed judgment" and major assumptions in critical steps of the process.

Given this situation and all of the information presented in this report, the ORCS Working Group recommends the following tiered approach to setting ABCs for ORCS:

- Apply DB-SRA to a stock, if possible. The main limitation here is the availability of a complete time series of historical catch, which is often not available.

- If it is not possible to apply DB-SRA, apply DCAC to a stock. DCAC's main limitation is that it is only appropriate for stocks with moderate to low natural mortality rates ($\leq$ 0.20 yr^{-1}).

- If DB-SRA and DCAC are not possible, apply the ORCS Working Group's Approach. The main limitation with this approach is that a number of critical decisions are required before it can be made operational. Some would also view this as an advantage, as it provides flexibility in its establishment.

- Finally, in some cases none of the above methods are practical for setting ABCs for an individual stock, as specific ORCS stocks may not have the capability to be effectively managed or monitored. In these cases, it may be best to use a stock complex approach. There are many limitations of applying a stock complex approach as described above, and the ORCS Working Group cautions against overusing or misusing this approach, as it may result in converse of precautionary management, exactly what MSA was designed to avoid.

Finally, we recommend moving forward with the research recommendations listed above, given the methods for setting ABCs for ORCS are in various stages of development and necessarily depend on adequate attention and funding in the future.

VIII. LITERATURE CITED

Anon. 2009. May 2009 Plenary Report Complete. Ministry of Fisheries, Government of New Zealand, 1,040 p. [http://fs.fish.govt.nz/Page.aspx?pk=113&dk=22080]

Branton, M., and J.S. Richardson. 2011. Assessing the value of the umbrella-species concept for conservation planning with meta-analysis. Cons. Biol. 25: 9-20.

Cadrin, S.X., J.A. Boutillier, and J.S. Idoine. 2004. A hierarchical approach to determining reference points for Pandalid shrimp. Can. J. Fish. Aquat. Sci. 61:1373-1391.

Clark, W.G. 1991. Groundfish exploitation rates based on life history parameters. Can. J. Fish. Aquat. Sci. 48:734-750.

Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). 2009a. Schedule of conservation measures in force (2009/10 season) *in* Article IX of the Convention on the Conservation of Antarctic Marine Living Resources. 232 p.

Cope, J. M., J. DeVore, E. J. Dick, J. Budrick, D. Erickson, J. Grebel, G. Hanshew, R. Jones, L. Mattes, C. Niles, and S. Williams. In press. An approach to defining species complexes for U.S. west coast groundfishes using vulnerabilities and ecological distributions. N. Am. J. Fish. Manage.

Department of Commerce (DOC). 2007. Magnuson-Stevens Fishery Conservation and Management Act. U.S.A. Public Law 94-265.

Dick, E. J., and A. D. MacCall. 2010. Estimates of sustainable yield for 50 data-poor stocks in the Pacific Coast groundfish fishery management plan. NOAA Tech. Memo. NMFS-SWFSC-460, 201 p.

Dick, E. J., and A. D. MacCall. In press. Depletion-Based Stock Reduction Analysis: a catch-based method for determining sustainable yields for data-poor fish stocks. Fish. Res..

Dulvy, N. K., Y. Sadovy, and J. D. Reynolds. 2003. Extinction vulnerability in marine populations. Fish. Fish. 4:25-64.

Ebell, M. 2001. Evidence-based diagnosis: A handbook of clinical prediction rules. Springer, New York. 416 p.

Fletcher, R.I. 1978. On the restructuring of the Pella-Tomlinson system. Fish. Bull. 76:515-521.

Hilborn, R. 2010. Pretty good yield and exploited fishes. Mar. Pol. 34:193-196.

Hoenig, J. M. 1983. Empirical use of longevity data to estimate mortality rates. Fish. Bull. 82:898-903.

MacCall, A. D. 2009. Depletion-corrected average catch: a simple formula for estimating sustainable yields in data-poor situations. ICES J. Mar. Sci. 66:2267-2271.

McAllister, M. K., E. A. Babcock, E. K. Pikitch, and M. H. Prager. 2000. Application of a non-equilibrium generalized production model to South and North Atlantic swordfish: combining Bayesian and demographic methods for parameter estimation. Col. Vol. Sci. Pap. ICCAT, 51:1523-1550.

Musick, J. A. 1999. Criteria to define extinction risk in marine fishes. Fisheries 24:6–14.

National Marine Fisheries Service (NMFS). 2009. Final rule national standard guidelines. 74 Federal Register (January 16, 2009). 3178-3212.

Patrick, W. S., P. Spencer, J. Link, J. Cope, J. Field, D. Kobayashi, P. Lawson, T. Gedamke, E. Cortés, O. Ormseth, K. Bigelow, and W. Overholtz. 2010. Using productivity and susceptibility indices to assess the vulnerability of United States fish stocks to overfishing. Fish. Bull. 108:305-322.

Patrick, W. S., P. Spencer, O. Ormseth, J. Cope, J. Field, D. Kobayashi, T. Gedamke, E. Cortés, K. Bigelow, W. Overholtz, J. Link, and P. Lawson. 2009. Use of productivity and susceptibly indices to determine stock vulnerability, with example applications to six U.S. fisheries. NOAA Tech. Memo. NMFS-F/SPO-101, 90 p.

Porch, C. E., A. M. Eklund, and G. P. Scott. 2006. A catch-free stock assessment model with application to goliath grouper (*Epinephelus itajara*) off southern Florida. Fish. Bull. 104:89-101.

Prager, M., and K. Shertzer. 2010. Deriving Acceptable Biological Catch from the Overfishing Limit: Implications for Assessment Models. N. Am. J. Fish. Manage 30:289-294.

Quinn, T. J., II, and R. B. Deriso. 1999. Quantitative Fish Dynamics. Oxford University Press, New York, NY. 542 p.

R Development Core Team. 2009. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0, URL http://www.R-project.org.

Ralston, S., A. E. Punt, O. S. Hamel, J. D. DeVore, and R. J. Conser. In press. A meta-analytic approach to quantifying scientific uncertainty in stock assessments. Fish. Bull..

Restrepo, V. R., G. G. Thompson, P. M. Mace, W. L. Gabriel, L. L. Low, A. D. MacCall, R. D. Methot, J. E. Powers, B. L. Taylor, P. R. Wade, and J. F. Witzig. 1998. Technical guidance on the use of precautionary approaches to implementing National Standard 1 of the Magnuson–Stevens Fishery Conservation and Management Act. NOAA Tech. Memo. NMFS-F/SPO-31, 54 p.

Restrepo, V. R., and J. E. Powers. 1999. Precautionary control rules in U.S. fisheries management: specifications and performance. ICES J. Mar. Sci. 56:846-852.

Rosenberg, A. A., J. H. Swasey, and M. Bowman. 2006. Rebuilding US fisheries: progress and problems. Front. Ecol. Environ. 4:303-308.

Shertzer, K., M. Prager, and E. Williams. 2008. A probability-based approach to setting annual catch levels. Fish. Bull. 106:225-232.

Shertzer, K. W. and E. H. Williams. 2008. Fish assemblages and indicator species: reef fishes off the southeastern United States. Fish. Bull. 106:257-269.

Walters, C. J., S. J. D. Martell, and J. Korman. 2006. A stochastic approach to stock reduction analysis. Can. J. Fish. Aquat. Sci. 63:212-223.

Witherell, D. (editor). 2010. Second National Meeting of the Regional Fishery Management Councils' Scientific and Statistical Committees. Report of a National SSC Workshop on Establishing a Scientific Basis for Annual Catch Limits. Caribbean Fishery Management Council, St. Thomas, November 10-13, 2009, 71 p.

Table 1. The Methot table showing possible actions for determining ABC based on different fishery impact categories and expert opinion. Taken from the workshop report of the 2nd National SSC meeting.

Historical Catch	**Expert Judgment**	**Possible Action**
Nil, not targeted	Inconceivable that catch could be affecting stock	Not in fishery; Ecosystem Component; SDC not required
Small	Catch is enough to warrant including stock in the fishery and tracking, but not enough to be of concern	Set ABC and ACL above historical catch; Set ACT at historical catch level. Allow increase in ACT if accompanied by cooperative research and close monitoring.
Moderate	Possible that any increase in catch could be overfishing	ABC/ACL = f(catch, vulnerability) So caps current fishery
Moderately high	Overfishing or overfished may already be occurring, but no assessment to quantify	Set provisional OFL = f(catch, vulnerability); Set ABC/ACL below OFL to begin stock rebuilding

Table 2. The natural variability factor, c, used in the New Zealand approach, as determined by the value of the natural mortality rate, M.

M	**c**
< 0.05	1.0
0.05-0.15	0.9
0.16-0.25	0.8
0.26-0.35	0.7
> 0.35	0.6

Table 3. Potential management objectives depending on stock status for ORCS Working Group Approach.

Stock status	Potential management objectives
Lightly exploited	Maintain current catch levels or allow for limited increases in catch
Moderately exploited	Maintain current catch levels
Heavily exploited, possibly overfished	Reduce catches to end overfishing

Table 4. Table of attributes for assigning stock status for historical catch-only assessments.

Overall scores are obtained by an unweighted average of the attributes for which scoring is possible, although alternative weighting schemes could also be considered. An initial assignment to a stock status category is: mean scores>2.5—heavily exploited; stocks with mean scores 1.5-2.5--moderately exploited; and stocks with mean scores<1.5--lightly exploited. When the attribute does not apply or is unknown it can be left unscored.

Attribute	Stock status		
	Lightly exploited (1)	**Moderately exploited (2)**	**Heavily exploited (3)**
Overall fishery exploitation based on assessed stocks	All known stocks are either moderately or lightly exploited. No overfished stocks	Most stocks are moderately exploited. No more than a few overfished stocks	Many stocks are overfished
Presence of natural or managed refugia	Less than 50% of habitat is accessible to fishing	50%-75% of habitat is accessible to fishing	>75% of habitat is accessible to fishing
Schooling, aggregation, or other behavior responses affecting capture	Low susceptibility to capture (specific behaviors depend on gear type)	Average susceptibility to capture (specific behaviors depend on gear type)	High susceptibility to capture (specific behaviors depend on gear type)
Morphological characteristics affecting capture	Low susceptibility to capture (specific characteristics depend on gear type)	Average susceptibility to capture (specific characteristics depend on gear type)	High susceptibility to capture (specific characteristics depend on gear type)
Bycatch or actively targeted by the fishery	No targeted fishery	Occasionally targeted, but occurs in a mix with other species in catches	Actively targeted
Natural mortality compared to dominant species in the fishery	Natural mortality higher or approximately equal to dominant species ($M \geq \overline{M}$)	Natural mortality equal to dominant species ($M \approx \overline{M}$)	Natural mortality less than dominant species ($M < \overline{M}$)
Rarity	Sporadic occurrence in catch	Not uncommon, mostly pure catches are possible with targeting	Frequent occurrence in catch
Value or desirability	Low value (< $1.00/lb, often not retained (< 33% of the time)	Moderate value ($1.00 - $2.25), usually retained (34-66% of the time)	Very valuable or desirable (e.g., > $2.25/lb), almost always retained (>66% of the time).
Trend in catches (use only when effort is stable)	Catch trend increasing or stable (assign score of 1.5)	Catch trend increasing or stable (assign score of 1.5)	Decreasing catches

Table 5. Recommended OFLs using ORCS Working Group Approach.

Stock category		
Lightly exploited ($B > B_{65\%}$)	Moderately exploited ($B \sim B_{MSY}$)	Heavily exploited ($B < B_{20\%}$)
2.0 x catch statistic	1.0 x catch statistic	0.50 x catch statistic

Table 6. Example ABC options for catch-only stocks using the ORCS Working Group Approach.

Risk level	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Low risk (high productivity)	0.75 x OFL	0.75 x OFL	0.90 x OFL	0.90 x OFL
Moderate risk (moderate productivity)	0.75 x OFL	0.75 x OFL	0.75 x OFL	0.80 x OFL
High risk (low productivity)	0.75 x OFL	0.50 x OFL	0.50 x OFL	0.70 x OFL

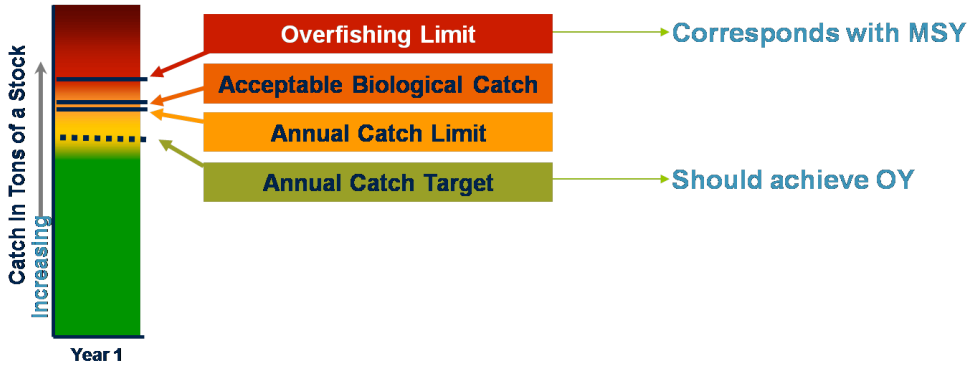

Figure 1. The relationship of catch reference points under National Standard 1.

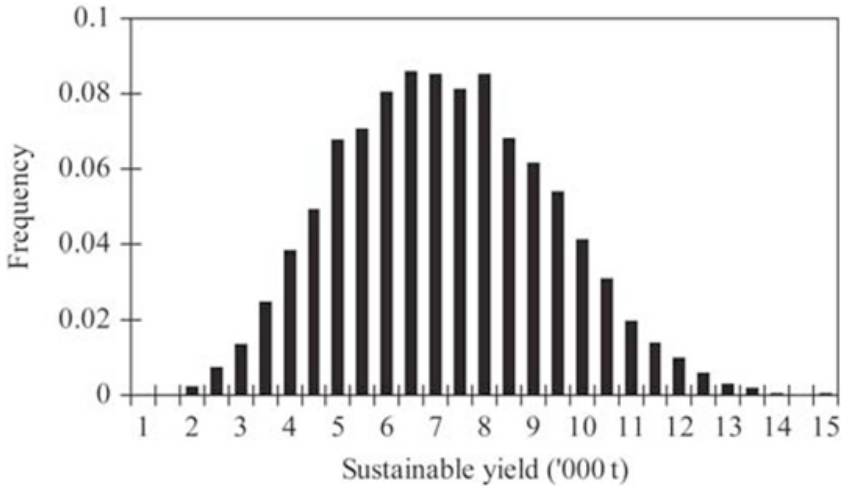

Figure 2. Distribution of 1989 widow rockfish yields from DCAC analysis (taken from MacCall 2009). The median of the sustainable yield distribution is 6,849 mt, which compares with MSY that was estimated to be 8,300 mt.

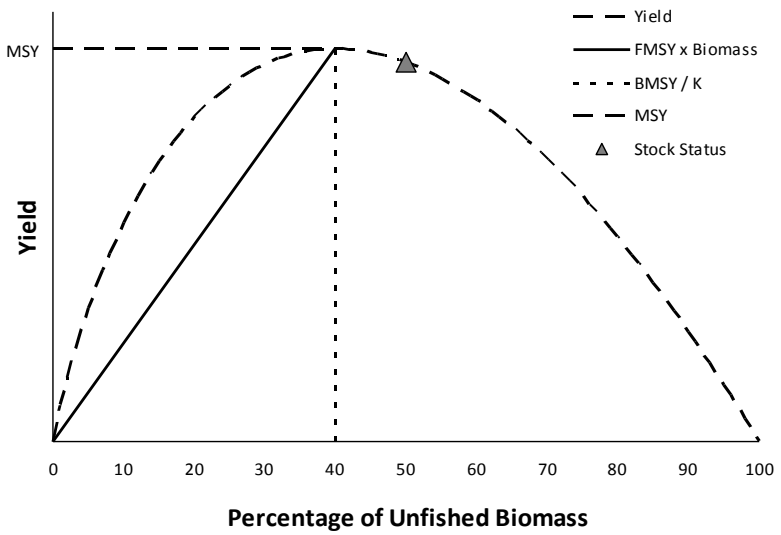

Figure 3. Graphical representation of one iteration of the DB-SRA method, shown on rescaled biomass ($B_0 = 1.0$).

The slope of the diagonal solid line is determined by the current value of F_{MSY}, which is the product of draws from the M and $F_{MSY} \div M$ distributions. The relative biomass that generates maximum sustainable yield (B_{MSY}/B_0) is also drawn from its distribution (value shown = 0.4). Lastly, stock status relative to unfished biomass is determined by a draw from the distribution of relative biomass depletion (Δ, value shown = 0.5). For each set of draws from the four input distributions, the catch time series determines the unique value of unfished biomass (B_0) that satisfies the current estimate of stock status. Figure courtesy of E.J. Dick.

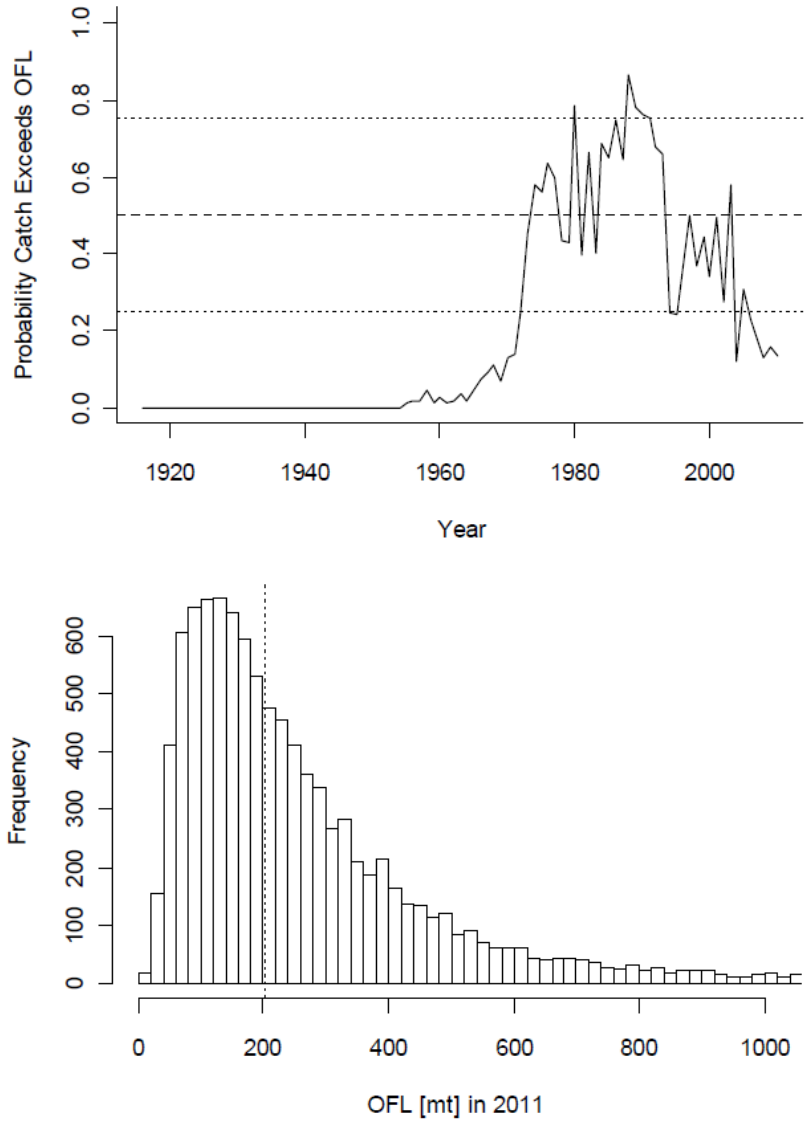

Figure 4. DB-SRA output for brown rockfish. The upper panel shows a time series of the probability that overfishing occurred in any particular year. The lower panel provides the posterior distribution of OFL in 2011 (vertical dotted line = median of distribution).

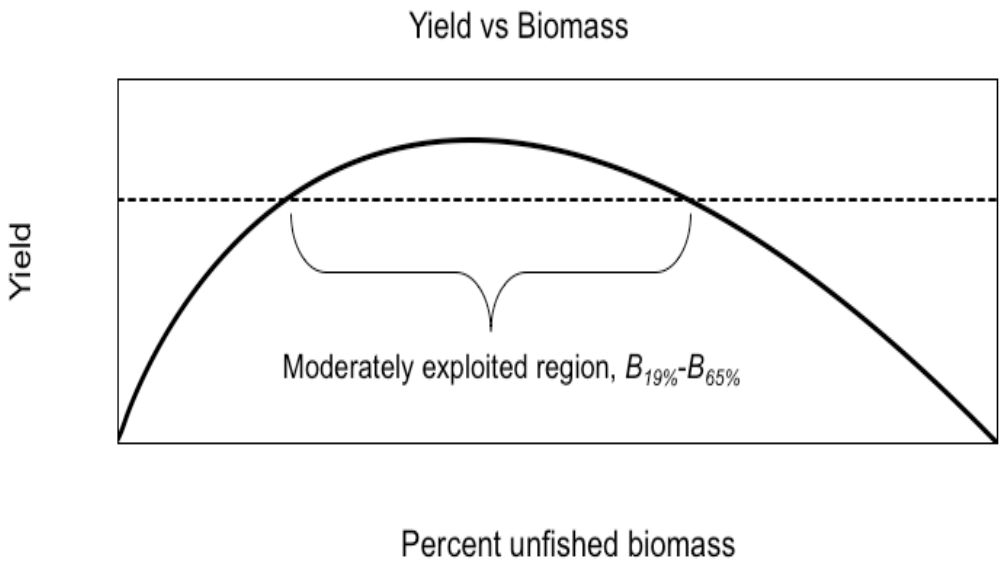

Figure 5. Equilibrium yield as a function of biomass for the Pella-Tomlinson model with n = 1.2.

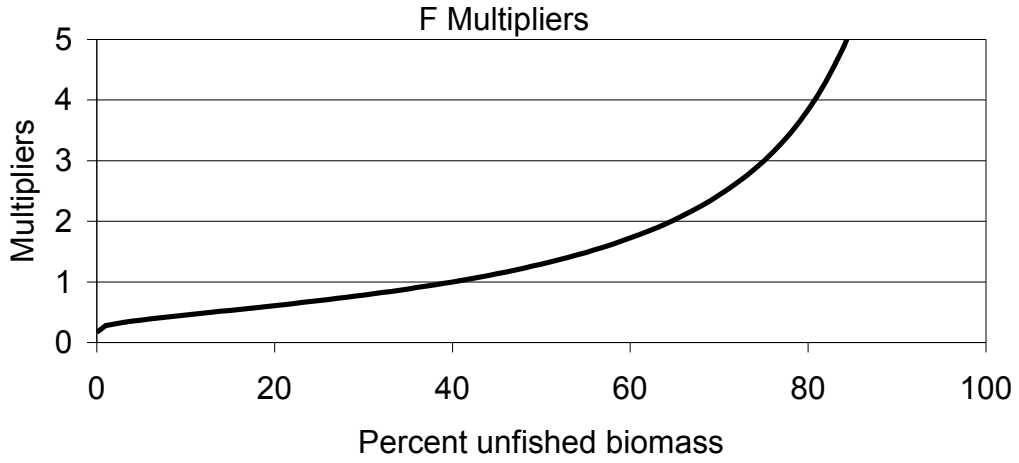

Figure 6. Multiplier for fishing mortality to reduce or increase fishing mortality to F_{MSY} for the Pella-Tomlinson model with n = 1.2.

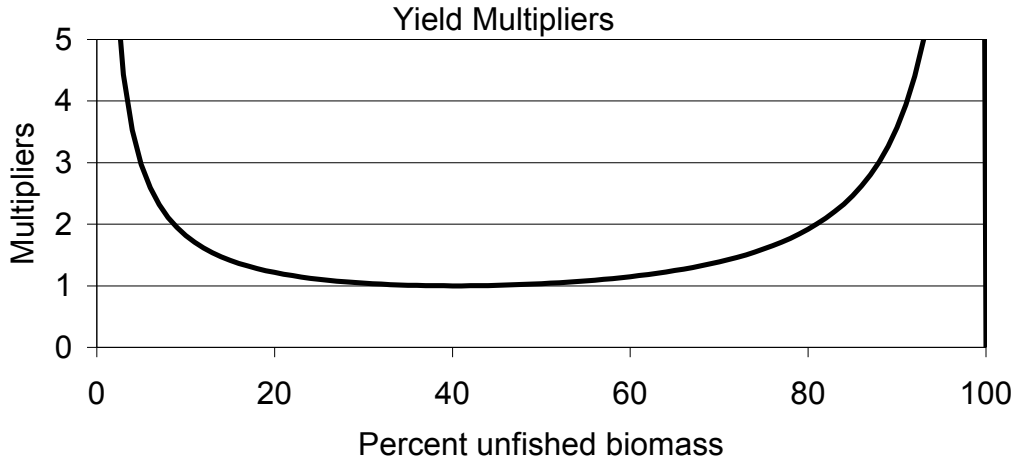

Figure 7. Multiplier for yield to reduce or increase yield to MSY for the Pella-Tomlinson model with n = 1.2.

SOUTH ATLANTIC FISHERY MANAGMENT COUNCIL

SCIENTIFIC AND STATISTICAL COMMITTEE

SSC ORCS WORKSHOP REPORT

August 1-3, 2012

Crowne Plaza
North Charleston, SC

PURPOSE

This workshop was convened to:

- Apply the ORCS approach to unassessed SAFMC stocks

CONTENTS

1. Introduction

1.1. Documents

Agenda

1.2. Action

Introductions
Review and Approve Agenda

The ORCS meeting was called to order at 3:00 pm, as scheduled. The agenda was adopted without change. Workshop participants (*see Section 3 below*) were introduced and their affiliations noted for the administrative record. The Chair reviewed the agenda and outlined meeting format and process.

2. Workshop Terms of Reference

The SSC ORCS sub-Committee developed Terms of Reference to guide the workshop.

1. Review and update the ORCS Table of Stock Attributes (Table 4 in the ORCS report) to better suit SAFMC-managed stocks.
2. Develop a scoring method for assigning stocks to exploitation categories (develop criteria for addressing missing values, weighting, range of scores for exploitation categories etc.). Consider developing a new exploitation category for 'special case' stocks or stocks with no reliable catch data. Assign stocks to exploitation categories.
3. Determine the appropriate catch statistic for OFL (e.g., mean, median, maximum, minimum, percentile, etc.). Identify the proper OFL scalar range to be applied to different exploitation categories.
4. Recommend a range of scalar values (to apply to OFL) that captures the Council's risk tolerance level for assigning ABC values for low risk (high productivity), moderate risk (moderate productivity), and high risk (low productivity) stocks.
5. Create a report to summarize and document work group findings.

3. Apply the ORCS Approach

3.1. Action

Address Workshop Terms of Reference

WORKSHOP MEETING SUMMARY:

To better address the Terms of Reference workshop participants were assigned to 3 breakout groups:

Life History and Ecology:
Jim Berkson (leader)
Eric Johnson (rapporteur)
Churchill Grimes
George Sedberry
Jeffrey Buckel
Luiz Barbieri
David Cupka (Chair, SAFMC)
John Jolley (member, SAFMC)

Fisheries Landings and Surveys:
Marcel Reichert (leader)
Chip Collier (rapporteur)
Carolyn Belcher
Yan Jiao
Doug Vaughan
Michelle Duval (member, SAFMC)

Fishery Characteristics:
Steve Cadrin (leader)
Anne Lange (rapporteur)
Sherry Larkin
Robert Johnson (Chair, Snapper-Grouper AP)
David Harter (Chair, Dolphin-Wahoo AP)
Bob Pelosi (Chair, Mackerel AP)
Ben Hartig (Vice Chair, SAFMC)
Charlie Philips (Member, SAFMC)

The first Term of Reference dealt with customizing the ORCS Table of Attributes to better suit SAFMC stocks. Points addressed by the 3 breakout groups and further discussed during plenary included:

- Levels for attributes reflect the risk of overfishing, not the exploitation level of the stock. Change 'Stock Status' heading to 'Risk of Over-Exploitation'. Also, sub-headings were changed to reflect above modification: Low, Medium, and High.
- It may be advisable to combine attribute 2 (managed refugia) with effectiveness of fishery regulations.

- Consensus was to keep attribute 4 (morphology), contrary to the Life History and Ecology group's suggestion, because this attribute reflects capture probability and therefore, as suggested by the Fishery Characteristics group, has information value.
- The 'Discard Mortality' attribute was modified to read discard mortality instead of discard mortality rate so that the attribute encompasses the mortality rate plus the magnitude of discards. Categories were modified to read Low, Medium, and High. , which could include some catchability issues (e.g. changes in technology).
- Habitat loss or alteration should stay as is. The time period applicable for this attribute should be based on the period of landings being considered.
- Concerning the effectiveness of regulations attribute, the working group felt that other ways should be developed to incorporate this attribute into the table since it affects several of the other criteria. The suggestion was made to modify this attribute to read 'Impacts of Regulations' in order to capture regulations that impact a species even though they were meant to regulate a different species.
- The working group felt that consideration should be given to modification of the fleet stability attribute to fleet productivity to capture some economic issues such as some catchability issues (e.g. changes in technology) as well as fishing efficiency. This attribute also needs to reflect changes in effort. Some of this information can be captured in the 'targeted fishery or bycatch' criteria.

According to the comments and suggestions discussed above the following table of attributes was produced:

Attribute	Risk of Overexploitation		
	Low (1)	**Moderate (2)**	**High (3)**
Overall fishery exploitation based on assessed stocks	All known stocks are either moderately or lightly exploited. No overfished stocks.	Most stocks are moderately exploited. No more than a few overfished stocks.	Many stocks are overfished.
Presence of natural or managed refugia	Less than 50% of habitat is accessible to fishing	50%-75% of habitat is accessible to fishing	>75% of habitat is accessible to fishing
Schooling, aggregation, or other behavior responses affecting capture	Low susceptibility to capture (specific behaviors depend on gear type)	Average susceptibility to capture (specific behaviors depend on gear type)	High susceptibility to capture (specific behaviors depend on gear type)
Morphological characteristics affecting capture	Low susceptibility to capture (specific characteristics depend on gear type)	Average susceptibility to capture (specific characteristics depend on gear type)	High susceptibility to capture (specific characteristics depend on gear type)
Discard mortality rate	Low	Medium	High
Bycatch or actively targeted by the fishery	No targeted fishery	Occasionally targeted, but occurs in a mix with other species in catches	Actively sought after
Natural mortality compared to dominant species in the fishery	Natural mortality higher or approximately equal to dominant species ($M \geq \overline{M}$)	Natural mortality higher or equal to dominant species ($M \approx \overline{M}$)	Natural mortality less than dominant species ($M < \overline{M}$)
Rarity	Sporadic occurrence in catch	Not uncommon, mostly pure catches are possible with targeting	Frequent occurrence in catch
Value or desirability	Low value, often not retained (<$1/lb)	Moderate value, usually retained ($1-$2.25/lb)	Very valuable or desirable (trophy fish or >$2.25/lb)
Trend in catches (use only when effort is stable)	Catch trend increasing or stable (assign score of 1.5)	Catches trend increasing or stable (assign score of 1.5)	Decreasing catches
Loss or alteration of habitat	No loss or alteration of habitat, or habitat is increasing	Habitat is being lost or altered and the rate is declining or staying constant	Habitat is being lost or altered and the rate is increasing
Fleet stability	Fleet/# of trips/effort decreasing	Fleet/# of trips/effort stable	Fleet/# of trips/effort increasing
Fishery Independent CPUE	Increasing in most recent years	stable in most recent years,	Decreasing in most recent years.
Effectiveness of regulations (other than ACLs) to limit exploitation	Most of the resource is protected from harvest (closed areas, size limits, seasons)	Considerable portions of the resource are protected	The resource is fully vulnerable to the fishery

In addressing Term of Reference #2 workshop participants came to the following consensus decisions:

- The ORCS table of attributes will be scored with equal weights.
- Missing values (i.e., unscored attributes) will be left as 'blanks' and not used in calculating the stock's final mean score.
- Stocks with no reliable catch data, i.e., stocks with very low landings that show very high variability in catch estimates (mostly caused by the high degree of uncertainty in recreational landings estimates), or stocks that have species identification issues that may cause unreliable landings estimates, will be removed from this exercise and moved to a new ABC control rule Tier 5 (unassessed stocks that do not qualify as ORCS). The table below lists SAFMC stocks removed from this ORCS application exercise. Table headings indicate the reason for considering these stocks as not having reliable catch.

Variability	Landings or Data Collection issues	Species ID
Black Snapper	Black Snapper	Almaco Jack
	Blackfin Snapper	Lesser Amberjack
	Sand Tilefish	Sailor's Choice
	Mahogany	Banded Rudderfish
	Dog Snapper	Yellowmouth Grouper
	Misty Grouper	Scup
	Sailor's Choice	Saucereye Porgy
	Coney	Jolthead Porgy
	Graysby	Knobbed Porgy
	Saucereye Porgy	Whitebone Porgy
	Scup	
	Queen Snapper	
	Warsaw grouper	
	Speckled hind	

Application of the revised and upgraded ORCS table of attributes to remaining stocks (i.e., after the non-ORCS stocks were removed from the analysis) resulted in the assignment of all stocks to the 'Moderate' risk of exploitation category.

To refine the analysis and achieve better resolution in assigning stocks to risk of exploitation categories (i.e., to better differentiate between risk levels for different stocks) workshop participants reviewed individual criteria and attributes discussed by the 3 breakout groups (Life History and Ecology, Landings and Surveys, and Fishery Characteristics). Then, based on group consensus and expert judgment the group assigned each stock to a final risk of exploitation category. Results are summarized on the table below (Qualitative Categorization column).

Species	MEAN	Exploitation Category	Life History	Fishery Characteristics	Fishery Surveys and Trends	Qualitative Categorization
bar jack	1.50	Moderate	Moderate	Low	Low	Low
margate	1.65	Moderate	Moderate	Low	Moderate	Moderate
rock hind	1.65	Moderate	Moderate	Low	Moderate	Mod High
red hind	1.73	Moderate	Moderate	Low	Moderate	Moderate
cubera snapper	1.79	Moderate	Moderate	Moderate	Low	Moderate
wahoo	1.80	Moderate	Low	Moderate	Moderate	Moderate
tomtate	1.83	Moderate	Low	Moderate	High	Mod High
blue runner	1.88	Moderate	Moderate	Moderate	Moderate	Moderate
yellowedge grouper	2.05	Moderate	Moderate	Moderate	Moderate	Moderate
hogfish	2.03	Moderate	High*	Moderate	Moderate	Mod High
blueline tilefish	1.94	Moderate	Moderate	Moderate	High	Moderate
silk snapper	2.00	Moderate	Moderate	Moderate	Moderate	Moderate
white grunt north			Moderate	Moderate	High	Mod High
white grunt south	2.08	Moderate	Moderate	Moderate	High	Moderate
atlantic spadefish	2.09	Moderate	Moderate	Moderate	Moderate	Moderate
gray snapper	2.10	Moderate	High	Moderate	Moderate	Moderate
dolphin	2.10	Moderate	Low*	High	Moderate	Mod Low
lane snapper	2.06	Moderate	High	Moderate	Low	Moderate
scamp	2.16	Moderate	Moderate	Moderate	Moderate	Mod High
gray triggerfish	2.25	Moderate	Moderate	Moderate (High)	Moderate (High)	Mod High

Unfortunately, we ran out of time and were not able to address Terms of Reference 3-5 at this workshop. The workgroup recommended meeting again in the spring of 2013 to complete application of the ORCS approach and finalize the report.

The group discussed the fact that several of the stocks included in this analysis (e.g., gray snapper, dolphin, white grunt) should have enough data to have stock assessments based on more traditional quantitative assessment methods—i.e., based on the data available they likely fall under higher tiers of our ABC control rule (the ORCS approach is tier 4). The SSC will discuss this issue in more detail at its October meeting.

Workshop adjourned.

SOUTH ATLANTIC FISHERY MANAGMENT COUNCIL

SCIENTIFIC AND STATISTICAL COMMITTEE

SSC ORCS WORKSHOP

August 1-3, 2012

SSC ORCS WORKSHOP II
April 8-9, 2013

Crowne Plaza
North Charleston, SC

PURPOSE

This workshop is convened to:

- Complete application of the ORCS approach to unassessed SAFMC stocks

CONTENTS

1. Introduction

1.1. Documents

Agenda
ORCS Workshop I Final Report

1.2. Action

Introductions
Review and Approve Agenda

The ORCS meeting was called to order at 1:00 pm, as scheduled. The agenda was adopted without change. Workshop participants were introduced and their affiliations noted for the administrative record. The Chair reviewed the agenda and outlined meeting format and process.

2. Workshop Terms of Reference

The SSC ORCS sub-Committee developed Terms of Reference to guide the workshop.

1. Review and update the ORCS Table of Stock Attributes (Table 4 in the ORCS report) to better suit SAFMC-managed stocks.
2. Develop a scoring method for assigning stocks to exploitation categories (develop criteria for addressing missing values, weighting, range of scores for exploitation categories etc.). Consider developing a new exploitation category for 'special case' stocks or stocks with no reliable catch data. Assign stocks to exploitation categories.
3. Determine the appropriate catch statistic for OFL (e.g., mean, median, maximum, minimum, percentile, etc.). Identify the proper OFL scalar range to be applied to different exploitation categories.
4. Recommend a range of scalar values (to apply to OFL) that captures the Council's risk tolerance level for assigning ABC values for low risk (high productivity), moderate risk (moderate productivity), and high risk (low productivity) stocks.
5. Create a report to summarize and document workgroup findings.

3. Apply the ORCS Approach

3.1. Documents

Attachment 1. April 2012 SSC Report
Attachment 2. ORCS Report
Attachment 3. ABC Control Rule
Attachment 4. ABC Recommendations
Attachment 5. SSC ORCS Group Summary
Attachment 6. Preliminary ORCS Application
Attachment 7. Preliminary ORCS Application Details
Attachment 8. MRAG PSA results
Attachment 9. NMFS PSA results
Attachment 10. MRAG PSA Gulf Results
Attachment 11. ORCS Application Workshop Draft
Attachment 12. ORCS Application Workshop Draft worksheet
Attachment 13. Preliminary evaluation of effort trends

3.2. Overview

The objective of the second workshop was to address Terms of Reference 3 and 4, which were not considered during the first workshop. Since there have been no changes in the ORCS method since the first workshop, and the intent of the workshop is to continue the work started previously we ask readers to refer to the ORCS workshop 1 report for details and full documentation on how Terms of Reference 1 and 2 were addressed.

4. WORKSHOP MEETING SUMMARY:

The workgroup reviewed progress and results from the first workshop and proceeded to address the remaining Terms of Reference:

3. ***Determine the appropriate catch statistic for OFL (e.g., mean, median, maximum, minimum, percentile, etc.). Identify the proper OFL scalar range to be applied to different exploitation categories.***

The group had an extensive discussion regarding the difficulties associated with choosing a catch statistic that would be appropriate for the full suite of stocks being considered for application of the ORCS method. Initial suggestions focused on using the median landings over a set time period. However, after further inspection the median was considered inadequate to represent the high fluctuation in landings—i.e., to appropriately capture the range of occasional high landings—and the group reached consensus on using the maximum catch over the period 1999-2007. The time period was chosen to (1) be consistent with the period of landings used in the Council's Comprehensive ACL Amendment, and (2) to minimize the impact of recent regulations and the economic down turn on the landings time series.

A few special case stocks had different landings time periods used for the catch statistic. Please refer to the table below for the time periods used for these stocks and to the April 2010 SSC meeting report for a description of the rationale used to choose the time periods.

Stock	Landings Period
Wahoo	1994-2003
Dolphin	1994-1997

The group also had extensive discussion regarding selection of a scalar to be associated with the catch statistic. Scalars should help capture the range of variability in landings so managers do not take action on random landings fluctuations or measurement error by interpreting them as overexploitation.

After much debate the group reached consensus on a scalar scheme consistent with the Risk of Overexploitation categories assigned to stocks in the first ORCS workshop:

Risk of Overexploitation	Scalar Value
Low	2
Moderate Low	1.75
Moderate	1.5
Moderate High	1.25

<u>Important Note</u>: given characteristics specific to South Atlantic stocks the group agreed that the "catch statistic × scalar" metric developed in this stage of the process may not represent a reliable proxy for OFL and, therefore, would not be called OFL or used as such.

The resulting values of "catch statistic × scalar" metric for the South Atlantic stocks in question can be found in the table below:

				Scalar X Catch Stats			
Stock	Risk of OverExpl.	Max. Catch		2	1.75	1.5	1.25
Bar Jack	Low	2.303442733		4.61			
Dolphin	Mod Low	1.54699779			2.71		
Margate	Moderate	2.731488304				4.1	
Red Hind	Moderate	1.131450531				1.7	
Cubera Snapper	Moderate	1.440948167				2.16	
Wahoo	Moderate	1.993493971				2.99	
Blue runner	Moderate	1.807000846				2.71	
Yellowedge Grouper	Moderate	1.648473237				2.47	
Blueline tilefish	Moderate	1.908467571				2.86	
Silk snapper	Moderate	2.124247472				3.19	
White Grunt (South)	Moderate	0.990796505				1.49	
Atlantic Spadefish	Moderate	2.743772279				4.12	
Gray snapper	Moderate	1.525352698				2.29	
Lane snapper	Moderate	1.460420169				2.19	
Rock Hind	Mod High	2.377527761					2.97
Tomtate	Mod HIgh	1.334877919					1.67
Hogfish	Mod HIgh	1.340823933					1.68
White Grunt (North)	Mod HIgh	0.990796505					1.24
Scamp	Mod High	1.332317715					1.67
Gray triggerfish	Mod HIgh	1.325207325					1.66

4. Recommend a range of scalar values (to apply to OFL) that captures the Council's risk tolerance level for assigning ABC values for low risk (high productivity), moderate risk (moderate productivity), and high risk (low productivity) stocks.

The next step in the process involves obtaining ABC values for each stock by multiplying the "catch statistic × scalar" metric (*here not being called OFL*) by a range of scalar values that reflects the SAFMC's risk tolerance level. After much discussion and input from the Council members participating in the workshop the group consensus was to follow the risk level described by Alternative A in the table below:

Risk level	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Low risk (high productivity)	0.75 x OFL	0.75 x OFL	0.90 x OFL	0.90 x OFL
Moderate risk (moderate productivity)	0.75 x OFL	0.75 x OFL	0.75 x OFL	0.80 x OFL
High risk (low productivity)	0.75 x OFL	0.50 x OFL	0.50 x OFL	0.70 x OFL

The resulting interim ABC values obtained (i.e., catch statistic × scalar × 0.75) for each stock can be found in the table below:

Stock	Risk of OverExpl.	ORCS ABC
Bar Jack	Low	3.4552
Dolphin	Mod Low	2.0304
Margate	Moderate	3.0729
Red Hind	Moderate	1.2729
Cubera Snapper	Moderate	1.6211
Wahoo	Moderate	2.2427
Blue runner	Moderate	2.0329
Yellowedge Grouper	Moderate	1.8545
Blueline tilefish	Moderate	2.1470
Silk snapper	Moderate	2.3898
White Grunt (South)	Moderate	1.1146
Atlantic Spadefish	Moderate	3.0867
Gray snapper	Moderate	1.7160
Lane snapper	Moderate	1.6430
Rock Hind	Mod High	2.2289
Tomtate	Mod HIgh	1.2514
Hogfish	Mod HIgh	1.2570
White Grunt (North)	Mod HIgh	0.9289
Scamp	Mod High	1.2490
Gray triggerfish	Mod HIgh	1.2424

However, the group also recognized that further input from the full Council would be necessary before a final decision on ABC scalar values could be obtained. The group proposes the Alternative A risk tolerance scheme as a starting value but suggests that the Council evaluate this issue in more detail at its June meeting and provide further guidance to the SSC on the risk tolerance level to be adopted.

Workshop adjourned.

APPENDIX I. REGULATORY IMPACT REVIEW

Introduction

The National Marine Fisheries Service (NMFS) requires a Regulatory Impact Review (RIR) for all regulatory actions that are of public interest. The RIR does three things: (1) It provides a comprehensive review of the level and incidence of impacts associated with a regulatory action; (2) it provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives which could be used to solve the problem; and (3) it ensures that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost effective way.

The RIR also serves as the basis for determining whether any proposed regulations are a "significant regulatory action" under certain criteria provided in Executive Order 12866 (E.O. 12866) and whether the approved regulations will have a "significant economic impact on a substantial number of small business entities" in compliance with the Regulatory Flexibility Act of 1980.

Problems and Objectives

The purpose and need, issues, problems, and objectives of this Amendment 29 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region are presented in **Chapter 1**, **Section 1.4**, and incorporated herein by reference.

Methodology and Framework for Analysis

This RIR assesses management measures from the standpoint of determining the resulting changes in costs and benefits to society. To the extent practicable, the net effects of the proposed measures for an existing fishery should be stated in terms of producer and consumer surplus, changes in profits, and employment in the direct and support industries. Where figures are available, they are incorporated into the analysis of the economic impacts of the different actions and alternatives.

Description of the Fishery

A description of the snapper grouper fishery is contained in Chapter 3 and is incorporated herein by reference.

Effects of Management Measures

This action will directly apply to the businesses that own and/or operate commercial and for-hire recreational fishing vessels that harvest snapper grouper species in the South Atlantic

exclusive economic zone (EEZ). It will also apply to recreational fishers who harvest those species from private or rental vessels in those waters.

Commercial vessels must have a valid commercial snapper grouper permit, which is a limited access permit for either an unlimited quantity of pounds per trip or no more than 225 pounds (lbs) per trip. The numbers of both valid unlimited and 225-lb permits have declined annually since 2008, resulting in increased concentration of the commercial sector of the fishery. As of July 3, 2014, there were 551 valid (and 18 renewable/transferrable) unlimited pounds permits and 113 valid (and 10 renewable/transferrable) 225-lb permits.

For-hire fishing vessels must have a valid charter/headboat permit for snapper grouper to harvest and possess snapper grouper species in the South Atlantic EEZ. As of July 3, 2014, there were 1,437 valid permits. The number of anglers that use private or rented boats to harvest the species in federal waters is unknown.

Action 1

Action 1 is an administrative action and would have no direct economic impact. Any indirect impact is dependent on following actions. The preferred alternative of **Action 1** would change the allowable biological catch (ABC) rule for Only Reliable Catch Stocks (ORCS) of the snapper grouper fishery. Presently, the ABC for these stocks is equal to the third highest landings from 1999 through 2009. The preferred alternative would change the ABC to the highest landings from 1999 through 2007 and multiply that by a scalar value and then by a risk tolerance scalar. There are 14 species identified as ORCS species, and they are Atlantic spadefish, bar jack, silk snapper, yellowedge grouper, gray triggerfish, lane snapper, margate, tomtate, white grunt, scamp, red hind, rock hind, cubera snapper and gray snapper. Silk snapper and yellowedge grouper are part of the Deepwater Complex; margate, tomtate, and white grunt are part of the Grunts Complex; red hind and rock hind are in the Shallow Water Grouper Complex, and cubera, lane and gray snapper belong to the Snappers Complex.

Action 2

Action 2 is an administrative action and would have no direct economic impact. Any indirect impact is dependent on following action. The preferred alternatives of **Action 2** would assign scalar values and risk tolerance levels for stocks deemed to have low, moderate and moderately high risk of overexploitation; the lower the risk, the higher the values and levels. Only bar jack is deemed by the South Atlantic Scientific and Statistical Committee (SSC) to be with low risk of overexploitation. Five of the stocks have a moderate high risk of overexploitation (gray triggerfish, rock hind, scamp, tomtate and white grunt), and eight with a moderate risk (Atlantic spadefish, cubera snapper, gray snapper, lane snapper, margate, red hind, silk snapper and yellowedge grouper).

Combined, the preferred alternatives of **Actions 1** and **2** would increase the ABC for the stocks with a low or moderate risk of overexploitation and decrease the ABC of those with a high risk of exploitation. These changes range from a 26.8% decrease to a 328.84% increase and represent potential changes in annual landings (**Table I-1**). All of the stocks deemed to have a

moderate high risk of overexploitation would have a lower ABC. The largest reduction would be the ABC for scamp; which would decrease by 136,739 lbs whole weight (ww).

Table I-1. Preferred Sub-alternatives 2b, 3b, and 4d of Action 2.

Only Reliable Catch Stocks	Complex	ABC (lbs ww)			
		Alt. 1	Pref. Sub-alt.	Change	% Change
Low Risk of Overexploitation					
Bar Jack		24,780	62,249	37,469	151.21%
Moderate Risk of Overexploitation					
Atlantic Spadefish		189,460	812,478	623,018	328.84%
Cubera Snapper	**Snappers**	24,680	63,265	38,585	156.34%
Gray Snapper	**Snappers**	795,743	1,247,132	451,389	56.73%
Lane Snapper	**Snappers**	119,984	203,486	83,502	69.59%
Margate	**Grunts**	29,889	76,792	46,903	156.92%
Red Hind	**Shallow Water Grouper**	24,867	33,084	8,217	33.04%
Silk Snapper	**Deepwater**	25,104	90,323	65,219	259.79%
Yellowedge Grouper	**Deepwater**	30,221	55,596	25,375	83.96%
Moderate High Risk of Overexploitation					
Gray Triggerfish		626,518	717,000	90,482	14.42%
Rock Hind	**Shallow Water Grouper**	37,953	37,493	-460	-1.21%
Scamp		509,788	373,049	-136,739	-26.82%
Tomtate	**Grunts**	80,056	92,670	12,614	15.76%
White Grunt	**Grunts**	674,033	643,889	-30,144	-4.47%

The changes to the ABCs for species within a complex are combined to yield the change to the ABC for the complex. For example, the total ABC for the Grunts Complex would increase by 29,373 lbs ww, which is the sum of the changes of the ABCs for margate, tomtate, and white grunt. Currently, the total ABC for the Grunts Complex is 806,652 lbs ww and the preferred alternatives would increase the total ABC for the Grunts Complex to 836,025 lbs ww, which is an increase of approximately 4% (**Table I-2**). The total ABC would increase for all four species complexes (**Tables I-2** and **I-3**).

Table I-2. Comparison of Alternative 1 (No Action) and proposed (prop.) changes (Preferred Sub-Alternatives 3b and 4d) of Action 2 by species complex.

Species Complex	ABC (lbs ww)			
	Current	Prop.	Prop. Change	Percent Change
Grunts	806,652	836,025	29,373	3.64%
Shallow Water Grouper	96,432	104,190	7,758	8.05%
Snappers	944,239	1,517,716	573,477	60.73%

Table I-3. Comparison of Alternative 1 (No Action) and proposed (prop.) changes (Preferred Sub-Alternative 3b) of Action 2 for Deepwater Complex.

Species Complex	With or Without Blueline Tilefish	ABC (lbs ww)			
		Current	Prop.	Prop. Change	Percent Change
Deepwater	**With**	711,025	801,619	90,594	12.74%
	Without	79,684	170,278	90,594	113.69%

Note that **Table I-3** includes consideration for temporary and permanent changes of the ABC for the Deepwater Complex. An emergency rule temporarily removed blueline tilefish from the complex, and its permanent removal from the complex is being considered in Amendment 32 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region (Amendment 32).

Action 3

Action 3 would set the total annual catch limit (ACL) for each of the four individual stocks and three of the four complexes. **Action 3** does not include the Deepwater Complex. Consequently, although the preferred alternatives of **Actions 1** and **2** include changes of the ABCs for two species within the Deepwater Complex, this action would not change the total ACL for the Deepwater Complex.

Preferred Alternative 2 of **Action 3** would set the total ACL equal to the revised total ABC (and OY) for three of the four complexes (Grunts, Snappers, and Shallow Water Grouper) and Atlantic spadefish, bar jack, and gray triggerfish. **Preferred Alternative 4** would set the total ACL for scamp at 90% of its total ABC.

The revised total ACLs are allocated to the commercial and recreational sectors. This rule would not change the current percentages of a total ACL allocated to either sector. As shown in **Table I-4**, the total ACLs for six of the seven species/species complexes would increase, while the total ACL for scamp would decrease.

Table I-4. Comparison of Alternative 1 (No Action) and proposed (prop.) total ACLs (Preferred Alternatives 2 and 4) for species/species complex.

Species or Complex	Total		
	Current	Prop.	Prop. Change
Atlantic Spadefish	189,460	812,478	623,018
Bar Jack	24,780	62,249	37,469
Gray Triggerfish	626,518	836,025	209,507
Grunts	806,652	836,025	29,373
Scamp	509,788	335,744	-174,044
Shallow Water Grouper	96,432	104,190	7,758
Snappers	944,239	1,517,716	573,477

The preferred alternatives would reduce the commercial and recreational ACLs for scamp and increase the commercial and recreational ACLs for Atlantic spadefish, bar jack, gray triggerfish, and the Shallow Water Grouper and Snappers Complexes (**Table I-5**). The commercial ACL for the Grunts Complex would decrease, but its recreational ACL would increase.

Table I-5. Comparison of Alternative 1 (No Action) and proposed (prop.) ACLs (Preferred Alternatives 2 and 4) for species or species complex by sector.

Species or Complex	Commercial Sector			Recreational Sector		
	Current	Prop.	Prop. Change	Current	Prop.	Prop. Change
Atlantic Spadefish	35,108	150,552	115,444	154,352	661,926	507,574
Bar Jack	5,265	13,228	7,963	19,515	49,021	29,506
Gray Triggerfish	272,880	312,325	39,445	353,638	404,675	51,037
Grunts	218,539	217,903	-636	588,113	618,122	30,009
Scamp	333,100	219,375	-113,725	176,688	116,369	-60,319
Shallow Water Grouper	49,776	55,542	5,766	46,656	48,648	1,992
Snappers	215,662	344,884	129,222	728,577	1,172,832	444,255

Commercial Sector:

The above changes in the commercial ACLs represent potential changes in annual landings. First, changes in ACLs would have no effects if there were no corresponding accountability measures (AMs) to cap landings when they reach or are projected to reach the ACLs. However, the above four individual species and three complexes have AMs that close the commercial season for the remainder of the fishing year when landings reach or are projected to reach the commercial ACL. Once a commercial season is closed, all sale or purchase of the species or complex is prohibited and harvest or possession of the relevant species in the South Atlantic EEZ is limited to the (recreational) bag and possession limit. Second, if annual landings of a stock (either individual species or complex) have and are expected to remain substantially less than its current ACL, an increase in the ACL would be expected to produce no change in annual landings. Similarly, if the ACL for a stock is reduced but annual landing of that stock have been and are expected to remain less than the lower revised ACL, the decrease in the ACL would be expected to have no impact on annual landings of that stock. Consequently, estimates of expected changes of annual landings require a comparison of baseline landings to the current and proposed ACLs.

The fishing year for snapper grouper species is from January 1 through December 31. However, commercial fishing for scamp and shallow water grouper complex is prohibited from January 1 through April 30 each year. Only one commercial season closed early in 2013 (gray triggerfish closed on July 13), and in 2012, the commercial seasons for scamp and the shallow water grouper complex closed on October 20th to reopen from November 13 through 21 (**Table I-6**). However, the early closures of the scamp and shallow water grouper complex seasons were not because their landings reached or exceeded their ACLs, but instead were the seasons were required to close when the commercial season for gag grouper closed that year. More recently, the commercial season for gray triggerfish closed on May 12, 2014.

Table I-6. Commercial seasons that closed early in 2012, 2013 and as of June 19, 2014.

Year	Closed Early	Date Closed
2014[1]	Gray Triggerfish	May 12
2013	Gray Triggerfish	July 13
2012	Scamp and Shallow Water Grouper	October 20 & re-opened November 13 - 21.

1. As of June 23, 2014.

If annual commercial landings of a stock exceed its commercial ACL and the stock is overfished, the commercial ACL for the following year is reduced by the amount of the overage in the prior fishing year. None of the four individual species or three complexes above is or has been overfished during the above time period.

Three alternative baseline landings are used to estimate the range of economic impacts of **Action 3** on the commercial sector: 1) the average of 2013 and projected 2014 landings, 2) the average of 2012, 2013, and projected 2014 landings, and 3) the average of 2012 and 2013 landings. All three variations of baseline landings for Atlantic spadefish, Grunts Complex, scamp, Shallow Water Grouper Complex, and Snappers Complex are less than their current and proposed commercial ACLs (**Table I-7**). Hence, the proposed action is expected to have no additional effect on commercial landings (both by weight and value) of Atlantic spadefish, Grunts Complex, scamp, Shallow Water Grouper Complex and Snappers Complex (**Table I-8**).

All three variations of baseline commercial landings of gray triggerfish exceed the current commercial ACL (**Table I-7**). The proposed action would increase the commercial ACL for gray triggerfish by 39,445 lbs ww. The baseline landings exceed the current ACL from 22,978 to 34,726 lbs ww. Therefore, the proposed action is expected to increase annual landings of gray triggerfish from 22,978 to 34,726 lbs ww, although annual landings potentially could increase by as much as 39,445 lbs ww. In 2013, the average dockside price of gray triggerfish in the South Atlantic Region was $1.92 per lb ww (NMFS SERO ALS data). From that it is estimated that the proposed action would increase annual dockside revenue from gray triggerfish landings from $44,117 to $66,674 (**Table I-8**).

Baseline commercial landings of bar jack exceed the current commercial ACL from 0 to 1,429 lbs ww (**Table I-7**) and the proposed action would increase the commercial ACL for bar jack by 7,963 lbs ww. Thus, the proposed action is expected to increase annual landings of bar jack from 0 to 1,429 lbs ww, although potentially they could increase by as much as 7,963 lbs ww. In 2013, the average dockside price of bar jack in the South Atlantic Region was $1.36 per lb ww. Consequently, the proposed action would be expected to increase annual dockside revenue from bar jack landings from $0 to $1,944 (**Table I-8**). The total annual increase in dockside revenue would range from $44,177 to $68,618 ($ 2013).

Table I-7. Annual and averages of commercial landings and ACL for seven stocks, 2012, 2013, and January 1 through June 19, 2014.

Year	Atlantic Spadefish		Bar Jack		Gray Triggerfish		Scamp	
	Lbs ww	ACL	Lbs ww	ACL	Lbs ww	ACL	Lbs ww	ACL
2014[1]	1,091	35,108	3,325	5,265	289,120	272,880	52,221	333,100
2013	3,152	35,108	6,250	5,265	302,595	272,880	130,942	333,100
2012	27,416	36,476	4,072	6,686	312,617	305,262	175,564	341,636
Exp. 2014[2]	2,342		7,139		289,120		255,883	
Ave. 2012-13 & exp. 2014	10,970		5,820		301,444		187,463	
Ave. 2013 & exp. 2014	2,747		6,694		295,858		193,412	
Ave. 2012 - 13	15,284		5,161		307,606		153,253	

Year	Grunts		Shallow Water Groupers		Snappers	
	Lbs ww	ACL	Lbs ww	ACL	Lbs ww	ACL
2014[1]	40,719	218,539	10,496	49,776	32,717	215,662
2013	95,194	218,539	19,417	49,776	133,666	215,662
2012	106,375	214,624	17,813	49,888	124,939	204,552
Exp. 2014[2]	87,426		51,430		22,536	
Ave. 2012-13 & exp. 2014	96,332		29,553		93,714	
Ave. 2013 & exp. 2014	91,310		35,424		78,101	
Ave. 2012 - 13	100,785		18,615		129,303	

1. Landings from January 1 through June 19, 2014.
2. Projected 2014 landings assuming average daily rate through June 19, 2014, applies through rest of year.

Table I-8. Expected changes in dockside revenue due to Action 3.

Stock	Expected Change in Annual Landings	
	Lbs ww	Revenue ($ 2013)
Atlantic Spadefish	0	$0
Bar Jack	0 - 1,429	$0 - $1,944
Gray Triggerfish	22,978 - 34,726	$44,117 - $66,674
Grunts	0	$0
Scamp	0	$0
Shallow Water Groupers	0	$0
Snappers	0	$0
Total	22,978 to 36,155	$44,117 to $68,618

The above increases in annual dockside revenue are expected to be accompanied by higher annual trip-related costs. Consequently, the expected change in annual net dockside revenue is expected to be less than $44,177 to $68,618.

Recreational Sector:

A single baseline of the average of 2012 and 2012 recreational landings is used to estimate the annual impacts of **Action 3** on the recreational sector (**Table I-9**). Baseline recreational

landings are less than the current recreational ACL for Atlantic spadefish, bar jack, Grunts Complex, scamp, Shallow Water Grouper Complex, and Snappers Complex. As shown previously in **Table I-5**, **Action 3** would increase the recreational ACLs for Atlantic spadefish, bar jack, Grunts Complex, Shallow Water Grouper Complex, and Snappers Complex. Consequently, **Action 3** is not expected to change annual recreational landings of and associated economic benefits from Atlantic spadefish, bar jack, Grunts Complex, Shallow Water Grouper Complex and Snappers Complex.

The preferred alternatives of **Action 3** would reduce the recreational ACL for scamp to 116,369 lbs ww. Baseline recreational landings of scamp are substantially lower than that figure. Hence, **Action 3** is not expected to change recreational landings of and associated economic benefits from scamp.

Baseline recreational landings of gray triggerfish are greater than the stock's current recreational ACL by 25,087 lbs ww and **Action 3** would increase the recreational ACL by 51,037 lbs ww. From those figures, it is expected that **Action 3** would increase annual recreational landings of gray triggerfish by 25,087 lbs ww. That annual increase would have associated increases in net economic benefits from recreational harvest of gray triggerfish that cannot be quantified at this time.

Table I-9. Annual and average annual recreational landings and ACLs for species/species complexes affected by Action 3.

Year	Atlantic Spadefish		Bar jack		Gray triggerfish		Scamp	
	Lbs ww	ACL	Lbs ww	ACL	Lbs ww	ACL	Lbs ww	ACL
2013	53,878	154,352	2,209	19,515	373,983	353,638	45,813	176,688
2012	187,106	246,365	2,559	13,834	383,466	367,303	78,446	150,936
Average	120,492		2,384		378,725		62,130	

Year	Grunts		Shallow Water Groupers		Snappers	
	Lbs ww	ACL	Lbs ww	ACL	Lbs ww	ACL
2013	359,382	588,113	26,959	46,656	803,450	728,577
2012	408,318	562,151	19,552	48,329	428,982	
Average	383,850		23,256		616,216	

Action 4

Action 4 would change the minimum size limit for gray triggerfish and enlarge the area of the South Atlantic EEZ where the minimum size limit would apply. Presently, the minimum size limit for gray triggerfish is 12 inches total length (TL) and only applies in the South Atlantic EEZ off Florida. The preferred alternatives would specify a minimum size limit of 12 inches fork length (FL) in federal waters off North Carolina, South Carolina, and Georgia and a minimum size limit of 14 inches FL in federal waters off Florida's east coast.

Commercial Sector:

During 2007-2012, commercial landings in Florida accounted for 14% to 24% and North Carolina, South Carolina, and Georgia combined to account for 76% to 86% of the annual gray triggerfish commercial harvest in the South Atlantic. Those ranges of percentages are applied to the current commercial ACL (272,880 lbs ww) for gray triggerfish to estimate baseline landings for Florida and the three combined states (**Table I-10**).

Table I-10. Baseline annual commercial landings of gray triggerfish by area.

Area	Range of Baseline Commercial Landings (lbs ww)	
	If 14% FL & 86% NC,SC,GA	If 24% FL and 76% NC,SC,GA
FL East Coast	38,203	65,491
NC, SC & GA	234,677	207,389

It is estimated that **Preferred Sub-alternative 3a** would reduce baseline commercial landings of the North Carolina, South Carolina, and Georgia from 1% to 3% and **Preferred Sub-alternative 5a** would reduce baseline commercial landings in Florida from 14% to 22%. The ranges of annual losses of commercial gray triggerfish landings would be as low as from 5,348 to 8,404 lbs ww ($10,269 to $16,137) in Florida if 14% of annual landings is landed in Florida to as high as from 9,169 to 14,408 lbs ww ($17,604 to $27,663) in Florida if 24% of landings are in Florida. Similarly, the ranges of annual losses of commercial gray triggerfish landings in the combined states of North Carolina, South Carolina, and Georgia would be as low as 2,074 to 6,222 lbs ww ($3,982 to $11,946) to as high as 2,347 to 7,040 lbs ww ($4,506 to $13,517) (**Table I-11**). Note that the figures in **Table I-3** do not include the increase of the commercial ACL due to **Action 3**.

Table I-11. Expected decrease in annual commercial landings (lbs ww and $ 2013) due to Action 4 without increase of commercial ACL of Action 3. Average price of $1.92 per lbw w (NMFS SERO ACL data).

Area	Range of Decreases in Commercial Landings (lbs ww) by Area due to Action 4	
	If 14% FL & 86% NC,SC,GA	If 24% FL and 76% NC,SC,GA
FL East Coast	5,348 to 8,405 ($10,269 to $16,137)	9,169 to 14,408 ($17,604 to $27,663)
NC, SC & GA	2,347 to 7,040 ($4,506 to $13,517)	2,074 to 6,222 ($3,982 to $11,946)
Total	7,695 to 15,445 ($14,775 to $29,654)	11,243 to 20,630 ($21,586 to $39,609)

As stated previously, **Action 3** is expected to increase annual commercial landings of gray triggerfish from 22,987 to 34,726 lbs ww. That would represent increases in annual baseline commercial landings in Florida from 3,219 to 4,862 lbs ww if Florida represents 14% of all landings and 5,515 to 8,334 lbs ww if Florida's landings represent 24% of the total (**Table I-12**).

Table I-12. Expected increase in annual commercial landings (lbs ww and $ 2013) due to Action 3, independent of Action 4. Average price of $1.92 per lbw w (NMFS SERO ACL data).

Area	Range of Increases in Commercial Landings (lbs ww) by Area due to Action 3	
	If 14% FL & 86% NC,SC,GA	If 24% FL and 76% NC,SC,GA
FL East Coast	3,219 to 4,862 ($6,179 to $9,334)	5,517 to 8,334 ($10,592 to $16,002)
NC, SC & GA	19,769 to 29,864 ($37,956 to $57,340)	17,470 to 26,392 ($33,543 to $50,672)
Total	22,987 to 34,726 ($44,117 to $66,674)	22,987 to 34,726 ($44,117 to 66,674)

The above economic impacts of these two actions are combined to estimate the net change in landings of gray triggerfish (by weight and value) due to **Actions 3** and **4**. The combined impact is expected to be a net increase in annual landings by weight and value in the South Atlantic Region; however, there would be a net beneficial impact in North Carolina, South Carolina, and Georgia and a net adverse impact in Florida. The net annual increase of dockside revenues from gray triggerfish landings in North Carolina, South Carolina, and Georgia would range from $22,548 to $27,064 if the states' combined landings represent 76% of the total and from $29,363 to $37,020 if the states' landings represent 86% of the total (**Table I-13**). The net annual decrease of dockside revenues from gray triggerfish landings in Florida would range from $4,087 to $6,803 if 14% of the landings occur in Florida or from $7,012 to $11,662 if 24% of total landings are in Florida.

Table I-13. Net changes in commercial gray triggerfish landings by area due to Actions 3 and 4 combined.

Area	Range of Net Change in Commercial Landings (lbs ww) by Area due to Actions 3 & 4	
	If 14% FL & 86% NC,SC,GA	If 24% FL and 76% NC,SC,GA
FL East Coast	-2,129 to -3,543 (-$4,087 to -$6,803)	-3,652 to -6,074 (-$7,012 to -$11,662)
NC, SC & GA	17,422 to 22,824 ($33,450 to $43,822)	15,396 to 20,170 ($29,560 to $38,726)
Total	15,293 to 19,281 ($29,363 to $37,020)	11,744 to 14,096 ($22,548 to $27,064)

Commercial fishermen in these states, especially Florida, may take action to mitigate for the expected losses of landings due to **Action 4**. For example, in Florida fishermen may increase targeting of gray triggerfish in state waters, where there would be a smaller minimum size limit, or they may increase the number or length of trips in federal waters. However, the ability to mitigate is dependent on additional actions, specifically, the length of the open commercial fishing season (which would be split into two parts by **Action 5**) and establishment of a commercial trip limit for gray triggerfish (which would be set at 1,000 lbs ww by **Action 6**). Dealers who purchase gray triggerfish harvested by these commercial fishermen would experience indirect adverse economic impacts in the form of smaller net revenues from wholesale sales of gray triggerfish.

Recreational Sector:

It is estimated that **Preferred Sub-alternative 3b** would reduce annual recreational landings of gray triggerfish in the South Atlantic Region from 2.7% to 3.7%. From 2008 through 2012, an annual average of 459,031 lbs ww of gray triggerfish was landed in the South Atlantic States. From that it is estimated that **Preferred Sub-alternative 3b** would reduce annual recreational landings of gray triggerfish in North Carolina, South Carolina, and Georgia by 12,394 to 16,984 lbs ww. It is also estimated that **Preferred Sub-alternative 5b** would reduce annual recreational landings in the Region from 4.9% to 6.0%. From those figures, it is estimated that **Preferred Sub-alternative 5b** would reduce annual recreational landings in Florida from 22,493 to 27,542 lbs ww. There are insufficient data to estimate the dollar equivalents of those losses of pounds.

Action 5

Given the preferred alternatives under **Actions 3** and **4**, if the South Atlantic Fishery Management Council (South Atlantic Council) did chose **No Action (Alternative 1)** as its preferred alternative for **Action 5**, the commercial season for gray triggerfish is expected to be extended by 15 days. **Preferred Alternative 2** would split the season into two six-month periods, January through June, and July through December, with each season receiving 50% of the allocation. However, the South Atlantic Council's selection of **Preferred Alternative 2** would have the first split season lasting 20 days longer than **Alternative 1, No Action** and the second split season would last 8 days longer than **Alternative 1, No Action**.

Whether a single 12-month season or two 6-month seasons, annual commercial landings are capped by the commercial ACL. This action would affect the rate of commercial landings, but likely would not affect the annual total landings. Although it is unknown how having split seasons for gray triggerfish would actually affect future fishing behavior, it may reduce the current average monthly rate from January through June and increase the current average monthly rate from July through December. Regardless of which seasonal scenario was chosen as the preferred alternative, it is expect that the entire ACL will be caught, therefore none of the alternatives of **Action 5** is not expected to change the economic benefits or costs of the commercial gray triggerfish fishery.

Action 6

This action would establish a commercial trip limit for gray triggerfish. **Preferred Alternative 2, Sub-Alternative 2b** would establish a trip limit of 1,000 lbs ww. The purpose of the trip limit is to extend the fishing season longer. It is expected that even with the trip limit and the effects of the other actions of this amendment, the entire ACL of gray triggerfish will continue to be harvested each season and fishermen will be expected to be able to receive the full economic benefit of harvesting the entire ACL regardless of the selected alternative of this action.

Commercial trip limits, in general, are not economically efficient because they limit vessels from benefiting from economies of scale. They have a tendency to increase some fishing trip costs when a trip must stop targeting a specific species because its trip limit has been reached.

Unless a vessel that has reached its limit of the targeted fish can easily move into targeting a different species on the same trip, trip costs associated with the species where the limit has been reached will increase because it will require more annual trips by vessels to catch the ACL. Depending on vessel characteristics and the distance required to travel to fish, a trip limit that is too low could result in targeted trips being cancelled altogether if the vessel cannot target other species on the same trip.

If the entire commercial ACL of gray triggerfish is caught in a single fishing year and fishermen are able to continue to have profitable trips at the same rate, none of the alternatives or sub-alternatives of **Action 6** would result in positive or negative economic changes from the status quo. However, it is not possible to estimate the number of trips that might be foregone should a trip limit be set too low to be deemed profitable. Additionally, lower trip limits would require more trips to land the ACL. The additional trip costs associated with the "extended season" trips would reduce the profits attributable to the fishery. A mitigating factor that could offset some of the additional trip costs would be if the ex-vessel price per pound of the species goes up because there would be fewer fish on the market. However, only 2.29% of trips in 2012 landed more than 1,000 lbs ww; therefore, it is expected that relatively few trips will be affected by this action.

Public and Private Costs of Regulations

The preparation, implementation, enforcement, and monitoring of this or any Federal action involves the expenditure of public and private resources, which can be expressed as costs associated with the regulations. Costs associated with this action include, but are not limited to South Atlantic Council costs of documentation preparation, meeting, and other costs; NMFS administration costs of document preparation, meetings and review, and annual law enforcement costs. A preliminary estimate is up to from $100,000 to $150,000 before annual law enforcement costs, if any.

Determination of Significant Regulatory Action

Pursuant to E.O. 12866, a regulation is considered a "significant regulatory action" if it is expected to result in: (1) an annual effect of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities; (2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; (3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights or obligations of recipients thereof; or (4) raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this executive order.

This rule would not have an adverse economic effect of $100 million or more, create a serious inconsistency or otherwise interfere with an action taken by another agency, materially alter the budgetary impact of programs or rights or obligations of recipients, or raise novel legal or policy issues. Hence, it is not a significant regulatory action.

Appendix J. Regulatory Flexibility Analysis

Introduction

The purpose of the Regulatory Flexibility Act (RFA) is to establish a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and applicable statutes, to fit regulatory and informational requirements to the scale of businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure that such proposals are given serious consideration. The RFA does not contain any decision criteria; instead, the purpose of the RFA is to inform the agency, as well as the public, of the expected economic impacts of the alternatives contained in the FMP or amendment (including framework management measures and other regulatory actions) and to ensure that the agency considers alternatives that minimize the expected impacts while meeting the goals and objectives of the FMP and applicable statutes.

With certain exceptions, the RFA requires agencies to conduct a regulatory flexibility analysis for each proposed rule. The regulatory flexibility analysis is designed to assess the impacts various regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize those impacts. In addition to analyses conducted for the RIR, the initial regulatory flexibility analysis (IRFA) provides: (1) a description of the reasons why action by the agency is being considered; (2) a succinct statement of the objectives of, and legal basis for the proposed rule; (3) an identification, to the extent practicable, of all relevant Federal rules which may duplicate, overlap, or conflict with the proposed rule; (4) a description and, where feasible, an estimate of the number of small entities to which the proposed rule will apply; (5) a description of the projected reporting, record-keeping, and other compliance requirements of the final rule, including an estimate of the classes of small entities which will be subject to the requirements of the report or record; and (6) a description of significant alternatives to the proposed rule which accomplish the stated objectives of applicable statues and which minimize any significant economic impact of the proposed rule on small entities.

Statement of need for, objectives of, and legal basis for the proposed rule

The purpose and need, issues, problems, and objectives of the proposed action are presented in **Section 1.4** and are incorporated herein by reference.

Identification of federal rules which may duplicate, overlap or conflict with the proposed rule

No federal rules have been identified that duplicate, overlap or conflict with the proposed rule.

Description and estimate of the number of small entities to which the proposed rule will apply

This action will directly apply to the firms that own and/or operate commercial fishing vessels that harvest snapper grouper species in the South Atlantic Exclusive Economic Zone (EEZ). These vessels must have a valid federal commercial snapper-grouper permit, which is a limited access permit for either an unlimited quantity of pounds per trip or no more than 225 pounds (lbs) per trip.

The number of both valid unlimited and 225-lb permits has declined annually since 2008, resulting in increased concentration of the commercial sector of the fishery (**Table J-1**). As of July 3, 2014, there were 551 valid (and 18 renewable/transferrable) unlimited pounds permits and 113 valid (and 10 renewable/transferrable) 225-lb permits.

Table J-1. Numbers of valid South Atlantic commercial snapper-grouper permits, 2007 - 2014. Sources: SAFMC May 22, 2013 (S-G Regulatory Amendment 19) for 2007 – 2013 and NMFS SERO PIMS for 2014 as of July 3, 2014.

Year	Valid permits		Change		% Change	
	Unlimited	225-lb	Unlimited	225-lb	Unlimited	225-lb
2007	695	165				
2008	665	151	-30	-14	-4.32%	-8.48%
2009	640	144	-25	-7	-3.76%	-4.64%
2010	624	139	-16	-5	-2.50%	-3.47%
2011	569	126	-55	-13	-8.81%	-9.35%
2012	558	123	-11	-3	-1.93%	-2.38%
2013	551	121	-7	-2	-1.25%	-1.63%
2014	551	113	0	-8	0%	-6.61%

The largest drop in the number of valid unlimited permits occurred in 2011. A partial explanation for that drop is that by 2011, there were many in-season closures for snapper-grouper species, such as vermilion snapper, golden tilefish and black sea bass, and longer seasonal closures for grouper species. Another partial explanation is the 2-for-1 permit transfer requirement. A firm intending to obtain a commercial snapper-grouper unlimited permit from a current permit holder who is not in the vessel owner's immediate family must obtain and exchange two such permits for one permit to be issued. NMFS will transfer a single snapper grouper unlimited permit only to the permit holder's immediate family (e.g. mother, father, brother, sister, son, daughter, or spouse). There is no such transfer requirement for the 225-lb permit. The search for a transferrable unlimited permit is complicated by the fact that not all unlimited pound permits are equal. A transferred permit's catch history follows it to the new holder/vessel with that permit, which can affect the perceived value of a permit, especially if the permit's catch history is low to zero and there is perceived risk of future allocation based on the permit's catch history.

The largest percentages of unlimited and 225-lb permit holders reside in Florida (**Table J-2**). Entities that reside outside the South Atlantic States hold less than 2% of the permits.

Table J-2. Number and percent of valid and renewable/transferable commercial snapper-grouper permits by state of residence of permit holder as of February 16, 2014. Source: NMFS SERO PIMS.

State	Unlimited lb permits		225-lb permits	
	Number	%	Number	%
FL	394	69.2%	112	90.3%
GA	5	0.9%	0	0.0%
NC	114	20.0%	8	6.5%
SC	49	8.6%	2	1.6%
Other	7	1.2%	2	1.6%
Total	569	100.0%	124	100.0%

This proposed rule would directly affect up to 693 commercial fishing vessels. Approximately 22% (124) of the vessels with an unlimited permit are owned by 45 permit holders and two of the vessels with a 225-lb permit are owned by one permit holder. Hence, it is estimated that 490 firms have an unlimited permit and 123 firms with a 225-lb permit would be affected by the proposed rule.

These 613 firms operate in the commercial finfish fishing industry (NAICS 114111). A business primarily involved in finfish harvesting is classified as a small business if it is independently owned and operated, is not dominant in its field of operation (including its affiliates), and has combined annual receipts not in excess of $20.5 million for all its affiliated operations worldwide. It is estimated that a substantial number of the 613 firms are small businesses.

Description of compliance requirements and estimates of economic impacts of the proposed rule

Actions 1 and 2:

These are administrative actions that do not have a direct economic impact. The preferred alternative of Action 1 would change the acceptable biological catch (ABC) rule for Only Reliable Catch Stocks (ORCS) of the snapper grouper fishery. There are 14 ORCS species. Four of these stocks are managed at the individual species level and ten are included in the management of four species complexes. Together, these actions revise the total ABC of each of these stocks.

Action 3:

Action 3 does not include the Deepwater Complex. Consequently, although the preferred alternatives of **Actions 1** and **2** include changes of the ABCs for two species within the Deepwater Complex, this proposed rule would not change the total ACL for the Deepwater Complex. Snapper Grouper Amendment 32 would make that change.

The preferred alternatives of **Action 3** would revise the total annual catch limit (ACL) for three of the four species complexes (Grunts, Snappers and Shallow Water Grouper) and the four individual species: Atlantic spadefish, bar jack, gray triggerfish, and scamp. These revised total ACLs are then allocated to the commercial and recreational sectors. This rule would not change the current percentages of a total ACL allocated to either sector.

The small businesses directly affected by this action are within the commercial sector. Consequently, the remainder of this discussion is limited to that sector.

The preferred alternatives would increase the commercial ACLs for Atlantic spadefish, bar jack, gray triggerfish, Shallow Water Grouper Complex, and Snappers Complex and decrease the commercial ACLs for scamp and the Grunts Complex (**Table J-3**).

Table J-3. Comparison of current and proposed commercial ACLs for species/species complexes.

Species or Complex	Commercial ACL (lbs ww)		
	Current	Prop.	Prop. Change
Atlantic Spadefish	35,108	150,552	115,444
Bar Jack	5,265	13,228	7,963
Gray Triggerfish	272,880	312,325	39,445
Grunts	218,539	217,903	-636
Scamp	333,100	219,375	-113,725
Shallow Water Grouper	49,776	55,542	5,766
Snappers	215,662	344,884	129,222

As more fully explained in the Regulatory Impact Review (RIR), baseline commercial landings for Atlantic spadefish, Shallow Water Groupers Complex, and Snappers Complex are less than their current commercial ACLs. The proposed action would increase the commercial ACLs for these species/species complexes. Thus, the proposed action is expected to have no additional effect on commercial landings (by weight or value) of Atlantic spadefish, Shallow Water Groupers Complex and Snappers Complex.

The proposed action would reduce the commercial ACL for the Grunts Complex to 217,903 lbs whole weight (ww). Baseline landings have been and are less than the current and revised ACL. Consequently, there is expected to be no change in annual commercial landings (by weight or value) of the Grunts Complex because of the action.

Baseline commercial landings of gray triggerfish and bar jack exceed their current commercial ACLs. The proposed action is expected to increase annual commercial landings of gray triggerfish from 22,978 to 34,726 lbs ww and from $44,117 to $66,674 ($ 2013). It is also expected to increase annual commercial landings of bar jack from 0 to 1,429 lbs ww and from $0 to $1,944 ($2013). The total economic impact of Action 3 on the commercial sector would be an annual increase in dockside revenue from $44,177 to $68,618 ($ 2013) (**Table J-4**) less any trip-related costs associated with higher landings of these species.

Table J-4. Expected changes in annual dockside revenue due to Action 3.

Stock	Expected Change in Annual Landings	
	Lbs ww	Revenue ($ 2013)
Atlantic Spadefish	0	$0
Bar Jack	0 - 1,429	$0 - $1,944
Gray Triggerfish	22,978 - 34,726	$44,117 - $66,674
Grunts	0	$0
Scamp	0	$0
Shallow Water Groupers	0	$0
Snappers	0	$0
Total	22,978 to 36,155	$44,117 to $68,618

Action 4:

Action 4 would change the minimum size limit for gray triggerfish and enlarge the area of the South Atlantic EEZ where the minimum size limit would apply. Presently, the minimum size limit for gray triggerfish is 12 inches total length (TL) and only applies in the South Atlantic EEZ off Florida. The preferred alternatives would specify a minimum size limit of 12 inches fork length (FL) in federal waters off North Carolina, South Carolina, and Georgia and a minimum size limit of 14 inches FL in federal waters off Florida's east coast.

During 2007-2012, commercial landings in Florida accounted for 14% to 24% and North Carolina, South Carolina and Georgia combined to account for 76% to 86% of the annual gray triggerfish commercial harvest in the South Atlantic. Those ranges of percentages are applied to the current ACL for gray triggerfish to estimate baseline landings for Florida and the three combined states (**Table J-5**).

Table J-5. Baseline annual commercial landings of gray triggerfish by area.

Area	Range of Baseline Commercial Landings (lbs ww)	
	If 14% FL & 86% NC,SC,GA	If 24% FL and 76% NC,SC,GA
FL East Coast	38,203	65,491
NC, SC & GA	234,677	207,389

It is estimated that **Preferred Sub-alternative 3a** would reduce baseline commercial landings of gray triggerfish in North Carolina, South Carolina and Georgia combined from 1% to 3% and **Preferred Sub-alternative 5a** would reduce baseline commercial landings of gray

triggerfish in Florida from 14% to 22%. The ranges of annual losses of commercial gray triggerfish landings would be as low as 5,348 to 8,404 lbs ww ($10,269 to $16,137) in Florida if 14% of annual landings is landed in Florida to as high as from 9,169 to 14,408 lbs ww ($17,604 to $27,663) in Florida if 24% of landings are in Florida. Similarly, the ranges of annual losses of commercial gray triggerfish landings in the combined states of North Carolina, South Carolina and Georgia would be as low as 2,074 to 6,222 lbs ww ($3,982 to $11,946) to as high as 2,347 to 7,040 lbs ww ($4,506 to $13,517) (**Table J-6**). Note that the figures in **Table J-6** do not include the increase of the commercial ACL due to **Action 3**.

Table J-6. Expected decrease in annual commercial landings (lbs ww and $ 2013) due to Action 4 without increase of commercial ACL of Action 3. Average price of $1.92 per lb ww (NMFS SERO ACL data).

Area	Range of Decreases in Commercial Landings (lbs ww) by Area due to Action 4	
	If 14% FL & 86% NC,SC,GA	**If 24% FL and 76% NC,SC,GA**
FL East Coast	5,348 to 8,405 ($10,269 to $16,137)	9,169 to 14,408 ($17,604 to $27,663)
NC, SC & GA	2,347 to 7,040 ($4,506 to $13,517)	2,074 to 6,222 ($3,982 to $11,946)
Total	7,695 to 15,445 ($14,775 to $29,654)	11,243 to 20,630 ($21,586 to $39,609)

As stated previously, Action 3 is expected to increase annual commercial landings of gray triggerfish from 22,987 to 34,726 lbs ww. That would represent increases in annual baseline commercial landings in Florida from 3,219 to 4,862 lbs ww if Florida represents 14% of all landings and 5,515 to 8,334 lbs ww if Florida's landings represent 24% of the total (**Table J-7**).

Table J-7. Expected increase in annual commercial landings (lbs ww and $ 2013) due to Action 3, independent of Action 4. Average price of $1.92 per lb ww (NMFS SERO ACL data).

Area	Range of Increases in Commercial Landings (lbs ww) by Area due to Action 3	
	If 14% FL & 86% NC,SC,GA	**If 24% FL and 76% NC,SC,GA**
FL East Coast	3,219 to 4,862 ($6,179 to $9,334)	5,517 to 8,334 ($10,592 to $16,002)
NC, SC & GA	19,769 to 29,864 ($37,956 to $57,340)	17,470 to 26,392 ($33,543 to $50,672)
Total	22,987 to 34,726 ($44,117 to $66,674)	22,987 to 34,726 ($44,117 to 66,674)

The above economic impacts of these two actions are combined to estimate the net change in landings of gray triggerfish (by weight and value) due to **Actions 3** and **4**. The combined impact is expected to be a net increase in annual landings by weight and value in the South Atlantic Region; however, there would be a net beneficial impact in North Carolina, South Carolina, and Georgia and a net adverse impact in Florida. The net annual increase of dockside revenues from gray triggerfish landings in North Carolina, South Carolina, and Georgia would range from $22,548 to $27,064 if the states' combined landings represent 76% of the total and from $29,363

to $37,020 if the states' landings represent 86% of the total (**Table J-8**). The net annual decrease of dockside revenues from gray triggerfish landings in Florida would range from $4,087 to $6,803 if 14% of the landings occur in Florida or $7,012 to $11,662 if 24% of total landings are in Florida (**Table J-8**).

Table J-8. Net changes in commercial gray triggerfish landings by area due to Actions 3 and 4 combined.

Area	Range of Net Change in Commercial Landings (lbs ww) by Area due to Actions 3 & 4	
	If 14% FL & 86% NC, SC, GA	**If 24% FL and 76% NC, SC, GA**
FL East Coast	-2,129 to -3,543 (-$4,087 to -$6,803)	-3,652 to -6,074 (-$7,012 to -$11,662)
NC, SC & GA	17,422 to 22,824 ($33,450 to $43,822)	15,396 to 20,170 ($29,560 to $38,726)
Total	15,293 to 19,281 ($29,363 to $37,020)	11,744 to 14,096 ($22,548 to $27,064)

Action 4 would require commercial fishermen to sort and discard fish that presently are landed, but, once implemented, would be undersized. The sorting and discarding of undersized fish is expected to increase trip costs per pound landed, which are not reflected in the above estimates of changes in dockside revenues. **Action 4** may also decrease the rate of landings. However, commercial fishermen in these states, especially Florida, may take action to mitigate for the expected losses of landings due to **Action 4**. For example, those in Florida may increase targeting of gray triggerfish in state waters, where there would be a smaller minimum size limit, or they may increase the number or length of trips in federal waters. However, the ability to mitigate is dependent on additional actions, specifically, the length of the open commercial fishing season (which would be split into two parts by **Action 5**) and establishment of a commercial trip limit for gray triggerfish (which would be set at 1,000 lbs ww by **Action 6**).

Action 5:

Once commercial landings of gray triggerfish reach or are expected to reach its commercial ACL, the season in federal waters is closed. In 2013 and 2014, the commercial season closed early: on July 13 in 2013 and May 12 in 2014. Presently, the commercial ACL for gray triggerfish is 272,880 lbs ww, but **Action 4** would increase that ACL by 39,445 lbs ww (to 312,325 lbs ww). **Action 5** would not change the commercial ACL, but, instead, would allocate 50% of the ACL to the first half of the season and the remaining 50% to the second half. Each 50% would be a quota and any remaining quota from season 1 would transfer to season 2. Any remaining quota from season 2 would not be carried forward. The divided commercial season would provide fishermen the opportunity to fish for gray triggerfish in the summer months when weather conditions are more favorable, especially for those more north, although weather conditions did not prevent North Carolina from having the largest percentage of commercial landings in the South Atlantic Region from 2003 through 2012.

A split commercial season is not new. The commercial season for vermilion snapper has been split since 2009: January 1 through June and July 1 through December. In 2012, the first

half of the vermilion snapper season closed on February 29th and the second half closed on September 28th. Similarly, in 2013, the first half of the season closed on February 13th and second half closed on December 2nd. This year (2014), the first half of the season closed on April 19th.

Gray triggerfish and vermilion snapper are co-occurring and co-targeted species and because they are, similarly split seasons could improve average net revenues per trip that land the two species.

Action 6:

This action would establish a commercial trip limit for gray triggerfish of 1,000 lbs ww. Presently, there is no such limit. **Action 6** is not expected to change annual landings , but instead the length of time that landings reach the ACL. By reducing the rate of landings, **Action 6** is expected to increase the length of the first half of the commercial season up to 16 days and the second half by one day.

Action 6 would not affect commercial fishing vessels equally. Those with larger net tonnage, which can and do land higher quantities of fish, would more likely be adversely affected by the trip limit. Larger vessels may presently experience economies of scale by landing more than 1,000 lbs ww, and the trip limit would decrease their net revenue per pound.

Description of significant alternatives

Considered but not adopted alternatives of **Action 3** would have resulted in smaller commercial ACLs, which would have smaller beneficial and larger adverse economic impacts on small businesses.

A larger minimum size standard was considered for **Action 4**, but would have had a larger adverse economic impact on small businesses that harvest gray triggerfish in federal waters off North Carolina, South Carolina and Georgia. A considered but not adopted alternative of **Action 5** would have allocated a smaller percentage (40%) of the commercial ACL to the first half of the season and larger percentage (60%) to the second half, which would result in smaller economic benefits in the first half of the year and larger economic benefits in the second half. However, there would be no expected difference in annual landings between the rejected and accepted alternatives.

Considered but not adopted alternatives of the commercial trip limit (**Action 6**) would have established a lower trip limit and a larger adverse economic impact. The adverse impacts would not be equal across vessels. Smaller trip limits can have significantly larger adverse economic impacts on larger fishing vessels, especially those that presently experience economies of scale with higher landings per trip. Another considered but rejected alternative would have established a higher commercial trip limit than the selected alternative; however, it would also have allowed for a higher rate of landings and likely shorter open seasons.

Appendix K. Fishery Impact Statement (FIS)

The Magnuson-Stevens Act requires a FIS be prepared for all amendments to Fishery Management Plans (FMPs). The FIS contains an assessment of the likely biological and socioeconomic effects of the conservation and management measures on: 1) fishery participants and their communities; 2) participants in the fisheries conducted in adjacent areas under the authority of another Council; and 3) the safety of human life at sea.

Actions Contained in Amendment 29 to the Snapper Grouper FMP

Amendment 29 proposes actions to: update the South Atlantic Fishery Management Council's (Council's) acceptable biological catch (ABC) control rule to incorporate methodology for determining the ABC of select unassessed species; adjust ABCs for the affected unassessed species; adjust ACLs and recreational annual catch targets (ACTs) based on revised ABCs; and revise management measures for gray triggerfish to modify minimum size limits, establish a commercial split season and commercial trip limits.

Assessment of Biological Effects

The action to modify the ABC control rule will have neutral biological impacts as it is an administrative action that will not have direct impacts on harvest.

Action 2 would revise ABCs based on the new ABC control rule. There is uncertainty associated with the risk of overexploitation scalar (determined by the Scientific and Statistical Committee) and the risk tolerance scalar (which was selected by the Council). However, the South Atlantic Council selected risk tolerance scalars to achieve values of ABC that will minimize any biological impacts associated with harvest levels.

The action to select ACLs would not have negative biological impacts. The South Atlantic Council's ABC control rule takes into account scientific uncertainty and the National Standard 1 guidelines indicate ACL may typically be set very close to the ABC. The Council has selected preferred alternatives that would set the ACL equal to the ABC for these unassessed species except scamp.

The action to implement a minimum size limit of 12 inches fork length (FL) for North Carolina, South Carolina, and Georgia and a 14-inch (FL) minimum size limit for east Florida would provide positive biological impacts by offering slightly greater spawning opportunities for gray triggerfish, relative to the status quo.

The action to implement a commercial split season for gray triggerfish could have positive biological impacts by reducing bycatch of both gray triggerfish and vermilion snapper. These species are co-occurring species that are caught together and this action would implement fishing seasons for gray triggerfish that have opening and closing dates that coincide with those for the commercial harvest of vermilion snapper.

The action to implement a commercial trip limit of 500 pounds of gray triggerfish would be expected to have neutral biological effects because ACLs and AMs are in place to cap harvest, and take action if ACLs are exceeded.

Assessment of Economic Effects

The combined actions to revise the ABCs and ACLs would increase the total ACLs for Atlantic spadefish, bar jack, gray triggerfish, Grunts Complex, Shallow Water Grouper Complex and Snapper Complex. The total ACL of scamp would decrease. Actual economic impacts are dependent on baseline landings relative to the current and revised ACLs, and baseline landings indicate there would be no changes in annual commercial or recreational landings and associated economic benefits from fishing for Atlantic spadefish, the Grunts Complex, Shallow Water Grouper Complex, and Snapper Complex. There would be no changes in annual landings and associated economic benefits from commercial fishing for scamp. Annual landings and associated economic benefits from commercial fishing for bar jack would increase, whereas annual landings and associated economic benefits from recreational fishing for scamp would decrease. The previous actions combined with the minimum size limit for gray triggerfish would yield increases in annual landings and associated economic benefits from commercial and recreational fishing for gray triggerfish; however, landings and associated economic benefits on Florida's east coast would be reduced, while those in North Carolina, South Carolina and Georgia would increase.

The action to establish a commercial split season for gray triggerfish is expected to increase the number of months that the season is open, which could economically benefit fishermen that are more active in the summer months when weather conditions are more favorable. However, the sum of landings from the two split seasons would be capped by the ACL, so there would be no increase in annual landings and associated economic benefits.

The action to establish commercial trip limits for gray triggerfish is expected to increase the number of days that the season is open; however, it would likely not affect commercial fishing vessels equally. Those with larger net tonnage, which can and do land higher quantities of fish, would more likely be adversely affected by the trip limit. Larger vessels may presently experience economies of scale by landing more than 1,000 lbs ww, and the trip limit would decrease their net revenue per pound.

Assessment of the Social Effects

The action to modify the ABC control rule is an administrative action and has no direct beneficial or adverse social impacts.

The action to revise the ABCs based on the new control rule is an administrative action and would not have direct social impacts. However, this action would modify the ABCs for fourteen species, which would allow for subsequent action that could affect annual landings and may impact social benefits.

The action to revise the ACLs and recreational annual catch targets would result in the largest increases in the total ACLs for Atlantic spadefish, bar jack, gray triggerfish, Grunts Complex, Shallow Water Grouper Complex and Snappers Complex. The ACL of scamp would decrease. Actual social impacts are dependent on baseline landings relative to the current and revised ACLs. In general, the higher the ACL, the greater the short-term social and economic benefits that would be expected to accrue, assuming overfishing does not occur.

The action to modify minimum size limits for gray triggerfish would result in positive impacts associated with the sustainability of harvest and health of the stock, which would be

beneficial to recreational and commercial fishermen in the long term. Negative effects would be associated with potential increases in discard mortality due to a newly established size limit in North Carolina, South Carolina, and Georgia and a modified minimum size limit for the east coast for Florida.

The action to establish a split commercial fishing season for gray triggerfish would likely increase access to the commercial ACL for North Carolina and South Carolina, which would be beneficial to commercial businesses in these areas. Additionally, a split season for gray triggerfish could reduce discards of vermilion snapper because the two species are commonly caught together. This could improve trip efficiency and help reduce regulatory discards for vessels catching vermilion snapper.

Assessment of Effects on Safety at Sea

The action to establish a commercial split season for gray triggerfish is likely to be beneficial to commercial fishermen harvesting gray triggerfish in North Carolina and South Carolina. Because the current fishing year starts on January 1, fishermen in North Carolina and South Carolina sometimes have limited or no access to gray triggerfish in the early months due to weather, or could risk unsafe conditions to fish. Therefore, this action would improve safety at sea considerations.