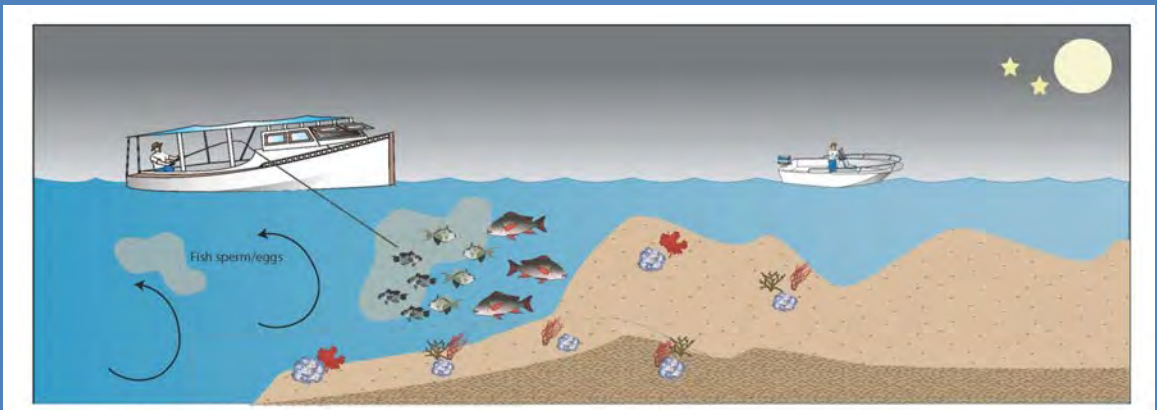
DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) VERSION



Spawning Aggregations & Larval Transport around Specific Lunar Cycles

Amendment 36

to the Fishery Management Plan for the
Snapper Grouper Fishery of the South Atlantic Region

Actions to Implement Special Management Zones in the South Atlantic

Including an Environmental Impact Statement

October 18, 2015

A publication of the South Atlantic Fishery Management Council pursuant to
National Oceanic and Atmospheric Administration
Award Number NA05NMF4410004

Cover graphic by Amber Von Harten, SAFMC Staff

Abbreviations and Acronyms Used in the FMP

ABC	acceptable biological catch
ACL	annual catch limits
AM	accountability measures
ACT	annual catch target
B	a measure of stock biomass in either weight or other appropriate unit
B_{MSY}	the stock biomass expected to exist under equilibrium conditions when fishing at F_{MSY}
B_{OY}	the stock biomass expected to exist under equilibrium conditions when fishing at F_{OY}
B_{CURR}	The current stock biomass
CPUE	catch per unit effort
DEIS	draft environmental impact statement
EA	environmental assessment
EEZ	exclusive economic zone
EFH	essential fish habitat
EIS	environmental impact statement
F	a measure of the instantaneous rate of fishing mortality
$F_{30\%SPR}$	fishing mortality that will produce a static SPR = 30%
F_{CURR}	the current instantaneous rate of fishing mortality
F_{MSY}	the rate of fishing mortality expected to achieve MSY under equilibrium conditions and a corresponding biomass of B_{MSY}
F_{OY}	the rate of fishing mortality expected to achieve OY under equilibrium conditions and a corresponding biomass of B_{OY}
FEIS	final environmental impact statement
FMP	fishery management plan
FMU	fishery management unit
IPT	interdisciplinary planning team
M	natural mortality rate
MARMAP	Marine Resources Monitoring Assessment and Prediction Program
MFMT	maximum fishing mortality threshold
MMPA	Marine Mammal Protection Act
MRFSS	Marine Recreational Fisheries Statistics Survey
MRIP	Marine Recreational Information Program
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MSST	minimum stock size threshold
MSY	maximum sustainable yield
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OFL	overfishing limit
OY	optimum yield
RIR	regulatory impact review
SAFMC	South Atlantic Fishery Management Council
SEDAR	Southeast Data Assessment and Review
SEFSC	Southeast Fisheries Science Center
SERO	Southeast Regional Office
SIA	social impact assessment

SPR spawning potential ratio

SSC Scientific and Statistical Committee

Amendment 36 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region Including a Draft Environmental Impact Statement (DEIS)

Abstract: This Draft EIS (DEIS) is prepared pursuant to the National Environmental Policy Act to assess the environmental impacts associated with a regulatory action. The DEIS analyzes the impacts of a reasonable range of alternatives intended to:

1) Modify the Special Management Zone procedure to allow for the designation of Spawning Special Management Zones
2) Modify the framework procedure to allow Spawning Special Management Zones to be added and/or modified through framework actions
3) Establish new Spawning Special Management Zones off North Carolina
4) Establish new Spawning Special Management Zones off South Carolina
5) Establish new Spawning Special Management Zones off Georgia
6) Establish new Spawning Special Management Zones off Florida
7) Move the existing Charleston Deep Artificial Reef Marine Protected Area (MPA) 1.4 miles Northwest to match the boundary of the permitted site
8) Establish transit and anchoring provisions in the Spawning Special Management Zones
9) Establish a Sunset Provision for the Spawning Special Management Zones

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Type of Action

( ) Administrative
(X) Draft
( ) Legislative
( ) Final

Filing Dates with Environmental Protection Agency (EPA)
Notice of intent (NOI) to prepare an EIS published: April 8, 2015 (80 FR 18823)
DEIS filed with EPA:
DEIS comment period ends:
EPA comments on DEIS:

Magnuson-Stevens Fishery and Conservation Act scoping meetings were held in August 2014 from North Carolina through Florida. NEPA scoping was held in April/May 2015 and two comments were received. The first round of public hearings were held in April 2015, and a second round of public hearings were held in August 2015.

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Summary

AMENDMENT 36
to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region (Amendment 36)

1.1 What Action Is Being Proposed?

Fishery managers are proposing to close areas to fishing for snapper and grouper species to protect spawning fish.

1.2 Who is Proposing the Action?

The South Atlantic Fishery Management Council (Council) is proposing the actions. The Council develops the amendment and sends it to the National Marine Fisheries Service (NMFS) who, on behalf of the Secretary of Commerce, approves, disapproves, or partially approves the amendment, and then implements the measures in the amendment . NMFS is a part of the National Oceanic and Atmospheric Administration within the Department of Commerce.

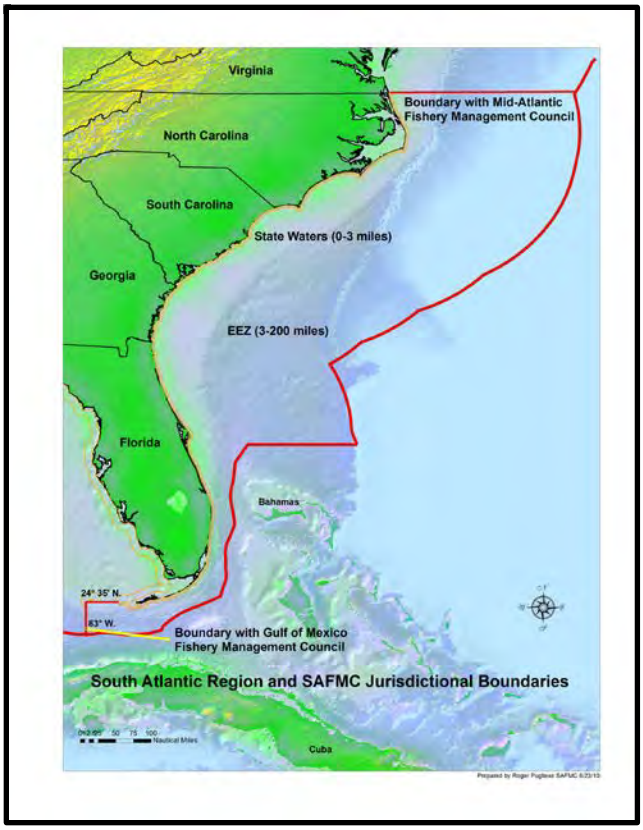
South Atlantic Fishery Management Council

- Responsible for conservation and management of fish stocks
- Consists of 13 voting members: 8 appointed by the Secretary of Commerce, 1 representative from each of the 4 South Atlantic states, the Southeast Regional Director of NMFS; and 4 non-voting members
- Responsible for developing fishery management plans and amendments under the Magnuson-Stevens Act and recommends actions to NMFS for implementation
- Management area is from 3 to 200 miles off the coasts of North Carolina, South Carolina, Georgia, and east Florida through Key West with the exception of Mackerel which is from New York to Florida, and Dolphin-Wahoo, which is from Maine to Florida

1.3 Where is the Project Located?

Management of the federal snapper grouper fishery located off the southeastern United States (South Atlantic) in the 3-200 nautical miles U.S. Exclusive Economic Zone is conducted under the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region (Snapper Grouper FMP, SAFMC 1983) (**Figure S-1**).

Figure S-1. Jurisdictional boundaries of the South Atlantic Fishery Management Council.



1.4 Why is the Council and NMFS Considering Action (Purpose and Need)?

The Council intends to protect spawning habitat and spawning fish. Certain habitat areas are very important for a number of species as sites where they move/aggregate to spawn. Protecting these areas, and the associated habitat, will allow the species to produce more eggs and larvae, and may increase subsequent recruitment of juvenile fish.

Purpose for Action

Protect~~Identify~~ important spawning habitat for snapper grouper species that can be designated for protection to enhance spawning ~~and increase recruitment~~. Reduce bycatch and bycatch mortality of snapper grouper species, including speckled hind and warsaw grouper. ~~Align the existing South Carolina Marine Protected Area (MPA) with the permitted site.~~

Need for Action

Prevent overfishing and achieve optimum yield (National Standard 1); reduce bycatch and bycatch mortality of economically and ecologically important snapper grouper species, including speckled hind and warsaw grouper, to the extent practicable (NS 9); and achieve conservation goals while minimizing to the extent practicable negative social and economic effects to snapper grouper fishermen and fishing communities (NS 8).

2.1 Action 1. Modify the Special Management Zone (SMZ) Procedure

Alternative 1. No Action. The current SMZ procedure addresses the use of certain gear on areas including artificial reefs, fish attraction devices, and other modified areas of habitat used for the purpose of fishing. Possession limits can also be regulated in SMZs.

Preferred Alternative 2. Modify the SMZ procedure to include protection of any area important for spawning by designating Spawning SMZs.

Note: It is the South Atlantic Fishery Management Council's (Council's) intent that the Spawning Special Management Zone (SMZ) approach would not make any changes to the existing Marine Protected Areas (MPAs) or Special Management Zones (SMZs). The Council is developing a System Management Plan (SMP) to specify the outreach, law enforcement, and monitoring/research projects (with cost estimates) necessary to effectively monitor and evaluate the existing MPAs.

2.1.1 Discussion

Alternative 1 would maintain the existing Special Management Zone (SMZ) procedures, which apply only to artificial reef areas and fish attraction devices. Artificial Reef Special Management Zones (SMZs) were established in the original Snapper Grouper Fishery Management Plan (FMP) (SAFMC 1983) to limit certain gear used on artificial reefs. The following is the SMZ procedure, as set forth in the Original Snapper Grouper FMP (SAFMC 1983):

"Management Measure #17: Prohibition or Restraint of Specific Fishing Gear From Artificial Reefs. Upon request to the Council from the permittee (possessor of a Corps of Engineers permit) for any artificial reef or fish attraction device (or other modification of habitat for the purpose of fishing) the modified area and an appropriate surrounding area may be designated as a Special Management Zone (SMZ) that prohibits or restrains the use of specific types of fishing gear that are not compatible with the intent of the permittee for the artificial reef or fish attraction device. This will be done by regulatory amendment similar to adding or changing minimum sizes (Section 10.2.3):

1. *A monitoring team* will evaluate the request in the form of a written report considering the following criteria:*
   a. *fairness and equity*
   b. *promote conservation*
   c. *excessive shares*
2. *At the request of the Steering Committee, the Council Chairman may schedule meetings of the Advisory Panel (AP) and/or Scientific and Statistical Committee (SSC) to review the report and associated documents and to advise the Council. The Council Chairman may also schedule public hearings.*

3. *The Council, following review of the Team's report, supporting data, public comments, and other relevant information, may recommend to the Southeast Regional Director of the National Marine Fisheries Service (RD) that a SMZ be approved. Such a recommendation would be accompanied by all relevant background data.*
4. *The RD will review the Council's recommendation, and if he concurs in the recommendation, will propose regulations in accordance with the recommendations. He may also reject the recommendation, providing written reasons for rejection.*
5. *If the RD concurs in the Council's recommendations, he shall publish proposed regulations in the Federal Register and shall afford a reasonable period for public comment which is consistent with the urgency of the need to implement the management measure(s).*

   **Monitoring Team – The Team will be comprised of members of Council staff, Fishery Operations Branch (Southeast Region, NMFS), and the NMFS Southeast Fisheries Center.*

Impact and rationale

The intent of a SMZ is to create incentive to create artificial reefs and fish attraction devices that will increase biological production and/or create fishing opportunities that would not otherwise exist. The drawback to "investing" in artificial reefs or fish attraction devices is that they are costly and have limited advantages that can be rapidly dissipated by certain types of fishing gear (e.g. traps harvesting black sea bass from artificial reefs). Fishing gear that offers "exceptional advantages" over other gear to the point of eliminating the incentive for artificial reefs and fish attraction devices for users with other types of fishing gear prevent improved fishing opportunities that would not otherwise exist."

Preferred Alternative 2 would allow the Council to establish Special Management Zones (SMZs) to protect natural bottom important for spawning. Designation of natural spawning habitat as "Spawning SMZs" would provide additional protection as Essential Fish Habitat-Habitat Areas of Particular Concern (EFH-HAPCs) without any additional action by the Council given that localaties of known or likely periodic spawning aggregations and medium to high profile offshore hardbottom where spawning normally occurs is already defined as EFH-HAPCs. Spawning SMZs include areas where spawning normally occurs and would meet the EFH-HAPC definition. As part of the Essential Fish Habitat consultation process, permit applicants (e.g., wind farms, ocean turbines, drilling, or mineral extraction) would be required to provide a detailed assessment of how impacts to these areas and the species and fisheries dependent on these unique habitats would be eliminated or reduced to the maximum extent practicable.

Designating areas as Spawning SMZs would provide the opportunity to monitor such areas using citizen science in cooperation with fishery independent surveys to document spawning activity of snapper grouper species. Citizen science is scientific research conducted, in whole or in part, by amateur or nonprofessional scientists. The Council concluded that protecting species within the Spawning SMZs would enhance reproduction for members of the snapper grouper complex and thus increase the number of larvae that are produced. Future evaluation of the effects of the Spawning SMZs, as outlined in the System Management Plan (**Appendix N**), will

provide input on how to refine this approach to characterize and protect spawning locations to enhance the abundance of snapper grouper species.

2.2 Action 2. Modify the Framework Procedure to Allow Modifications of and/or Additional Spawning Special Management Zones (Spawning SMZs)

Alternative 1. No Action. The existing framework for the Snapper Grouper FMP does not include modifying or establishing new Spawning SMZs.

Preferred Alternative 2. Modify the framework for the Snapper Grouper FMP to include modifying or establishing new Spawning SMZs.

Alternative 3. Modify the framework for the Snapper Grouper FMP to include modifying existing Spawning SMZs.

2.2.1 Discussion

Alternative 1 (No Action) would require a plan amendment to modify or add new Spawning SMZs. **Preferred Alternative 2** would allow the Council to modify or establish new Spawning SMZs through the framework procedure. If monitoring efforts (for example using citizen science in cooperation with fishery independent surveys) were to show that an area needed to be adjusted, then the framework would allow the Council to modify the boundary using an abbreviated process instead of a plan amendment. The Council would consider this action over at least 2 Council meetings and there would be a number of opportunities for public input prior to any Council decision.

Alternative 3 would require the Council to use a plan amendment to establish new Spawning SMZs but would allow the Council to modify areas through the framework procedure. If monitoring efforts (for example using citizen science in cooperation with fishery independent surveys) were to identify a new area that needed to be protected, the Council would require more time to implement such a change though a plan amendment.

2.3 Action 3. Establish New Spawning Special Management Zones (Spawning SMZ) off North Carolina

Alternative 1. No Action. There are no Spawning SMZs off North Carolina.

Alternative 2. Establish a Spawning SMZ in the Malchase Wreck area that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.

Sub-alternative 2a. Malchase Wreck (2.47 square miles)

Sub-alternative 2b. Malchase Wreck (1 square mile)

Alternative 3. Establish a Spawning SMZ in the 780 Bottom area that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.

Sub-alternative 3a. 780 Bottom (4 square miles)

Sub-alternative 3b. 780 Bottom (3 square miles)

Alternative 4. Establish a Spawning SMZ in the NC Deep Wreck (3 square miles) that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.

Preferred Alternative 5. Establish a Spawning SMZ in the South Cape Lookout (5 square miles) that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.

The general location of the Spawning SMZs is shown in **Figure S-2**; more details on the specific location of each alternative are shown in **Figures S-3** and **S-4**. Travel distance, size, and depth profile for the alternatives/sub-alternatives are shown in **Table S-1**; corner coordinates are shown in **Tables S-2** through **S-5**; and fish species with evidence of spawning are shown in **Table S-6**. In addition, for the South Cape Lookout Spawning SMZ alternative, habitat characterization and species identified from video transects are shown in **Tables S-7** and **S-8** respectively.

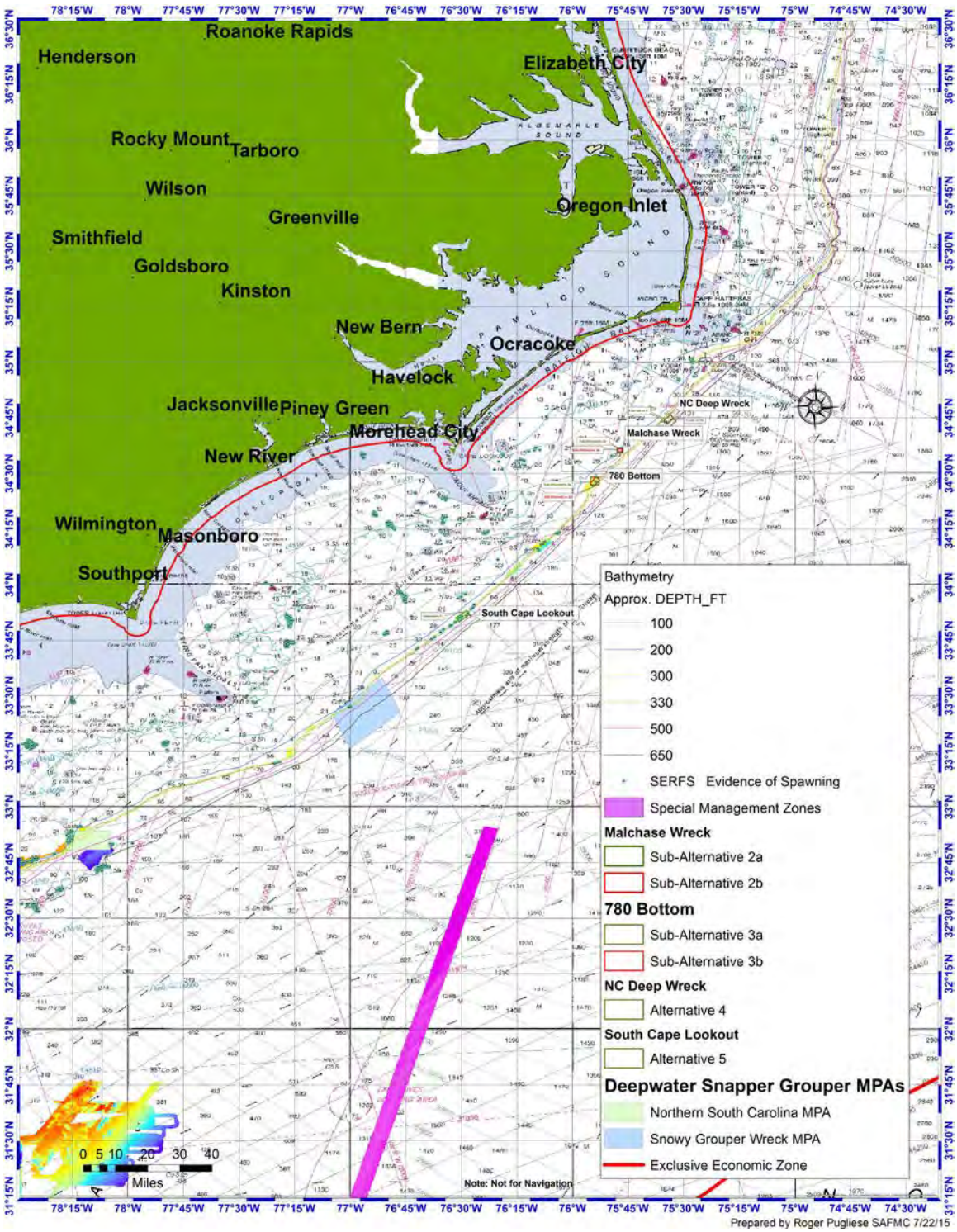


Figure S-2. Chart showing location, associated bathymetry and size of Spawning SMZ Alternatives for "Malchase Wreck", "780 Bottom", NC Deep Wreck, and South Cape Lookout off North Carolina.
Source: Roger Pugliese, SAFMC Staff.

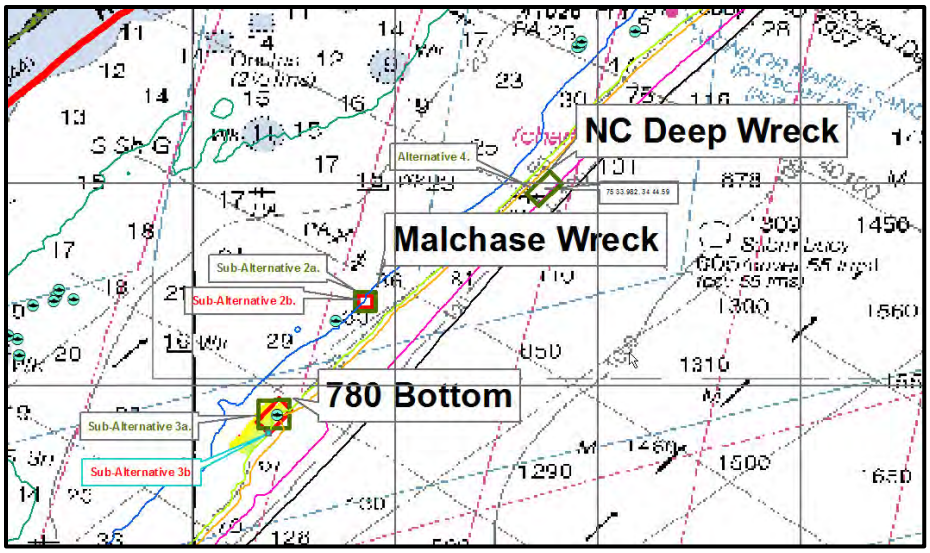


Figure S-3. Chart showing location and approximate size of Sub-alternative 2a (2.47 square miles) and Sub-alternative 2b (1 square mile) for the area off North Carolina known as the "Malchase Wreck"; Sub-alternative 3a (4 square miles) and Sub-alternative 3b (3 square miles) for the area off North Carolina known as the "780 Bottom"; and Alternative 4 for the area off North Carolina known as the "NC Deep Wreck" (3 square miles).
Source: Roger Pugliese, SAFMC Staff.

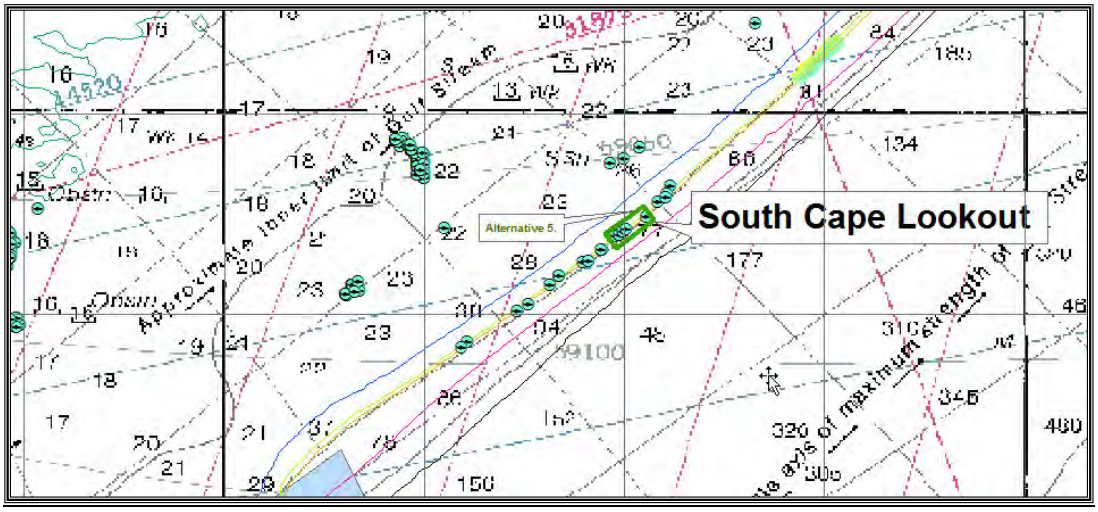


Figure S-4. Chart showing location and approximate size of Alternative 5 (5 square miles) for the area off North Carolina known as "South Cape Lookout."
Source: Roger Pugliese, SAFMC Staff.

2.3.1 Discussion

Under **Alternative 1 (No Action)**, fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit is prohibited year-round in the Snowy Grouper Wreck Marine Protected Area (MPA) (190 square miles). The following section describes the Spawning SMZ attributes for each alternative and includes relevant comparisons on environmental and other grounds.

SMZ Attributes: Size, Depth, Distance from Shore

Table S-1. Travel distance, size, and depth range of Sub-Alternatives/Alternatives for proposed Spawning SMZs off North Carolina.

Proposed Spawning SMZ off North Carolina	Sub-Alts	Distance From Ocracoke Inlet (miles)	Size (square miles)	Depth inshore feet (meters)	Depth offshore feet (meters)
Malchase Wreck	**2a**	33	2.47	171 (52)	236(72)
	2b	33.5	1	180(55)	246(75)
780 Bottom	**3a**	40.5	12	197(60)	328(100)
	3b	40.5	4	203(62)	328(100)
NC Deep Wreck	**4**	32.4	3	295(90)	525(160)
South Cape Lookout	**5**	64 miles From South Inlet	5	246(75)	453(138)

Source: Roger Pugliese, SAFMC Staff.

Table S-2. Corner Coordinates for Alternative 4 for NC Deep Wreck proposed Spawning SMZ off North Carolina.

NC Deep Wreck	West Longitude	East Latitude
Alternative 4	75° 35.298’	34° 44.226’
	75° 33.603’	34° 45.857’
	75° 32.719’	34° 44.982’
	75° 34.441’	34° 43.369’

Source: Roger Pugliese, SAFMC Staff.

Table S-3. Corner coordinates for Sub-alternatives 2a and 2b for Malchase Wreck proposed Spawning SMZ off North Carolina.

Malchase Wreck (Corner Coordinates	West Longitude	East Latitude
Sub-Alternative 2a	75° 48.000’	34° 37.000’
	75° 46.469’	34° 37.000’
	75° 46.469’	34° 35.551’
	75° 48.000’	34° 35.551’
Sub-Alternative 2b	75° 47.719’	34° 36.682’
	75° 46.714’	34° 36.682’
	75° 46.714’	34° 35.780’
	75° 47.719’	34° 35.780’

Source: Roger Pugliese, SAFMC Staff.

Table S-4. Corner coordinates for Sub-Alternatives 3a and 3b for 780 Bottom proposed Spawning SMZ off North Carolina.

780 Bottom (Corner Coordinates)	West Longitude	East Latitude
Sub-Alternative 3a	75° 55.138’	34° 28.949’
	75° 52.842’	34° 28.949’
	75° 52.842’	34° 26.904’
	75° 55.138’	34° 26.904’
Sub-Alternative 3b	75° 53.661’	34° 29.049’
	75° 52.747’	34° 28.241’
	75° 54.342’	34° 26.518’
	75° 55.235’	34° 27.347’

Source: Roger Pugliese, SAFMC Staff.

Table S-5. Corner coordinates for Alternative 5 for proposed South Cape Lookout Spawning SMZ off North Carolina.

South Cape Lookout (Corner Coordinates)	West Longitude	East Latitude
Alternative 5		
	76° 28.617’	33° 53.040’
	76° 27.798’	33° 52.019’
	76° 30.627’	33° 49.946’
	76° 31.424’	33° 51.041’

Source: Roger Pugliese, SAFMC Staff.

SMZ Attributes: Presence of Fish Including Those in Spawning Condition

Table S-6. Fish species in proposed Spawning SMZs off North Carolina with evidence of spawning.

Proposed Spawning SMZ off North Carolina	Sub-alts	Species
780 Bottom	**3a**	*Lutjanus campechanus* (Red Snapper)
	3b	*Lutjanus campechanus* (Red Snapper)
South Cape Lookout	**5**	*Epinephelus morio* (Red Grouper)

Source: Southeast Reef Fish Survey (SERFS – MARMAP/SEAMAP/SEFIS).

Note: For the tables in the Summary and Chapter 2, evidence of spawning is defined as males and/or females in any stage of spawning condition. In lieu of extensive sampling and collection of females in spawning condition, evidence of males and females provides a conservative estimate of spawning in both time and space. Tables and figures in Chapter 4 use a more restrictive definition of female fish being within 48 hour of spawning. This results in some differences in the tables/figures.

The 2014 NOAA Cooperative Institute for Ocean Exploration, Research, and Technology (CIOERT) Cruise report and observed ROV locations were reviewed to

determine if any information may have been collected in the areas presently under consideration. The only area with observed ROV locations close to a proposed Spawning SMZ alternative is a location just south of South Cape Lookout (Alternative 5) along the same depth contour (**Tables S-7** and **S-8**).

Table S-7. Habitat characterization (fish densities, and percent cover of benthic macro-biota and substrate) derived from ROV video transect at dive site along depth contour south of South Cape Lookout Spawning SMZ Alternative.

Site	Dive #	% Hard Bottom	# Fish species; Density (#/cubic meter)	% Cover Benthic Biota	% Cover Coral	% Cover Octo.	% Cover Antipat.	% Cover Porifera	% Cover Algae
South Cape Lookout	18	40.44%	23; 0.03	19.41%	0.00%	2.93%	0.61%	2.43%	6.88%

Data Source: NOAA CIOERT Cruise Report - Nancy Foster Cruise 14-08 FGBNMS Mohawk ROV, June 18-27, 2014. Note: Coral = Scleractinia hard coral; Octo = Octocorallia (gorgonacea); Porifera (sponges); Antipat. = Antipathidae, a taxa of Cnidaria - 5 species of Antipathidae: (*Antipatharia atlantica*, *Antipathes* sp. A, *Tanacetipathes barbadensis, Stichopathes lutkeni*, and unidentified sp.).

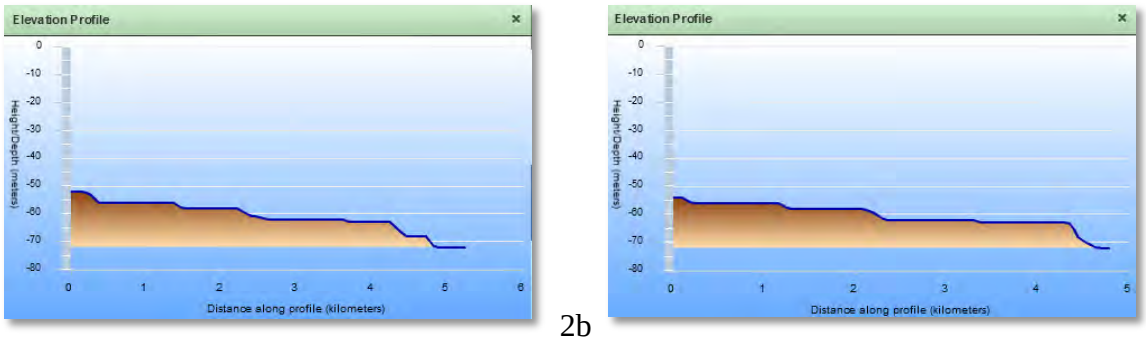
Table S-8. List of fish species identified from video transects at dive site along depth contour south of South Cape Lookout Alternative 5.

Scientific Name	**Common Name**
Acanthurus sp.	doctorfish
Apogon pseudomaculatus	twospot cardinalfish
Bodianus pulchellus spotfin	spotfin hogfish
Canthigaster rostrata	sharpnose puffer
Cephalopholis cruentata	graysby
Chaetodon ocellatus	spotfin butterflyfish
Chaetodon sedentarius	reef butterflyfish
Chromis enchrysurus	yellowtail reeffish
Chromis insolata	sunshinefish
Chromis sp.	damselfish
Halichoeres bivitattus	greenband wrasse
Halichoeres sp.	wrasse
Holacanthus bermudensis	blue angelfish
Holacanthus tricolor	rock beauty
Holocentridae	squirrelfish
Malacanthus plumieri	sand tilefish
Muraenidae	moray eel
Paranthias furcifer	creole fish
Pomacanthus paru	french angelfish
Priacanthus arenatus	bigeye
Pristigenys alta	short bigeye
Pterois volitans	lionfish
Seriola sp.	amberjack
Serranus phoebe	tattler

Source: NOAA CIOERT Cruise Report - Nancy Foster Cruise 14-08 FGBNMS Mohawk ROV, June 18-27, 2014.

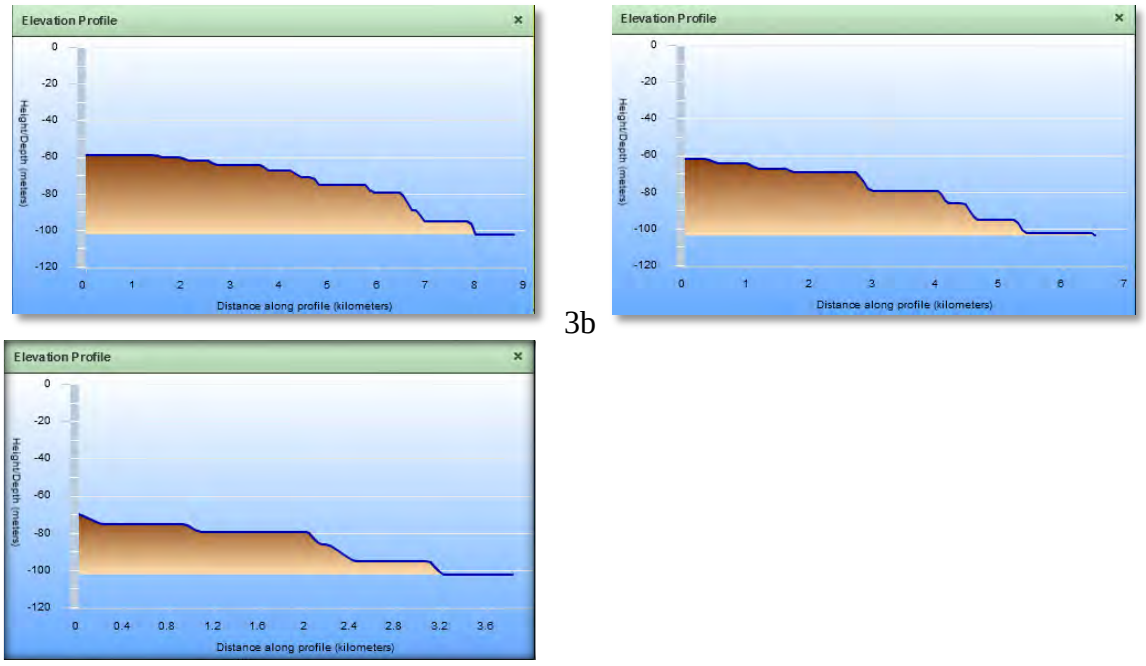
SMZ Attributes: Habitat Type, Bathymetry, Temperature, and Salinity

Elevation profiles for each of the alternatives/sub-alternatives are shown in **Figures S-5** through **S-8**.



2a 2b

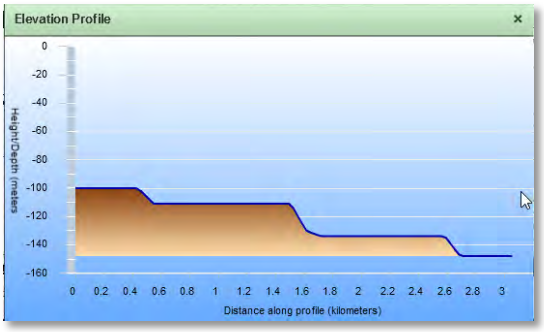
Figure S-5. Elevation Profiles for Malchase Wreck Sub-Alternatives 2a and 2b.
Source: (http://ocean.floridamarine.org/safmc_atlas/) Roger Pugliese, SAFMC Staff



3a 3b

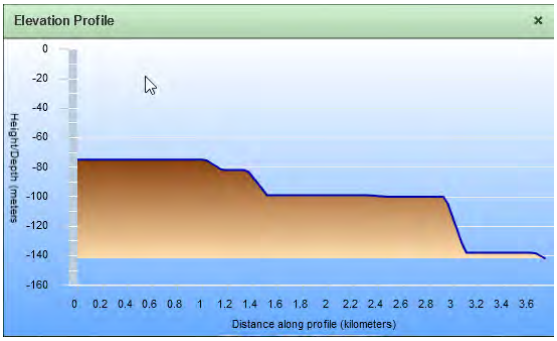
3c

Figure S-6. Elevation Profiles for 780 Bottom Sub-Alternatives 3a, 3b, and 3c.
Source: (http://ocean.floridamarine.org/safmc_atlas/) Roger Pugliese, SAFMC Staff



4

Figure S-7. Elevation Profiles for NC Deep Wreck Alternative 4.
Source: (http://ocean.floridamarine.org/safmc_atlas/) Roger Pugliese, SAFMC Staff



5

Figure S-8. Elevation Profiles for South Cape Lookout Alternatives 5.
Source: (http://ocean.floridamarine.org/safmc_atlas/) Roger Pugliese, SAFMC Staff

To provide oceanographic information for site characterization, the Ocean Observing and Modeling Group (OOMG) in the Department of Marine, Earth & Atmospheric Sciences, North Carolina State University provided temperature and salinity profiles for each site. The OOMG approach is to use in situ and remote sensing observations, numerical models, and data analysis and assimilation methods to examine fundamental ocean circulation physics, and to gain an integrated understanding of their interactions with the atmosphere and with ocean biological, geological, and chemical processes. The temperature profiles for the North Carolina are shown **Figures T1-T8** in **Appendix O**. Salinity profiles are shown in **Figures S1-S8** in **Appendix O**.

2.4 Action 4. Establish New Spawning Special Management Zones (Spawning SMZ) off South Carolina

Alternative 1. No Action. There are no Spawning SMZs off South Carolina.

Preferred Alternative 2. Establish a Spawning SMZs in the Devil's Hole/Georgetown Hole area that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.

Sub-alternative 2a. Devil's Hole/Georgetown Hole (13.5 square miles)
Sub-alternative 2b. Devil's Hole/Georgetown Hole (4 square miles)
Sub-alternative 2c. Devil's Hole/Georgetown Hole (1 square mile)
Sub-alternative 2d. Devil's Hole/Georgetown Hole (15.2 square miles)
Sub-alternative 2e. SC South (8 square miles) (Alternative to Devils Hole)
Preferred Sub-alternative 2f. Devil's Hole/Georgetown Hole (3.1 square miles)

Preferred Alternative 3. Establish a Spawning SMZ in the Area 51 site that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round (2.99 square miles).

Preferred Alternative 4. Establish a Spawning SMZ in the Area 53 site that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round (2.99 square miles).

A large chart showing the general location of the Spawning SMZs is included as **Figure S-9**; more detailed charts showing the specific location of each alternative is included as **Figures S-10** and **S-11**. Travel distance, size, and depth profile for the alternatives/sub-alternatives is shown in **Table S-9**; corner coordinates are shown in **Table S-10**; and fish species with evidence of spawning is shown in **Table S-11**.

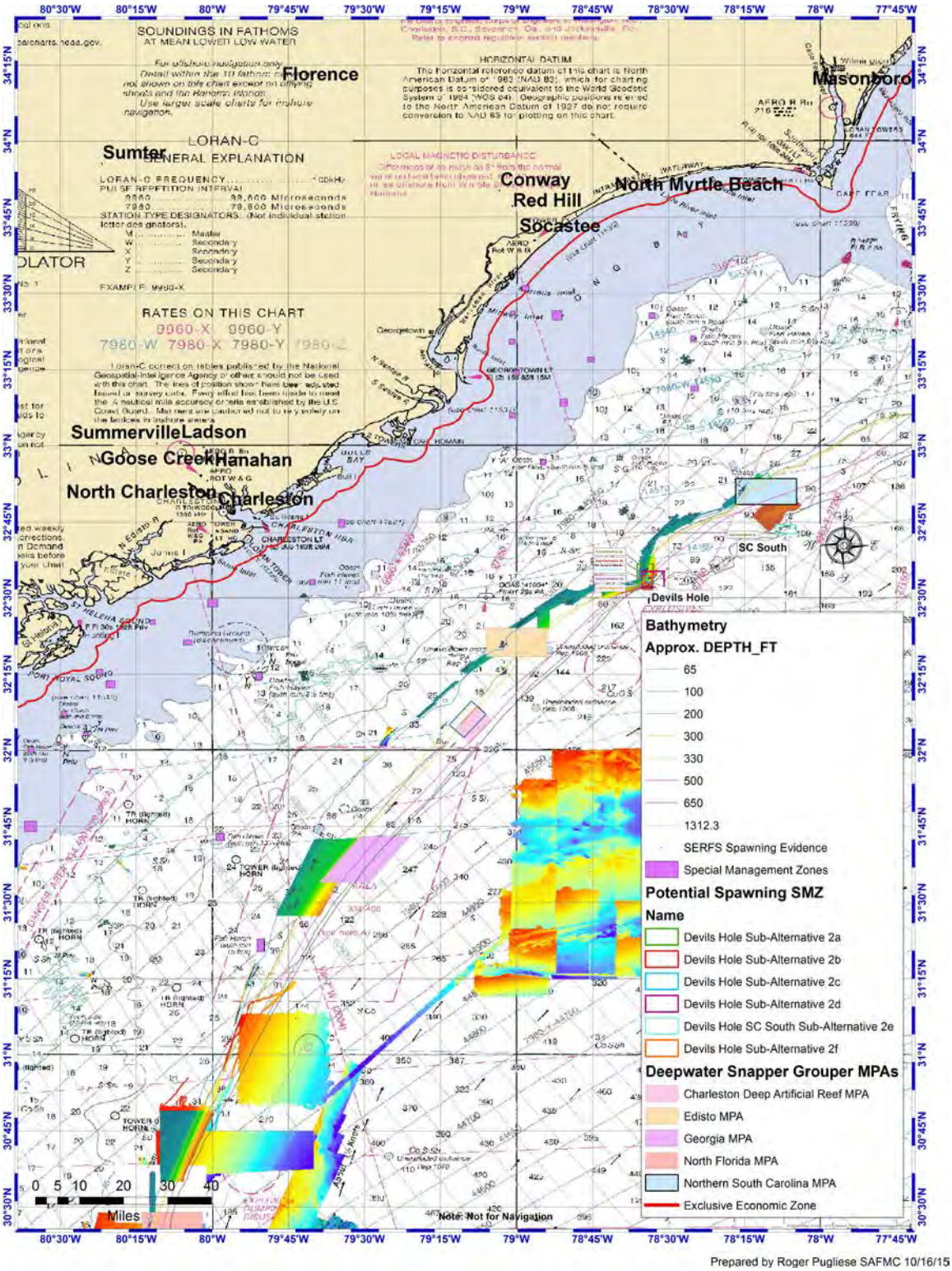


Figure S-9. Chart showing location, associated bathymetry and size of Spawning SMZ Alternatives for the area known as "Devils Hole" off South Carolina. Note: The locations of Area 51 and 53 are not being shown at this time to protect these areas from fishing pressure. Area 51 is 2.99 square miles and Area 53 is 2.99 square miles.
Source: Roger Pugliese, SAFMC Staff.

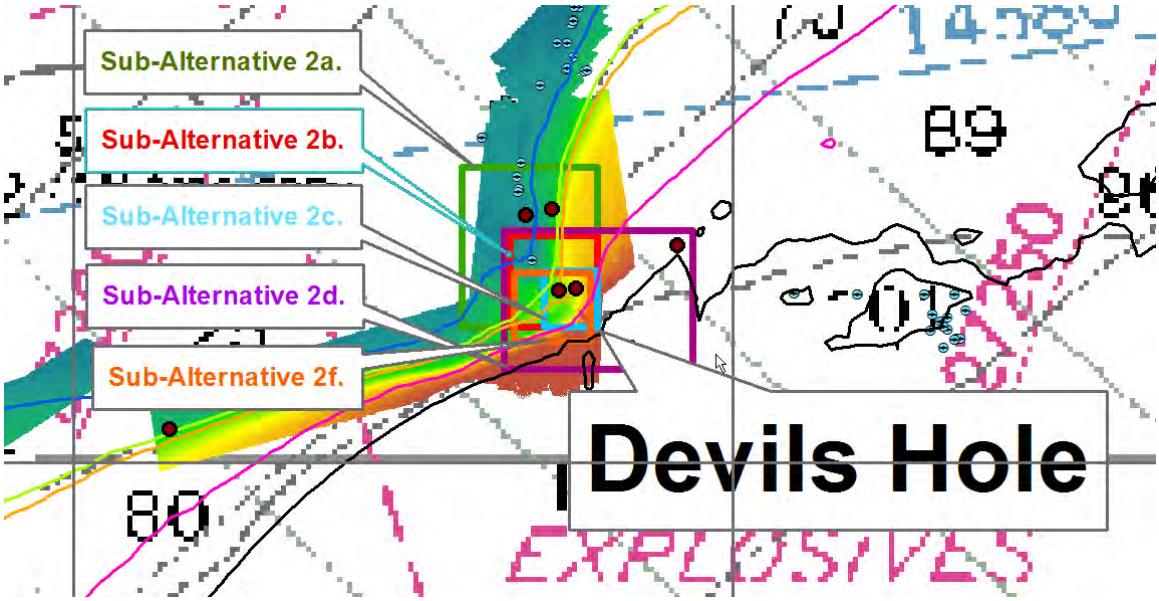


Figure S-10. Chart showing location, associated bathymetry, and approximate size of Sub-Alternative 2a (13.5 square miles), Sub-Alternative 2b (4 square miles), Sub-Alternative 2c (1 square mile), and Sub-Alternative 2d (15.2 square miles) for the area off South Carolina known as "Devils Hole."
Source: Roger Pugliese, SAFMC Staff.

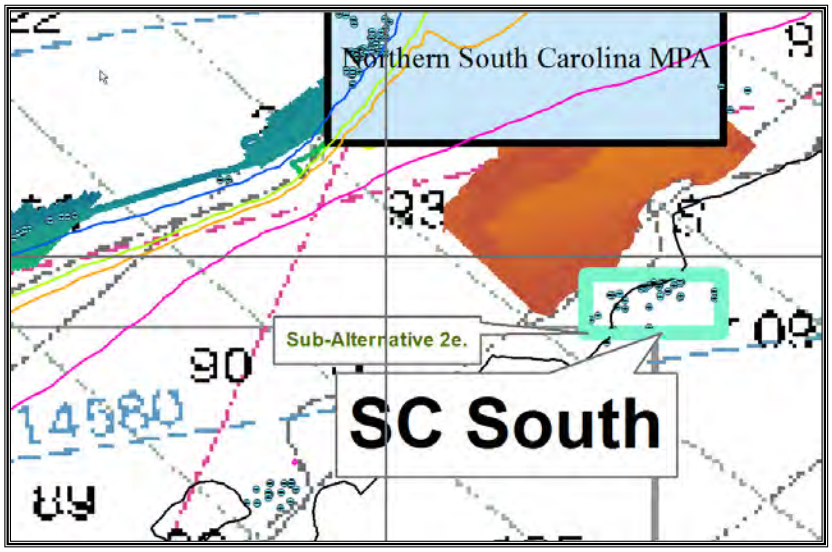


Figure S-11. Chart showing area location, associated bathymetry, and approximate size of Sub-Alternative 2e (8 square miles) for the area off South Carolina known as "SC South."
Source: Roger Pugliese, SAFMC Staff.

2.4.1 Discussion

Under **Alternative 1 (No Action)**, fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit is prohibited year-round in the Northern South Carolina (67 square miles), Edisto (66 square miles), and the Charleston Deep Artificial Reef (28 square miles) MPAs. The following section describes the Spawning SMZ attributes for each alternative and includes relevant comparisons on environmental and other grounds.

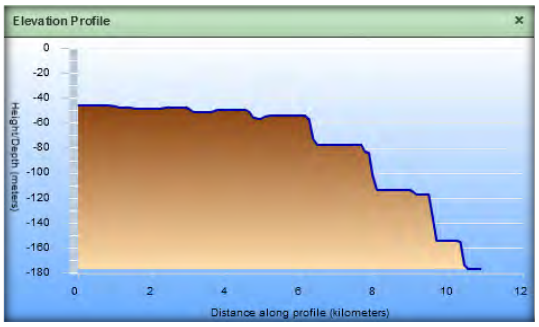
SMZ Attributes: Size, Depth, and Distance from Shore

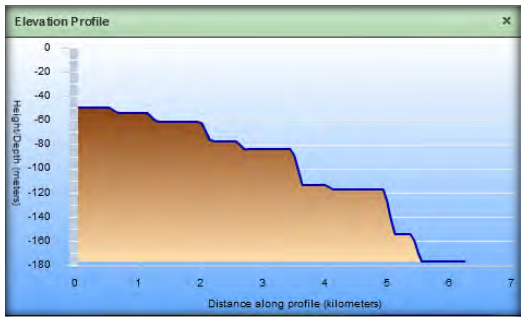
Table S-9. Travel distance, size, and depth range of Alternative 2 Sub-Alternatives for proposed Spawning SMZs off South Carolina.

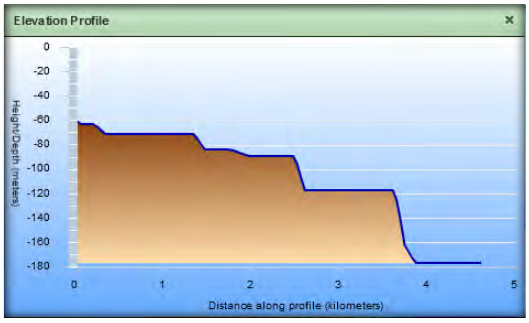
Proposed Spawning SMZ off South Carolina	Sub-Alts.	Distance From Georgetown (miles)	Size (square miles)	Depth inshore feet(meters)	Depth offshore feet(meters)
Devils Hole	**2a**	54	13.5	148(45)	591(180
	2b	55.5	4	180(55)	591(100)
	2c	56.5	1	197(60)	591(100)
	2d	54	15.2	148 (45)	804 (235)
SC South	**2e**	68.1	8	591(180)	705 (215)

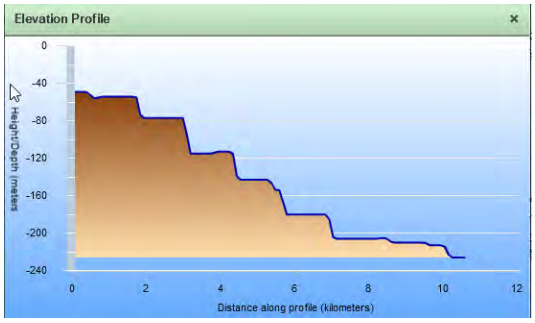
Source: Roger Pugliese, SAFMC Staff.

Elevation profiles for each of the alternatives/sub-alternatives are shown in **Figure S-12**.

2a 

2b 

2c 

2d 

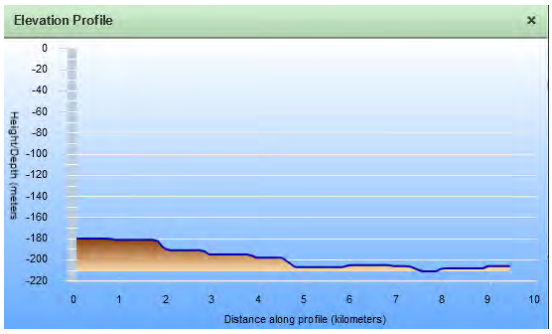
2e 

Figure S-12. Elevation Profiles for Devils Hole Sub-Alternatives 2a, 2b, 2c, 2d and 2e. Source: (http://ocean.floridamarine.org/safmc_atlas/) Roger Pugliese, SAFMC Staff.

Table S-10. Corner Coordinates for Sub-Alternatives for proposed Devils Hole Spawning SMZ off South Carolina.

Devils Hole (Corner Coordinates)	Longitude	Latitude
Sub-Alternative 2a	78 36.171	32 36.718
(12.5 sq mile)	78 36.171	32 33.086
	78 33.079	32 33.086
	78 33.079	32 36.718
Sub-Alternative 2b	78 35.059	32 35.172
(4.6 sq mile)	78 33.079	32 35.172
	78 33.079	32 33.086
	78 35.059	32 33.086
Sub-Alternative 2c	78 34.29	32 34.373
(1.7 sq mile)	78 33.079	32 34.373
	78 33.079	32 33.086
	78 34.29	32 33.086
Sub-Alternative 2d	78 34.944	32 35.793
(15.2 sq mile)	78 30.763	32 35.793
	78 30.756	32 32.717
	78 34.929	32 32.717
SC South Sub-Alternative 2e	78 8.918	32 44.412
(7.9 sq mile)	78 4.813	32 44.412
	78 4.813	32 42.676
	78 8.918	32 42.676
Sub-Alternative 2f	78 33.220	32 34.311
(3 sq mile)	78 34.996	32 34.311
	78 34.996	32 32.748
	78 33.220	32 32.748

Source: Roger Pugliese, SAFMC Staff.

SMZ Attributes: Presence of Fish Including Those in Spawning Condition

Documented evidence of species spawning in the Alternative 2 proposed sites are showin in **Table S-11**.

Table S-11. Fish species in proposed Alternative 2 Spawning SMZs off South Carolina with evidence of spawning.

Proposed Spawning SMZ off South Carolina	Sub-Alts	Species
Devils Hole		
	2a	*Balistes capriscus* (Grey Triggerfish) *Rhomboplites aurorubens* (Vermilion Snapper) *Seriola dumerili* (Greater Amberjack) *Epinephelus nigritus* (Warsaw Grouper) *Mycteroperca phenax* (Scamp Grouper)
	2b	*Balistes capriscus (Grey Triggerfish)* *Epinephelus nigritus* (Warsaw Grouper) *Mycteroperca phenax* (Scamp Grouper)
	2c	*Epinephelus nigritus* (Warsaw Grouper) *Mycteroperca phenax* (Scamp Grouper)
	2d	*Balistes capriscus* (Grey Triggerfish) *Epinephelus niveatus* (Snowy Grouper) *Epinephelus flavolimbatus* (Yellowedge Grouper) *Caulolatilus microps* (Blueline Tilefish) *Epinephelus nigritus* (Warsaw Grouper) *Mycteroperca phenax* (Scamp Grouper)
SC South (Alternative to Devils Hole)	**2e**	*Hyporthodus niveatus* (Snowy Grouper) *Hyporthodus flavolimbatus* (Yellowedge Grouper)
	2f	*Balistes capriscus (Grey Triggerfish)* *Epinephelus nigritus* (Warsaw Grouper) *Mycteroperca phenax* (Scamp Grouper)

Source: Southeast Reef Fish Survey (SERFS – MARMAP/SEAMAP/SEFIS) and LGL Ecological Research Associates, Inc., 2014.

SMZ Attributes: Habitat Type, Bathymetry, Temperature, and Salinity

Area 51 – established April 24, 1998. Area 51 is an experimental artificial reef site established by the South Carolina Department of Natural Resources to investigate the feasibility of using artificial reef materials as an experimental Marine Protected Area (MPA). Area 51 is a 1.5 nauticle miles X 1.5 nautical miles (1.73 statute miles X 1.73 statute miles = 2.99 square statute miles) permitted artificial reef site located in approximately 70 feet of water off the South Carolina coast on sandy bottom.

Area 53 – established April 29, 2003. Due in part to the results obtained from work on the Area 51 reef site, the South Atlantic Fishery Management Council (Council) provided funding to replicate that study design in deeper water to specifically target a wider range of snapper grouper species. The permitting process and all reef parameters for the new site, designated Area 53, were identical to Area 51 except that water depth for this site was 105 feet.

To provide oceanographic information for site characterization, the Ocean Observing and Modeling Group (OOMG) in the Department of Marine, Earth & Atmospheric Sciences, North Carolina State University provided temperature and salinity profiles for each site. The OOMG approach is to use in situ and remote sensing observations, numerical models, and data analysis and assimilation methods to examine fundamental ocean circulation physics, and to gain an integrated understanding of their interactions with the atmosphere and with ocean biological, geological, and

chemical processes. The temperature profiles for Devils Hole are shown **Figures T10-T11** in **Appendix O**. Salinity profiles are shown in **Figures S9-S10** in **Appendix O**.

2.5 Action 5. Establish New Spawning Special Management Zones (Spawning SMZs) off Georgia

Preferred Alternative 1. No Action. There are no Spawning SMZs off Georgia.

Alternative 2. Establish a Spawning SMZ in the St. Simons area that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.

Sub-alternative 2a. St. Simons Area (14.1 square miles)
Sub-alternative 2b. St. Simons Area (9.4 square miles)
Sub-alternative 2c. St. Simons Area (4 square miles)

A large chart showing the general location of the Spawning SMZs is included as **Figure S-13**; a more detailed chart showing the specific location of each alternative is included as **Figure S-14**. Travel distance, size, and depth profile for the alternatives/sub-alternatives is showing in **Table S-12**; corner coordinates are shown in **Table S-13**; and fish species with evidence of spawning is shown in **Table S-14**.

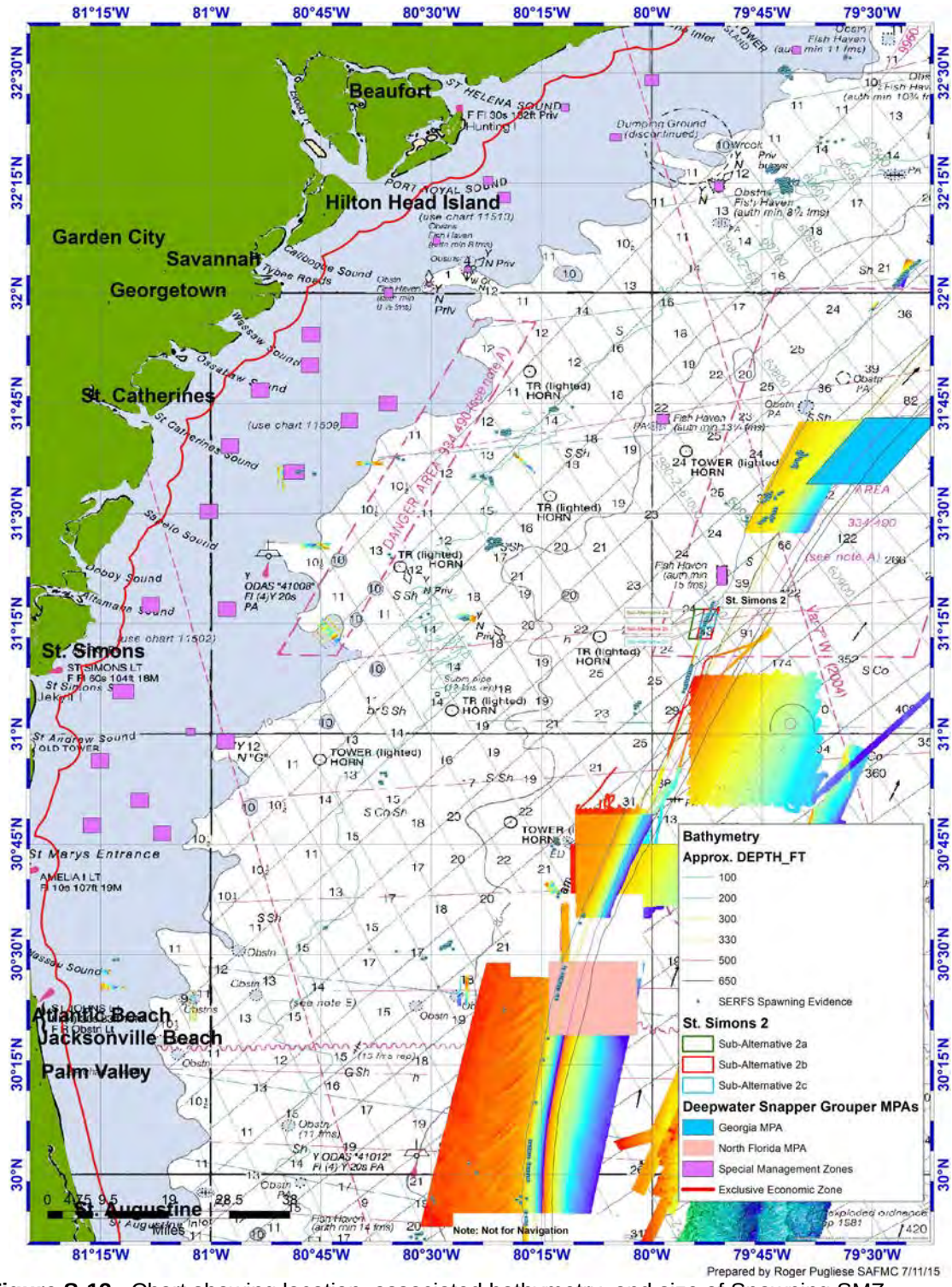


Figure S-13. Chart showing location, associated bathymetry, and size of Spawning SMZ Alternatives for area known as "St. Simons 2" off Georgia.
Source: Roger Pugliese, SAFMC Staff.

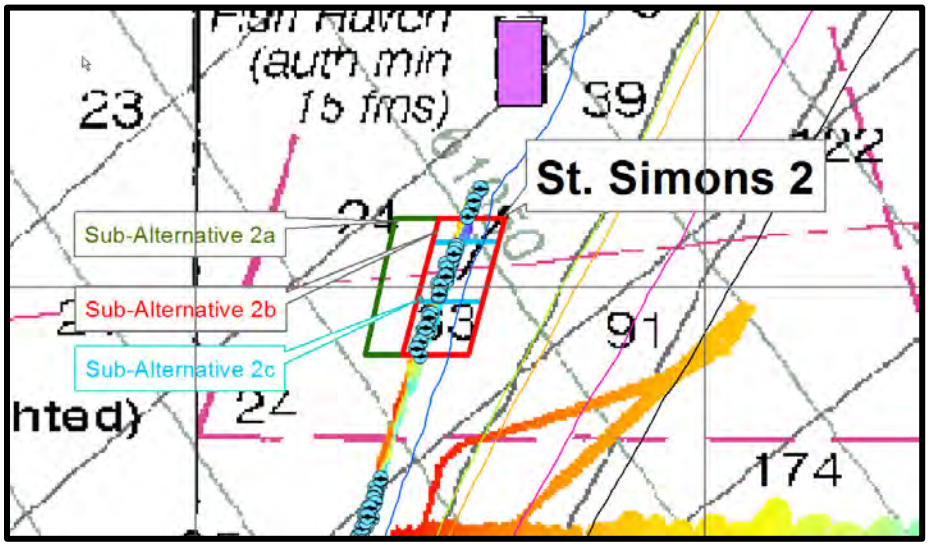


Figure S-14. Chart showing location, associated bathymetry, and approximate size of Sub-Alternative 2a (14.1 square miles), Sub-Alternative 2b (9.4 square miles), and Sub-Alternative 2c (4 square miles) for the area off Georgia known as the "St. Simons 2."
Source: Roger Pugliese, SAFMC Staff

2.5.1 Discussion

Under Alternative 1 **(No Action)**, fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit is prohibited year-round in the Georgia MPA (102 square miles). The following section describes the Spawning SMZ attributes for each alternative and includes relevant comparisons on environmental and other grounds.

SMZ Attributes: Size, Depth, and Distance from Shore

Table S-12. Travel distance, size, and depth range of Sub-Alternatives 2a, 2b, and 2c for the area known as "Simons 2" Spawning SMZ off Georgia.

Proposed Spawning SMZ off Georgia	Sub-Alts.	Distance From (miles)	Size (square miles)	Depth inshore feet (meters)	Depth offshore feet (meters)
		Sapelo Sound			
St. Simons 2	**2a**	77	14.1	138(42)	230(70)
	2b	78	9.4	164(50)	230(70)
	2c	78.3	4	164(50)	230(70)

Source: Roger Pugliese, SAFMC Staff

Table S-13. Corner Coordinates for Alternative 2 Sub-Alternatives for proposed St. Simons 2 Spawning SMZ off Georgia.

St. Simons 2 (Corner Coordinates)	West Longitude	East Latitude
Sub-Alternative 2a	79° 54.122’	31° 17.021’
	79° 55.013’	31° 12.995’
	79° 51.963’	31° 12.995’
	79° 50.884’	31° 17.021’
Sub-Alternative 2b	79° 52.837’	31° 17.021’
	79° 53.916’	31° 12.995’
	79° 51.963’	31° 12.995’
	79° 50.884’	31° 17.021’
Sub-Alternative 2c	79° 53.019’	31° 16.314’
	79° 51.066’	31° 16.314’
	79° 51.537’	31° 14.592’
	79° 53.481’	31° 14.592’

Source: Roger Pugliese, SAFMC Staff.

SMZ Attributes: Presence of Fish Including Those in Spawning Condition

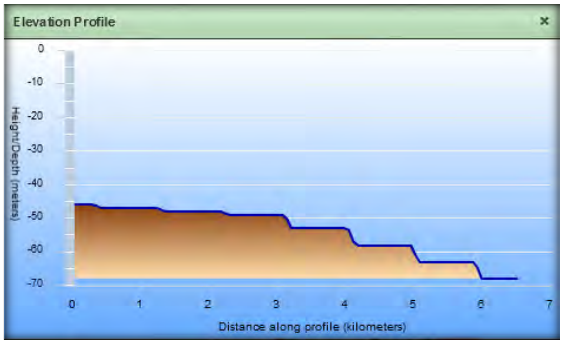
Table S-14. Fish species in proposed spawning SMZs off Georgia with evidence of spawning.

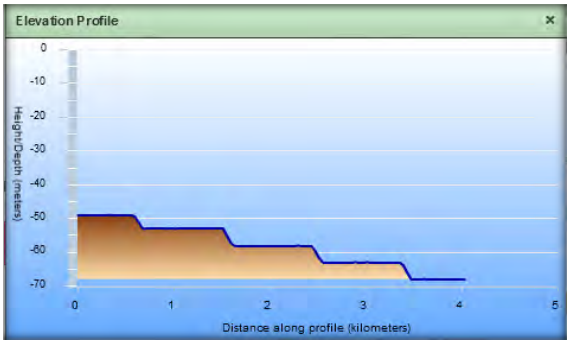
Proposed Spawning SMZ off Georgia	Sub-Alts	Species
St. Simons 2	**2a**	*Rhomboplites aurorubens* (Vermilion Snapper) *Haemulon aurolineatum* (Tomtate) *Lutjanus campechanus* (Red Snapper) *Balistes capriscus* (Gray Triggerfish) *Mycteroperca phenax* (Scamp) *Pagrus pagrus* (Red Porgy)
	2b	*Rhomboplites aurorubens* (Vermilion Snapper) *Haemulon aurolineatum* (Tomtate) *Lutjanus campechanus* (Red Snapper) *Balistes capriscus* (Gray Triggerfish) *Mycteroperca phenax* (Scamp) *Pagrus pagrus* (Red Porgy)
	2c	*Rhomboplites aurorubens* (Vermilion Snapper) *Haemulon aurolineatum* (Tomtate) *Lutjanus campechanus* (Red Snapper) *Balistes capriscus* (Gray Triggerfish) *Mycteroperca phenax* (Scamp) *Pagrus pagrus* (Red Porgy)

Source: Southeast Reef Fish Survey (SERFS – MARMAP/SEAMAP/SEFIS)

SMZ Attributes: Habitat Type, Bathymetry, Temperature, and Salinity

Elevation profiles for each of the alternatives/sub-alternatives are shown in **Figure S-15**.

2a 

2b 

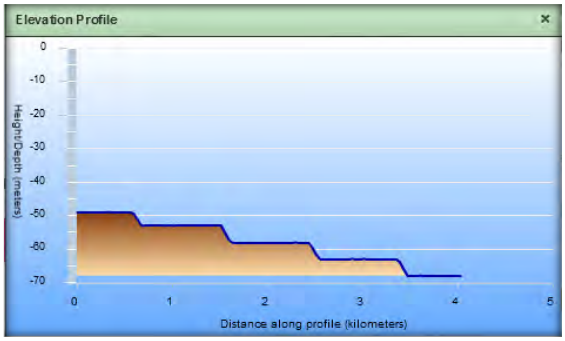
2c 

Figure S-15. Elevation Profiles for St. Simons 2 Sub-Alternatives 2a, 2b, and 2c.
Source: (http://ocean.floridamarine.org/safmc_atlas/) Roger Pugliese, SAFMC Staff

To provide oceanographic information for site characterization, the Ocean Observing and Modeling Group (OOMG) in the Department of Marine, Earth & Atmospheric Sciences, North Carolina State University provided temperature and salinity profiles for each site. The OOMG approach is to use in situ and remote sensing observations, numerical models, and data analysis and assimilation methods to examine fundamental ocean circulation physics, and to gain an integrated understanding of their interactions with the atmosphere and with ocean biological, geological, and chemical processes. The temperature profile for the St. Simons 2 Spawning SMZ is shown **Figure T12** in **Appendix O**. Salinity profiles are shown in **Figures S11-S12** in **Appendix O**.

2.6 Action 6. Establish New Spawning Special Management Zones (Spawning SMZs) off Florida

Alternative 1. No Action. There are no Spawning SMZs off Florida.

Preferred Alternative 2. Establish a Spawning SMZ in the Warsaw Hole area that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.

Sub-alternative 2a. Warsaw Hole (2 square miles)
Preferred Sub-alternative 2b. Warsaw Hole (1 square mile)
Sub-alternative 2c. Warsaw Hole (4 square mile)

Alternative 3. Establish a Spawning SMZ in the Daytona Steeples area that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.

Sub-alternative 3a. Daytona Steeples (6 square miles) area of apparent high relief in the 27 square mile footprint.
Sub-alternative 3b. Daytona Steeples (12 square miles)
Sub-alternative 3c. Daytona Steeples (6 square miles)

Large charts showing the general location of the Spawning SMZs are included as **Figures S-16** and **S-18**; more detailed charts showing the specific location of each alternative are included as **Figures S-17** and **S-19**. Travel distance, size, and depth profile for the alternatives/sub-alternatives are shown in **Tables S-17** and **18**; and corner coordinates are shown in **Tables S-15** and **S-16**.

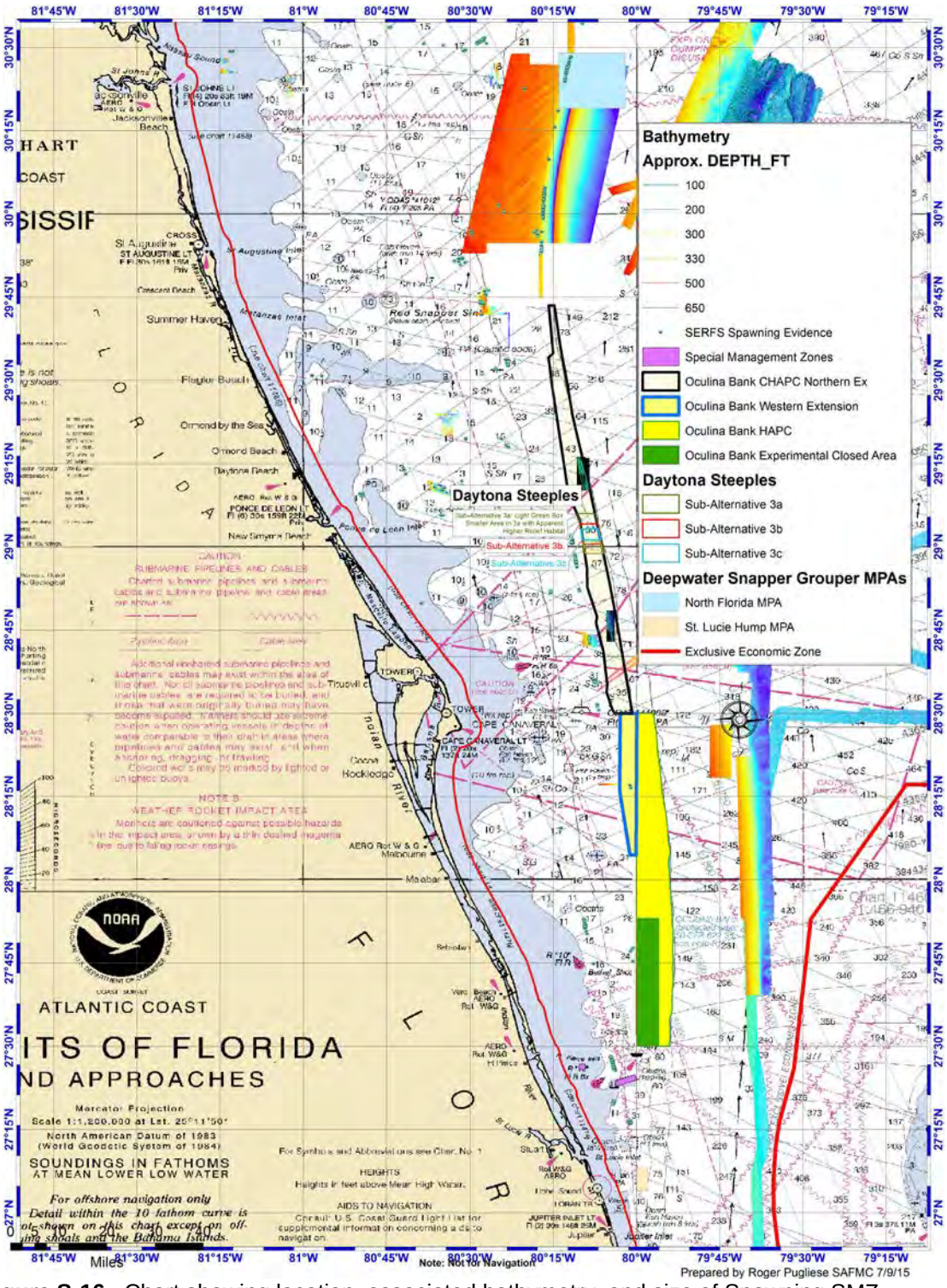


Figure S-16. Chart showing location, associated bathymetry, and size of Spawning SMZ Alternatives for the area known as "Daytona Steeples" off Florida.
Source: Roger Pugliese, SAFMC Staff.

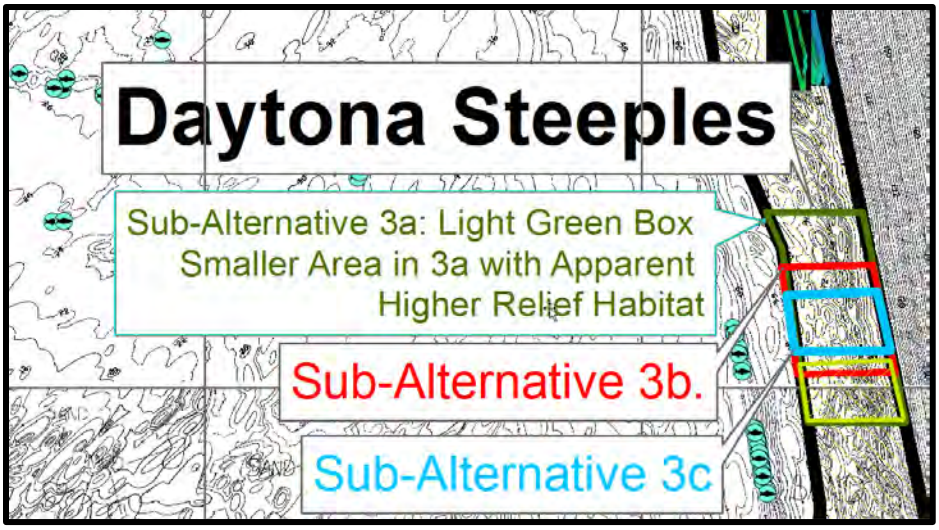


Figure S-17. Chart showing location, associated bathymetry, and approximate size of Sub-Alternative 3a (6 square mile area within 27 square mile footprint), Sub-Alternative 3b (12 square miles), and Sub-Alternative 3c (6 square miles) for the area off the east coast of Florida known as the "Daytona Steeples."
Source: Roger Pugliese, SAFMC Staff.

Table S-15. Corner Coordinates for Alternative 3 Sub-Alternatives for proposed Daytona Steeples Spawning SMZ off the East Coast of Florida.

Daytona Steeples	West Longitude	East Latitude
Sub-Alternative 3a	80° 10.743'	29° 5.989'
(Footprint)	80° 7.488'	29° 5.989'
	80° 5.981'	28° 58.851'
	80° 9.293'	28° 58.794'
	80° 10.195'	29° 4.756'
Smaller Area in 3a	80° 9.533'	29° 0.633'
	80° 6.410'	29° 0.633'
	80° 6.018'	28° 58.875'
	80° 9.304'	28° 58.875'
Sub-Alternative 3b	80° 10.092'	29° 4.139'
	80° 9.624'	29° 0.530'
	80° 6.289'	29° 0.530'
	80° 7.066'	29° 4.139'
Sub-Alternative 3c	80° 10.000'	29° 3.237'
	80° 6.833'	29° 3.340'
	80° 6.517'	29° 1.501'
	80° 9.738'	29° 1.455'

Source: Roger Pugliese, SAFMC Staff

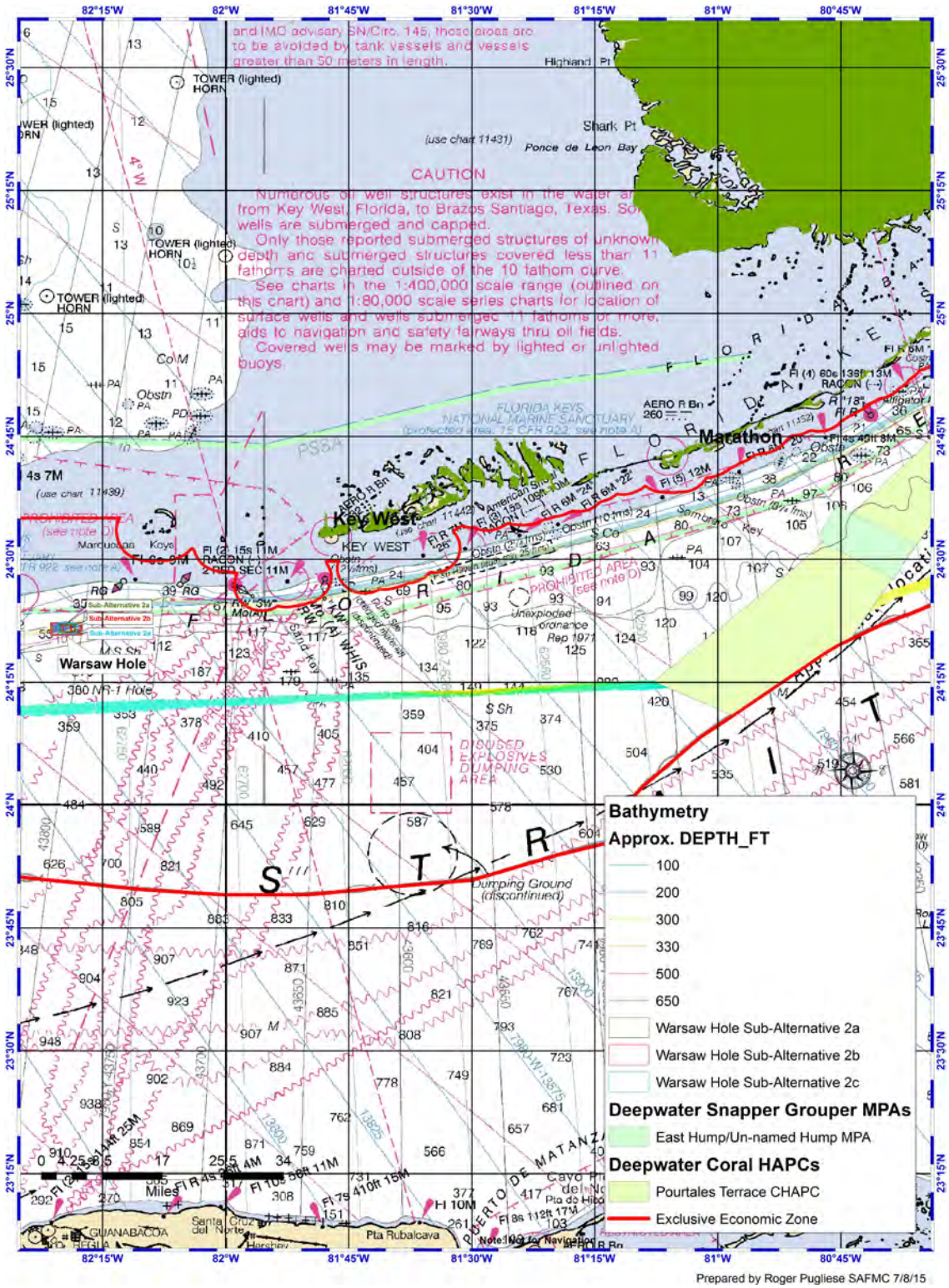


Figure S-18. Chart showing location of the area known as "Warsaw Hole" off the Florida Keys.
Source: Roger Pugliese, SAFMC Staff

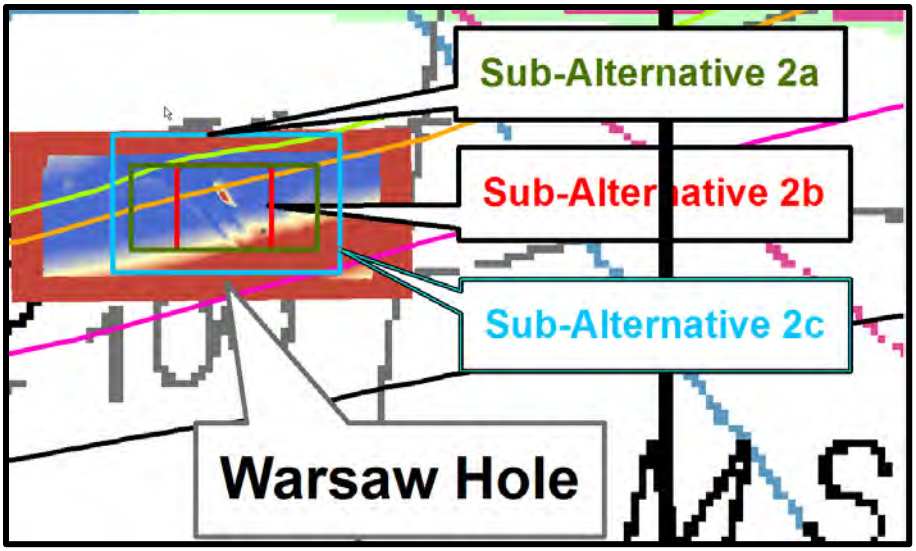


Figure S-19. Chart showing location and approximate size of Sub-Alternative 2a (2 square miles), Sub-Alternative 2b (1 square mile), and Sub-Alternative 2c (4 square miles) for the area off the Florida Keys known as the "Warsaw Hole."
Source: Roger Pugliese, SAFMC Staff

Table S-16. Corner Coordinates for Alternative 2 Sub-Alternatives for proposed Warsaw Hole Spawning SMZ off the East Coast of Florida.

Warsaw Hole	West Longitude	East Latitude
Sub-Alternative 2a	82° 20.227'	24° 21.972'
	82° 18.418'	24° 21.972'
	82° 18.418'	24° 21.154'
	82° 20.227'	24° 21.154'
Sub-Alternative 2b	82° 19.802'	24° 21.972'
	82° 18.882'	24° 21.972'
	82° 18.882'	24° 21.154'
	82° 19.802'	24° 21.154'
Sub-Alternative 2c	82° 20.417'	24° 22.277'
	82° 18.215'	24° 22.277'
	82° 18.215'	24° 20.932'
	82° 20.417'	24° 20.932'

Source: Roger Pugliese, SAFMC Staff

2.6.1 Discussion

Under **Alternative 1 (No Action)**, fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit is prohibited year-round in the North Florida (137 square miles), *Oculina* Experimental Closed Area (108 square miles), St. Lucia Hump (9 square miles), and the East Hump (66 square miles) MPAs. The following section describes the Spawning SMZ attributes for each alternative and includes relevant comparisons on environmental and other grounds.

SMZ Attributes: Size, Depth, and Distance from Shore

Table S-17. Travel distance, size, and depth range of Alternative 3 Sub-Alternatives for proposed Spawning SMZs off the east coast of Florida.

Proposed Spawning SMZ off the East coast of Florida	Sub-Alts.	Distance From Ponce De Leon Inlet (miles)	Size (square miles)	Depth inshore feet(meters)	Depth offshore feet(meters)
Daytona Steeples	**3a**	39	6 (in 27 mile footprint)	230(70)	312(95)
	3b	37	12	230(70)	312(95)
	3c	38	6	230(70)	312(95)

Source: Roger Pugliese, SAFMC Staff

Table S-18. Travel distance, size, and depth range of Alternatie 2 Sub-Alternatives for proposed Spawning SMZs off the Florida Keys.

Proposed Spawning SMZ of the east coast of Florida	Sub-alts.	Distance From Key West (miles)	Size (square miles)	Depth inshore feet(meters)	Depth offshore feet(meters)
Warsaw Hole	**2a**	35	2	187(57)	226(69)
	2b	35.6	1	187(57)	226(69)
	2c	34.7	4	230 (70)	443 (135)

Source: Roger Pugliese, SAFMC Staff

SMZ Attributes: Presence of Fish Including Those in Spawning Condition

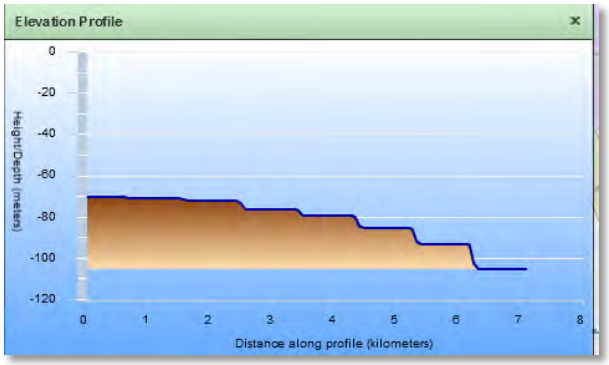
The following information is taken directly from the MPA Expert Workgroup Report (SAFMC 2013):

"Warsaw Hole (Figure 11) consists of a 50-fm. hump, southwest of Cosgrove Shoal Light (about 10 miles west-southwest of Key West and south of the Marquesas Keys). The east side of the feature is a backbone ridge where depth drops steeply from 240 to 400 ft. Warsaw grouper have been seen aggregating there in March, and one female has been caught with obvious roe. The area southeast and southwest of Cosgrove Shoal is thought to be a spawning area for red snapper (Lindeman et al. 2000).

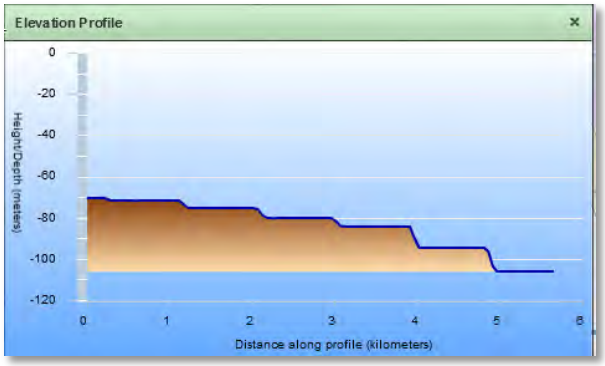
Warsaw Hole is an area of critical concern. Not only does it have warsaw grouper (occasionally caught), but also almaco jack, greater amberjack (all winter long), groupers (including black and scamp), snappers [silk (yelloweye), blackfin, red, vermilion], and other reef fishes. Warsaw grouper definitely aggregate there, as accounts from the old-time conch fishermen clearly indicate there must have been an aggregation based on the numbers they caught. Warsaw Hole may also be a spawning aggregation site for greater amberjack."

SMZ Attributes: Habitat Type, Bathymetry, Temperature, and Salinity

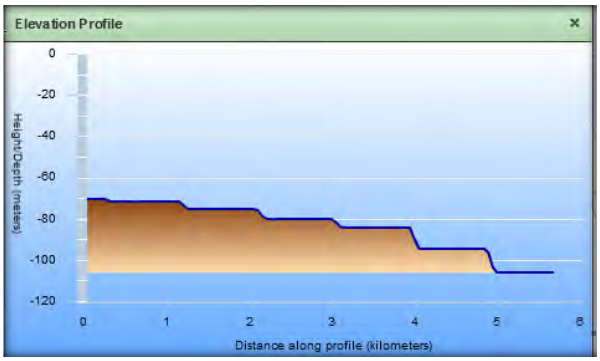
Elevation profiles for each of the alternatives/sub-alternatives are shown in **Figures S-20** and **S-21**.



3a

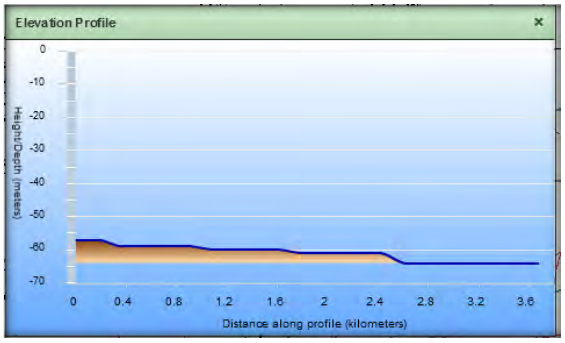


3b

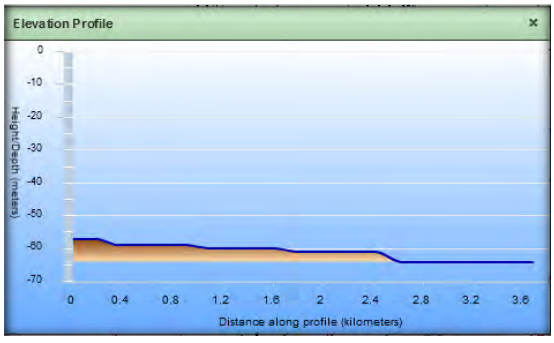


3c

Figure S-20. Elevation Profiles for Daytona Steeples Sub-Alternatives 3a, 3b, and 3c.
Source: (http://ocean.floridamarine.org/safmc_atlas/) Roger Pugliese, SAFMC Staff



2a



2b

2c

Figure S-21. Elevation Profiles for Warsaw Hole Sub-Alternatives 2a, 2b, and 2c.
Source: (http://ocean.floridamarine.org/safmc_atlas/) Roger Pugliese, SAFMC Staff

The elevation profile for the Warsaw Hole sub-alternatives is shown in **Figure S-22**.

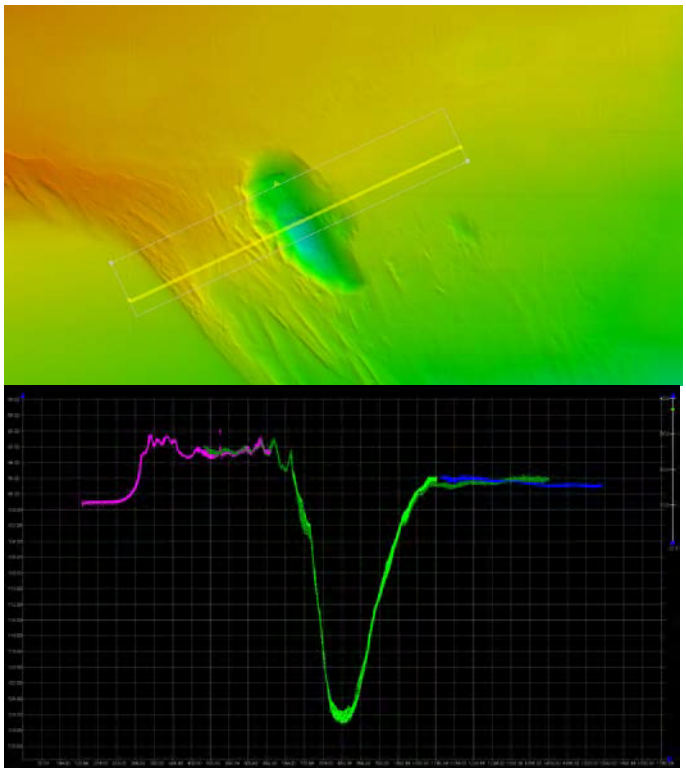


Figure S-22. Elevation profiles for a cross section Warsaw Hole contained in Sub-Alternatives 2a, 2b, and 2c.
Source: NOAA - Multi-beam mapping of Warsaw Hole by the Nancy Foster Associated with NF 15-04 FKNMS Ecological Assessment

To provide oceanographic information for site characterization, the Ocean Observing and Modeling Group (OOMG) in the Department of Marine, Earth & Atmospheric Sciences, North Carolina State University provided temperature and salinity profiles for each site. The OOMG approach is to use in situ and remote sensing observations, numerical models, and data analysis and assimilation methods to examine fundamental ocean circulation physics, and to gain an integrated understanding of their interactions with the atmosphere and with ocean biological, geological, and chemical processes. The temperature profiles for Florida are shown **Figures T13-T16** in **Appendix O**. Salinity profiles are shown in **Figures S13-S16** in **Appendix O**.

2.7 Action 7. Move the Existing Charleston Deep Artificial Reef MPA 1.4 miles to the Northwest to Match the Boundary of the Permitted Site

Alternative 1. No Action. The existing Charleston Deep Artificial Reef MPA boundaries are: The northwest corner at 32°4' N, 79°12'W; the northeast corner at 32°8.5'N, 79° 7.75'W; the southwest corner at 32°1.5'N, 79°9.3'W; and the southeast corner at 32°6'N, 79°5'W.

Preferred Alternative 2. Move the Charleston Deep Artificial Reef MPA 1.4 miles to the northwest to match the boundary of the U.S. Army Corps of Engineers' permitted artificial reef area.

A chart showing the location and coordinates for the proposed shift of the Charleston Deep Artificial Reef MPA is provided as **Figure S-23**.

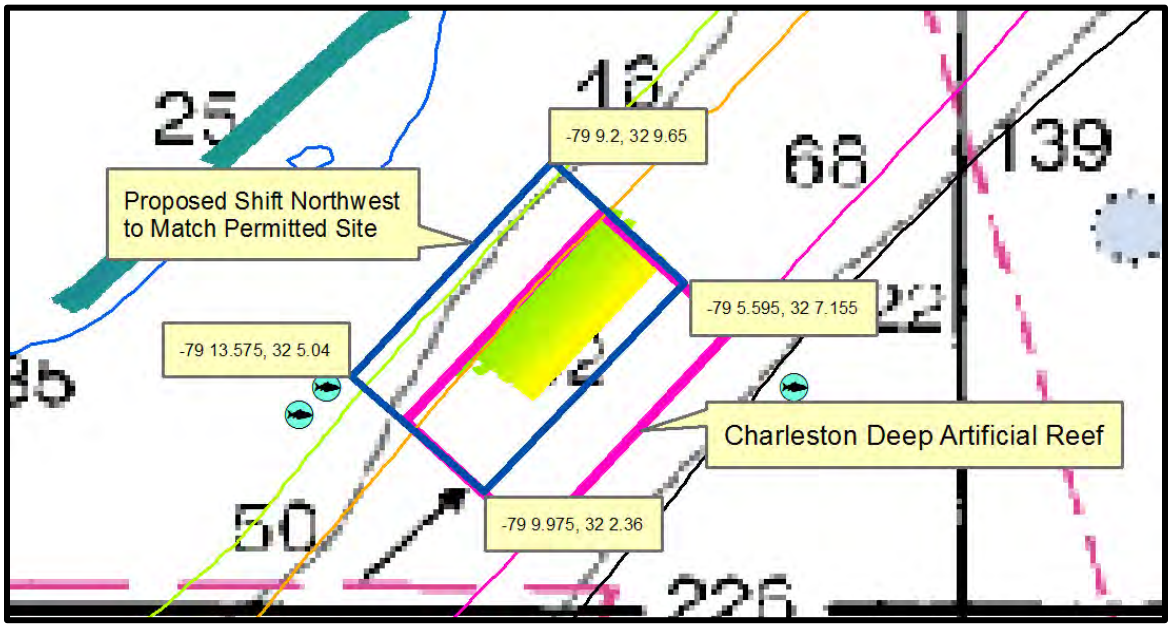


Figure S-23. Chart showing location and coordinates for the proposed shift of the Charleston Deep Artificial Reef MPA northwest to match the existing permitted site.
Source: Roger Pugliese, SAFMC Staff

2.7.1 Discussion

The area is mostly sand bottom and the site was chosen by the Council in Amendment 14 to the Snapper Grouper FMP (SAFMC 2007) to place artificial reef material in a sandy environment and prohibit all snapper grouper fishing while having no negative impacts on recreational and/or commercial fishermen. The Council's intent was to test how well artificial reefs can work to increase the abundance of fish and provide them the opportunity to grow and reproduce in an un-fished area.

The Council originally designated the area as the Charleston Deep Artificial Reef MPA (**Alternative 1 (No Action)**) in Snapper Grouper Amendment 14 (SAFMC 2007). The State of South Carolina worked with the Corps of Engineers to modify the boundary of this site to include some material that was recently sunk in the area. The State of South Carolina requested the Council shift the boundary of the existing Charleston Deep Artificial Reef MPA to match the new boundary of the artificial reef site. This requires that the boundary be shifted 1.4 miles to the northwest (**Preferred Alternative 2**). The following section describes the Spawning SMZ attributes for each alternative and includes relevant comparisons on environmental and other grounds.

2.8 Action 8. Establish Transit and Anchoring Provisions

Alternative 1. No Action. Do not establish transit and anchoring provisions in the proposed Spawning Special Management Zones (SMZs). There are no Spawning SMZs in place and, if established, anchoring within the Spawning SMZ and transiting with snapper grouper species onboard would be allowed.

Preferred Alternative 2. In the proposed Spawning SMZs, allow transit with snapper grouper species aboard a vessel when fishing gear is appropriately stowed as defined below.

Preferred Alternative 3. Prohibit anchoring by fishing vessels in the proposed spawning SMZs.

Sub-alternative 3a. Prohibit anchoring by fishing vessels in all Spawning SMZs.

Sub-alternative 3b. Prohibit anchoring by fishing vessels in all Spawning SMZs except Area 51 and Area 53.

Definitions for Alternatives in Action 8

"Transit" means direct, non-stop progression through the Spawning SMZs.

"*Fishing gear appropriately stowed*" means:

(A) A longline may be left on the drum if all gangions and hooks are disconnected and stowed below deck. Hooks cannot be baited. All buoys must be disconnected from the gear; however, buoys may remain on deck.
(B) Trawl doors and nets must be out of the water but the doors are not required to be on deck or secured on deck or below deck.
(C) A gillnet, stab net, or trammel net must be left on the drum. Any additional such nets not attached to the drum must be stowed below deck.
(D) Terminal gear (*i.e.*, hook, leader, sinker, flasher, or bait) used with an automatic reel, bandit gear, buoy gear, handline, or rod and reel must be disconnected and stowed separately from such fishing gear.
(E) A crustacean trap, golden crab trap, or sea bass pot cannot be baited. All buoys must be disconnected from the gear; however, buoys may remain on deck.
(F) Sinkers must be disconnected from the down rigger and stowed separately.

2.8.1 Discussion

Under **Alternative 1 (No Action)**, fishermen may transit the current eight deepwater MPAs with snapper grouper species aboard a vessel when fishing gear is appropriately stowed. Transit with snapper grouper species aboard a vessel is not allowed in the *Oculina* Experimental Closed Area. Anchoring is allowed in the eight deepwater MPAs but not in the *Oculina* Experimental Closed Area, *Oculina* Habitat Area of Particular Concern (HAPC), or in any of the coral HAPCs.

Alternative 2 addresses allowing transit through the Spawning SMZs and **Alternative 3** would prohibit anchoring. These two alternatives would track what is currently in place for the *Oculina* Experimental Closed Area and HAPCs.

2.9 Action 9. Establish a Sunset Provision for the Spawning SMZs.

Alternative 1. No Action. The Spawning SMZs would not automatically expire through a sunset provision.

Alternative 2. The Spawning SMZs will sunset 10 years after implementation if not reauthorized.

Sub-alternative 2a. Apply the sunset provision to all Spawning SMZs.

Sub-alternative 2b. Apply the sunset provision to all Spawning SMZs except Area 51 and Area 53.

Alternative 3. The Spawning SMZs will sunset 7 years after implementation if not reauthorized.

Sub-alternative 3a. Apply the sunset provision to all Spawning SMZs.

Sub-alternative 3b. Apply the sunset provision to all Spawning SMZs except Area 51 and Area 53.

Alternative 4. The Spawning SMZs will sunset 5 years after implementation if not reauthorized.

Sub-alternative 4a. Apply the sunset provision to all Spawning SMZs.

Sub-alternative 4b. Apply the sunset provision to all Spawning SMZs except Area 51 and Area 53.

Direction to staff: Add discussion about what needs to be done; refer to Appendix N. Add wording to alternatives (I suggest putting in the discussion – Gregg) that discusses what specifically allows a site to sunset. Also, use the following list of species to document spawning activity within Spawning SMZs.

Table S-19. Spawning SMZs target species.

Groupers Goliath grouper (*Epinephelus itajara*), Nassau grouper (*E. striatus*), red grouper (*E. morio*), red hind (*E. guttatus*) (due to documented aggregations in other areas), speckled hind (*E. drummondhayi*), snowy grouper (*Hyporthodus niveatus* formerly *E. niveatus*), Warsaw grouper (*H. nigritus* formerly *E. nigritus*), black grouper (*Mycteroperca bonaci*), gag (*M. microlepis*), scamp (*M. phenax*)

Snappers Yellowtail snapper (*Ocyurus chrysurus*), cubera snapper (*Lutjanus cyanopterus*), ~~dog snapper (*L. jocu*), gray snapper (*L. griseus*), lane snapper (*L. synagris*),~~ mutton snapper (*L. analis*), red snapper (*L. campechanus*), silk snapper (*L. vivanus*)

Tilefish Golden tilefish (*Lopholatilus chamaeleonticeps*), blueline tilefish (*Caulolatilus microps*)

2.9.1 Discussion

Alternative 1 (No Action) would not establish a sunset provision and the Spawning SMZs would remain in place until altered by the Council through an amendment. Under **Alternative 2**, the sunset provision would mean that the Spawning SMZs would no longer exist after 10 years. The Interdisciplinary Planning Team (IPT) may suggest the Council consider another alternative to sunset 15 years after implementation.

Chapter 1.
Introduction

1.1 What Action Is Being Proposed?

Fishery managers are proposing closing areas to fishing for snapper and grouper species to protect spawning fish. See **Chapter 2** for a complete list of the management actions in this amendment.

1.2 Who is Proposing the Action?

The South Atlantic Fishery Management Council (Council) is proposing the actions. The Council develops the amendment and sends it to the National Marine Fisheries Service (NMFS) who approves, disapproves, or partially approves, and implements the measures in the amendment on behalf of the Secretary of Commerce. NMFS is a part of the National Oceanic and Atmospheric Administration within the Department of Commerce.

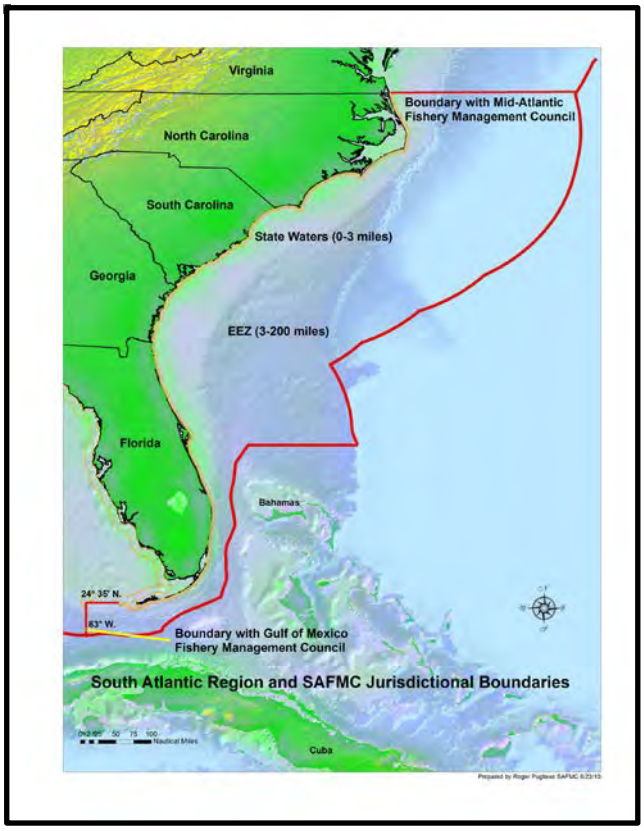
South Atlantic Fishery Management Council

- Responsible for conservation and management of fish stocks
- Consists of 13 voting members: 8 appointed by the Secretary of Commerce, 1 representative from each of the 4 South Atlantic states, the Southeast Regional Director of NMFS; and 4 non-voting members
- Responsible for developing fishery management plans and amendments under the Magnuson-Stevens Act and recommends actions to NMFS for implementation
- Management area is from 3 to 200 miles off the coasts of North Carolina, South Carolina, Georgia, and east Florida through Key West with the exception of Mackerel which is from New York to Florida, and Dolphin-Wahoo, which is from Maine to Florida

1.3 Where is the Project Located?

Management of the federal snapper grouper fishery located off the southeastern United States (South Atlantic) in the 3-200 nautical miles U.S. Exclusive Economic Zone is conducted under the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region (Snapper Grouper FMP, SAFMC 1983) (**Figure 1.3.1**).

Figure 1.3.1. Jurisdictional boundaries of the South Atlantic Fishery Management Council.



1.4 Why is the Council and NMFS Considering Action (Purpose and Need)?

The Council intends to protect spawning habitat and spawning fish. Certain habitat areas are very important for a number of species as sites where they move/aggregate to spawn. Depending on alternative selected by the Council, protecting these areas, and the associated habitat could produce more eggs, larvae, and subsequent recruitment of juvenile fish.

The Council had previously included a restriction on the possession or harvest of some deepwater snapper grouper species in waters greater than 240 feet deep (240 feet seaward) to help protect warsaw grouper and speckled hind, two deepwater species extremely vulnerable to overfishing (Amendment 17B to the Snapper Grouper FMP; SAFMC 2010b). Those regulations became effective on January 31, 2011. Subsequent analysis showed that warsaw grouper and speckled hind were generally not caught when fishermen targeted deep water species such as blueline tilefish and snowy grouper. Furthermore, the negative socieoeconomic impacts of the harvest prohibition was significant in some areas.

However, in Regulatory Amendment 11 to the Snapper Grouper FMP (SAFMC 2011b) the Council eliminated the restriction on the possession or harvest of six deepwater snapper grouper species in waters greater than 240 feet. Those regulations became effective on May 10, 2012. The Council originally planned to re-address measures to reduce bycatch of speckled hind and warsaw grouper in Comprehensive Ecosystem-Based Amendment 3 (CE-BA 3). The Council then moved the issue of protecting speckled hind and warsaw grouper was moved from CE-BA 3 to Regulatory Amendment 17 to the Snapper Grouper FMP and then to

Amendment 36 to have changes implemented more quickly.

The Natural Resources Defense Council and Ocean Conservancy sued the Secretary of Commerce, the Department of Commerce and NOAA and NMFS on the final rule to implement Regulatory Amendment 11that removed some of the measures limiting possession of deepwater species. The court ruled in favor of the Secretary of Commerce, the Department of Commerce and NOAA and NMFS. NMFS/Council stated they would take additional action. For example, as stated in the final rule for Regulatory Amendment 11, the Council and NMFS planned to develop area and species prohibitions that would most effectively reduce encounters with speckled hind and warsaw grouper while minimizing, to the extent practicable, socio-economic effects to the fishing industry.

Recent action taken by the Council includes the following:

a. Snapper Grouper Amendment 36 (Spawning SMZs for a number of species including speckled hind & warsaw grouper)
b. MPA Expert Workgroup – the Council formed a group of MPA experts composed of scientists and fishermen with experience studying snapper grouper species or observing spawning in the South Atlantic Council's area. The group was requested to review scientific data on spawning sites, habitat mapping, and species occurrence and to provide recommendations on potential areas. The group met twice and provided a report that is available from the Council's website (See: http://www.safmc.net/managed-areas/marine-protected-areas). The Council reviewed the areas recommended by the group and decided to move forward with looking at spawning SMZs rather than additional MPAs. The Council used the data compiled by the group and input during public hearings when determining spawning SMZ areas to evaluate.
c. Coral Amendment 8 (SAFMC 2013h) – expanded Coral HAPCs; sent to the Secretary of Commerce for formal review on 11/26/13; the proposed rule published in the Federal Register on June 3, 2014 and comments were due on or before July 3, 2014. Amendment 8 was approved on August 20, 2014; the final rule became effective on August 17, 2015 (80 FR 42423). Based on regulations in the Coral HAPCs, fishing will be reduced (e.g., no anchoring). The MPA Rankings prepared by the MPA Expert Work Group assumed 50% protection efficiency for CHAPCs. This means that the Coral HAPCs are assumed to be 50% as effective as an MPA (Source: MPA Spreadsheet; NMFS SERO). The following actions affecting the total effective area under "MPA protection" are in Coral Amendment 8:
    i. Action 1. Expand Oculina Bank HAPC – 267 square miles + 76 square miles = 343 square miles of additional area would be added to the current area under "MPA protection".
    ii. Action 3. Expand Stetson-Miami Terrace Coral HAPC – 490 square miles of additional area would be added to the current area under "MPA protection".
    iii. Action 4. Expand Cape Lookout Coral HAPC – 10 square miles of additional area would be added to the current area under "MPA protection".

The Council is developing a System Management Plan (SMP) for the Spawning SMZs that will describe in detail the monitoring and evaluation requirements for the proposed sites. This SMP will is included as **Appendix N** to Snapper Grouper Amendment 36.

The Council originally designated the Charleston Deep Artificial Reef MPA in Snapper Grouper Amendment 14 to the Snapper Grouper FMP (SAFMC 2007). The State of South Carolina worked with the Army Corps of Engineers to modify the boundary of this site to include some material that was recently sunk in the area. The State of South Carolina requested the Council shift the boundary of the existing Charleston Deep Artificial Reef MPA to match the new boundary of the artificial reef site. This requires that the boundary be shifted 1.4 miles to the northwest.

The Council has identified alternative areas to provide the public an idea of what Spawning SMZs they are considering in Amendment 36 (**Actions 3-6**). These alternative areas have been identified based on occurrence/spawning data collected and analyzed by MARMAP, recommendations from the Council's MPA Expert Work Group, recommendations from the Snapper Grouper Advisory Panel, results of cooperative research, and recommendations from the public. Travel distance, size, and depth profile of the alternative sites are provided. The Council will receive additional input from the public before they choose final areas for implementation.

The Council will consider all input during their September 14-18, 2015, meeting where they will identify specific areas as preferred alternatives and approve all actions in Amendment 36. Final review of the draft environmental impact statement comments and Amendment 36 will take place at the Council's December 7-11, 2015, meeting when the Council will consider approval of the amendment for formal review by the Secretary of Commerce.

Catch data were used to estimate the impact the proposed areas would have on recreational and commercial fishermen. Given the small size of the areas and the large size of the statistical grids for catch data, the Council recognizes it is difficult to accurately measure the impacts. The Council will be asking the public to provide input on potential impacts to your fishing during the second round of public hearings.

Purpose for Action

Protect~~Identify~~ important spawning habitat for snapper grouper species that can be designated for protection to enhance spawning ~~and increase recruitment~~. Reduce bycatch and bycatch mortality of snapper grouper species, including speckled hind and warsaw grouper. ~~Align the existing South Carolina Marine Protected Area (MPA) with the permitted site.~~

Need for Action

Prevent overfishing and achieve optimum yield (National Standard 1); reduce bycatch and bycatch mortality of economically and ecologically important snapper grouper species, including speckled hind and warsaw grouper, to the extent practicable (NS 9); and achieve conservation goals while minimizing to the extent practicable negative social and economic effects to snapper grouper fishermen and fishing communities (NS 8).

1.5 What Are the Proposed Actions in the Amendment?

A Spawning SMZ is a designated area with habitat characteristics, bottom topography, and current systems that provide important snapper grouper spawning habitat and where fishing for or retention of snapper grouper species is prohibited and certain other activities (types of fishing, anchoring, etc.) are restricted. Proposed actions in Amendment 36 are:

1) Modify the Special Management Zone procedure to allow for the designation of Spawning Special Management Zones
2) Modify the framework procedure to allow Spawning Special Management Zones to be added and/or modified through framework actions
3) Establish new Spawning Special Management Zones off North Carolina
4) Establish new Spawning Special Management Zones off South Carolina
5) Establish new Spawning Special Management Zones off Georgia
6) Establish new Spawning Special Management Zones off Florida
7) Move the existing Charleston Deep Artificial Reef MPA 1.4 miles Northwest to match the boundary of the permitted site
8) Establish transit and anchoring provisions in the Spawning Special Management Zones
9) Establish a Sunset Provision for the Spawning SMZs

Chapter 2. Proposed Actions and Alternatives

2.1 Action 1. Modify the Special Management Zone (SMZ) Procedure

Alternative 1. No Action. The current SMZ procedure addresses the use of certain gear on areas including artificial reefs, fish attraction devices, and other modified areas of habitat used for the purpose of fishing. Possession limits can also be regulated in SMZs.

Preferred Alternative 2. Modify the SMZ procedure to include protection of any area important for spawning by designating Spawning SMZs.

Note: It is the South Atlantic Fishery Management Council's (Council's) intent that the Spawning Special Management Zone (SMZ) approach would not make any changes to the existing Marine Protected Areas (MPAs) or Special Management Zones (SMZs). The Council is developing a System Management Plan (SMP) to specify the outreach, law enforcement, and monitoring/research projects (with cost estimates) necessary to effectively monitor and evaluate the existing MPAs.

2.1.1 Discussion

Alternative 1 would maintain the existing SMZ procedures, which apply only to artificial reef areas and fish attraction devices. Artificial Reef Special Management Zones (SMZs) were established in the original Snapper Grouper Fishery Management Plan (FMP) (SAFMC 1983) to limit certain gear used on artificial reefs. The following is taken directly from the Original Snapper Grouper FMP (SAFMC 1983):

"Management Measure #17: Prohibition or Restraint of Specific Fishing Gear From Artificial Reefs. Upon request to the Council from the permittee (possessor of a Corps of Engineers permit) for any artificial reef or fish attraction device (or other modification of habitat for the purpose of fishing) the modified area and an appropriate surrounding area may be designated as a Special Management Zone (SMZ) that prohibits or restrains the use of specific types of fishing gear that are not compatible with the intent of the permittee for the artificial reef or fish attraction device. This will be done by regulatory amendment similar to adding or changing minimum sizes (Section 10.2.3):

6. *A monitoring team* will evaluate the request in the form of a written report considering the following criteria:*
   a. *fairness and equity*
   b. *promote conservation*
   c. *excessive shares*
7. *At the request of the Steering Committee, the Council Chairman may schedule meetings of the Advisory Panel (AP) and/or Scientific and Statistical Committee (SSC) to review the report and*

associated documents and to advise the Council. The Council Chairman may also schedule public hearings.

8. *The Council, following review of the Team's report, supporting data, public comments, and other relevant information, may recommend to the Southeast Regional Director of the National Marine Fisheries Service (RD) that a SMZ be approved. Such a recommendation would be accompanied by all relevant background data.*
9. *The RD will review the Council's recommendation, and if he concurs in the recommendation, will propose regulations in accordance with the recommendations. He may also reject the recommendation, providing written reasons for rejection.*
10. *If the RD concurs in the Council's recommendations, he shall publish proposed regulations in the Federal Register and shall afford a reasonable period for public comment which is consistent with the urgency of the need to implement the management measure(s).*

**Monitoring Team – The Team will be comprised of members of Council staff, Fishery Operations Branch (Southeast Region, NMFS), and the NMFS Southeast Fisheries Center.*

Impact and rational

The intent of a SMZ is to create incentive to create artificial reefs and fish attraction devices that will increase biological production and/or create fishing opportunities that would not otherwise exist. The drawback to "investing" in artificial reefs or fish attraction devices is that they are costly and have limited advantages that can be rapidly dissipated by certain types of fishing gear (e.g. traps harvesting black sea bass from artificial reefs). Fishing gear that offers "exceptional advantages" over other gear to the point of eliminating the incentive for artificial reefs and fish attraction devices for users with other types of fishing gear prevent improved fishing opportunities that would not otherwise exist."

Preferred Alternative 2 would allow the Council to establish Special Management Zones (SMZs) to protect natural bottom important for spawning. Designation of natural spawning habitat as "Spawning SMZs" would provide additional protection as Essential Fish Habitat-Habitat Areas of Particular Concern (EFH-HAPCs) without any additional action by the Council given that localaties of known or likely periodic spawning aggregations and medium to high profile offshore hardbottom where spawning normally occurs is already defined as EFH-HAPCs. Spawning SMZs include areas where spawning normally occurs and would meet the EFH-HAPC definition. As part of the Essential Fish Habitat consultation process, permit applicants (e.g., wind farms, ocean turbines, drilling, or mineral extraction) would be required to provide a detailed assessment of how impacts to these areas and the species and fisheries dependent on these unique habitats would be eliminated or reduced to the maximum extent practicable.

Designating areas as Spawning SMZs would provide the opportunity to monitor such areas using citizen science in cooperation with fishery independent surveys to document expected changes in the size, age, and abundance of snapper grouper species within these areas. The Council concluded that protecting species within the Spawning SMZs could enhance the opportunity of snapper grouper species to reproduce and provide more larvae into the environment. Future evaluation of the results, as outlined in the System Management Plan (**Appendix N**), will provide input on how to refine this approach to characterize and protect spawning locations to enhance the abundance of snapper grouper species.

2.2 Action 2. Modify the Framework Procedure to Allow Modifications of and/or Additional Spawning Special Management Zones (Spawning SMZs)

Alternative 1. No Action. The existing framework for the Snapper Grouper FMP does not include modifying or establishing new Spawning SMZs.

Preferred Alternative 2. Modify the framework for the Snapper Grouper FMP to include modifying or establishing new Spawning SMZs.

Alternative 3. Modify the framework for the Snapper Grouper FMP to include modifying existing Spawning SMZs.

2.2.1 Discussion

Alternative 1 (No Action) would require a plan amendment to modify or add new Spawning SMZs. **Preferred Alternative 2** would allow the Council to modify or establish new Spawning SMZs through the framework procedure. If monitoring using citizen science in cooperation with fishery independent surveys shows that the area needs to be adjusted, then the framework would allow the Council to modify the boundary using an abbreviated process instead of a plan amendment. The Council would consider this action over at least 2 Council meetings and there would be a number of opportunities for public input prior to any Council decision.

Alternative 3 would require the Council to use a plan amendment to establish new Spawning SMZs but would allow the Council to modify areas through the framework procedure. If the monitoring using citizen science in cooperation with fishery independent surveys were to identify a new area that needed to be protected, the Council would require more time to implement such a change though a plan amendment.

2.3 Action 3. Establish New Spawning Special Management Zones (Spawning SMZ) off North Carolina

Alternative 1. No Action. There are no Spawning SMZs off North Carolina.

Alternative 2. Establish a Spawning SMZ in the Malchase Wreck area that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.

Sub-alternative 2a. Malchase Wreck (2.47 square miles)

Sub-alternative 2b. Malchase Wreck (1 square mile)

Alternative 3. Establish a Spawning SMZ in the 780 Bottom area that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.

Sub-alternative 3a. 780 Bottom (4 square miles)

Sub-alternative 3b. 780 Bottom (3 square miles)

Alternative 4. Establish a Spawning SMZ in the NC Deep Wreck (3 square miles) that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.

Preferred Alternative 5. Establish a Spawning SMZ~~s~~ in the South Cape Lookout (5 square miles) that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.

A large chart showing the general location of the Spawning SMZs is included as **Figure 2.3.1**; more detailed charts showing the specific location of each alternative are included as **Figures 2.3.2** and **2.3.3**. Travel distance, size, and depth profile for the alternatives/sub-alternatives is shown in **Table 2.3.1.1**; corner coordinates are shown in **Tables 2.3.1.2** through **2.3.1.5**; and fish species with evidence of spawning is shown in **Table 2.3.1.6**. In addition, for the South Cape Lookout Spawning SMZ alternative, habitat characterization and species identified from video transects are shown in **Tables 2.3.1.7** and **2.3.1.8** respectively.

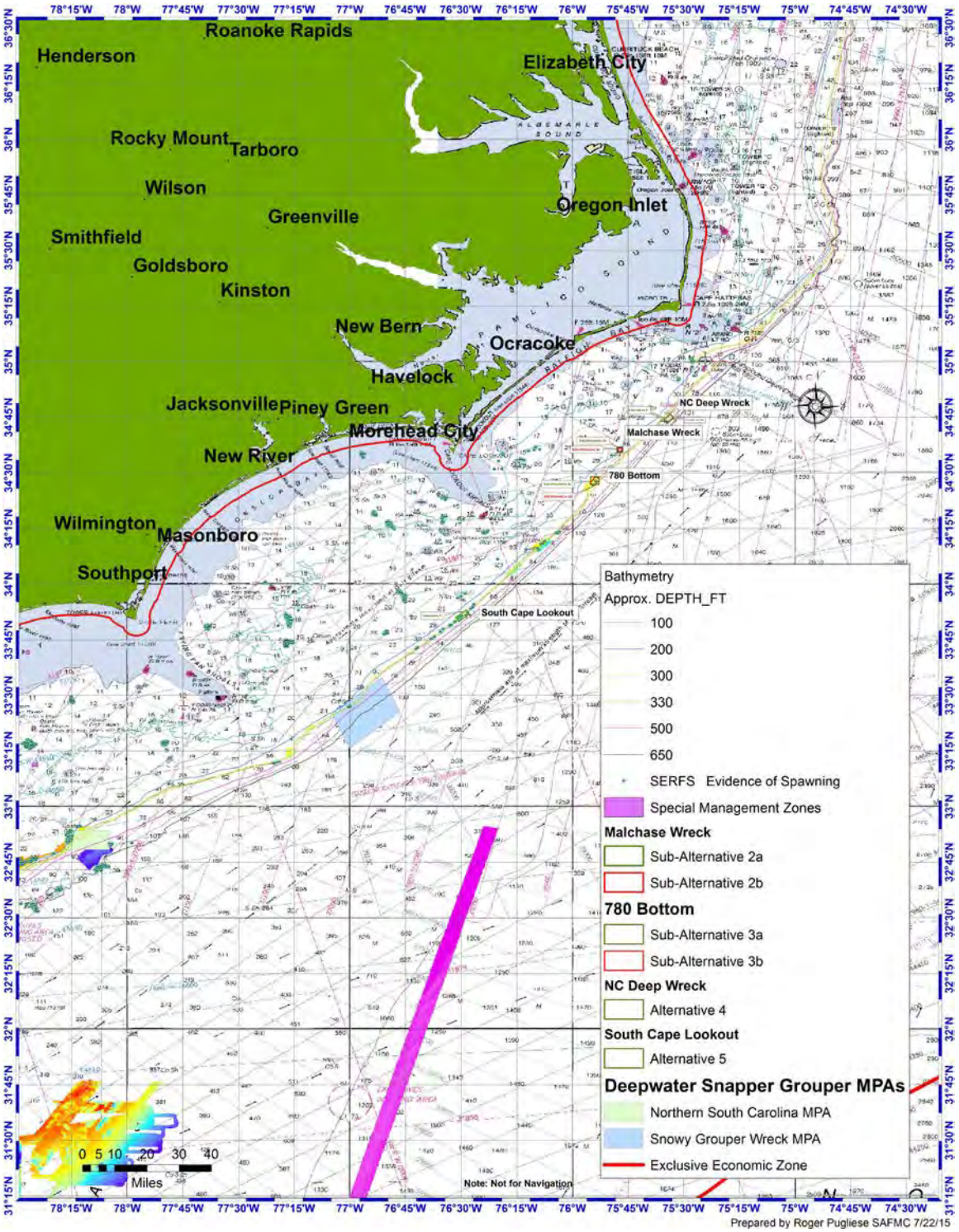


Figure 2.3.1. Chart showing location, associated bathymetry and size of Spawning SMZ Alternatives for "Malchase Wreck", "780 Bottom", NC Deep Wreck, and South Cape Lookout off North Carolina.
Source: Roger Pugliese, SAFMC Staff.

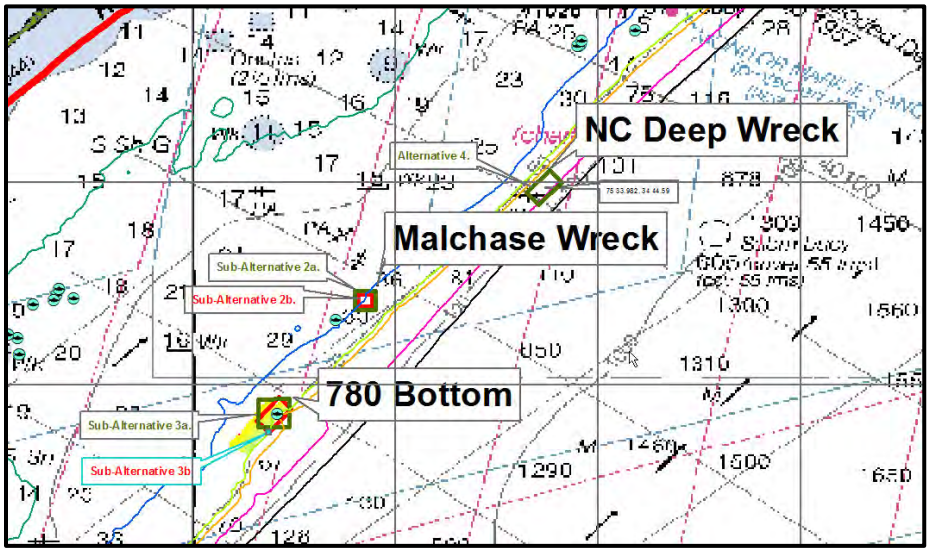


Figure 2.3.2. Chart showing location and approximate size of Sub-Alternative 2a (2.47 square miles) and Sub-Alternative 2b (1 square mile) for the area off North Carolina known as the "Malchase Wreck"; Sub-Alternative 3a (4 square miles) and Sub-Alternative 3b (3 square miles) for the area off North Carolina known as the "780 Bottom"; and Alternative 4 for the area off North Carolina known as the "NC Deep Wreck" (3 square miles).
Source: Roger Pugliese, SAFMC Staff

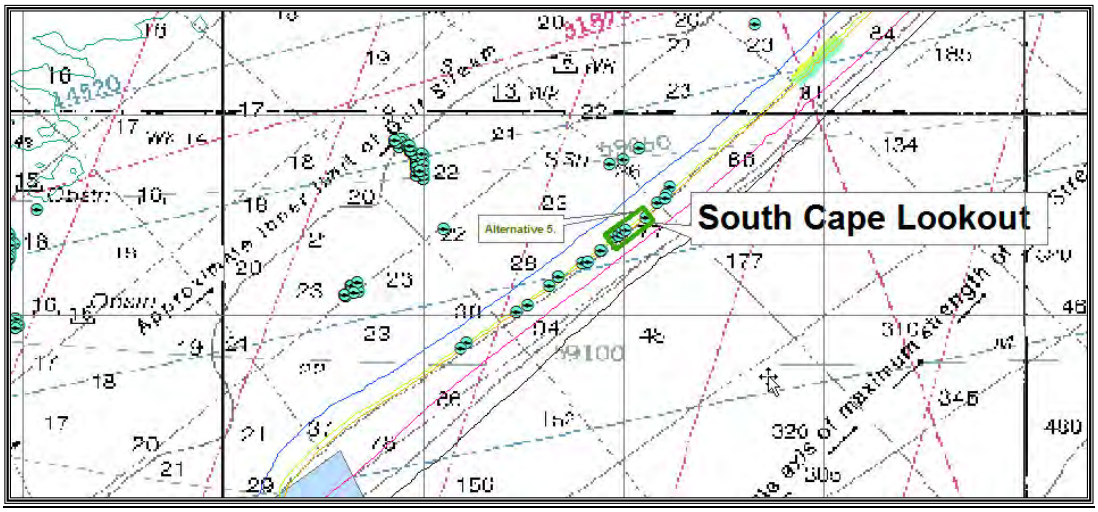


Figure 2.3.3. Chart showing location and approximate size of Alternative 5 (5 square miles) for the area off North Carolina known as "South Cape Lookout."
Source: Roger Pugliese, SAFMC Staff

2.3.1 Discussion

Under **Alternative 1 (No Action)**, fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit is prohibited year-round in the Snowy Grouper Wreck MPA (190 square miles).

SMZ Attributes: Size, Depth, Distance from Shore

Table 2.3.1.1. Travel distance, size, and depth range of Sub-Alternatives/Alternatives for proposed Spawning SMZs off North Carolina.

Proposed Spawning SMZ off North Carolina	Sub-Alts	Distance From Ocracoke Inlet (miles)	Size (square miles)	Depth inshore feet(meters)	Depth offshore feet(meters)
Malchase Wreck	**2a**	33	2.47	171 (52)	236(72)
	2b	33.5	1	180(55)	246(75)
780 Bottom	**3a**	40.5	12	197(60)	328(100)
	3b	40.5	4	203(62)	328(100)
NC Deep Wreck	**4**	32.4	3	295(90)	525(160)
South Cape Lookout	**5**	64 miles From South Inlet	5	246(75)	453(138)

Source: Roger Pugliese, SAFMC Staff

Table 2.3.1.2. Corner Coordinates for Alternative 4 for NC Deep Wreck proposed Spawning SMZ off North Carolina.

NC Deep Wreck	West Longitude	East Latitude
Alternative 4	75 35.298	34 44.226
	75 33.603	34 45.857
	75 32.719	34 44.982
	75 34.441	34 43.369

Source: Roger Pugliese, SAFMC Staff

Table 2.3.1.3. Corner Coordinates for Alternative 2 Sub-Alternatives for Malchase Wreck proposed Spawning SMZ off North Carolina.

Malchase Wreck (Corner Coordinates	West Longitude	East Latitude
Sub-Alternative 2a	75 48.000	34 37.000
	75 46.469	34 37.000
	75 46.469	34 35.551
	75 48.000	34 35.551
Sub-Alternative 2b	75 47.719	34 36.682
	75 46.714	34 36.682
	75 46.714	34 35.780
	75 47.719	34 35.780

Source: Roger Pugliese, SAFMC Staff

Table 2.3.1.4. Corner Coordinates for Alternative 3 Sub-Alternatives for 780 Bottom proposed Spawning SMZ off North Carolina**.**

780 Bottom (Corner Coordinates)	West Longitude	East Latitude
Sub-Alternative 3a	75 55.138	34 28.949
	75 52.842	34 28.949
	75 52.842	34 26.904
	75 55.138	34 26.904
Sub-Alternative 3b	75 53.661	34 29.049
	75 52.747	34 28.241
	75 54.342	34 26.518
	75 55.235	34 27.347

Source: Roger Pugliese, SAFMC Staff

Table 2.3.1.5. Corner Coordinates for Alternative 5 for proposed South Cape Lookout Spawning SMZ off North Carolina.

South Cape Lookout (Corner Coordinates)	West Longitude	East Latitude
Alternative 5		
	76 28.617	33 53.04
	76 27.798	33 52.019
	76 30.627	33 49.946
	76 31.424	33 51.041

Source: Roger Pugliese, SAFMC Staff

SMZ Attributes: Presence of Fish Including Those in Spawning Condition

Table 2.3.1.6. Fish species in proposed spawning SMZs off North Carolina with evidence of spawning.

Proposed Spawning SMZ off North Carolina	Sub-Alts	Species
780 Bottom	**3a**	*Lutjanus campechanus* (Red Snapper)
	3b	*Lutjanus campechanus* (Red Snapper)
South Cape Lookout	**5**	*Epinephelus morio* (Red Grouper)

Source: Southeast Reef Fish Survey (SERFS – MARMAP/SEAMAP/SEFIS)

The 2014 NOAA Cooperative Institute for Ocean Exploration, Research, and Technology (CIOERT) Cruise report and observed ROV locations were reviewed to determine if any information may have been collected in the areas presently under consideration. The only area with observed ROV locations close to a proposed Spawning SMZ alternative is a location just south of South Cape Lookout (Alternative 5) along the same depth contour (**Tables 2.3.1.7** and **2.3.1.8**).

Table 2.3.1.7. Habitat characterization (fish densities, and percent cover of benthic macro-biota and substrate) derived from ROV video transect at dive site along depth contour south of South Cape Lookout Spawning SMZ Alternative 5.

Site	Dive #	% Hard Bottom	# Fish species; Density (#/cubic meter)	% Cover Benthic Biota	% Cover Coral	% Cover Octo.	% Cover Antipat.	% Cover Porifera	% Cover Algae
South Cape Lookout NC	18	40.44%	23; 0.03	19.41%	0.00%	2.93%	0.61%	2.43%	6.88%

Data Source: NOAA CIOERT Cruise Report - Nancy Foster Cruise 14-08 FGBNMS Mohawk ROV, June 18-27, 2014. Note: Coral = Scleractinia hard coral; Octo = Octocorallia (gorgonacea); Porifera (sponges); Antipat. = Antipathidae, a taxa of Cnidaria - 5 species of Antipathidae: (*Antipatharia atlantica*, *Antipathes* sp. A, *Tanacetipathes barbadensis, Stichopathes lutkeni*, and unidentified sp.).

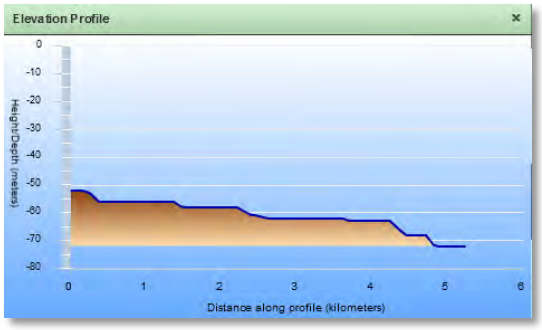
Table 2.3.1.8. List of fish species identified from video transects at dive site along depth contour south of South Cape Lookout Alternative.

Scientific Name	**Common Name**
Acanthurus sp.	doctorfish
Apogon pseudomaculatus	twospot cardinalfish
Bodianus pulchellus spotfin	spotfin hogfish
Canthigaster rostrata	sharpnose puffer
Cephalopholis cruentata	graysby
Chaetodon ocellatus	spotfin butterflyfish
Chaetodon sedentarius	reef butterflyfish
Chromis enchrysurus	yellowtail reeffish
Chromis insolata	sunshinefish
Chromis sp.	damselfish
Halichoeres bivitattus	greenband wrasse
Halichoeres sp.	wrasse
Holacanthus bermudensis	blue angelfish
Holacanthus tricolor	rock beauty
Holocentridae	squirrelfish
Malacanthus plumieri	sand tilefish
Muraenidae	moray eel
Paranthias furcifer	creole-fish
Pomacanthus paru	french angelfish
Priacanthus arenatus	bigeye
Pristigenys alta	short bigeye
Pterois volitans	lionfish
Seriola sp.	amberjack
Serranus phoebe	tattler

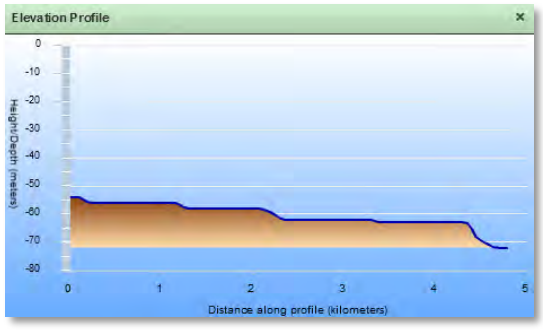
Source: NOAA CIOERT Cruise Report - Nancy Foster Cruise 14-08 FGBNMS Mohawk ROV, June 18-27, 2014

SMZ Attributes: Habitat Type, Bathymetry, Temperature, and Salinity

Elevation profiles for each of the alternatives/sub-alternatives are shown in **Figures 2.3.1.1** through **2.3.1.4**.

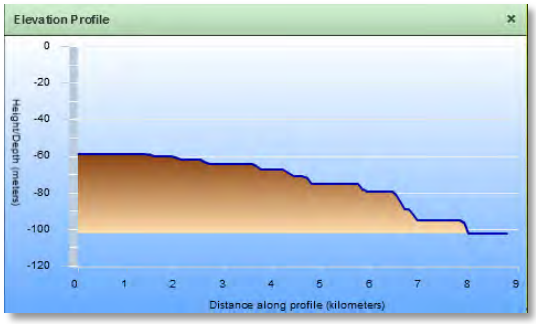


2a

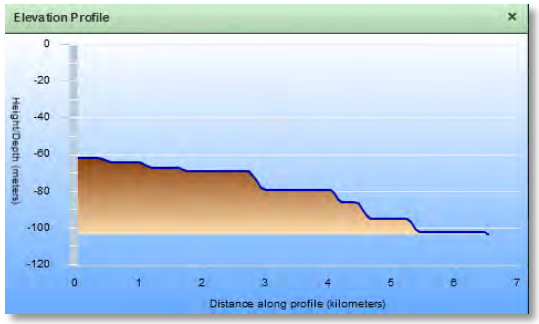


2b

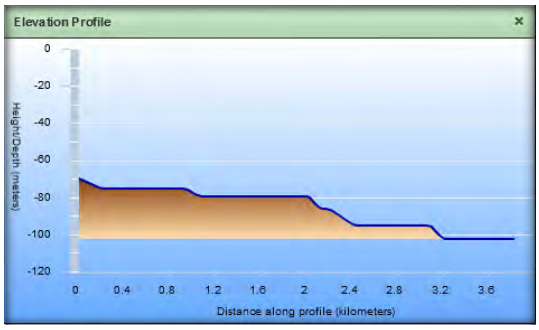
Figure 2.3.1.1. Elevation Profiles for Malchase Wreck Sub-Alternatives 2a and 2b.
Source: (http://ocean.floridamarine.org/safmc_atlas/) Roger Pugliese, SAFMC Staff



3a



3b



3c

Figure 2.3.1.2. Elevation Profiles for 780 Bottom Sub-Alternatives 3a, 3b, and 3c.
Source: (http://ocean.floridamarine.org/safmc_atlas/) Roger Pugliese, SAFMC Staff

4

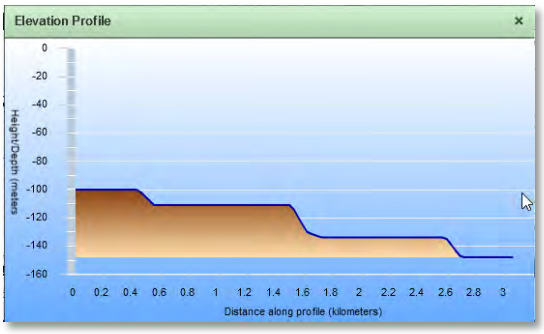


Figure 2.3.1.3. Elevation Profiles for NC Deep Wreck Alternative 4.
Source: (http://ocean.floridamarine.org/safmc_atlas/) Roger Pugliese, SAFMC Staff

5

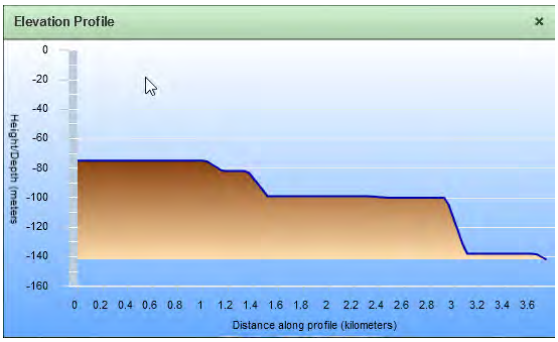


Figure 2.3.1.4. Elevation Profiles for South Cape Lookout Alternatives 5.
Source: (http://ocean.floridamarine.org/safmc_atlas/) Roger Pugliese, SAFMC Staff

To provide oceanographic information for site characterization, the Ocean Observing and Modeling Group (OOMG) in the Department of Marine, Earth & Atmospheric Sciences, North Carolina State University provided temperature and salinity profiles for each site. The OOMG approach is to use in situ and remote sensing observations, numerical models, and data analysis and assimilation methods to examine fundamental ocean circulation physics, and to gain an integrated understanding of their interactions with the atmosphere and with ocean biological, geological, and chemical processes. The temperature profiles for the North Carolina are shown in **Figures T1-T8** in **Appendix O**. Salinity profiles are shown in **Figures S1-S8** in **Appendix O**.

2.4 Action 4. Establish New Spawning Special Management Zones (Spawning SMZ) off South Carolina

Alternative 1. No Action. There are no Spawning SMZs off South Carolina.

Preferred Alternative 2. Establish a Spawning SMZ~~s~~ in the Devil's Hole/Georgetown Hole area that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.

Sub-alternative 2a. Devil's Hole/Georgetown Hole (13.5 square miles)
Sub-alternative 2b. Devil's Hole/Georgetown Hole (4 square miles)
Sub-alternative 2c. Devil's Hole/Georgetown Hole (1 square mile)
Sub-alternative 2d. Devil's Hole/Georgetown Hole (15.2 square miles)
Sub-alternative 2e. SC South (8 square miles) (Alternative to Devils Hole)
Preferred Sub-alternative 2f. Devil's Hole/Georgetown Hole (3.1 square miles)

Preferred Alternative 3. Establish a Spawning SMZ~~s~~ in the Area 51 site ~~area~~ that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round (2.99 square miles).

Preferred Alternative 4. Establish a Spawning SMZ~~s~~ in the Area 53 site ~~area~~ that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round (2.99 square miles).

A large chart showing the general location of the Spawning SMZs is included as **Figure 2.4.1**; more detailed charts showing the specific location of each alternative are included as **Figures 2.4.2** and **2.4.3**. Travel distance, size, and depth profile for the alternatives/sub-alternatives is shown in **Table 2.4.1.1**; corner coordinates are shown in **Table 2.4.1.2**; and fish species with evidence of spawning is shown in **Table 2.4.1.3**.

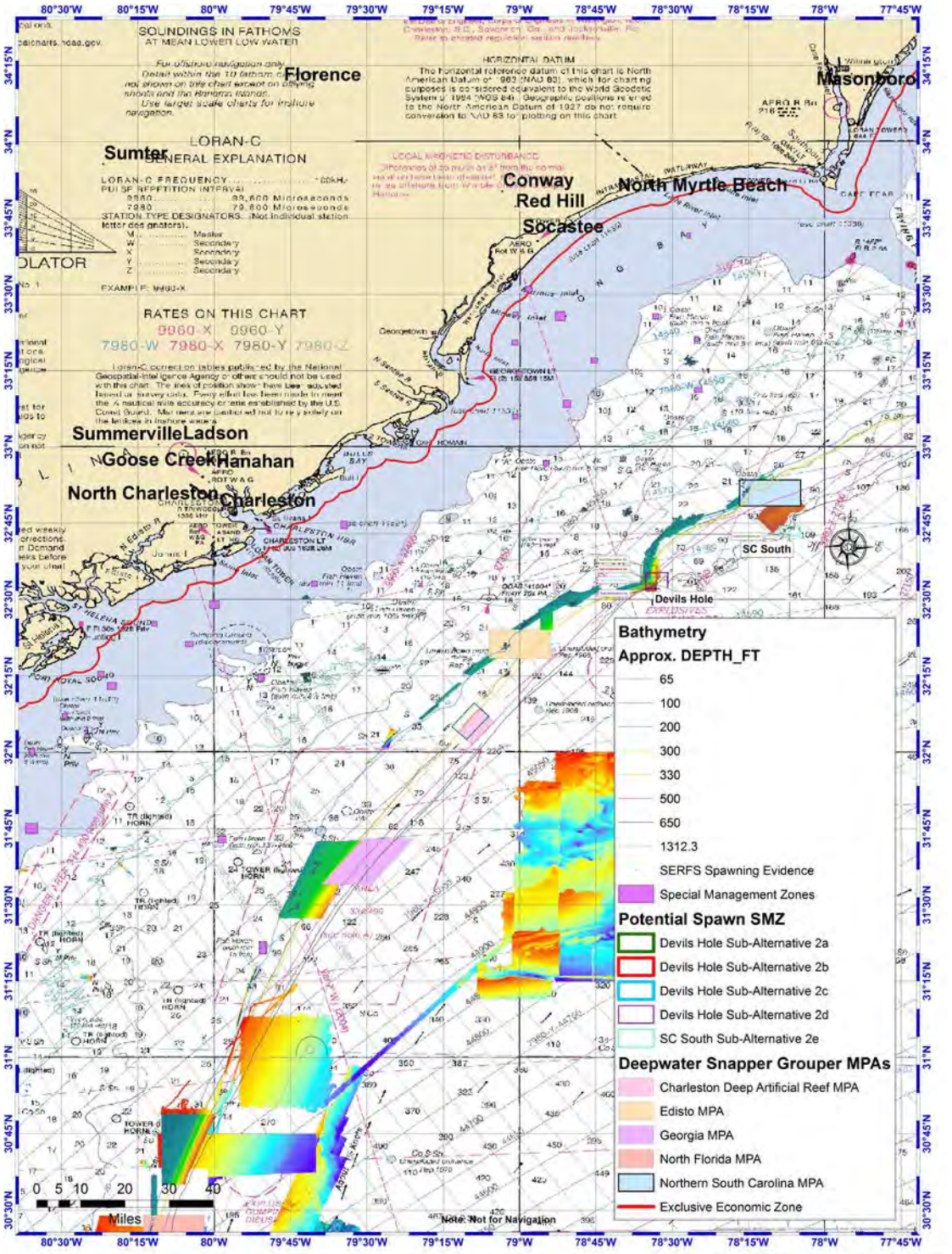


Figure 2.4.1. Chart showing location, associated bathymetry and size of Spawning SMZ Alternatives for the area known as "Devils Hole" off South Carolina. Note: The locations of Area 51 & 53 are not being shown at this time to protect these areas. Area 51 is 2.99 square miles and Area 53 is 2.99 square miles.
Source: Roger Pugliese, SAFMC Staff

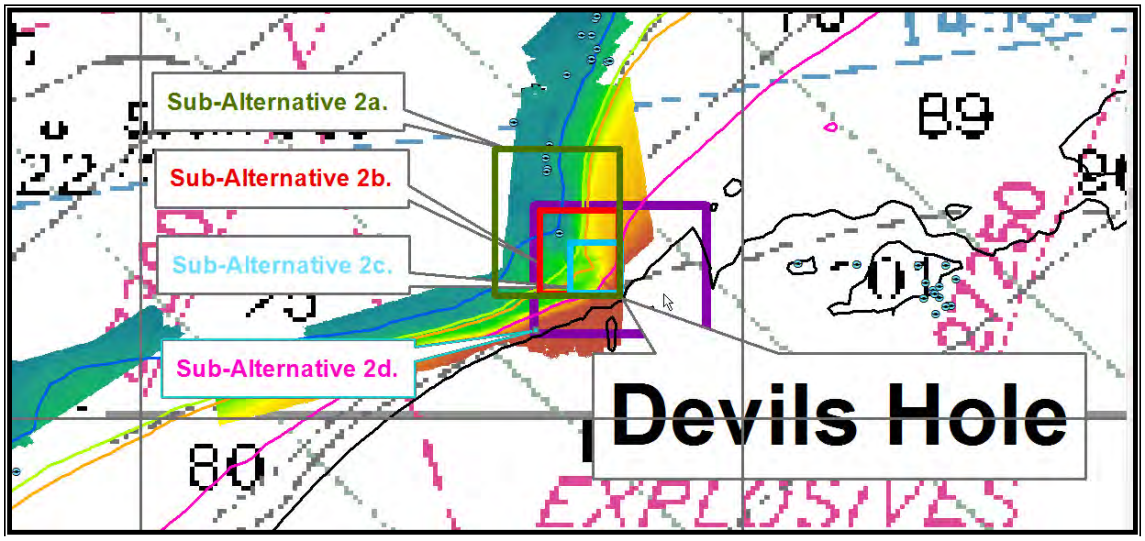


Figure 2.4.2. Chart showing location, associated bathymetry, and approximate size of Sub-Alternative 2a (13.5 square miles), Sub-Alternative 2b (4 square miles), Sub-Alternative 2c (1 square mile), and Sub-Alternative 2d (15.2 square miles) for the area off South Carolina known as "Devils Hole."
Source: Roger Pugliese, SAFMC Staff

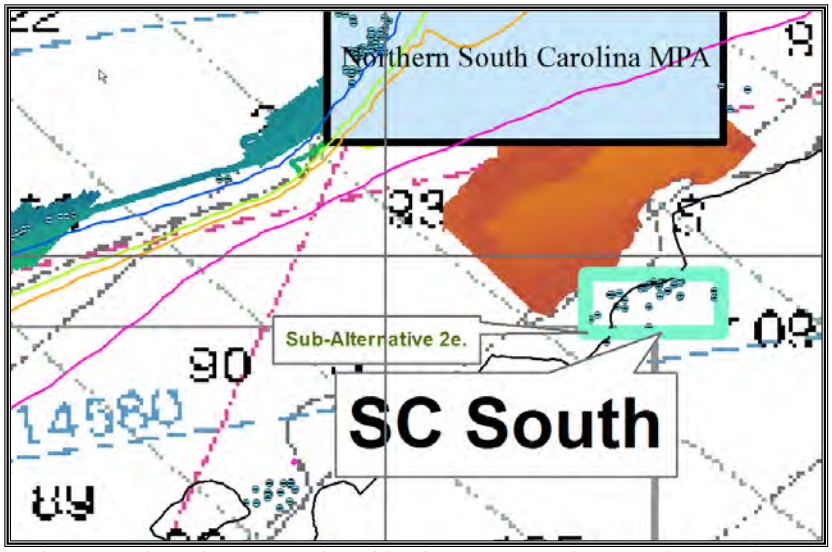


Figure 2.4.3. Chart showing area location, associated bathymetry, and approximate size of Sub-Alternative 2e (8 square miles) for the area off South Carolina known as "SC South."
Source: Roger Pugliese, SAFMC Staff

2.4.1 Discussion

Under **Alternative 1 (No Action)**, fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit is prohibited year-round in the Northern South Carolina (67 square miles), Edisto (66 square miles), and the Charleston Deep Artificial Reef (28 square miles) MPAs.

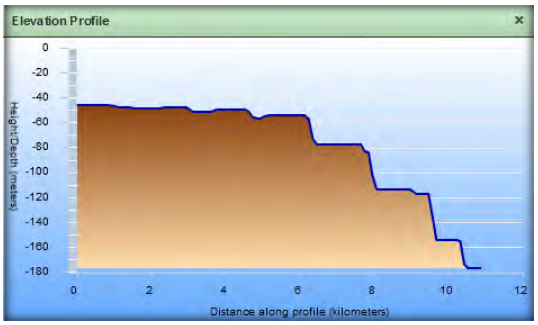
SMZ Attributes: Size, Depth, and Distance from Shore

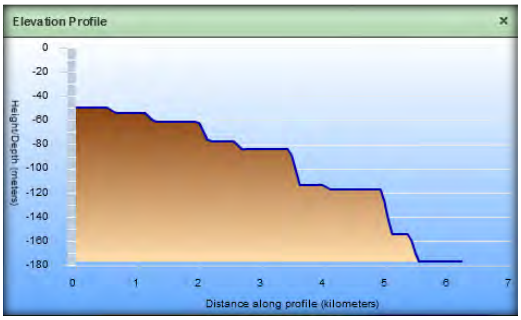
Table 2.4.1.1. Travel distance, size, and depth range of Alternative 2 Sub-Alternatives for proposed Spawning SMZs off South Carolina.

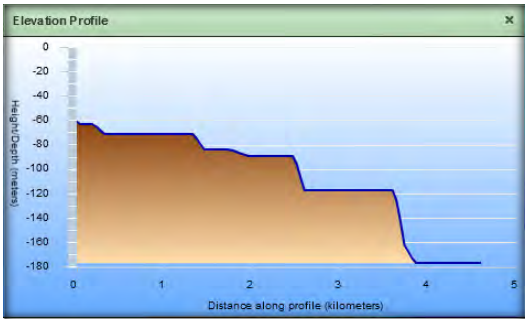
Proposed Spawning SMZ off South Carolina	Sub-Alts.	Distance From Georgetown (miles)	Size (square miles)	Depth inshore feet(meters)	Depth offshore feet(meters)
Devils Hole	**2a**	54	13.5	148(45)	591(180
	2b	55.5	4	180(55)	591(100)
	2c	56.5	1	197(60)	591(100)
	2d	54	15.2	148 (45)	804 (235)
SC South	**2e**	68.1	8	591(180)	705 (215)

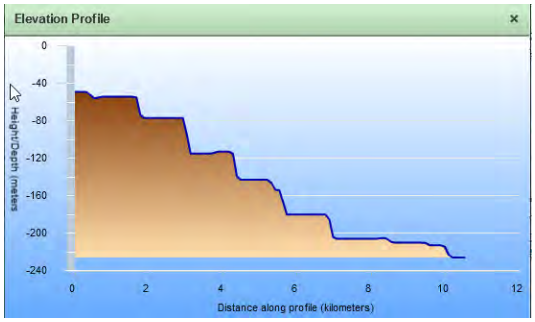
Source: Roger Pugliese, SAFMC Staff

Elevation profiles for each of the alternatives/sub-alternatives are shown in **Figure 2.4.1.1**.

2a 

2b 

2c 

2d 

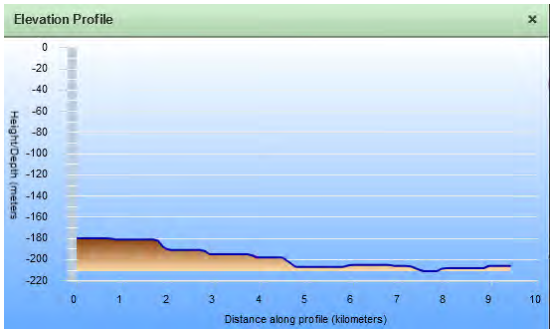
2e 

Figure 2.4.1.1. Elevation Profiles for Devils Hole Sub-Alternatives 2a, 2b, 2c, 2d and 2e. Source: (http://ocean.floridamarine.org/safmc_atlas/) Roger Pugliese, SAFMC Staff

Table 2.4.1.2. Corner Coordinates for Sub-Alternatives for proposed Devils Hole Spawning SMZ off South Carolina.

Devils Hole (Corner Coordinates)	West Longitude	East Latitude
Sub-Alternative 2a	78 36.171	32 36.718
(13.5 sq mile)	78 36.171	32 33.086
	78 33.079	32 33.086
	78 33.079	32 36.718
Sub-Alternative 2b	78 35.059	32 35.172
(4 sq mile)	78 33.079	32 35.172
	78 33.079	32 33.086
	78 35.059	32 33.086
Sub-Alternative 2c	78 34.290	32 34.373
(1 sq mile)	78 33.079	32 34.373
	78 33.079	32 33.086
	78 34.290	32 33.086
Sub-Alternative 2d	78 34.944	32 35.793
(15.2 sq mile)	78 30.763	32 35.793
	78 30.756	32 32.717
	78 34.929	32 32.717
SC South Sub-Alternative 2e	78 8.918	32 44.412
(8 sq mile)	78 4.813	32 44.412
	78 4.813	32 42.676
	78 8.918	32 42.676

Source: Roger Pugliese, SAFMC Staff

SMZ Attributes: Presence of Fish Including Those in Spawning Condition

Species spawning within the Alternative 2 Spawning SMZs off South Carolina are shown in **Table 2.4.1.3**.

Table 2.4.1.3. Fish species in proposed Alternative 2 Spawning SMZs off South Carolina with evidence of spawning.

Proposed Spawning SMZ off South Carolina	Sub-Alts	Species
Devils Hole		
	2a	*Balistes capriscus* (Gray Triggerfish) *Rhomboplites aurorubens* (Vermilion Snapper) *Seriola dumerili* (Greater Amberjack) *Epinephelus nigritus* (Warsaw Grouper) *Mycteroperca phenax* (Scamp)
	2b	*Balistes capriscus* (Gray Triggerfish) *Epinephelus nigritus* (Warsaw Grouper) *Mycteroperca phenax* (Scamp Grouper)
	2c	*Epinephelus nigritus* (Warsaw Grouper) *Mycteroperca phenax* (Scamp)
	2d	*Balistes capriscus* (Gray Triggerfish) *Epinephelus niveatus* (Snowy Grouper) *Epinephelus flavolimbatus* (Yellowedge Grouper) *Caulolatilus microps* (Blueline Tilefish) *Epinephelus nigritus* (Warsaw Grouper) *Mycteroperca phenax* (Scamp)
SC South (Alternative to Devils Hole)	**2e**	*Hyporthodus niveatus* (Snowy Grouper) *Hyporthodus flavolimbatus* (Yellowedge Grouper)

Source: Southeast Reef Fish Survey (SERFS – MARMAP/SEAMAP/SEFIS) and LGL Ecological Research Associates, Inc., 2014

SMZ Attributes: Habitat Type, Bathymetry, Temperature, and Salinity

Area 51 – established April 24, 1998. Area 51 is an experimental artificial reef site established by the South Carolina Department of Natural Resources (SCDNR) to investigate the feasibility of using artificial reef materials as an experimental Marine Protected Area (MPA). Area 51 is a 1.5 nautical mile X 1.5 nautical mile (1.73 statute mile X 1.73 statute mile = 2.99 square statute mile) permitted artificial reef site located in approximately 70 feet of water off the South Carolina coast on sandy bottom.

Area 53 – established April 29, 2003. Due in part to the results obtained from work on the Area 51 reef site, the South Atlantic Fishery Management Council (Council) provided funding to replicate that study design in deeper water to specifically target a wider range of snapper grouper species. The permitting process and all reef parameters for the new site, designated Area 53, were identical to Area 51 except that water depth for this site is 105 feet.

To provide oceanographic information for site characterization, the Ocean Observing and Modeling Group (OOMG) in the Department of Marine, Earth & Atmospheric Sciences, North Carolina State University provided temperature and salinity profiles for each site. The OOMG approach is to use in situ and remote sensing observations, numerical models, and data analysis and assimilation methods to examine fundamental ocean circulation physics, and to gain an integrated understanding of their interactions with the atmosphere and with ocean biological, geological, and chemical processes. The temperature profiles for Devils Hole are shown **Figures T10-T11** in **Appendix O**. Salinity profiles are shown in **Figures S9-S10** in **Appendix O**.

2.5 Action 5. Establish New Spawning Special Management Zones (Spawning SMZs) off Georgia

Preferred Alternative 1. No Action. There are no Spawning SMZs off Georgia.

Alternative 2. Establish a Spawning SMZ in the St. Simons area that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.

Sub-alternative 2a. St. Simons Area (14.1 square miles)
Sub-alternative 2b. St. Simons Area (9.4 square miles)
Sub-alternative 2c. St. Simons Area (4 square miles)

A large chart showing the general location of the Spawning SMZs is included as **Figure 2.5.1**; a more detailed chart showing the specific location of each alternative is included as **Figure 2.5.2**. Travel distance, size, and depth profile for the alternatives/sub-alternatives is shown in **Table 2.5.1.1**; corner coordinates are shown in **Table 2.5.1.2**; and fish species with evidence of spawning is shown in **Table 2.5.1.3**.

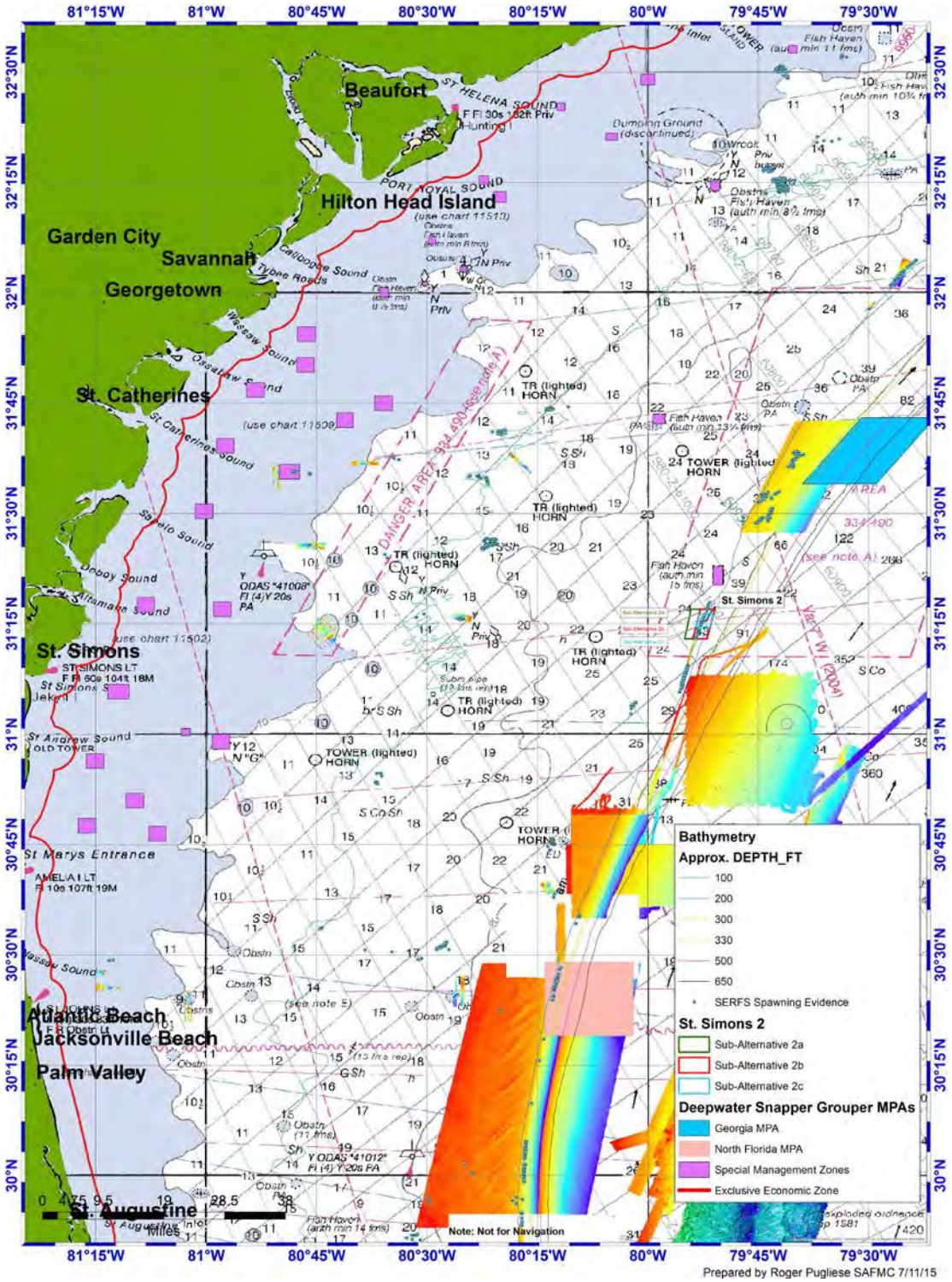


Figure 2.5.1. Chart showing location, associated bathymetry, and size of Spawning SMZ Alternatives for area known as "St. Simons 2" off Georgia.
Source: Roger Pugliese, SAFMC Staff

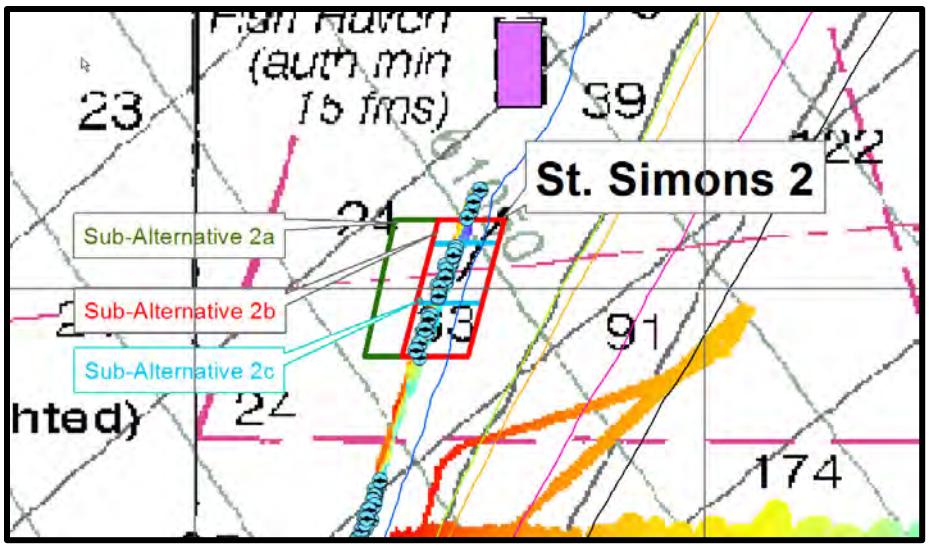


Figure 2.5.2. Chart showing location, associated bathymetry, and approximate size of Sub-Alternative 2a (14.1 square miles), Sub-Alternative 2b (9.4 square miles), and Sub-Alternative 2c (4 square miles) for the area off Georgia known as the "St. Simons 2."
Source: Roger Pugliese, SAFMC Staff

2.5.1 Discussion

Under Alternative 1 **(No Action)**, fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit is prohibited year-round in the Georgia MPA (102 square miles).

SMZ Attributes: Size, Depth, and Distance from Shore

Table 2.5.1.1. Travel distance, size, and depth range of Sub-Alternatives 2a, 2b, and 2c for the area known as "Simons 2" Spawning SMZ off Georgia.

Proposed Spawning SMZ off Georgia	Sub-Alts.	Distance From Sapelo Sound (miles)	Size (square miles)	Depth inshore feet (meters)	Depth offshore feet (meters)
St. Simons 2	**2a**	77	14.1	138(42)	230(70)
	2b	78	9.4	164(50)	230(70)
	2c	78.3	4	164(50)	230(70)

Source: Roger Pugliese, SAFMC Staff

Table 2.5.1.2. Corner Coordinates for Alternative 2 Sub-Alternatives for proposed St. Simons 2 Spawning SMZ off Georgia.

St. Simons 2 (Corner Coordinates)	West Longitude	East Latitude
Sub-Alternative 2a	79 54.122	31 17.021
	79 55.013	31 12.995
	79 51.963	31 12.995
	79 50.884	31 17.021
Sub-Alternative 2b	79 52.837	31 17.021
	79 53.916	31 12.995
	79 51.963	31 12.995
	79 50.884	31 17.021
Sub-Alternative 2c	79 53.019	31 16.314
	79 51.066	31 16.314
	79 51.537	31 14.592
	79 53.481	31 14.592

Source: Roger Pugliese, SAFMC Staff

SMZ Attributes: Presence of Fish Including Those in Spawning Condition

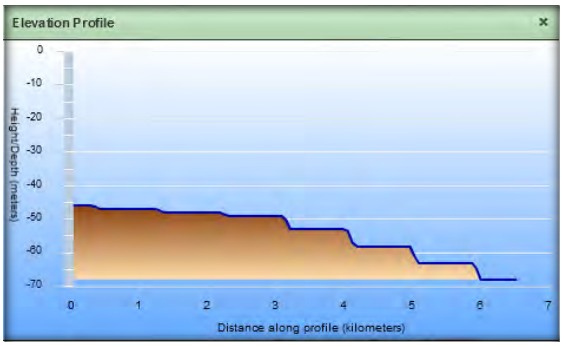
Table 2.5.1.3. Fish species in proposed Alternative 2 spawning SMZs off Georgia with evidence of spawning.

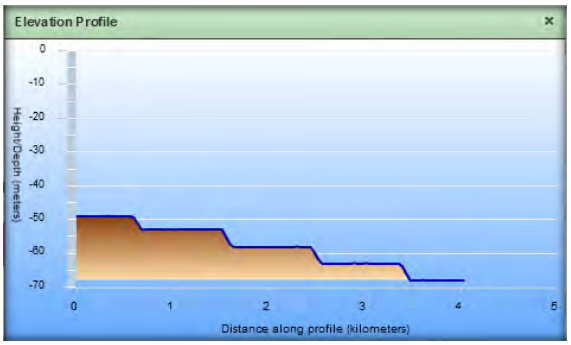
Proposed Spawning SMZ off Georgia	Sub-Alts	Species
St. Simons 2	**2a**	*Rhomboplites aurorubens* (Vermilion Snapper) *Haemulon aurolineatum* (Tomtate) *Lutjanus campechanus* (Red Snapper) *Balistes capriscus* (Gray Triggerfish) *Mycteroperca phenax* (Scamp) *Pagrus pagrus* (Red Porgy)
	2b	*Rhomboplites aurorubens* (Vermilion Snapper) *Haemulon aurolineatum* (Tomtate) *Lutjanus campechanus* (Red Snapper) *Balistes capriscus* (Gray Triggerfish) *Mycteroperca phenax* (Scamp) *Pagrus pagrus* (Red Porgy)
	2c	*Rhomboplites aurorubens* (Vermilion Snapper) *Haemulon aurolineatum* (Tomtate) *Lutjanus campechanus* (Red Snapper) *Balistes capriscus* (Gray Triggerfish) *Mycteroperca phenax* (Scamp) *Pagrus pagrus* (Red Porgy)

Source: Southeast Reef Fish Survey (SERFS – MARMAP/SEAMAP/SEFIS)

SMZ Attributes: Habitat Type, Bathymetry, Temperature, and Salinity

Elevation profiles for each of the alternatives/sub-alternatives are shown in **Figure 2.5.1.1**.

2a 

2b 

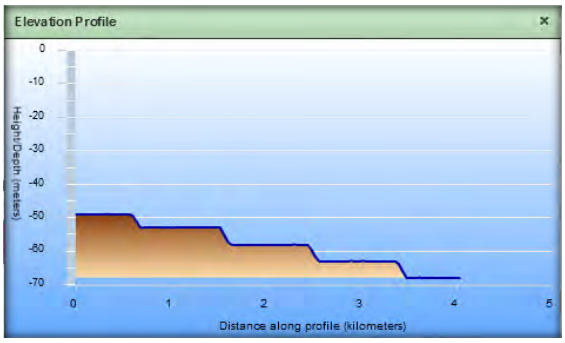
2c 

Figure 2.5.1.1. Elevation Profiles for St. Simons 2 Sub-Alternatives 2a, 2b, and 2c.
Source: (http://ocean.floridamarine.org/safmc_atlas/) Roger Pugliese, SAFMC Staff

To provide oceanographic information for site characterization, the Ocean Observing and Modeling Group (OOMG) in the Department of Marine, Earth & Atmospheric Sciences, North Carolina State University provided temperature and salinity profiles for each site. The OOMG approach is to use in situ and remote sensing observations, numerical models, and data analysis and assimilation methods to examine fundamental ocean circulation physics, and to gain an integrated understanding of their interactions with the atmosphere and with ocean biological, geological, and chemical processes. The temperature profile for the St. Simons 2 Spawning SMZ is shown **Figure T12** in **Appendix O**. Salinity profiles are shown in **Figures S11-S12** in **Appendix O**.

2.6 Action 6. Establish New Spawning Special Management Zones (Spawning SMZs) off Florida

Alternative 1. No Action. There are no Spawning SMZs off Florida.

Preferred Alternative 2. Establish a Spawning SMZ in the Warsaw Hole area that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.

Sub-alternative 2a. Warsaw Hole (2 square miles)

Preferred Sub-alternative 2b. Warsaw Hole (1 square mile)

Sub-alternative 2c. Warsaw Hole (4 square mile)

Alternative 3. Establish a Spawning SMZ in the Daytona Steeples area that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.

Sub-alternative 3a. Daytona Steeples (6 square miles) area of apparent high relief in the 27 square mile footprint.

Sub-alternative 3b. Daytona Steeples (12 square miles)

Sub-alternative 3c. Daytona Steeples (6 square miles)

Large charts showing the general location of the Spawning SMZs is included as **Figures 2.6.1 and 2.6.3**; more detailed charts showing the specific location of each alternative are included as **Figures 2.6.2** and **2.6.4**. Travel distance, size, and depth profile for the alternatives/sub-alternatives is shown in **Tables 2.6.1.1** and **2.6.1.2**; and corner coordinates are shown in **Table 2.6.1** and **2.6.2**.

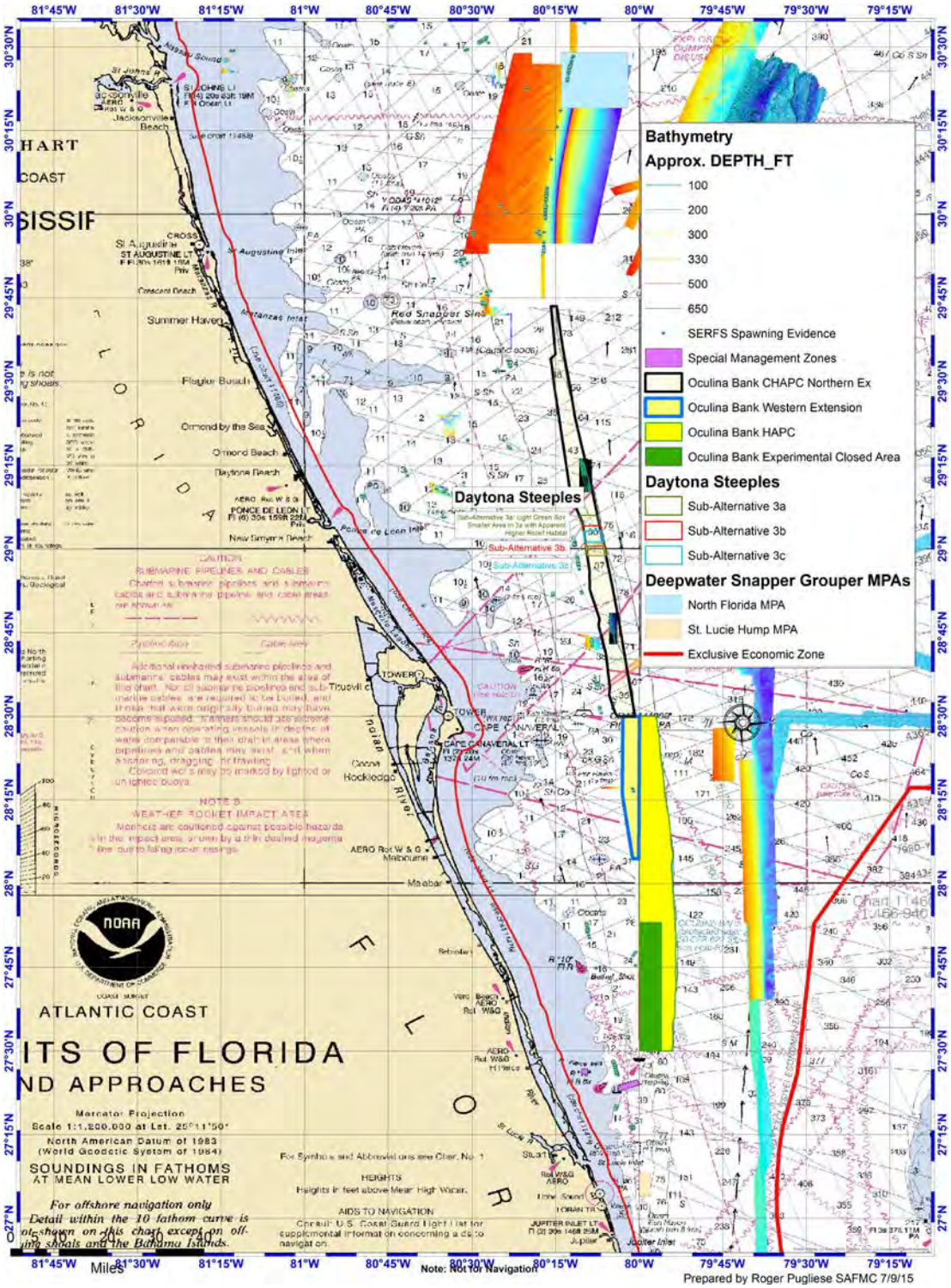


Figure 2.6.1. Chart showing location, associated bathymetry, and size of Spawning SMZ Alternatives for the area known as "Daytona Steeples" off Florida.
Source: Roger Pugliese, SAFMC Staff

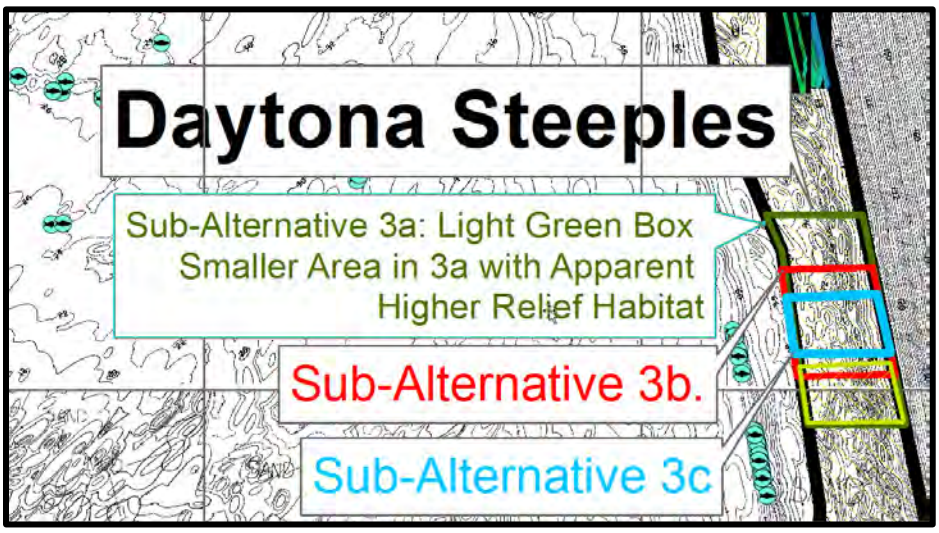


Figure 2.6.2. Chart showing location, associated bathymetry, and approximate size of Sub-Alternative 3a (6 square mile area within 27 square mile footprint), Sub-Alternative 3b (12 square miles), and Sub-Alternative 3c (6 square miles) for the area off the east coast of Florida known as the "Daytona Steeples."
Source: Roger Pugliese, SAFMC Staff

Table 2.6.1. Corner Coordinates for Alternative 3 Sub-Alternatives for proposed Daytona Steeples Spawning SMZ off the East Coast of Florida.

Daytona Steeples	West Longitude	East Latitude
Sub-Alternative 3a	80 10.743	29 5.989
(Footprint)	80 7.488	29 5.989
	80 5.981	28 58.851
	80 9.293	28 58.794
	80 10.195	29 4.756
Smaller Area in 3a	80 9.533	28 0.633
	80 6.410	28 0.633
	80 6.018	28 58.875
	80 9.304	28 58.875
Sub-Alternative 3b	80 10.092	29 4.139
	80 9.624	29 0.530
	80 6.289	29 0.530
	80 7.066	29 4.139
Sub-Alternative 3c	80 10.000	29 3.237
	80 6.833	29 3.340
	80 6.517	29 1.501
	80 9.738	29 1.455

Source: Roger Pugliese, SAFMC Staff

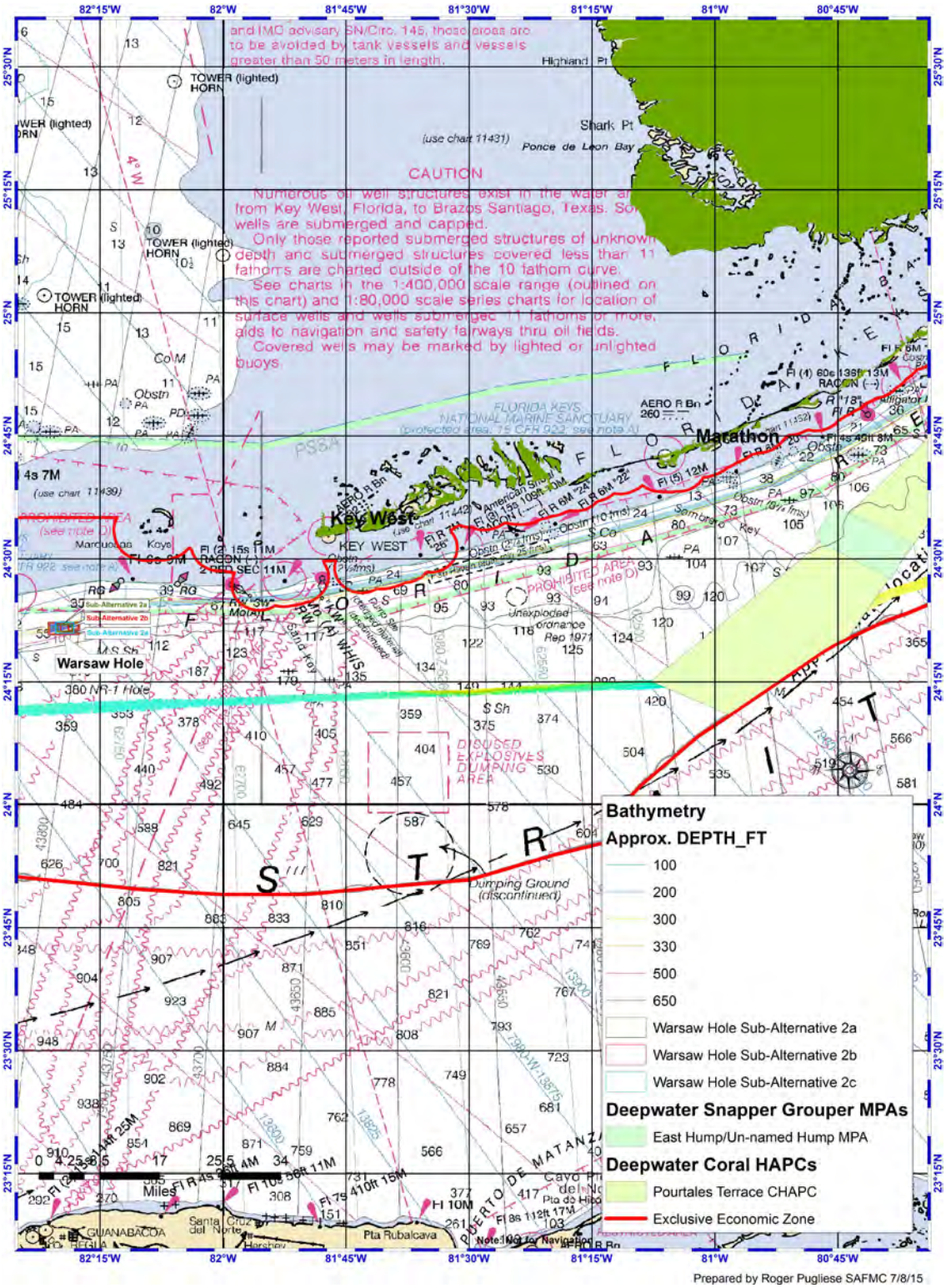


Figure 2.6.3. Chart showing location of the area known as "Warsaw Hole" off the Florida Keys.
Source: Roger Pugliese, SAFMC Staff

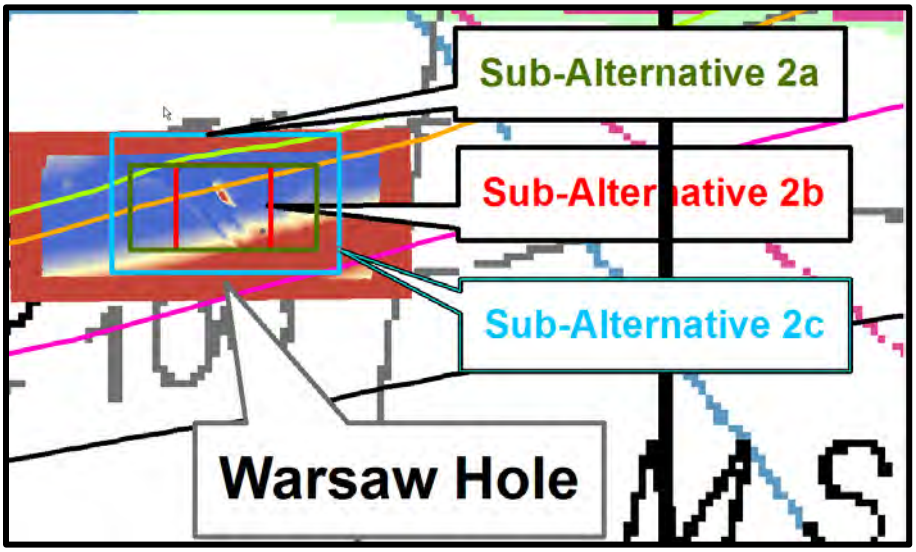


Figure 2.6.4. Chart showing location and approximate size of Sub-Alternative 2a (2 square miles), Sub-Alternative 2b (1 square mile), and Sub-Alternative 2c (4 square miles) for the area off the Florida Keys known as the "Warsaw Hole."
Source: Roger Pugliese, SAFMC Staff

Table 2.6.2. Corner Coordinates for Alternative 2 Sub-Alternatives for proposed Warsaw Hole Spawning SMZ off the East Coast of Florida.

Warsaw Hole	**West Longitude**	**East Latitude**
Sub-Alternative 2a	82 20.227	24 21.972
	82 18.418	24 21.972
	82 18.418	24 21.154
	82 20.227	24 21.154
Sub-Alternative 2b	82 19.802	24 21.972
	82 18.882	24 21.972
	82 18.882	24 21.154
	82 19.802	24.21.154
Sub-Alternative 2c	82 20.417	24 22.277
	82 18.215	24 22.277
	82 18.215	24 20.932
	82 20.417	24 20.932

Source: Roger Pugliese, SAFMC Staff

2.6.1 Discussion

Under **Alternative 1 (No Action)**, fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit is prohibited year-round in the North Florida (137 square miles), *Oculina* Experimental Closed Area (108 square miles), St. Lucia Hump (9 square miles), and the East Hump (66 square miles) MPAs.

SMZ Attributes: Size, Depth, and Distance from Shore

Table 2.6.1.1. Travel distance, size, and depth range of Alternative 3 Sub-Alternatives for proposed Spawning SMZs off the east coast of Florida.

Proposed Spawning SMZ off the East coast of Florida	Sub-Alts.	Distance From Ponce De Leon Inlet (miles)	Size (square miles)	Depth inshore feet (meters)	Depth offshore feet (meters)
Daytona Steeples	**3a**	39	6 (in 27 mile footprint)	230(70)	312(95)
	3b	37	12	230(70)	312(95)
	3c	38	6	230(70)	312(95)

Source: Roger Pugliese, SAFMC Staff

Table 2.6.1.2. Travel distance, size, and depth range of Alternative 2 Sub-Alternatives for proposed Spawning SMZs off the Florida Keys.

Proposed Spawning SMZ of the east coast of Florida	Sub-alts.	Distance From Key West (miles)	Size (square miles)	Depth inshore feet(meters)	Depth offshore feet(meters)
Warsaw Hole	**2a**	35	2	187(57)	226(69)
	2b	35.6	1	187(57)	226(69)
	2c	34.7	4	230 (70)	443 (135)

Source: Roger Pugliese, SAFMC Staff

SMZ Attributes: Presence of Fish Including Those in Spawning Condition

The following information is taken directly from the MPA Expert Workgroup Report (SAFMC 2013):

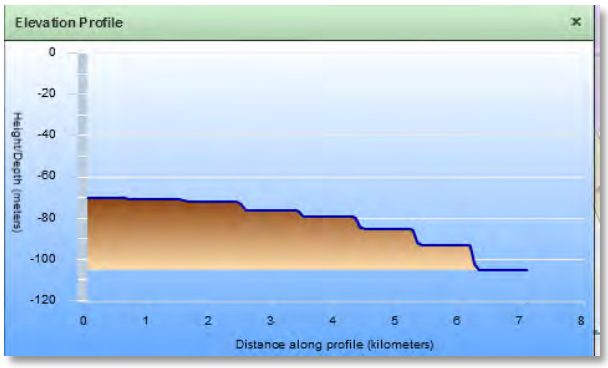
"Warsaw Hole (Figure 11) consists of a 50-fm. hump, southwest of Cosgrove Shoal Light (about 10 miles west-southwest of Key West and south of the Marquesas Keys). The east side of the feature is a backbone

ridge where depth drops steeply from 240 to 400 ft. Warsaw grouper have been seen aggregating there in March, and one female has been caught with obvious roe. The area southeast and southwest of Cosgrove Shoal is thought to be a spawning area for red snapper (Lindeman et al. 2000).

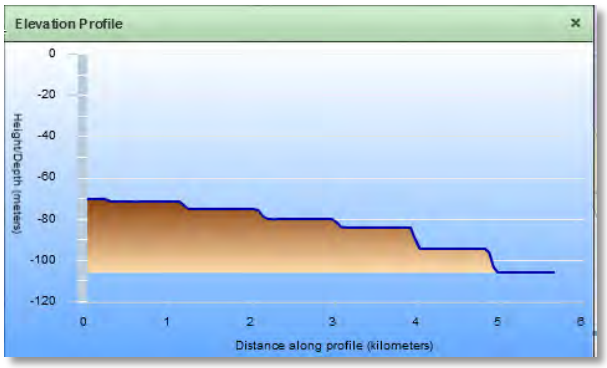
Warsaw Hole is an area of critical concern. Not only does it have warsaw grouper (occasionally caught), but also almaco jack, greater amberjack (all winter long), groupers (including black and scamp), snappers [silk (yelloweye), blackfin, red, vermilion], and other reef fishes. Warsaw grouper definitely aggregate there, as accounts from the old-time conch fishermen clearly indicate there must have been an aggregation based on the numbers they caught. Warsaw Hole may also be a spawning aggregation site for greater amberjack."

SMZ Attributes: Habitat Type, Bathymetry, Temperature, and Salinity

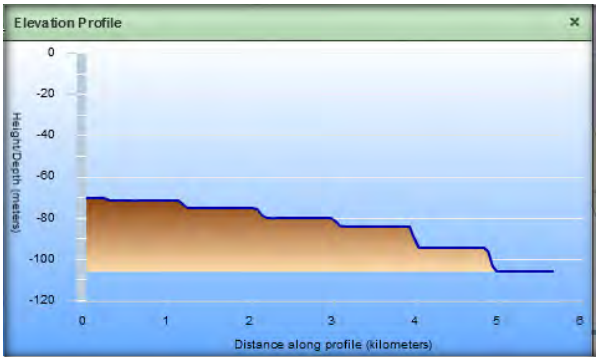
Elevation profiles for each of the alternatives/sub-alternatives are shown in **Figures 2.6.1.1** and **2.6.1.2**.



3a

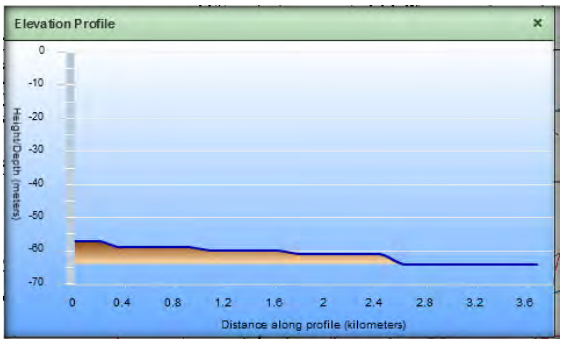


3b

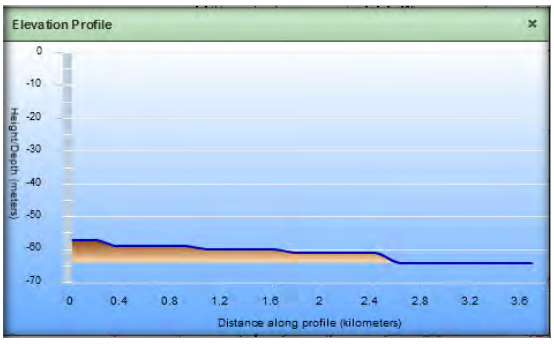


3c

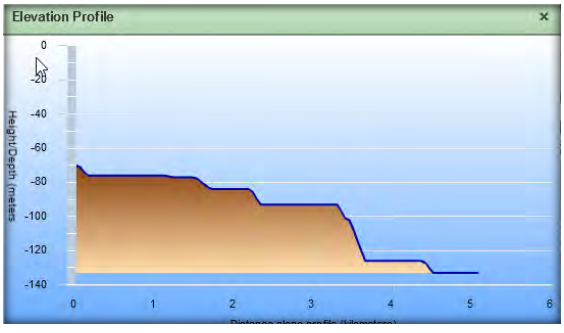
Figure 2.6.1.1. Elevation Profiles for Daytona Steeples Sub-Alternatives 3a, 3b, and 3c.
Source: (http://ocean.floridamarine.org/safmc_atlas/) Roger Pugliese, SAFMC Staff



2a



2b



2c

Figure 2.6.1.2. Elevation Profiles for Warsaw Hole Sub-Alternatives 2a, 2b, and 2c.
Source: (http://ocean.floridamarine.org/safmc_atlas/) Roger Pugliese, SAFMC Staff

The elevation profile for a cross section of the Warsaw Hole sub-alternatives is shown in **Figures 2.6.1.3**.

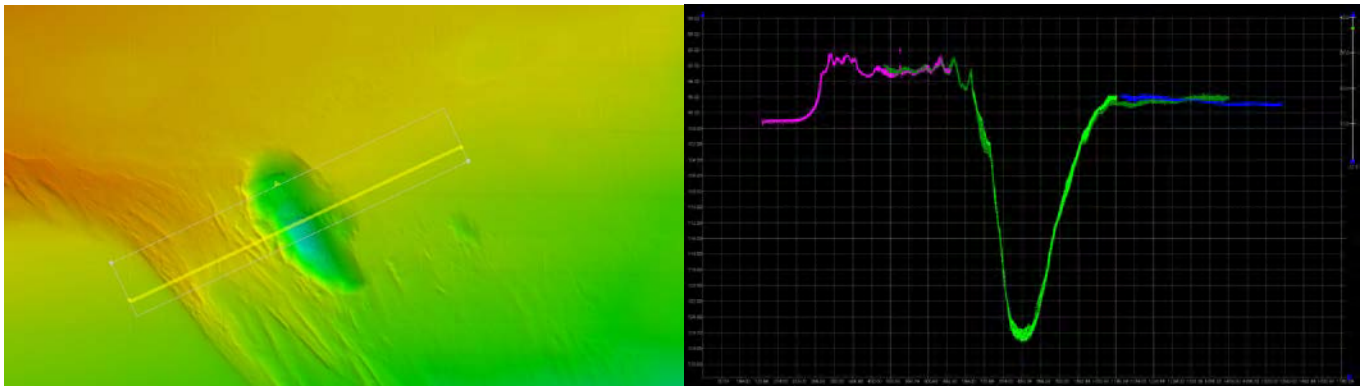


Figure 2.6.1.3. Elevation profiles for a cross section of the Warsaw Hole contained in Sub-Alternatives 2a, 2b, and 2c.
Source: NOAA - Multi-beam mapping of Warsaw Hole by the Nancy Foster Associated with NF 15-04 FKNMS Ecological Assessment

To provide oceanographic information for site characterization, the Ocean Observing and Modeling Group (OOMG) in the Department of Marine, Earth & Atmospheric Sciences, North Carolina State University provided temperature and salinity profiles for each site. The OOMG approach is to use in situ and remote sensing observations, numerical models, and data analysis and assimilation methods to examine fundamental ocean circulation physics, and to gain an integrated understanding of their interactions with the atmosphere and with ocean biological, geological, and chemical processes. The temperature profiles for Florida are shown **Figures T13-T16** in **Appendix O**. Salinity profiles are shown in **Figures S13-S16** in **Appendix O**.

2.7 Action 7. Move the Existing Charleston Deep Artificial Reef MPA 1.4 miles to the Northwest to Match the Boundary of the Permitted Site

Alternative 1. No Action. The existing Charleston Deep Artificial Reef MPA boundaries are: The northwest corner at 32°4' N, 79°12'W; the northeast corner at 32°8.5'N, 79° 7.75'W; the southwest corner at 32°1.5'N, 79°9.3'W; and the southeast corner at 32°6'N, 79°5'W.

Preferred Alternative 2. Move the Charleston Deep Artificial Reef MPA 1.4 miles to the northwest to match the boundary of the U.S. Army Corps of Engineers' permitted artificial reef area.

A chart showing the location and coordinates for the proposed shift of the Charleston Deep Artificial Reef MPA is included as **Figure 2.7.1**.

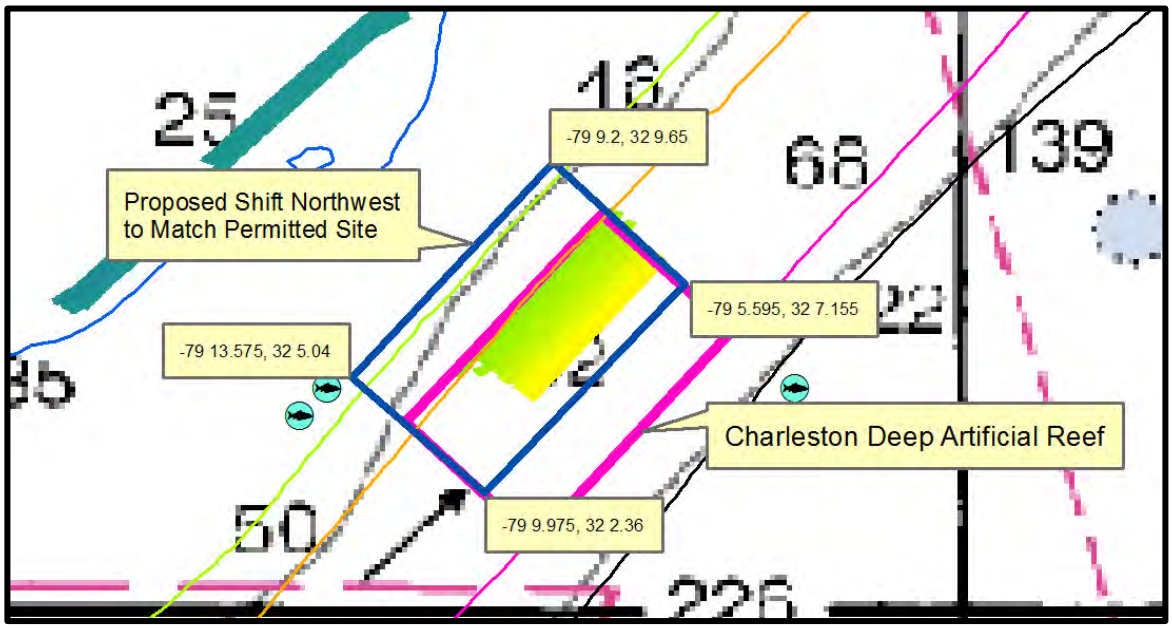


Figure 2.7.1. Chart showing location and coordinates for the proposed shift of the Charleston Deep Artificial Reef MPA northwest to match the existing permitted site.
Source: Roger Pugliese, SAFMC Staff

2.7.1 Discussion

The area is mostly sand bottom and the site was chosen as an area with no impact on recreational and/or commercial fishermen. This site was developed with the intent to place artificial reef material in a sandy environment and prohibit all snapper grouper fishing to test how well artificial reefs can work to increase the abundance of fish and provide them the opportunity to grow and reproduce in an un-fished area.

The Council originally designated the area as the Charleston Deep Artificial Reef MPA (**Alternative 1 (No Action)**) in Snapper Grouper Amendment 14 to the Snapper Grouper FMP (SAFMC 2007). The State of South Carolina worked with the Corps of Engineers to modify the boundary of this site to include

some material that was recently sunk in the area. The State of South Carolina requested the Council shift the boundary of the existing Charleston Deep Artificial Reef MPA to match the new boundary of the artificial reef site. This requires that the boundary be shifted 1.4 miles to the northwest (**Preferred Alternative 2**).

2.8 Action 8. Establish Transit and Anchoring Provisions

Alternative 1. No Action. Do not establish transit and anchoring provisions in the proposed Spawning Special Management Zones (SMZs). There are no Spawning SMZs in place and, if established, anchoring within the Spawning SMZ and transiting with snapper grouper species onboard would be allowed.

Preferred Alternative 2. In the proposed Spawning SMZs, allow transit with snapper grouper species aboard a vessel when fishing gear is appropriately stowed as defined below.

Preferred Alternative 3. Prohibit anchoring by fishing vessels in the proposed spawning SMZs.

Sub-alternative 3a. Prohibit anchoring by fishing vessels in all Spawning SMZs.

Sub-alternative 3b. Prohibit anchoring by fishing vessels in all Spawning SMZs except Area 51 and Area 53.

Definitions for Alternatives in Action 8

"Transit" means direct, non-stop progression through the Spawning SMZs.

"*Fishing gear appropriately stowed*" means:

(A) A longline may be left on the drum if all gangions and hooks are disconnected and stowed below deck. Hooks cannot be baited. All buoys must be disconnected from the gear; however, buoys may remain on deck.
~~(B) A trawl or try net may remain on deck, but trawl doors must be disconnected from such net and must be secured.~~
(B) Trawl doors and nets must be out of the water but the doors are not required to be on deck or secured on deck or below deck.
(C) A gillnet, stab net, or trammel net must be left on the drum. Any additional such nets not attached to the drum must be stowed below deck.
(D) Terminal gear (*i.e.*, hook, leader, sinker, flasher, or bait) used with an automatic reel, bandit gear, buoy gear, handline, or rod and reel must be disconnected and stowed separately from such fishing gear.
(E) A crustacean trap, golden crab trap, or sea bass pot cannot be baited. All buoys must be disconnected from the gear; however, buoys may remain on deck.
(F) Sinkers must be disconnected from the down rigger and stowed separately.

2.8.1 Discussion

Under **Alternative 1 (No Action)**, fishermen may transit the current eight deepwater MPA with snapper grouper species aboard a vessel when fishing gear is appropriately stowed. Transit with snapper grouper species aboard a vessel is not allowed in the *Oculina* Experimental Closed Area. Anchoring is allowed in the eight deepwater MPAs but not in the *Oculina* Experimental Closed Area, *Oculina* Habitat Area of Particular Concern (HAPC), or Coral HAPCs.

Alternative 2 addresses allowing transit through the Spawning SMZs and **Alternative 3** would prohibit anchoring. These two alternatives would track what is currently in place for the *Oculina* Experimental Closed Area, *Oculina* Habitat Area of Particular Concern (HAPC), and Coral HAPCs.

2.9 Action 9. Establish a Sunset Provision for the Spawning SMZs.

Alternative 1. No Action. The Spawning SMZs would not automatically expire through a sunset provision.

Alternative 2. The Spawning SMZs will sunset 10 years after implementation if not reauthorized.
- **Sub-alternative 2a.** Apply the sunset provision to all Spawning SMZs.
- **Sub-alternative 2b.** Apply the sunset provision to all Spawning SMZs except Area 51 and Area 53.

Alternative 3. The Spawning SMZs will sunset 7 years after implementation if not reauthorized.
- **Sub-alternative 3a.** Apply the sunset provision to all Spawning SMZs.
- **Sub-alternative 3b.** Apply the sunset provision to all Spawning SMZs except Area 51 and Area 53.

Alternative 4. The Spawning SMZs will sunset 5 years after implementation if not reauthorized.
- **Sub-alternative 4a.** Apply the sunset provision to all Spawning SMZs.
- **Sub-alternative 4b.** Apply the sunset provision to all Spawning SMZs except Area 51 and Area 53.

Direction to staff: Add discussion about what needs to be done; refer to Appendix N. Add wording to alternatives (I suggest putting in the discussion – Gregg) that discusses what specifically allows a site to sunset. Also, use the following list of species to document spawning activity within Spawning SMZs.

Table xx. Spawning SMZs target species.

Groupers

Goliath grouper (*Epinephelus itajara*), Nassau grouper (*E. striatus*), red grouper (*E. morio*), red hind (*E. guttatus*) (due to documented aggregations in other areas), speckled hind (*E. drummondhayi*), snowy grouper (*Hyporthodus niveatus* formerly *E. niveatus*), Warsaw grouper (*H. nigritus* formerly *E. nigritus*), black grouper (*Mycteroperca bonaci*), gag (*M. microlepis*), scamp (*M. phenax*)

Snappers

Yellowtail snapper (*Ocyurus chrysurus*), cubera snapper (*Lutjanus cyanopterus*), ~~dog snapper (*L. jocu*),~~ ~~gray snapper (*L. griseus*),~~ ~~lane snapper (*L. synagris*),~~ mutton snapper (*L. analis*), red snapper (*L. campechanus*), silk snapper (*L. vivanus*)

Tilefish

Golden tilefish (*Lopholatilus chamaeleonticeps*), blueline tilefish (*Caulolatilus microps*)

2.9.1 Discussion

Alternative 1 (No Action) would not establish a sunset provision and the Spawning SMZs would remain in place until altered by the Council through an amendment. Under **Alternative 2**, the sunset provision would automatically remove the Spawning SMZs. The Interdisciplinary Planning Team (IPT) may suggest the Council consider another alternative to sunset 15 years after implementation.

Chapter 3. Affected Environment

This section describes the affected environment in the proposed project area. The affected environment is divided into four major components.

Affected Environment

- **Habitat environment (Section 3.1)**

  Examples include coral reefs and sea grass beds

- **Biological end ecological environment (Section 3.2)**

  Examples include populations of blueline tilefish, corals, and turtles

- **Social and economic environment (Section 3.3)**

  Examples include fishing communities and economic descriptions of the fisheries

- **Administrative environment (Section 3.4)**

  Examples include the fishery management process and enforcement activities

3.1 Habitat Environment

3.1.1 Inshore/Estuarine Habitat

Many snapper grouper species utilize both pelagic and benthic habitats during several stages of their life histories; larval stages of these species live in the water column and feed on plankton. Most juveniles and adults are demersal and associate with hard structures on the continental shelf that have moderate to high relief (e.g., coral reef systems and artificial reef structures, rocky hard-bottom substrates, ledges and caves, sloping soft-bottom areas, and limestone outcroppings). Juvenile stages of some snapper grouper species also utilize inshore seagrass beds, mangrove estuaries, lagoons, oyster reefs, and embayment systems. In many species, various combinations of these habitats may be utilized during daytime feeding migrations or seasonal shifts in cross-shelf distributions. Additional information on the habitat utilized by species in the Snapper Grouper Complex is included in Volume II of the Fishery Ecosystem Plan (FEP, SAFMC 2009b) and incorporated here by reference. The FEP can be found at: http://www.safmc.net/EcosystemLibrary/FEPVolumeII.

3.1.2 Offshore Habitat

Predominant snapper grouper offshore fishing areas are located in live bottom and shelf-edge habitats where water temperatures range from 11º to 27º C (52º to 81º F) due to the proximity of the Gulf Stream, with lower shelf habitat temperatures varying from 11º to 14º C (52º to 57º F). Water depths range from 16 to 27 meters (54 to 90 ft) or greater for live-bottom habitats, 55 to 110 meters (180 to 360 ft) for the shelf-edge habitat, and from 110 to 183 meters (360 to 600 ft) for lower-shelf habitat areas.

The exact extent and distribution of productive snapper grouper habitat on the continental shelf north of Cape Canaveral, Florida, is unknown. Current data suggest from 3 to 30% of the shelf is suitable habitat for these species. These live-bottom habitats may include low relief areas, supporting sparse to moderate growth of sessile (permanently attached) invertebrates, moderate relief reefs from 0.5 to 2 meters (1.6 to 6.6 ft), or high relief ridges at or near the shelf break consisting of outcrops of rock that are heavily encrusted with sessile invertebrates such as sponges and sea fan species. Live-bottom habitat is scattered irregularly over most of the shelf north of Cape Canaveral, Florida, but is most abundant offshore from northeastern Florida. South of Cape Canaveral, Florida, the continental shelf narrows from 56 to 16 kilometers (35 to 10 mi) wide off the southeast coast of Florida and the Florida Keys. The lack of a large shelf area, presence of extensive, rugged living fossil coral reefs, and dominance of a tropical Caribbean fauna are distinctive benthic characteristics of this area.

Rock outcroppings occur throughout the continental shelf from Cape Hatteras, North Carolina to Key West, Florida (MacIntyre and Milliman 1970; Miller and Richards 1979; Parker et al. 1983), which are principally composed of limestone and carbonate sandstone (Newton et

al. 1971), and exhibit vertical relief ranging from less than 0.5 to over 10 meters (33 ft). Ledge systems formed by rock outcrops and piles of irregularly sized boulders are also common. Parker et al. (1983) estimated that 24% (9,443 km^2) of the area between the 27 and 101-meter (89 and 331 ft) depth contours from Cape Hatteras, North Carolina, to Cape Canaveral, Florida, is reef habitat. Although the bottom communities found in water depths between 100 and 300 meters (328 and 984 ft) from Cape Hatteras, North Carolina, to Key West, Florida, is relatively small compared to the whole shelf, this area, based upon landing information of fishers, constitutes prime reef fish habitat and probably significantly contributes to the total amount of reef habitat in this region.

Artificial reef structures are also utilized to attract fish and increase fish harvests; however, research on artificial reefs is limited and opinions differ as to whether or not these structures promote an increase of ecological biomass or merely concentrate fishes by attracting them from nearby, natural un-vegetated areas of little or no relief.

The distribution of coral and live hard bottom habitat as presented in the Southeast Area Monitoring, Assessment, and Prediction Program (SEAMAP) bottom mapping project is a proxy for the distribution of the species within the snapper grouper complex. The method used to determine hard bottom habitat relied on the identification of reef obligate species including members of the snapper grouper complex. The Florida Fish and Wildlife Research Institute (FWRI), using the best available information on the distribution of hard bottom habitat in the South Atlantic region, prepared ArcView maps for the four-state project. These maps, which consolidate known distribution of coral, hard/live bottom, and artificial reefs as hard bottom, are available on the South Atlantic Council's online map services provided by the newly developed SAFMC Habitat and Ecosystem Atlas: http://ocean.floridamarine.org/safmc_atlas/ . An introduction to the system is found at: http://www.safmc.net/ecosystem-management/mapping-and-gis-data.

Plots of the spatial distribution of offshore species were generated from the Marine Resources Monitoring, Assessment, and Prediction Program (MARMAP) data. The plots serve as point confirmation of the presence of each species within the scope of the sampling program. These plots, in combination with the hard bottom habitat distributions previously mentioned, can be employed as proxies for offshore snapper grouper complex distributions in the south Atlantic region. Maps of the distribution of snapper grouper species by gear type based on MARMAP data can also be generated through the South Atlantic Council's Digital Dashboard: http://ocean.floridamarine.org/safmc_dashboard/ and the SAFMC Regional Habitat and Ecosystem Atlas at the above address.

3.1.3 Essential Fish Habitat

Essential fish habitat (EFH) is defined in the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) as "those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S. C. 1802(10)). Specific categories

of EFH identified in the South Atlantic Bight, which are utilized by federally managed fish and invertebrate species, include both estuarine/inshore and marine/offshore areas. Specifically, estuarine/inshore EFH includes: Estuarine emergent and mangrove wetlands, submerged aquatic vegetation, oyster reefs and shell banks, intertidal flats, palustrine emergent and forested systems, aquatic beds, and estuarine water column. Additionally, marine/offshore EFH includes: live/hard bottom habitats, coral and coral reefs, artificial and manmade reefs, *Sargassum* species, and marine water column.

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 2000 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.

3.1.4 Habitat Areas of Particular Concern

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, Pourtalés Terrace Coral HAPC.

In addition to protecting habitat from fishing related degradation though fishery management plan regulations, the South Atlantic Council, in cooperation with National Marine Fisheries Service (NMFS), actively comments on non-fishing projects or policies that may impact essential fish habitat. With guidance from the Habitat Advisory Panel, the South Atlantic Council has developed and approved policies on: energy exploration, development, transportation and hydropower re-licensing; beach dredging and filling and large-scale coastal engineering; protection and enhancement of submerged aquatic vegetation; alterations to riverine, estuarine and near shore flows; offshore aquaculture; and marine invasive species and estuarine invasive species.

3.2 Biological and Ecological Environment

The reef environment in the South Atlantic management area affected by actions in this amendment is defined by two components (**Figure 3.2.1**). Each component will be described in detail in the following sections.

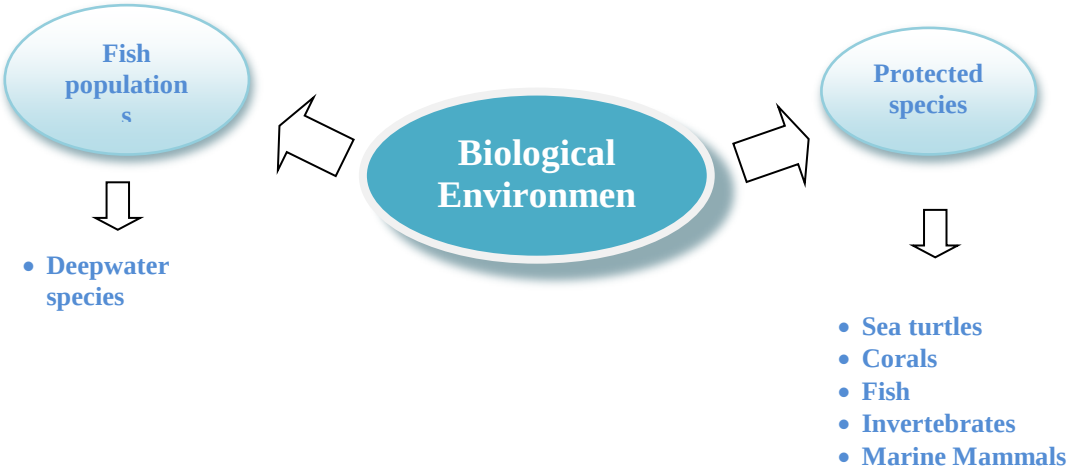


Figure 3.2.1. Two components of the biological environment described in this amendment.

3.2.1 Fish Populations

The waters off the South Atlantic coast are home to a diverse population of fish. The snapper grouper fishery management unit contains 73 species of fish, many of them neither "snappers" nor "groupers". These species live in depths from a few feet (typically as juveniles) to hundreds of feet. As far as north/south distribution, the more temperate species tend to live in the upper reaches of the South Atlantic management area (e.g., black sea bass, red porgy) while the tropical variety's core residence is in the waters off South Florida, Caribbean Islands, and northern South America (e.g., black grouper, mutton snapper).

These are reef-dwelling species that live amongst each other. These species rely on the reef environment for protection and food. There are several reef tracts that follow the southeastern coast. The fact that these fish populations congregate together dictates the nature of the fishery (multi-species) and further forms the type of management regulations proposed in this amendment.

3.2.1.1 Speckled Hind

Speckled hind occur in the Western Atlantic Ocean from North Carolina and Bermuda to the Florida Keys, and in the northern and eastern Gulf of Mexico (Heemstra and Randall 1993). The speckled hind is solitary and found in depths from 25 m (98 ft) (Heemstra and Randall 1993) to 400 m (1,312 ft) (Bullock and Smith 1991). Heemstra and Randall (1993) reported that it most commonly occurs at depths of 60-120 m (197-394 ft). Bullock and Smith (1991) indicated that most commercial catches are taken from depths of 50 m (164 ft) or more. Juveniles occur in shallower waters.

Speckled Hind
Stock Status

- Undergoing overfishing
- Overfished status unknown
- ABC=0 (landings only)
- ACL=0 (landings only; commercial and recreational)

Maximum reported size is 110 cm (43.3 in) TL and 30 kg (66 lbs) (Heemstra and Randall 1993). The maximum size and age of individuals examined by Matheson and Huntsman (1984) in the South Atlantic Bight was 110 cm (43.3 in) and 15 years, respectively. Heemstra and Randall (1993) reported a maximum age of 25 years. Estimated size at maturity is 81.1 cm (32 in), and M (natural mortality) is estimated at 0.14 (Froese and Pauly 2003) to 0.15 (Potts et al. 1998).

The speckled hind is believed to form spawning aggregations (G. Gilmore, Dynamac Corporation, personal communication). Spawning reportedly occurs from July to September (Heemstra and Randall 1993). Prey items include fishes, crustaceans, and squids (Bullock and Smith 1991; Heemstra and Randall 1993).

Speckled hind probably migrate to deeper water as they grow and mature (Ziskin, 2008). Ziskin (2008) reported there was a positive relationship between depth and length for speckled hind examined during 1977 to 1993. Furthermore, like other grouper species, speckled hind change sex from female to male as they age (Ziskin 2008).

A study conducted by Ziskin (2008) indicated that total mortality and fishing mortality of speckled hind had increased since 1977-1993 suggesting that speckled hind continues to be overexploited, despite the 1994 regulation that limited commercial and recreational catch to one speckled hind per trip, and may not be reproductively resilient enough to recover from depressed population levels.

3.2.1.2 Warsaw Grouper

Warsaw Grouper
Stock Status

- Undergoing overfishing
- Overfished status unknown
- ABC=0 (landings only)
- ACL=0 (landings only; commercial and recreational)

Warsaw grouper occur in the Western Atlantic from Massachusetts to southeastern Brazil (Robins and Ray 1986), and in the Gulf of Mexico (Smith 1971). The warsaw grouper is a solitary species (Heemstra and Randall 1993), usually found on rocky ledges and seamounts (Robins and Ray 1986), at depths from 55 to 525 m (180-1,722 ft) (Heemstra and Randall 1993). Juveniles are sometimes observed in inshore waters (Robins and Ray 1986), on jetties and shallow reefs (Heemstra and Randall 1993).

Maximum reported size is 230 cm (91 in) TL (Heemstra and Randall 1993) and 263 kg (580 lbs) (Robins and Ray 1986). The oldest specimen was 41 years old (Manooch and Mason 1987). Natural mortality was estimated by the SouthEast Data Assessment and Review (SEDAR) group during November 2003 to range from 0.05 to 0.12 (SEDAR 4 2004). The warsaw grouper spawns during August, September, and October in the Gulf of Mexico (Peter Hood, NOAA Fisheries, personal communication), and during April and May off Cuba (Naranjo 1956). Adults feed on benthic invertebrates and on fishes (Heemstra and Randall 1993).

3.2.1.3 Snowy Grouper

Life History Information

Snowy grouper occur in the Eastern Pacific and the Western Atlantic from Massachusetts to southeastern Brazil, including the northern Gulf of Mexico (Robins and Ray 1986). They are found at depths of 30 to 525 m (98-1,722 ft). Adults occur offshore over rocky bottom habitat. Juveniles are often observed inshore and occasionally in estuaries (Heemstra and Randall 1993). Snowy grouper probably migrate to deeper water as they grow and mature (Wyanski et al. 2000).

Snowy Grouper
Stock Status

- Undergoing overfishing
- Overfished
- ABC=102,960 pounds whole weight (landings only)
- ACL=82,900 pounds gutted weight (commercial) and 523 fish (recreational)

The snowy grouper is a protogynous species (female first then turning to male at older ages). The smallest, youngest male examined by Wyanski et al. (2000) was 72.7 cm (28.8 in) TL and age 8. The median size and age of snowy grouper was 91.9 cm (34.5 in) and 16 years. The largest specimen observed was 122 cm (48 in) TL and 30 kg (66 lbs), and 27 years old

(Heemstra and Randall 1993). The maximum age reported by Wyanski et al. (2000) was 29 years for fish collected off North Carolina and South Carolina. Radiocarbon techniques indicate that snowy grouper may live for as long as 40 years (Pat Harris, South Carolina Department of Natural Resources, personal communication). Wyanski et al. (2000) reported that 50% of the females are mature at 54.1 cm (21.3 in) TL and 5 years of age. The smallest mature female was 46.9 cm (18.5 in) TL, and the largest immature female was 57.5 cm (22.6 in) TL.

Females in spawning condition have been captured off western Florida during May, June, and August (Bullock and Smith 1991). In the Florida Keys, ripe individuals have been observed from April to July (Moore and Labinsky 1984). Spawning seasons reported by other researchers are as follows: South Atlantic (north of Cape Canaveral), April through September (Wyanski et al. 2000) and April through July (Parker and Mays 1998); and South Atlantic (south of Cape Canaveral), May through July (Manooch 1984). Wyanski et al. (2000) reported that snowy grouper spawn at depths from 176 to 232 m (577 to 761 ft) off South Carolina. Adults feed on fishes, gastropods, cephalopods, and crustaceans (Heemstra and Randall 1993).

SEDAR Assessment

Stock assessments, through the evaluation of biological and statistical information, provide an evaluation of stock health under the current management regime and other potential future harvest conditions. More specifically, the assessments provide an estimation of maximum sustainable yield (MSY) and a determination of stock status (whether *overfishing* is occurring and whether the stock is *overfished*).

The SEDAR process, which was initiated in 2002, is a cooperative fishery management council endeavor intended to improve the quality and reliability of fishery stock assessments in the South Atlantic, Gulf of Mexico, and US Caribbean. SEDAR is managed by the Caribbean, Gulf of Mexico, and South Atlantic Regional Fishery Management Councils in coordination with NOAA Fisheries Service and the Atlantic and Gulf States Marine Fisheries Commissions. The goal of SEDAR is to seek improvements in the scientific quality of stock assessments, constituent and stakeholder participation in assessment development, transparency in the assessment process, and a rigorous and independent scientific review of completed stock assessments.

The snowy grouper stock in the Atlantic is undergoing overfishing and is overfished as of 2004 (last year of data in the stock assessment). For snowy grouper the most recent estimate of the fishing mortality rate is from 2002 and was = 0.154 and F_{MSY} = 0.05 as the maximum fishing mortality threshold (MFMT). Comparing these two numbers:

- F_{2002}/MFMT = 0.154/0.05 = 3.08

This comparison is referred to as the overfishing ratio. If the ratio is greater than 1, then overfishing is occurring.

The snowy grouper stock in the Atlantic is overfished. For snowy grouper, the estimated level of spawning stock biomass in 2003 was 869,503 pounds whole weight. The minimum stock size threshold (MSST) = 3,498,735 pounds whole weight. Comparing these two numbers:

- SSB_{2003}/MSST = 869,503/3,498,735 = 0.25

If the ratio is less than 1, then the stock is overfished. In the absence of fishing it was determined that it would take 13 years to rebuild the stock to B_{MSY}. The maximum recommended rebuilding time is 34 years based on the formula: T_{MIN} (13 years) + one generation time (21 years).

Data that provide information on stock status are the average weight and length from the fisheries landings as well as the observed age and length composition data. The 2002 average weights and lengths from the commercial fisheries suggest the population is at very low levels. The average weight and length in 2002 from the handline fishery suggests the population is near 11% and 3% of SSB_{MSY}, respectively. The average weight and length in 2002 from the longline fishery suggests the population is near 44% and 28% of SSB_{MSY}, respectively. The length composition data from the most recent years (2000-2002) also suggests a depleted population of snowy grouper. The observed length distributions are skewed toward smaller fish compared to an equilibrium, virgin state length composition.

3.2.1.4 Blueline Tilefish

Life History Information

Blueline tilefish occurs in the Western Atlantic Ocean, North Carolina to southern Florida and Mexico, including the northern (and probably eastern) Gulf of Mexico (Dooley 1978). Blueline tilefish are found along the outer continental shelf, shelf break, and upper slope on irregular bottom with ledges or crevices, and around boulders or rubble piles in depths of 30 to 236 m (98-774 ft) and temperatures ranging from 15 to 23° C (59-73.4º F) (Ross 1978; Ross and Huntsman 1982; Robins and Ray 1986; Parker and Mays 1998). Fishermen off the coast of North Carolina north of Cape Hatteras report harvesting blueline tilefish off mud bottom. The number of fishermen using monofilament bottom longlines north of Cape Hatteras has increased since 2006. Monofilament longline gear requires fishing in specific habitat, particularly on mud bottom area, and is not as durable in strong current areas affiliated with rocky hardbottom.

Maximum reported size is 90 cm (35.7 in) TL and 7 kg (15 lbs) and maximum reported age is 42 years (Dooley 1978). The SEDAR group estimated M is between 0.04 and 0.17 (SEDAR 4 2004). Spawning occurs at night, from February to October, with a peak in May at depths of 48-

232 m (157-761 ft) (Harris et al. 2004). This species feeds primarily on benthic invertebrates and fishes (Dooley 1978).

SEDAR Assessment

The following is taken directly from the SSC Report:

Since this assessment falls under Tier 1 of our ABC control rule, ABC was obtained according to a P-star value. A summary of results from applying the ABC control rule is presented below. Since the Council has not formally accepted the new definition of MSST (75% SSB_{MSY}) as recommended by the SSC (see discussion and recommendations under agenda item 4 above) the Committee provided results using both definitions of MSST.

Blueline tilefish
Stock Status

- Undergoing overfishing
- Not overfished
- ABC=projected yield with a 30% chance of overfishing occurring
- ACL was specified through the Amendment 32

- *P* Analysis for MSST = 75% SSB_{MSY}*
  1. *Assessment Information: Tier 2 (-2.5%) since h is fixed and yields estimates of benchmarks that are actually proxies and h was unable to estimated*
  2. *Uncertainty: High (-2.5%)*
  3. *Stock Status: Not Overfished but Overfishing Occurring (-5%)*
  4. *Productivity-Susceptibility Analysis: High Risk (-10%)*

In total these results provide for an adjustment score of 20%. This results in a probability of overfishing (P) of 30%, and a $P_{REBUILD}$ = 70%. Under this alternative MSST, the stock is not overfished and a rebuilding plan is not needed. The stock is experiencing overfishing. The SSC recommends basing ABC on the projected yield with a 30% chance of overfishing occurring. Additional projections are required, based on a 30% chance of overfishing occurring, to provide the specific ABC values. These projections should include the actual 2012 landings as recommended by the SEDAR 32 Review Panel.*

- *Provide guidance on the basis for MSST*

The SSC reviewed the document provided by SEFSC (Attachment 9) and the earlier Council conclusions (Attachment 10) on alternative definitions of MSST. The Committee felt that the alternative definitions of MSST described in the document are reasonable. However, without a full evaluation of the long-term performance of each alternative (perhaps through management strategy evaluation) it is impossible to make an objective, science-based recommendation on the Committee's preferred option. Nevertheless, the SSC acknowledges that the 75% SSB_{MSY} approach being currently considered by the Council is an acceptable choice for MSST and voiced no concern regarding the adoption of this management reference point for SAFMC-managed stocks.

3.2.1.5 Yellowedge Grouper

Yellowedge grouper occur in the Western Atlantic from North Carolina to southern Brazil, including the Gulf of Mexico. A solitary, demersal, deep-water species, the yellowedge grouper occurs in rocky areas and on sand mud bottom, at depths ranging from 64 to 275 m (210 to 902 ft). On soft bottom habitats, this fish is often seen in or near trenches or burrow-like excavations (Heemstra and Randall 1993).

Yellowedge grouper
Stock Status

- Overfishing unknown
- Overfished unknown
- ABC=55,596 pounds whole weight
- Deepwater Complex ACL-170,278 lbs whole weight

Maximum reported size is 114 cm (45.3 in) TL (male) and 18.6 kg (41 lbs). Cass-Calay and Bahnick (2002) observed a maximum age of 85 years that was validated by the use of radiocarbon dating. Natural mortality is estimated to be 0.05 (Cass-Calay and Bahnick 2002). Bullock et al. (1996) in the Gulf of Mexico reported that 50% of fishes are mature at 57 cm (22.4 in), and that 50% of females transform into males by 81 cm (32.2 in) TL. Spawning occurs from April through October in the South Atlantic (Keener 1984; Manooch 1984; Parker and Mays 1998). Ripe females were found in the eastern Gulf of Mexico from May through September (Bullock et al. 1996). Yellowedge grouper eat a wide variety of invertebrates (mainly brachyuran crabs) and fishes (Bullock and Smith 1991; Heemstra and Randall 1993).

3.2.1.6 Misty Grouper

Misty grouper
Stock Status

- Overfishing unknown
- Overfished unknown
- ABC=2,863 lbs whole weight
- Deepwater Complex ACL-170,278 lbs whole weight

Misty grouper occurs in the Western and Eastern Atlantic Ocean (Heemstra and Randall 1993). In the Western Atlantic, it ranges from Bermuda and the Bahamas to Brazil (Robins and Ray 1986). The misty grouper is a solitary, bottom-dwelling species. Adults generally occur at depths from about 100 to 550 m (327 to 1,803 ft) (Robins 1967). Juveniles occur in shallower waters (e.g., 30 m (98 ft)).

Little is known about the age, growth, and reproduction of this species. Maximum reported size is 160 cm (63 in) TL and 100 cm (39 in) TL for males and females, respectively. Maximum reported weight is 107 kg (236 lbs) (Heemstra and Randall 1993). The estimated size at maturity is 81.1 cm (31.9 in), and M is 0.14 (Froese and Pauly 2003). This species feeds primarily on fishes, crustaceans, and squids (Heemstra and Randall 1993).

3.2.1.7 Queen Snapper

Queen snapper
Stock Status

- Overfishing unknown
- Overfished unknown
- ABC=9,466 lbs whole weight
- Deepwater Complex ACL-170,278 lbs whole weight

Queen snapper occurs in the Western Atlantic, ranging from Bermuda and North Carolina to Brazil, including the Gulf of Mexico and Caribbean Sea. It is commonly found near oceanic islands, and is particularly abundant in the Bahamas and the Antilles. This is a bottom-dwelling species (Allen 1985) and moves offshore to deep-water reefs and rocky ledges as it grows and matures (SAFMC 1998a). Allen (1985) indicates it is primarily found over rocky bottom habitat, in depths of 100 to 450 m (327 to 1,475 ft). Thompson and Munro (1974) report it was caught on mud slopes of the south Jamaica shelf at a depth of 460 m (1,508 ft). Maximum reported size is 100 cm TL (39 in, male). Maximum reported weight is 5,300 g (11.7 lbs) (Allen 1985). Size at maturity and age at first maturity are estimated as 53.6 cm TL (21 in) and 1 year, respectively. Spawning is reported to occur during April and May off St. Lucia (Murray et al. 1988). Primary prey items include small fishes and squids (Allen 1985).

3.2.1.8 Silk Snapper

Silk snapper occur in the Western Atlantic, from North Carolina to Brazil, including the Bahamas and the northern Gulf of Mexico. It is commonly found along rocky ledges, in depths of 91-242 m (299-794 ft) (Robins and Ray 1986). Adults are generally found further offshore than juveniles (SAFMC 1998a), and usually ascend to shallow water at night (Allen 1985). However, juveniles are sometimes observed on deep reefs (Robins and Ray 1986). Silk snapper form moving aggregations of similar-sized individuals (Boardman and Weiler 1980).

Silk snapper
Stock Status

- Overfishing unknown
- Overfished unknown
- ABC=90,323 lbs pounds whole weight
- Deepwater Complex ACL-170,278 lbs whole weight

Maximum reported size is 83.0 cm (32.9 in) TL and 8.3 kg (18.3 lb) (Allen 1985). Size at maturity and age at first maturity are estimated at 43.4 cm (17.2 in) TL and 6.3 years, respectively (Froese and Pauly 2003). Silk snapper do not change sex. Spawning occurs in June, July, and August in waters off North and South Carolina (Grimes 1987).

Silk snapper eat primarily fishes, shrimps, crabs, gastropods, cephalopods, tunicates, and some pelagic items, including urochordates (Allen 1985).

3.2.1.9 Red Snapper

Red snapper
Stock Status

- Undergoing overfishing
- Overfished
- ABC(2014)=106,000 fish
- No open season in 2015 due to total mortality exceeding ABC

The maximum size reported for this species is 100 cm (40 inches) total length (TL) (Allen 1985, Robins and Ray 1986) and 22.8 kg (50 lbs) (Allen 1985). The maximum reported age in the Gulf of Mexico is reported as 53 years by Goodyear (1995) and 57 years by Allman et al. (2002). For samples collected from North Carolina to eastern Florida, maximum reported age is 45 years (White and Palmer 2004). McInerny (2007) reports a maximum age of 54 years for red snapper in the South Atlantic. Natural mortality (M) is estimated to be 0.078 using the Hoenig (1983) method with a maximum age of 53 years (SEDAR 15 2008). The value of M used in Southeast Data, Assessment, and Review (SEDAR) 24 (2010) based on the Hoenig (1983) method is 0.08. Manooch et al. (1998) estimated M at 0.25 but the maximum age in their study was 25 years (Manooch and Potts 1997).

In the U.S. South Atlantic and in the Gulf of Mexico, Grimes (1987) reported that size of red snapper at first maturity is 23.7 cm (9.3 inches) fork length. For red snapper collected along the Southeastern United States, White and Palmer (2004) found that the smallest mature male was 20.0 cm (7.9 inches) TL, and the largest immature male was 37.8 cm (15 in) TL. Fifty percent of males are mature at 22.3 cm (8.8 in) TL, while 50% of females are mature at 37.8 cm (15 in) TL. Males are present in 86% of age 1, 91% of age 2, 100% of age 3, 98% of age 4, and 100% of older age fish. Mature females are present in 0% of age 1, 53% of age 2, 92% of age 3, 96% of age 4, and 100% of older age individuals. Grimes (1987) found that the spawning season of this species varies with location, but in most cases occurs nearly year round. White and Palmer (2004) reported that the spawning season for female red snapper off the southeastern United States extends from May to October, peaking in July through September. Red snapper eat fishes, shrimps, crabs, worms, cephalopods, and some planktonic items (Szedlemayer and Lee 2004).

3.2.1.10 Red Grouper

Red Grouper
Stock Status

- Undergoing overfishing
- Overfished
- ABC=780,000 lbs pounds whole weight
- ACL = ABC

Red grouper, *Epinephelus morio*, is primarily a continental species, mostly found in broad shelf areas (Jory and Iversen 1989). Red grouper is distributed in the Western Atlantic, from North Carolina to southeastern Brazil, including the eastern Gulf of Mexico and Bermuda, but can occasionally be found as far north as Massachusetts (Heemstra and Randall 1993). The red grouper is uncommon around coral reefs; it generally occurs over flat rock perforated with solution holes (Bullock and Smith 1991), and is commonly found in the caverns and crevices of limestone reef in the Gulf of Mexico (Moe 1969). It also occurs over rocky reef bottoms (Moe 1969).

Adult red grouper are sedentary fish that are usually found at depths of 5-300 meters (16-984 feet). Fishermen off North Carolina commonly catch red grouper at depths of 27-76 meters (88-249 feet) with an average of 34 meters (111 feet). Fishermen off southeastern Florida also catch red grouper in depths ranging from 27-76 with an average depth of 45 meters (148 feet) (Burgos 2001; McGovern et al., 2002). Moe (1969) reported that juveniles live in shallow water nearshore reefs until they are 40 centimeters (16 inches) and 5 years of age, when they become sexually mature and move offshore. Spawning occurs during February-June, with a peak in April (Burgos 2001). In the eastern Gulf of Mexico, ripe females are found December through June, with a peak during April and May (Moe 1969). Based on the presence of ripe adults (Moe 1969) and larval red grouper (Johnson and Keener 1984), spawning probably occurs offshore. Coleman et al. (1996) found groups of spawning red grouper at depths of 21-110 meters (70-360 feet). Red grouper do not appear to form spawning aggregations or spawn at specific sites (Coleman et al. 1996). They are reported to spawn in depths of 30-90 meters (98-295 feet) off the Southeast Atlantic coast (Burgos 2001; McGovern et al. 2002).

Red grouper are protogynous hermaphrodites, meaning they function as a female first and later transition to males. The proportion of males in the population increases with age. Off North Carolina, red grouper first become males at 50.9 centimeters (20.1 inches) TL and males dominate size classes greater than 70 centimeters (27.8 inches) TL. Most females transform to males between ages 7 and 14. Burgos (2001) reported that 50% of the females caught off North Carolina are undergoing sexual transition at age 8. Maximum age reported by Heemstra and Randall (1993) was 25 years. Burgos (2001) and McGovern et al. (2002) indicated that red grouper live for at least 20 years in the Southeast Atlantic and a maximum age of 26 years has been reported for red grouper in the Gulf of Mexico (L. Lombardi, NMFS Panama City, personal communication). Natural mortality rate is estimated to be 0.14 (SEDAR 19 2010). Maximum reported size is 125.0 centimeters (49.2 inches) TL (male) and 23.0 kilograms (51.1 lb). For fish collected off North Carolina during the late 1990s, age at 50% maturity of females is 2.4 years and size at 50% maturity is 48.7 centimeters (19.3 inches) TL. Off southeastern Florida, age at 50% maturity was 2.1 years and size at 50% maturity was 52.9 centimeters (21.0 inches) TL (Burgos 2001; McGovern et al. 2002). These fish eat a wide variety of fishes, octopuses, and crustaceans, including shrimp, lobsters, and stomatopods (Bullock and Smith 1991; Heemstra and Randall 1993).

3.2.1.11 Gray Triggerfish

Gray Triggerfish
Stock Status

- Overfishing unknown
- Overfished unknown
- ABC=717,000 lbs pounds whole weight
- ACL = ABC

Gray triggerfish, *Balistes capriscus*, are found in the Eastern Atlantic from the Mediterranean to Moçamedes, Angola, and in the Western Atlantic from Nova Scotia to Bermuda, the northern Gulf of Mexico, and to Argentina. The gray triggerfish is associated with live bottom and rocky outcrops from nearshore areas to depths of 100 m (328 ft). It also

inhabits bays, harbors, and lagoons, and juveniles drift at the surface with *Sargassum*. Maximum reported size is 60 cm (23.76 in) TL (male/unsexed) and 6.2 kg (13.8 lbs; Froese and Pauly 2003). Males are significantly larger than females (Moore 2001). The maximum age of gray triggerfish collected from North Carolina to eastern Florida was 10 years (Moore 2001). The maximum age of gray triggerfish collected from the Northeastern Gulf of Mexico was 13 years (Johnson and Saloman 1984). Potts and Brennan (2001) estimated the natural mortality of gray triggerfish to be 0.30. Gray triggerfish are gonochorists that exhibit nest-building and territorial reproductive behavior. Mature females from fishery-independent samples are found in 0% of age-0, 98 % of age-1 and age-2 fish, and 100% of fish older than age-3. Mature males from fishery-independent samples are present in 63% of age-1, 91% of age-2, 98% of age-3, 99% of age-4 and age-5, and 100% of older age fish. Females reach first maturity at 14.2 cm (5.6 in) FL, with an L50 of 15.8 cm (6.3 in) FL. Males first mature at 17.0 cm (6.7 in) FL, with a L50 of 18.0 cm (7.1 in) FL (Moore 2001).

Along the southeast United States, Moore (2001) determined that gray triggerfish spawn every 37 days, or 3-4 times per season. In contrast, Ingram (2001) estimated that gray triggerfish spawn every 3.7 days in the Gulf of Mexico. Off the southeast United States, female gray triggerfish are in spawning condition from April to August, with a peak of activity during June/July. Male gray triggerfish are found in spawning condition throughout the year; however, there is a peak in activity during May-September (Moore 2001).

3.2.1.12 Vermilion Snapper

Vermilion snapper occur in the Western Atlantic, from North Carolina to Rio de Janeiro. The species is most abundant off the southeastern United States and in the Gulf of Campeche (Hood and Johnson 1999). The vermilion snapper is demersal (bottom-dwelling), commonly found over rock, ledges, live-bottom, gravel, or sand bottoms near the edge of the continental and island shelves (Froese and Pauly 2003). It occurs at depths from 18 to 122 meters (59 to 400 feet), but is most abundant at depths less than 76 meters (250 feet). Individuals often form large schools. This fish is not believed to exhibit extensive long range or local movement (SEDAR 2-SAR 2 2003).

Vermilion Snapper
Stock Status

- Not overfishing
- Not overfished
- 2015 Jan-June: Commercial ACL = 438,260 lbs whole weight
- 2015 July-Dec Commercial ACL=438,260 lbs whole weight
- 2015 Recreational ACL=412,480 lbs whole weight

The maximum size of a male vermilion snapper, reported by Allen (1985), was 60.0 centimeters (23.8 inches) TL and 3.2 kilograms (7.1 pounds). Maximum reported age in the South Atlantic Bight was 14 years (Zhao et al. 1997; Potts et al. 1998). This species spawns in aggregations (Lindeman et al. 2000) from April through late September in the southeastern

United States (Cuellar et al. 1996). Zhao et al. (1997) indicated that most spawning in the South Atlantic Bight occurs from June through August. Eggs and larvae are pelagic.

Vermilion snapper are gonochorists meaning that males and females do not change sex during their lifetime. All vermilion snapper are mature at 2 years of age and 20.0 centimeters (7.9 inches) (SEDAR 2 2003). Cuellar et al. (1996) collected vermilion snapper off the southeastern United States and found that all were mature. The smallest female was 16.5 centimeters (6.5 inches) FL and the smallest male was 17.9 centimeters (7.1 inches) FL (Cuellar et al. 1996). Zhao and McGovern (1997) reported that 100% of males that were collected after 1982 along the southeastern United States were mature at 14.0 centimeters (5.6 inches) TL and age 1. All females collected after 1988 were mature at 18.0 centimeters (7.1 inches) TL and age 1.

This species preys on fishes, shrimp, crabs, polychaetes, and other benthic invertebrates, as well as cephalopods and planktonic organisms (Allen 1985). Sedberry and Cuellar (1993) reported that small crustaceans (especially copepods), sergestid decapods, barnacle larvae, stomatopods, and decapods dominated the diets of small (< 50 millimeters (2 inches) SL) vermilion snapper off the Southeastern United States. Larger decapods, fishes, and cephalopods are more important in the diet of larger vermilion snapper.

3.2.1.13 Scamp

Scamp
Stock Status

- Overfishing unknown
- Overfished unknown
- ABC=27,519 lbs pounds whole weight
- Shallow-water Complex ACL = 102,198 lbs whole weight

Scamp, *Mycteroperca phenax*, occur in the Western Atlantic, from North Carolina to Key West, in the Gulf of Mexico, and in the southern portion of the Caribbean Sea. Juveniles are sometimes encountered as far north as Massachusetts (Heemstra and Randall 1993. Its reported depth range is 30-100 m (98-328 ft) (Heemstra and Randall 1993. Juveniles are found in estuarine and shallow coastal waters (Bullock and Smith 1991; Heemstra and Randall 1993.

Scamp are protogynous, with females dominating sizes less than 70.0 cm (27.8 in) (Harris et al. 2002). Scamp live for at least 30 years (Harris et al. 2002), and attain sizes as great as 107.0 cm (42.4 in) TL and 14.2 kg (31.3 lbs) (Heemstra and Randall 1993. Natural mortality rate is estimated to be 0.15 (Potts and Brennan 2001). Harris et al. (2002) report that the length and age at first spawning of females off North Carolina to southeast Florida was 30.0-35.0 cm (11.9-13.8 in) TL and age 1. Length and age at 50% maturity was 35.3 cm (13.9 in) TL and 1.28 years, respectively (Harris et al. 2002). In a study conducted in the eastern Gulf of Mexico, all fish larger than 35.0 cm TL were sexually mature (M. Godcharles and L. Bullock, unpublished data).

Spawning occurs from February through July in the South Atlantic Bight and in the Gulf of Mexico, with a peak in March to mid-May (Harris et al. 2002). Hydration of eggs occurs primarily during the morning and late afternoon, which indicates that scamp spawn during late afternoon and evening. Spawning individuals have been captured off South Carolina and St. Augustine, Florida at depths of 33 to 93 m. Scamp aggregate to spawn. Spawning locations and time of spawning overlaps with gag (Gilmore and Jones 1992). Fish are the primary prey of this species (Matheson et al. 1986).

3.2.1.14 Bycatch

See Appendix F for a detailed discussion of bycatch. The South Atlantic snapper grouper fisheries are characterized by moderately high discards, especially of yellowtail snapper and black sea bass (**Table 3.2.14.1**). The most discards originate from handline/electric rig and trap gears, with some discards from trolling gear and relatively low discards from other gears. It is possible that trip-level reporting leads to the relatively high discard estimates from trolling gear; these may be sets using another gear on a trip declared as a trolling gear trip. It is difficult to compare the ratio of commercial landings to commercial discards (**Table 3.2.14.1**), because commercial landings are reported in pounds and discards are reported in numbers of fish; however, black sea bass, gray snapper, and yellowtail snapper discards appear to be high relative to landed commercial catch.

Table 3.2.14.1. Top ten stocks with mean estimated South Atlantic commercial discards (#fish) during snapper grouper trips (defined as trips with >50% of landings from snapper grouper stocks), sorted from largest to smallest, by gear, for the 2009-2013 period.
Source: SEFSC Commercial Logbook (accessed May 2015) and Commercial Discard Logbook (accessed November 2014).

Stock	Bouy Gear	Stock	Diver	Stock	Handline /Electric	Stock	Longline	Stock	Trap	Stock	Trolling
snowy grouper	1.9	black sea bass	27.7	yellowtail snapper	5483.2	shark dogfish smooth	52.6	black sea bass	3708.8	black sea bass	946.7
gag	1.9	red snapper	23.1	gray snapper	1887.4	shark sandbar	26.1	pinfish spottail	59.0	greater amberjack	771.9
red snapper	1.0	gag	12.5	black sea bass	1274.6	hake atlantic red & white	4.5	gray triggerfish	54.8	black grouper	475.5
		red porgy	6.3	red snapper	1132.6	hammerhead	3.2	white grunt	43.6	almaco jack	423.0
		shark atlantic sharpnose	4.7	vermilion snapper	721.6	snowy grouper	0.5	grunts	32.7	scamp	194.3
		almaco jack	3.6	red porgy	640.7	rays unc	0.3	scup	30.8	gag	68.4
		finfishes unc for food	3.4	gag	492.3	shark blue	0.2	red porgy	27.6	shark unc	56.5
		spanish mackerel	2.7	unc amberjack	172.2	skates	0.1	finfishes unc	8.3	barracuda	56.3
		vermilion snapper	1.7	unc groupers	143.9	shark unc	0.0	gag	8.2	red snapper	32.2
		unc amberjack	1.6	unc snappers	130.9	shark dogfish unc	0.0	vermilion snapper	5.8	red porgy	19.1

Source: SEFSC Commercial Logbook (accessed May 2015) and Commercial Discard Logbook (accessed November 2014).

Recreational discards of several Snapper-Grouper stocks are higher than the landings for certain modes of fishing (**Table 3.2.14.2**). Red grouper, black grouper, gag, and yellowtail snapper discards, especially, are many times higher than their landings across most modes. The magnitude of Private mode discards across all Reef Fish stocks is much higher than for the Headboat or Charter modes.

Table 3.2.14.2. South Atlantic snapper grouper headboat, charter, private, and commercial mean estimates of landings and discards (2009-2013).

	HEADBOAT			CHARTER			PRIVATE			COMMERCIAL	
Species	Landings (N)	Discards (N)	Ratio (D:L)	Landings (N)	Discards (N)	Ratio (D:L)	Landings (N)	Discards (N)	Ratio (D:L)	Landings (lbs)	Discards (N)
Almaco jack	3,276	246	8%	2,581	1,211	47%	3,900	6,108	157%	197,432	800
Atlantic spadefish	133	35	27%	262	48	18%	101,741	114,598	113%	27,045	0
Banded rudderfish	15,614	2,665	17%	2,658	2,428	91%	7,603	6,474	85%	68,163	115
Bank sea bass	5,607	0	0%	792	2,084	263%	2,708	10,135	374%	540	0
Bar jack	341	59	17%	0	141		2,818	8,995	319%	4,457	0
Black grouper	337	1,339	397%	900	8,002	889%	6,589	24,499	372%	51,616	1,351
Black sea bass	165,443	553,232	334%	62,295	182,704	293%	257,417	2,682,646	1042%	510,102	60,568
Black snapper	0	0	0%	0	0		0	0		9	0
Blackfin snapper	79	59	75%	68	0	0%	1,843	0	0%	1,546	0
Blue runner	19,715	9,236	47%	10,749	15,023	140%	627,727	658,209	105%	227,134	1,762
Blueline tilefish	4,148	78	2%	9,576	459	5%	19,680	650	3%	341,160	234
Coney	50	51	101%	11	19	181%	723	174	24%	54	3
Cottonwick	13	0	0%	0	0		148	0	0%	0	0
Cubera snapper	367	19	5%	4	0	0%	1,960	111	6%	4,395	0
Dog snapper	48	12	25%	57	0	0%	822	0	0%	308	0
Gag	2,479	4,678	189%	2,688	16,025	596%	14,258	80,697	566%	471,689	7,004
Golden crab	0	0		0	0		0	0		634,192	0
Golden tilefish	8,868	0	0%	120,672	30,875	26%	904,657	520,822	58%	472,484	12
Goliath grouper	0	30	14966%	0	0		0	8,054		0	215
Gray snapper	43,916	6,465	15%	16,081	1,236	8%	279,017	1,292,452	463%	122,538	26,114
Gray triggerfish	57,539	12,135	21%	35,115	7,709	22%	92,990	111,012	119%	401,615	2,138
Graysby	1,604	1,306	81%	1,136	418	37%	5,467	10,518	192%	618	23

Greater amberjack	3,448	1,811	53%	16,390	6,814	42%	20,143	23,684	118%	897,173	1,635
Hogfish	140	231	165%	41	3	7%	29,102	3,190	11%	42,219	41
Jolthead porgy	6,690	114	2%	3,014	0	0%	10,681	1,240	12%	5,055	0
Knobbed porgy	5,562	182	3%	727	0	0%	7,769	326	4%	22,913	0
Lane snapper	18,673	2,290	12%	11,644	3,506	30%	45,257	130,718	289%	3,057	210
Lesser amberjack	207	31	15%	12	0	0%	51	0	0%	17,374	23
Longspine porgy	6	0	0%	0	0		290	170	59%	0	0
Mahogany snapper	45	4	8%	0	0		35	0	0%	45	0
Margate	765	206	27%	188	59	32%	3,436	3,952	115%	3,876	23
Misty grouper	0	0		0	0		0	0		655	1
Mutton snapper	13,001	3,436	26%	19,547	8,826	45%	75,902	113,500	150%	73,908	597
Ocean triggerfish	729	0	0%	304	77	25%	4,107	3,769	92%	0	0
Queen snapper	5	0	0%	1	0	0%	0	0		3,087	84
Red grouper	1,373	10,547	768%	945	5,631	596%	18,781	52,502	280%	258,312	1,614
Red hind	212	64	30%	85	0	0%	460	564	123%	7,781	47
Red porgy	20,697	14,510	70%	9,527	3,034	32%	16,657	5,350	32%	170,004	9,800
Red snapper	5,398	44,889	832%	4,246	16,805	396%	20,521	94,894	462%	82,133	13,272
Rock hind	1,319	574	44%	83	18	22%	517	2,324	450%	13,147	11
Rock sea bass	8	0	0%	177	238	134%	2,524	6,330	251%	389	16
Sailors choice	286	0	0%	37	1,367	3740%	16,170	12,371	77%	0	0
Sand tilefish	796	952	120%	396	3,439	868%	4,863	22,423	461%	995	159
Saucereye porgy	148	1	0%	0	0		1,462	0	0%	0	0
Scamp	2,547	2,016	79%	2,275	1,361	60%	4,080	2,406	59%	194,931	740
Schoolmaster	244	0	0%	2	0	0%	4,873	2,435	50%	30	0
Scup	9,968	1,866	19%	294	28	9%	647	1,508	233%	0	414
Silk Snapper	1,322	108	8%	276	34	12%	153	855	558%	10,166	7

Snowy grouper	151	51	34%	984	341	35%	861	331	38%	86,858	264
Tomtate	51,944	59,693	115%	1,159	6,544	565%	65,439	227,285	347%	176	620
Vermilion snapper	145,661	87,183	60%	37,198	18,308	49%	52,666	50,317	96%	966,504	9,033
White grunt	143,151	36,412	25%	19,706	9,601	49%	195,099	184,863	95%	108,712	389
Whitebone porgy	4,910	159	3%	2,893	9	0%	9,109	1,088	12%	13	0
Yellowedge grouper	20	2	9%	35	0	0%	44	0	0%	15,619	6
Yellowfin grouper	13	5	42%	0	0		97	0	0%	3,275	6
Yellowmouth grouper	12	5	43%	15	0	0%	0	0		204	0
Yellowtail snapper	99,863	33,144	33%	179,508	76,571	43%	287,217	715,637	249%	1,216,264	71,453

Sources: MRIP data from SEFSC Recreational ACL Dataset (Jan 2015), Headboat data from SEFSC Headboat Logbook CRNF files (expanded; July 2014), Commercial landings data from SEFSC Commercial ACL Dataset (July 2014) with discard estimates from expanded SEFSC Commercial Logbook (Nov 2014) and Commercial Discard Logbook (Nov 2014).

Note: Commercial gray triggerfish includes "triggerfishes, unclassified" category; commercial white grunt includes "grunts, unclassified" category.

Release Mortality Rates

Release mortality rates are unknown for many managed species. Recent Southeast Data, Assessment, and Review (SEDAR) assessments include estimates of release mortality rates based on published studies. Stock assessment reports can be found at http://www.sefsc.noaa.gov/sedar/.

SEDAR 32 (2013) estimates release mortality rates of 100% for blueline tilefish. SEDAR 17 (2008) recommended a release mortality rate for vermilion snapper of 41% for the commercial sector and 38% for the recreational sector. The recent stock assessment for yellowtail snapper chose a rate of 10% release mortality as an approximation for the lower bound on release mortality for yellowtail snapper (FWRI 2012). SEDAR 10 (2006) estimated release mortality rates of 40% and 25% for gag taken by commercial and recreational fishermen, respectively. SEDAR 24 (2010) used release mortality rates of 48% commercial; 41% for-hire, and 39% private recreational for red snapper. Commercial and recreational release mortality rates were estimated as 20% for black grouper and red grouper in SEDAR 19 (2010). SEDAR 15 (2008) estimated a 20% release mortality rate for greater amberjack. SEDAR 32, which is under development, assumes a 12.5% release mortality rate for gray triggerfish. Snowy grouper are primarily caught in water deeper than 300 feet and golden tilefish are taken at depths greater than 540 feet; therefore, release mortality of the species are probably near 100% (SEDAR 4 2004, SEDAR 25 2011). Release mortality of black sea bass is considered to be low (7% for the recreational sector and 1% for the commercial sector) (SEDAR 25 2011) indicating minimum size limits are probably an effective management tool for black sea bass. Commercial sector discard mortality for red porgy is 35%, and 8% for the recreational sector (SEDAR Update 2012). SEDAR 32 (2013), estimates discard mortality for blueline tilefish is 100%, consistent with other deep-water species (i.e., snowy grouper, and golden tilefish); however, if new management is implemented to reduce the discard mortality rate, it might be appropriate for population projections to consider something lower than 100% (SEDAR 32 2013).

3.2.2 Protected Species

There are 44 species, or distinct population segments (DPSs) of species, protected by NMFS that may occur in the exclusive economic zone (EEZ) of the South Atlantic Region. Thirty-one of these species are marine mammals protected under the Marine Mammal Protection Act (MMPA) (Wynne and Schwartz 1999, Waring et al. 2013). The MMPA requires that each commercial fishery be classified by the number of marine mammals they seriously injure or kill. NMFS's List of Fisheries (LOF) classifies U.S. commercial fisheries into three categories based on the number of incidental mortalities or serious injuries they cause to marine mammals. More information about the LOF and the classification process can be found at: http://www.nmfs.noaa.gov/pr/interactions/lof/. Six of the marine mammal species (sperm, sei, fin, blue, humpback, and North Atlantic right whales) protected by the MMPA, are also listed as endangered under the Endangered Species Act (ESA). In addition to those six marine mammals, five species of sea turtles (green, hawksbill, Kemp's ridley, leatherback, and

loggerhead); the smalltooth sawfish; five DPSs of Atlantic sturgeon; and two *Acropora* coral species (elkhorn [*Acropora palmata*] and staghorn [*A. cervicornis*]) are also protected under the ESA. Portions of designated critical habitat for North Atlantic right whales, the Northwest Atlantic (NWA) DPS of loggerhead sea turtles, and *Acropora* corals occur within the South Atlantic Council's jurisdiction. Additionally, NMFS has proposed rules to uplist *Acropora* Corals and list seven additional species of corals. NMFS has conducted specific analyses ("Section 7 consultations") to evaluate the potential adverse effects from the South Atlantic Snapper Grouper Fishery on species protected under the ESA. Summaries of those consultations and their determination are in **Appendix C**. Those consultations indicate that of the species listed above, sea turtles and smalltooth sawfish are the most likely to interact with the snapper grouper fishery. The species potentially affected by the hook-and-line portion of the fishery are discussed below.

3.2.2.1 ESA-Listed Sea Turtles

Green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles are all highly migratory and travel widely throughout the South Atlantic. The following sections are a brief overview of the general life history characteristics of the sea turtles found in the South Atlantic region. Several volumes exist that cover the biology and ecology of these species more thoroughly (i.e., Lutz and Musick (eds.) 1997, Lutz et al. (eds.) 2002).

Green sea turtle hatchlings are thought to occupy pelagic areas of the open ocean and are often associated with *Sargassum* rafts (Carr 1987, Walker 1994). Pelagic stage green sea turtles are thought to be carnivorous. Stomach samples of these animals found ctenophores and pelagic snails (Frick 1976, Hughes 1974). At approximately 20 to 25 cm carapace length, juveniles migrate from pelagic habitats to benthic foraging areas (Bjorndal 1997). As juveniles move into benthic foraging areas a diet shift towards herbivory occurs. They consume primarily seagrasses and algae, but are also know to consume jellyfish, salps, and sponges (Bjorndal 1980, 1997; Paredes 1969; Mortimer 1981, 1982). The diving abilities of all sea turtles species vary by their life stages. The maximum diving range of green sea turtles is estimated at 110 m (360 ft) (Frick 1976), but they are most frequently making dives of less than 20 m (65 ft.) (Walker 1994). The time of these dives also varies by life stage. The maximum dive length is estimated at 66 minutes with most dives lasting from 9 to 23 minutes (Walker 1994).

The **hawksbill's** pelagic stage lasts from the time they leave the nesting beach as hatchlings until they are approximately 22-25 cm in straight carapace length (Meylan 1988, Meylan and Donnelly 1999). The pelagic stage is followed by residency in developmental habitats (foraging areas where juveniles reside and grow) in coastal waters. Little is known about the diet of pelagic stage hawksbills. Adult foraging typically occurs over coral reefs, although other hard-bottom communities and mangrove-fringed areas are occupied occasionally. Hawksbills show fidelity to their foraging areas over several years (Van Dam and Diéz 1998). The hawksbill's diet is highly specialized and consists primarily of sponges (Meylan 1988). Gravid females have been noted ingesting coralline substrate (Meylan 1984) and calcareous algae (Anderes Alvarez and Uchida 1994), which are believed to be possible sources of calcium to aid in eggshell

production. The maximum diving depths of these animals are not known, but the maximum length of dives is estimated at 73.5 minutes. More routinely, dives last about 56 minutes (Hughes 1974).

Kemp's ridley hatchlings are also pelagic during the early stages of life and feed in surface waters (Carr 1987, Ogren 1989). Once the juveniles reach approximately 20 cm carapace length they move to relatively shallow (less than 50m) benthic foraging habitat over unconsolidated substrates (Márquez-M. 1994). They have also been observed transiting long distances between foraging habitats (Ogren 1989). Kemp's ridleys feeding in these nearshore areas primarily prey on crabs, though they are also known to ingest mollusks, fish, marine vegetation, and shrimp (Shaver 1991). The fish and shrimp Kemp's ridleys ingest are not thought to be a primary prey item but instead may be scavenged opportunistically from bycatch discards or from discarded bait (Shaver 1991). Given their predilection for shallower water, Kemp's ridleys most routinely make dives of 50 m or less (Soma 1985, Byles 1988). Their maximum diving range is unknown. Depending on the life stage a Kemp's ridleys may be able to stay submerged anywhere from 167 minutes to 300 minutes, though dives of 12.7 minutes to 16.7 minutes are much more common (Soma 1985, Mendonca and Pritchard 1986, Byles 1988). Kemp's ridleys may also spend as much as 96% of their time underwater (Soma 1985, Byles 1988).

Leatherbacks are the most pelagic of all ESA-listed sea turtles and spend most of their time in the open ocean. Although they will enter coastal waters and are seen over the continental shelf on a seasonal basis to feed in areas where jellyfish are concentrated. Leatherbacks feed primarily on cnidarians (medusae, siphonophores) and tunicates. Unlike other sea turtles, leatherbacks' diets do not shift during their life cycles. Because leatherbacks' ability to capture and eat jellyfish is not constrained by size or age, they continue to feed on these species regardless of life stage (Bjorndal 1997). Leatherbacks are the deepest diving of all sea turtles. It is estimated that these species can dive in excess of 1000 m (Eckert et al. 1989) but more frequently dive to depths of 50 m to 84 m (Eckert et al. 1986). Dive times range from a maximum of 37 minutes to more routines dives of 4 to 14.5 minutes (Standora et al. 1984, Eckert et al. 1986, Eckert et al. 1989, Keinath and Musick 1993). Leatherbacks may spend 74% to 91% of their time submerged (Standora et al. 1984).

Loggerhead hatchlings forage in the open ocean and are often associated with *Sargassum* rafts (Hughes 1974, Carr 1987, Walker 1994, Bolten and Balazs 1995). The pelagic stage of these sea turtles are known to eat a wide range of things including salps, jellyfish, amphipods, crabs, syngnathid fish, squid, and pelagic snails (Brongersma 1972). Stranding records indicate that when pelagic immature loggerheads reach 40-60 cm straight-line carapace length they begin to live in coastal inshore and nearshore waters of the continental shelf throughout the U.S. Atlantic (Witzell 2002). Here they forage over hard- and soft-bottom habitats (Carr 1986). Benthic foraging loggerheads eat a variety of invertebrates with crabs and mollusks being an important prey source (Burke et al. 1993). Estimates of the maximum diving depths of loggerheads range from 211 m to 233 m (692-764ft.) (Thayer et al. 1984, Limpus and Nichols 1988). The lengths of loggerhead dives are frequently between 17 and 30 minutes (Thayer et al. 1984, Limpus and Nichols 1988, Limpus and Nichols 1994, Lanyon et al. 1989) and they may

spend anywhere from 80 to 94% of their time submerged (Limpus and Nichols 1994, Lanyon et al. 1989).

3.2.2.2 ESA-Listed Marine Fish

Historically the smalltooth sawfish in the U.S. ranged from New York to the Mexico border. Their current range is poorly understood but believed to have contracted from these historical areas. In the South Atlantic region, they are most commonly found in Florida, primarily off the Florida Keys (Simpfendorfer and Wiley 2004). Only two smalltooth sawfish have been recorded north of Florida since 1963 (the first was captured off North Carolina in 1963 and the other off Georgia in 2002 (National Smalltooth Sawfish Database, Florida Museum of Natural History)). Historical accounts and recent encounter data suggest that immature individuals are most common in shallow coastal waters less than 25 meters (Bigelow and Schroeder 1953, Adams and Wilson 1995), while mature animals occur in waters in excess of 100 meters (Simpfendorfer pers. comm. 2006). Smalltooth sawfish feed primarily on fish. Mullet, jacks, and ladyfish are believed to be their primary food resources (Simpfendorfer 2001). Smalltooth sawfish also prey on crustaceans (mostly shrimp and crabs) by disturbing bottom sediment with their saw (Norman and Fraser 1938, Bigelow and Schroeder 1953).

3.3 Social and Economic Environment

This action has the potential to affect a diverse array of snapper grouper species given the co-occurrence of these species within geographic areas. A socio-economic impacts analysis was conducted for Regulatory Amendment 17 that projected potential changes in landings and revenue resulting from marine protected area (MPA) closures (SERO-LAPP-2013-05). Nine species were identified as being most commonly landed within the MPAs. These species included speckled hind, warsaw grouper, red porgy, vermilion snapper, scamp, greater amberjack, blueline tilefish, gag, and red grouper. Because of the similarity between the spawning management zones (SMZs) considered under this amendment and the MPAs analyzed under Regulatory Amendment 17, these same nine species will be used to identify the affected economic environment here. Throughout this analysis they will be referred to as SMZ species, although they do not encompass all of the species that may be encountered within the proposed SMZs. A description of the snapper grouper stocks in general, as well as those likely to be affected by this amendment is provided in **Section 3.2**. Additional details on the South Atlantic Snapper Grouper Fishery can be found in the Comprehensive ACL Amendment for the South Atlantic Region (SAFMC 2011c) and Amendment 24 (SAFMC 2011d) and are incorporated herein by reference.

3.3.1 Economic Description of the Commercial Sector

The major sources of data summarized in this description are the NMFS SERO Permits Information Management System (PIMS) and the Federal Logbook System (FLS), supplemented by average prices calculated from the Accumulated Landings System (ALS) and price indices taken from the Bureau of Labor Statistics (BLS). Inflation adjusted revenues and prices are reported in 2014 dollars. Landings are expressed in pounds (lbs) gutted weight (gw) to match the method for collecting ex-vessel price information. The landings and revenue estimates for the SMZ species presented in this section are for the whole South Atlantic region; they are not limited to fish harvested within the proposed SMZ areas.

Permits

Any fishing vessel that harvests and sells any of the snapper grouper species from the South Atlantic EEZ must have a valid South Atlantic commercial snapper grouper permit, which is a limited access permit. As of May 4, 2015, there were 557 valid or renewable South Atlantic Unlimited Snapper-Grouper permits and 118 valid or renewable Snapper-Grouper 225-lb trip-limited permits. After a permit expires, it can be renewed and transferred up to one year after the date of expiration. The number of valid or renewable snapper grouper permits declined steadily from 2010 through 2014 (**Table 3.3.1.1**).

Table 3.3.1.1. Number of valid or renewable South Atlantic commercial snapper grouper permits (2010 through 2014).

	Unlimited	225-lb Trip-limited
2010	624	139
2011	615	138
2012	604	132
2013	592	129
2014	584	125
Average	604	133

Source: NMFS SERO Permits Dataset, 2015

Landings, Value, and Effort

Landings and revenue estimates for each of the SMZ species for the whole South Atlantic region from 2010 through 2014 are presented in **Figure 3.3.1.1** and **Figure 3.3.1.2**. Greater amberjack and vermilion snapper accounted for the majority of SMZ species landings each year, but vermilion snapper and gag accounted for the majority of SMZ species revenues.

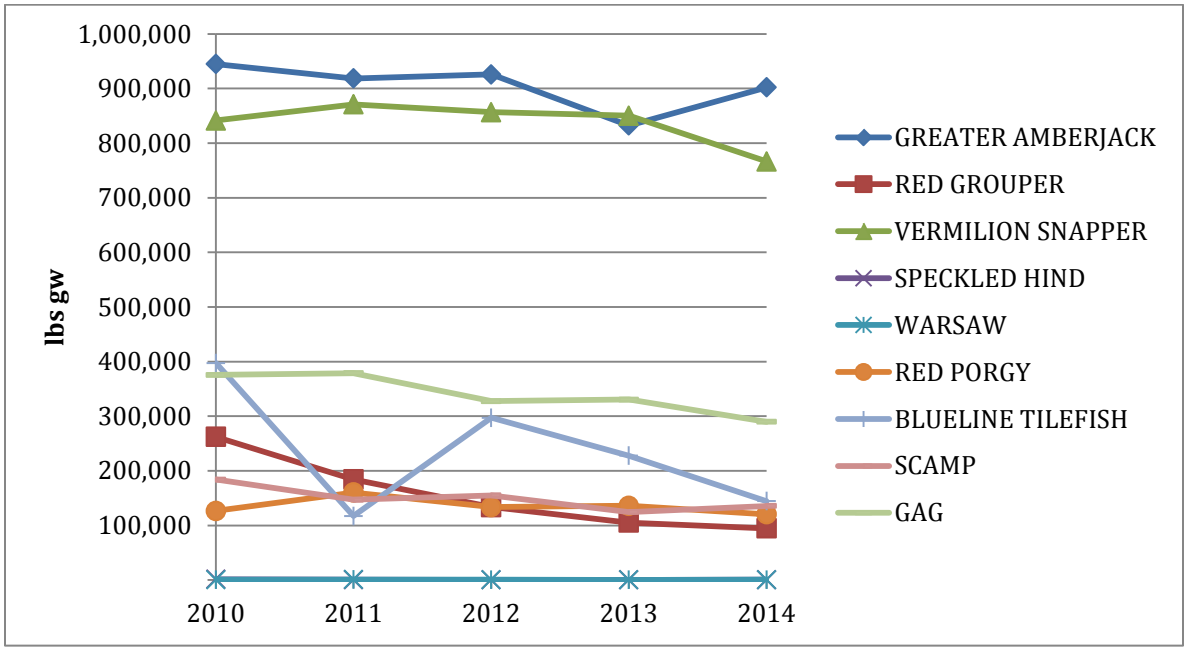


Figure 3.3.1.1. Annual commercial landings of SMZ species by weight (lbs gw).
Source: NMFS SEFSC Coastal Fisheries Logbook
Note: From January 31, 2011 through May 9, 2012, a 240-foot deepwater closure was in effect for deepwater snapper-grouper species, including blueline tilefish.

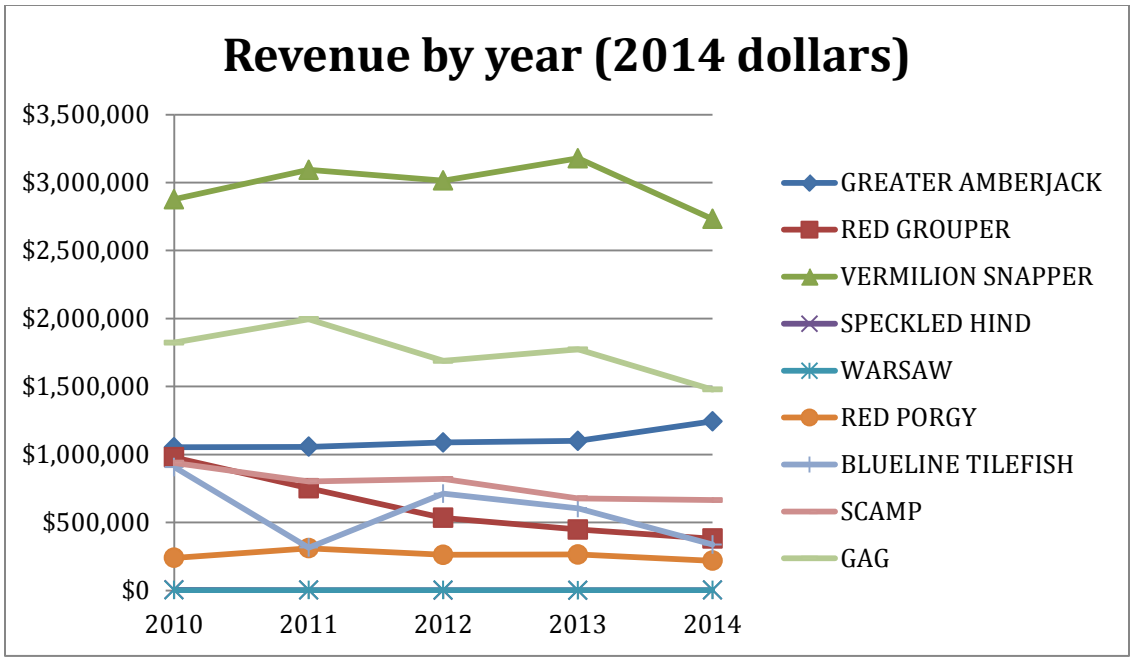


Figure 3.3.1.2. Annual ex-vessel revenue of SMZ species (2014 dollars).
Source: NMFS SEFSC Coastal Fisheries Logbook for landings and NMFS Accumulated Landings System for prices
Note: From January 31, 2011 through May 9, 2012, a 240-foot deepwater closure was in effect for deepwater snapper-grouper species, including blueline tilefish.

The number of vessels that landed SMZ species each year decreased from 2010 through 2014 by approximately 13% (**Table 3.3.1.2**). On trips in which SMZ species were harvested (2010 through 2014), the majority of landings, on average, were from SMZ species, suggesting these species were targeted. For vessels that harvested SMZ species each year, SMZ species accounted for approximately 34% of total all species landings (2010 through 2014 average) and 40% of total ex-vessel revenue (**Table 3.3.1.2** and **Table 3.3.1.3**). Approximately 8% of total ex-vessel revenue earned by these vessels (2010 through 2014 average) was from landings that occurred in the Gulf of Mexico, outside of the Council's jurisdiction. Total dockside revenue for vessels that landed SMZ species was mostly stable from 2010 through 2014, whereas average revenue per vessel steadily increased (**Table 3.3.1.3**).

Table 3.3.1.2. Number of vessels, number of trips and landings (lbs gw) by year.

Year	Number of vessels that caught SMZ species* (> 0 lbs gw)	Number of trips that caught SMZ species*	SMZ species* landings (lbs gw)	Other species' landings jointly caught with SMZ species* (lbs gw)	Number of South Atlantic trips that only caught other species	Other species' landings on South Atlantic trips without SMZ species* (lbs gw)	All species landings on Gulf of Mexico trips (lbs gw)
2010	472	5,097	3,133,960	1,523,308	8,169	3,843,306	353,846
2011	438	4,843	2,778,848	1,422,220	7,796	3,442,357	368,395
2012	434	4,675	2,830,388	1,308,694	7,790	3,200,719	671,563
2013	435	4,773	2,607,063	1,454,484	6,567	2,738,772	883,770
2014	410	5,115	2,455,078	1,485,866	7,507	3,189,864	679,735
Average	438	4,901	2,761,067	1,438,914	7,566	3,283,004	591,462

Source: NMFS SEFSC Coastal Fisheries Logbook
*SMZ species include warsaw grouper, speckled hind, red porgy, vermilion snapper, scamp, greater amberjack, blueline tilefish, gag, and red grouper

Table 3.3.1.3. Number of vessels and ex-vessel revenues by year (2014 dollars)*.

Year	Number of vessels that caught SMZ species**	Dockside revenue from SMZ species**	Dockside revenue from 'other species' jointly caught with SMZ species**	Dockside revenue from 'other species' caught on South Atlantic trips without SMZ species**	Dockside revenue from 'all species' caught on Gulf of Mexico trips	Total dockside revenue	Average total dockside revenue per vessel
2010	472	$8,821,843	$3,178,902	$7,618,786	$688,402	$20,307,934	$43,025
2011	438	$8,328,448	$2,890,822	$7,098,616	$834,645	$19,152,532	$43,727
2012	434	$8,120,119	$3,067,592	$7,892,083	$1,605,333	$20,685,127	$47,662
2013	435	$8,047,914	$3,810,121	$6,818,218	$2,623,532	$21,299,785	$48,965
2014	410	$7,058,072	$3,843,657	$7,553,479	$2,282,847	$20,738,055	$50,581
Average	438	$8,075,279	$3,358,219	$7,396,237	$1,606,952	$20,436,687	$46,792

Source: NMFS SEFSC Coastal Fisheries Logbook for landings and NMFS Accumulated Landings System for prices
*Revenues converted to 2014 dollars using the 2014 annual Consumer Price Index (CPI) for all US urban consumers provided by the Bureau of Labor and Statistics (BLS).
**SMZ species include warsaw grouper, speckled hind, red porgy, vermilion snapper, scamp, greater amberjack, blueline tilefish, gag, and red grouper

Imports

Imports of seafood products compete in the domestic seafood market and have in fact dominated many segments of the seafood market. Imports aid in determining the price for domestic seafood products and tend to set the price in the market segments in which they

dominate. Seafood imports have downstream effects on the local fish market. At the harvest level for snapper and grouper species, imports affect the returns to fishermen through the ex-vessel prices they receive for their landings. As substitutes to domestic production of snappers and groupers, imports tend to cushion the adverse economic effects on consumers resulting from a reduction in domestic landings. The following discussion describes the imports of fish products that directly compete with domestic harvest of snappers and groupers.

Imports[1] of fresh snapper were 22.8 million lbs product weight (pw) in 2010. They decreased to 21.7 million lbs pw in 2011, then increased steadily to 23.6 million lbs pw in 2014. Total revenue from fresh snapper imports increased from $64.5 million (2014 dollars[2]) in 2010 to a five-year high of $72.1 million in 2014. Imports of fresh snappers primarily originated in Mexico, Central America, or South America, and entered the U.S. through the port of Miami. Imports of fresh snapper were highest on average (2010 through 2014) during the months March through July.

Imports of frozen snapper were substantially less than imports of fresh snapper from 2010 through 2014. The annual value of frozen snapper imports ranged from $20.9 million (2014 dollars) to $30 million during the time period, with a peak in 2012. Imports of frozen snapper primarily originated in South America (especially Brazil), Indonesia, and Mexico. The majority of frozen snapper imports entered the U.S. through the ports of Miami and New York. Imports of frozen snappers tended to be lowest during March through June when fresh snapper imports were the highest.

Imports of fresh grouper ranged from 8.2 million lbs pw to 10 million lbs pw from 2010 through 2014. Total revenue from fresh grouper ranged from $27.6 million (2014 dollars) to $36.8 million during this time period, with a peak in 2013. The bulk of fresh grouper imports originated in Mexico and entered the U.S. through Miami. From 2010 through 2014, fresh grouper imports were lowest on average during the month of March and higher the rest of the year, with a peak in July.

Imports of frozen grouper were minimal and stable from 2010 through 2014, ranging from 1.3 million lbs pw worth $2.5 million (2014 dollars) to 2 million lbs pw worth $3.6 million. Frozen grouper imports generally originated in Mexico and to a lesser extent, Asia and entered the U.S. through Miami and Tampa. There was an inverse relationship in monthly landings between frozen and fresh groupers, with average imports being the highest in March for frozen grouper and lower during other months.

Business Activity

The commercial harvest and subsequent sale and consumption of fish generates business activity as fishermen expend funds to harvest the fish and consumers spend money on goods and

[1] NOAA Fisheries Service purchases fisheries trade data from the Foreign Trade Division of the U.S. Census Bureau. Data are available for download at http://www.st.nmfs.noaa.gov/st1/trade/index.html.
[2] Converted to 2014 dollars using the 2014 annual Consumer Price Index (CPI) for all US urban consumers provided by the Bureau of Labor and Statistics (BLS).

services, such as snapper and/or grouper purchased at a local fish market and served during restaurant visits. These expenditures spur additional business activity in the region(s) where the harvest and purchases are made, such as jobs in local fish markets, grocers, restaurants, and fishing supply establishments. In the absence of the availability of a given species for purchase, consumers would spend their money on substitute goods and services. As a result, the analysis presented below represents a distributional analysis only; that is, it only shows how economic effects may be distributed through regional markets and should not be interpreted to represent the impacts if these species are not available for harvest or purchase.

Estimates of the average annual business activity associated with the commercial harvest of SMZ species, and all species harvested by the vessels that harvested these SMZ species, were derived using the model developed for and applied in NMFS (2011b) and are provided in **Table 3.3.1.4**. This business activity is characterized as full-time equivalent jobs, income impacts (wages, salaries, and self-employed income), and output (sales) impacts (gross business sales). Income impacts should not be added to output (sales) impacts because this would result in double counting. It should be noted that the results provided should be interpreted with caution and demonstrate the limitations of these types of assessments. These results are based on average relationships developed through the analysis of many fishing operations that harvest many different species. Separate models to address individual species are not available. For example, the results provided here apply to a general reef fish category rather than just SMZ species and a harvester job is "generated" for approximately every $45,000 in ex-vessel revenue. These results contrast with the information provided in **Table 3.3.1.2** that shows an average of 438 harvesters (vessels) with recorded landings of SMZ species from 2010 through 2014.

Table 3.3.1.4. Average annual business activity (2010 through 2014) associated with the commercial harvest of SMZ species and the harvest of all species by vessels that landed SMZ species. All monetary estimates are in 2014 dollars.

Species	Average Ex-vessel Value ($ thousands)	Total Jobs	Harvester Jobs	Output (Sales) Impacts ($ thousands)	Income Impacts ($ thousands)
SMZ species*	$8,075	1,384	181	$106,323	$45,314
All species on all trips made by vessels that landed greater than one pound of SMZ species in a year.	$20,437	3,503	457	$269,080	$114,679

Source: Calculated by NMFS SERO using the model developed for NMFS (2011b)
*SMZ species include warsaw grouper, speckled hind, red porgy, vermilion snapper, scamp, greater amberjack, blueline tilefish, gag, and red grouper.

3.3.2 Economic Description of the Recreational Sector

The recreational sector of the snapper grouper fishery is comprised of a private and for-hire component. The private component includes anglers fishing from shore (all land-based structures) and private/rental boats. The for-hire component is composed of charter boats and headboats (also called party boats). Charter boats generally carry fewer passengers and charge a fee on an entire vessel basis, whereas headboats carry more passengers and payment is per person.

Permits

For-hire vessels are required to have a for-hire snapper grouper permit to fish for or possess snapper grouper species in the South Atlantic EEZ. As of May 4, 2015, there were 1,393 valid for-hire snapper grouper permits. This sector operates as an open access fishery and not all permitted vessels are necessarily active in the fishery. Some vessel owners may have obtained open access permits as insurance for uncertainties in the fisheries in which they currently operate. The number of for-hire vessel permits issued for the South Atlantic snapper grouper fishery decreased from 1,812 permits in 2010 to a five-year low of 1,727 permits in 2014 (**Table 3.3.1.5**). The majority of snapper grouper for-hire permitted vessels were home-ported in Florida; a relatively high proportion of these permitted vessels were also home-ported in North Carolina and South Carolina. Many vessels with South Atlantic for-hire snapper grouper permits were home-ported in states outside of the SAFMC's area of jurisdiction. On average (2010 through 2014), these vessels accounted for approximately 11% of the total number of for-hire snapper grouper permits issued.

Table 3.3.1.5. Number of South Atlantic for-hire snapper grouper permits, by homeport state, 2010-2014.

Home Port	2010	2011	2012	2013	2014	Average
North Carolina	331	330	312	307	294	315
South Carolina	145	132	138	150	160	145
Georgia	27	26	26	30	34	29
Florida	1,109	1,099	1,122	1,121	1,062	1,103
Gulf (AL-TX)	86	91	93	91	81	88
Others	114	103	106	100	96	104
Total	1,812	1,781	1,797	1,799	1,727	1,783

Source: NMFS SERO Permits Dataset, 2015

Although the for-hire permit application collects information on the primary method of operation, the permit itself does not identify the permitted vessel as either a headboat or a charter vessel and vessels may operate in both capacities. However, only federally permitted headboats are required to submit harvest and effort information to the NMFS Southeast Region Headboat

Survey (SRHS). Participation in the SRHS is based on determination by the Southeast Fishery Science Center (SEFSC) that the vessel primarily operates as a headboat. As of April 24, 2015, 77 South Atlantic headboats were registered in the SRHS (K. Fitzpatrick, NMFS SEFSC, pers. comm.). The majority of these headboats were located in Florida/Georgia (49), followed by North Carolina (18) and South Carolina (10).

There are no specific permitting requirements for recreational anglers to harvest snapper grouper species. Instead, anglers are required to possess either a state recreational fishing permit that authorizes saltwater fishing in general, or be registered in the federal National Saltwater Angler Registry system, subject to appropriate exemptions. As a result, it is not possible to identify with available data how many individual anglers would be expected to be affected by this proposed amendment.

Angler Effort

Recreational effort derived from the Marine Recreational Information Program (MRIP) database can be characterized in terms of the number of trips as follows:

- Target effort - The number of individual angler trips, regardless of duration, where the intercepted angler indicated that the species or a species in the species group was targeted as either the first or the second primary target for the trip. The species did not have to be caught.
- Catch effort - The number of individual angler trips, regardless of duration and target intent, where the individual species or a species in the species group was caught. The fish did not have to be kept.
- Total recreational trips - The total estimated number of recreational trips in the Gulf, regardless of target intent or catch success.

Other measures of effort are possible, such as directed trips (the number of individual angler trips that either targeted or caught a particular species), among other measures. **Table 3.3.1.6** and **Table 3.3.1.7** present target and catch effort estimates associated with speckled hind, warsaw grouper, red porgy, vermilion snapper, scamp, greater amberjack, blueline tilefish, gag, and red grouper. As discussed earlier, these species are estimated to be the most commonly harvested species within the candidate SMZs. Most of the estimated target and catch effort for these species occurred in Florida, with the private mode being the most prevalent mode of fishing. Catch effort was substantially higher than target effort, suggesting many of these species were incidentally caught while targeting other species.

Table 3.3.1.6. SMZ species recreational target trips, by mode and state, 2010-2014*.

	Florida	Georgia	North Carolina	South Carolina	Total
	Shore Mode				
2010	0	0	0	0	0
2011	0	0	0	0	0
2012	779	0	169	0	948
2013	0	0	0	0	0
2014	0	0	0	0	0
Average	156	0	34	0	190
	Charter Mode				
2010	2,698	0	1,270	418	4,385
2011	246	0	92	0	338
2012	1,739	0	0	0	1,739
2013	4,437	0	92	0	4,529
2014	1,945	0	438	0	2,383
Average	2,213	0	378	84	2,675
	Private/Rental Mode				
2010	34,428	0	171	0	34,599
2011	31,965	1,457	350	1,562	35,335
2012	22,092	0	2,187	0	24,279
2013	35,711	7,992	977	0	44,681
2014	22,537	822	1,348	2,289	26,996
Average	29,347	2,054	1,007	770	33,178
	All Modes				
2010	37,125	0	1,441	418	38,984
2011	32,211	1,457	443	1,562	35,672
2012	24,609	0	2,356	0	26,965
2013	40,149	7,992	1,069	0	49,210
2014	24,482	822	1,786	2,289	29,379
Average	31,715	2,054	1,419	854	36,042

Source: MRIP database, NOAA Fisheries, NMFS, SERO

* Includes all trips targeting one or more of the following species: warsaw grouper, speckled hind, red porgy, vermilion snapper, scamp, greater amberjack, blueline tilefish, gag, and red grouper.

Table 3.3.1.7. SMZ species recreational catch trips, by mode and state, 2010-2014*.

	Florida	Georgia	North Carolina	South Carolina	Total
	Shore Mode				
2010	4,240	0	0	0	4,240
2011	12,628	0	0	0	12,628
2012	5,111	0	4,413	0	9,524
2013	0	40	2,425	0	2,466
2014	4,825	0	3,259	3,878	11,962
Average	5,361	8	2,019	776	8,164
	Charter Mode				
2010	22,478	492	21,665	7,626	52,261
2011	16,686	1,187	12,644	1,173	31,689
2012	20,167	460	22,455	1,063	44,145
2013	25,513	1,243	7,702	1,666	36,124
2014	29,978	2,058	9,193	14,314	55,543
Average	22,964	1,088	14,732	5,168	43,952
	Private/Rental Mode				
2010	122,638	3,937	24,363	6,909	157,847
2011	88,481	1,457	11,736	3,866	105,540
2012	109,576	1,215	17,477	9,243	137,511
2013	121,914	1,945	18,181	2,274	144,315
2014	155,578	1,876	12,338	14,893	184,685
Average	119,637	2,086	16,819	7,437	145,980
	All Modes				
2010	149,356	4,429	46,028	14,536	214,348
2011	117,794	2,643	24,380	5,039	149,856
2012	134,855	1,675	44,344	10,306	191,180
2013	147,427	3,228	28,308	3,940	182,904
2014	190,381	3,934	24,790	33,085	252,189
Average	147,963	3,182	33,570	13,381	198,095

Source: MRIP database, NOAA Fisheries, NMFS, SERO

* Includes all trips that caught one or more of the following species: warsaw grouper, speckled hind, red porgy, vermilion snapper, scamp, greater amberjack, blueline tilefish, gag, and red grouper.

Note: From January 31, 2011 through May 9, 2012, a 240-foot deepwater closure was in effect for deepwater snapper-grouper species, including blueline tilefish.

Similar analysis of recreational effort is not possible for the headboat mode because headboat data are not collected at the angler level. Estimates of effort by the headboat mode are provided in terms of angler days, or the total number of standardized full-day angler trips[3]. Headboat effort, in terms of angler days, increased substantially in Florida/Georgia from 2010 through 2014, while effort remained relatively constant in North Carolina and South Carolina (**Table 3.3.1.8).** Headboat effort was the highest, on average, during the summer months of June through August (**Table 3.3.1.9**).

Table 3.3.1.8. Headboat angler days and percent distribution, by state, 2010-2014.

	Angler Days			Percent Distribution		
	Florida/Georgia	North Carolina	South Carolina	Florida/Georgia	North Carolina	South Carolina
2010	123,662	21,071	44,951	65.2%	11.1%	23.7%
2011	124,041	18,457	44,645	66.3%	9.9%	23.9%
2012	139,623	20,766	41,003	69.3%	10.3%	20.4%
2013	165,679	20,547	40,963	72.9%	9.0%	18.0%
2014	195,890	22,691	42,025	75.2%	8.7%	16.1%
Average	149,779	20,706	42,717	70.3%	9.7%	20.0%

Source: NMFS Southeast Region Headboat Survey (SRHS)

Table 3.3.1.9. Headboat angler days and percent distribution, by month, 2010 - 2014.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Headboat Angler Days											
2010	5,937	6,437	12,786	18,329	19,898	29,301	31,801	25,123	10,755	13,313	8,458	7,546
2011	8,011	10,688	13,718	17,472	17,786	29,793	33,259	21,634	11,107	8,352	6,491	8,832
2012	9,230	9,663	17,307	19,587	18,232	27,819	35,115	25,052	15,894	8,677	6,564	8,252
2013	10,182	10,892	14,541	16,129	20,969	33,079	39,463	33,830	16,335	14,534	6,698	10,537
2014	8,748	13,512	19,808	22,570	25,764	39,115	44,066	32,886	15,203	15,235	9,088	14,611
Avg	8,422	10,238	15,632	18,817	20,530	31,821	36,741	27,705	13,859	12,022	7,460	9,956
	Percent Distribution											
2010	3.1%	3.4%	6.7%	9.7%	10.5%	15.4%	16.8%	13.2%	5.7%	7.0%	4.5%	4.0%
2011	4.3%	5.7%	7.3%	9.3%	9.5%	15.9%	17.8%	11.6%	5.9%	4.5%	3.5%	4.7%
2012	4.6%	4.8%	8.6%	9.7%	9.1%	13.8%	17.4%	12.4%	7.9%	4.3%	3.3%	4.1%
2013	4.5%	4.8%	6.4%	7.1%	9.2%	14.6%	17.4%	14.9%	7.2%	6.4%	2.9%	4.6%
2014	3.4%	5.2%	7.6%	8.7%	9.9%	15.0%	16.9%	12.6%	5.8%	5.8%	3.5%	5.6%
Avg	4.0%	4.8%	7.3%	8.9%	9.6%	14.9%	17.3%	13.0%	6.5%	5.6%	3.5%	4.6%

Source: NMFS Southeast Region Headboat Survey (SRHS)

[3] Headboat trip categories include half-, three-quarter-, full-, and 2-day trips. A full-day trip equals one angler day, a half-day trip equals .5 angler days, etc. Angler days are not standardized to an hourly measure of effort and actual trip durations may vary within each category.

Economic Value

Participation, effort, and harvest are indicators of the value of saltwater recreational fishing. However, a more specific indicator of value is the satisfaction that anglers experience over and above their costs of fishing. The monetary value of this satisfaction is referred to as consumer surplus (CS). The value or benefit derived from the recreational experience is dependent on several quality determinants, which include fish size, catch success rate, and the number of fish kept. These variables help determine the value of a fishing trip and influence total demand for recreational fishing trips.

Direct estimates of the CS for every species potentially affected by this action are not currently available. There are, however, estimates for snapper and grouper species in general. Haab et al. (2012) estimated the CS (willingness to pay (WTP) for one additional fish caught and kept) for snappers and groupers in the Southeastern U.S. using four separate econometric modeling techniques. The finite mixture model, which takes into account variation in the preferences of fishermen, had the best prediction rates of the four models and, as such, was selected for presentation here. The WTP for an additional snapper (excluding red snapper) estimated by this model was $12.37 (2014 dollars) [4]. This value may seem low and may be strongly influenced by the pooling effect inherent to the model in which it was estimated. The WTP for an additional red snapper, in comparison, was estimated to be $140.23 (2014 dollars). The WTP for an additional grouper was estimated to be $134.73 (2014 dollars). Another study estimated the value of the consumer surplus for catching and keeping a second grouper on an angler trip at approximately $103 (2014 dollars) and lower thereafter (approximately $69 for a third grouper, $51 for a fourth grouper, and $40 for a fifth grouper) (Carter and Liese 2012). Additionally, this study estimated the value of harvesting a second red snapper at approximately $81 (2014 dollars) and lower thereafter. No estimates were provided for other snapper species.

The foregoing estimates of economic value should not be confused with economic impacts associated with recreational fishing expenditures. Although expenditures for a specific good or service may represent a proxy or lower bound of value (a person would not logically pay more for something than it was worth to them), they do not represent the net value (benefits minus cost), nor the change in value associated with a change in the fishing experience.

With regards to for-hire businesses, economic value can be measured by producer surplus (PS) per passenger trip (the amount of money that a vessel owner earns in excess of the cost of providing the trip). Estimates of the PS per for-hire passenger trip are not available. Instead, net operating revenue (NOR), which is the return used to pay all labor wages, returns to capital, and owner profits, is used as a proxy for PS. For the South Atlantic region, estimated NOR values are $163 (2014 dollars) per charter angler trip and $44 per headboat angler trip (C. Liese, NMFS SEFSC, pers. comm.)[5].

[4] Estimates converted to 2014 dollars using the 2014 annual Consumer Price Index (CPI) for all US urban consumers provided by the Bureau of Labor and Statistics (BLS).

[5] Estimates were converted to 2014 dollars using the 2014 annual CPI for all US urban consumers provided by the BLS.

Business Activity

The desire for recreational fishing generates economic activity as consumers spend their income on various goods and services needed for recreational fishing. This spurs economic activity in the region where recreational fishing occurs. It should be clearly noted that, in the absence of the opportunity to fish, the income would presumably be spent on other goods and services and these expenditures would similarly generate economic activity in the region where the expenditure occurs. As such, the analysis below represents a distributional analysis only.

Estimates of the business activity (economic impacts) associated with recreational angling for SMZ species were derived using average impact coefficients for recreational angling for all species, as derived from an add-on survey to the Marine Recreational Fisheries Statistical Survey (MRFSS) to collect economic expenditure information, as described and utilized in NMFS (2011b). Estimates of the average expenditures by recreational anglers are also provided in NMFS (2011b) and are incorporated herein by reference.

Recreational fishing generates business activity (economic impacts). Business activity for the recreational sector is characterized in the form of full-time equivalent jobs, output (sales) impacts (gross business sales), and value-added impacts (difference between the value of goods and the cost of materials or supplies). Estimates of the average target effort (2010-2014) for warsaw grouper, speckled hind, red porgy, vermilion snapper, scamp, greater amberjack, blueline tilefish, gag, and red grouper combined and associated business activity (2014 dollars) are provided in **Table 3.3.1.10**. The average impact coefficients, or multipliers, used in the model are invariant to the "type" of effort and can therefore be directly used to measure the impact of other effort measures such as catch trips if desired. To calculate the multipliers from **Table 3.3.1.10**, simply divide the desired impact measure (output impact, value-added impact, or jobs) associated with a given state and mode by the number of target trips for that state and mode.

The estimates provided in **Table 3.3.1.10** only apply at the state-level. These numbers should not be added across the region. Addition of the state-level estimates to produce a regional (or national) total could either under- or over-estimate the actual amount of total business activity because of the complex relationship between different jurisdictions and the expenditure/impact multipliers. Neither regional nor national estimates are available at this time.

Estimates of the business activity associated with headboat effort are not available. Headboat vessels are not covered in the MRFSS/MRIP, so, in addition to the absence of estimates of target effort, estimation of the appropriate business activity coefficients for headboat effort has not been conducted.

Table 3.3.1.10. Summary of SMZ species* target trips (2010-2014 average) and associated business activity (2014 dollars). Output and value added impacts are not additive.

	East Florida	Georgia	North Carolina	South Carolina
	Shore Mode			
Target Trips	156	0	34	0
Output Impact	$6,771	$0	$4,363	$0
Value Added Impact	$3,752	$0	$2,446	$0
Jobs	0	0	0	0
	Private/Rental Mode			
Target Trips	29,347	2,054	1,007	770
Output Impact	$1,526,094	$106,033	$84,970	$37,056
Value Added Impact	$859,163	$62,204	$48,168	$20,650
Jobs	13	1	1	0
	Charter Mode			
Target Trips	2,213	0	378	84
Output Impact	$1,764,794	$0	$201,635	$55,366
Value Added Impact	$1,161,525	$0	$138,103	$38,072
Jobs	15	0	2	1
	All Modes			
Target Trips	31,715	2,054	1,419	854
Output Impact	$3,297,660	$106,033	$290,968	$92,423
Value Added Impact	$2,024,439	$62,204	$188,717	$58,722
Jobs	28	1	3	1

Source: effort data from MRIP; economic impact results calculated by NMFS SERO using the model developed for NMFS (2011b).

* Includes all trips targeting one or more of the following species: warsaw grouper, speckled hind, red porgy, vermilion snapper, scamp, greater amberjack, blueline tilefish, gag, and red grouper.

3.3.3 Social Environment

The social environment includes a description of the commercial and recreational components of the snapper grouper fishery. The description is based on the geographical distribution of landings and the relative importance of the species for commercial and recreational fishing communities. A spatial approach enables the consideration of the importance of fishery resources to those communities, as required by National Standard 8.

3.3.3.1 Snapper Grouper

The snapper grouper fishery is considered to be of substantial social and cultural importance in the South Atlantic region. The description of the snapper grouper fishery focuses on available geographic and demographic data to identify communities with strong relationships with snapper grouper harvest (i.e., significant landings and revenue), because positive or negative impacts from regulatory change may occur in places with greater landings of snapper grouper species.

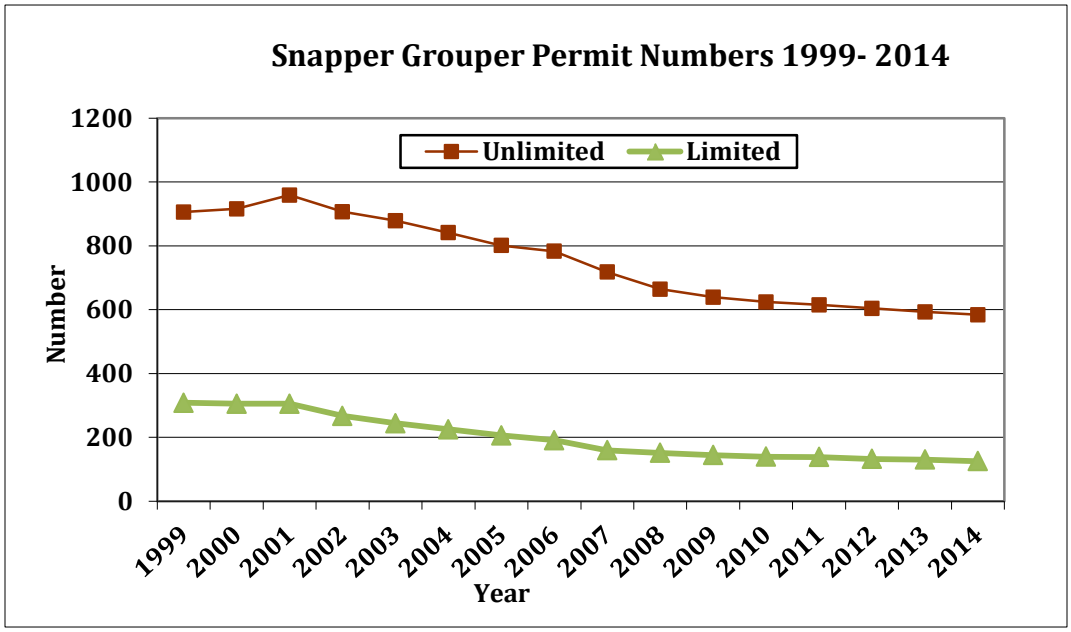


Figure 3.3.3.1. Snapper grouper Unlimited and 225-pound trip limit permits 1999-2014.
Source: NMFS SERO (2015)

Since 2003, South Atlantic Snapper Grouper Unlimited Permits and Snapper Grouper 225-pound Trip Limit Permits have shown a downward trend (**Figure 3.3.3.1**). With a limited entry program in place since 1998 and a "2 for 1" requirement, a reduction in permits would be expected over time and will likely continue as long as the criteria are a continued part of management.

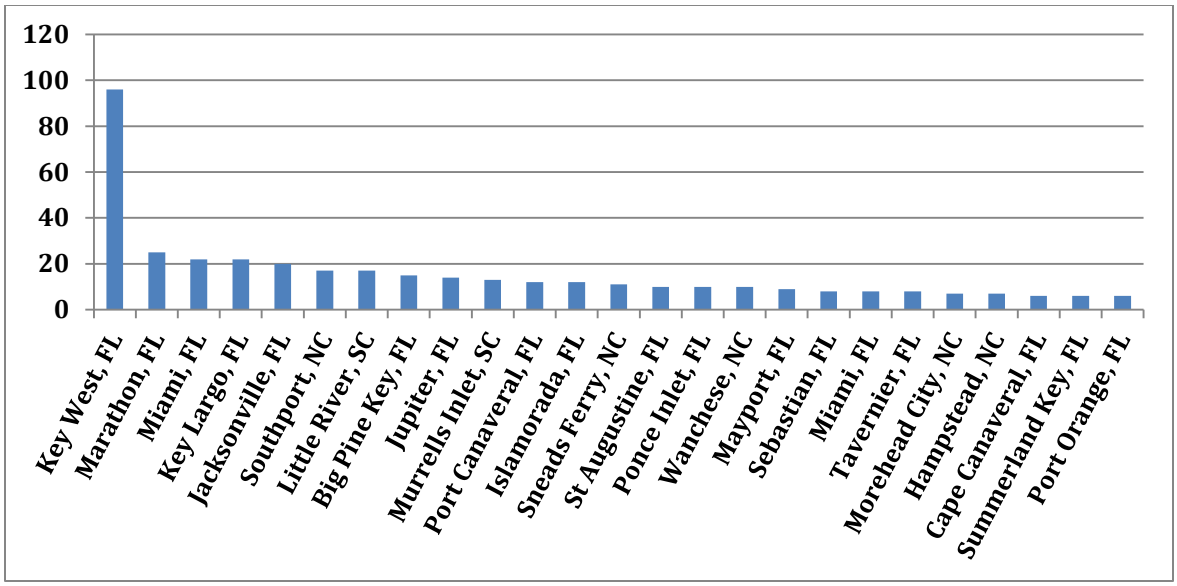


Figure 3.3.3.2. Snapper grouper unlimited 2014 permit frequency by homeport.
Source: NMFS SERO Permits 2015

Florida communities have the majority of snapper grouper unlimited permits. Communities in North Carolina within the top 25 are Southport, Sneads Ferry, Hampstead, Wilmington, Atlantic Beach and Wanchese; and in South Carolina Little River, Murrell's Inlet and Georgetown (**Figure 3.3.3.2**). Florida also dominates class 2 permits with Hatteras, NC the only community outside of the Florida listed in the top twenty communities with class 2 permits (**Figure 3.3.3.3**).

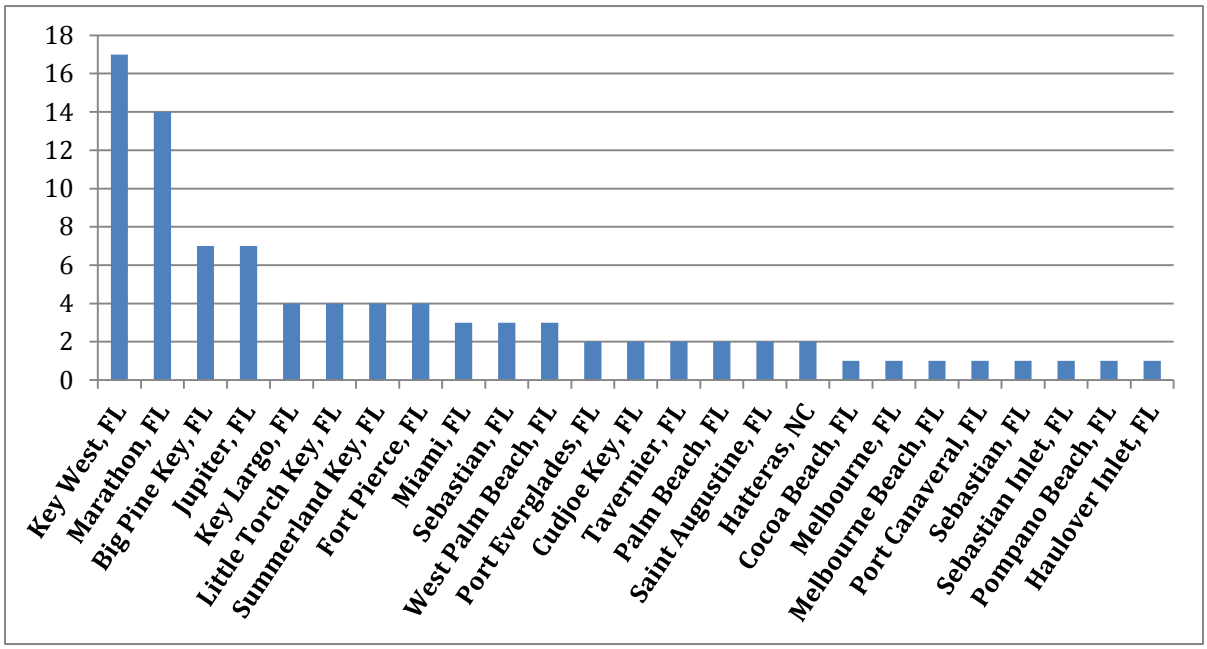


Figure 3.3.3.3. Snapper grouper 225-pound trip limit 2014 permits frequency by homeport
Source: NMFS SERO Permits

While the limited entry program has contributed to the reduced capacity, other factors have also contributed to this downward trend. Economic factors like increased imports, decreasing prices for domestic product and rising prices for diesel fuel and the recent recession have had a widespread effect on commercial fishing throughout many regions of the U.S. In addition, the loss of working waterfronts has contributed to a growing loss of fishing infrastructure that may play a role in the decline in many fishing communities (Garrity-Blake and Nash 2012; Griffith 2011). For North Carolina, the losses have been substantial as over a decade there has been a 36 percent decline in the number of fish houses (Garrity-Blake and Nash 2012).

The factors that affect the loss of working waterfronts in fishing communities are coastal development, rising property taxes, decreasing access to waterfront due to increasing privatization of public resources, rising cost of dockage and fuel, lack of maintenance of waterways and ocean passages, competition with imported fish, and other less tangible (often political) factors. These along with increasingly strict regulations have combined to place a great deal of stress on many communities and their associated fishing sectors including commercial, charter/headboat and private recreational.

While some of the same social factors above have affected the for-hire fishery in terms of loss of working waterfronts, other issues such as a downturn in the economy and competition have affected the growth of that sector. The recreational fishery is also subjected to permit requirements as vessels in the South Atlantic for-hire snapper grouper fishery are required to have a permit to fish for or possess species in the EEZ.

The number of for-hire permits issued in the South Atlantic snapper grouper fishery increased over the period 2003-2007, from 1,477 permits in 2003 to 1,754 permits in 2007 (**Figure 3.3.3.4**). Increases occurred for those vessels that were strictly for-hire businesses, since permits issued for vessels operating as for-hire and commercial entities were flat from 2005 to 2006 and fell in 2007. Most of these for-hire permitted vessels were home-ported in Florida; with vessels also home-ported in North Carolina and South Carolina; some in the Gulf, Mid-Atlantic and Northeast.

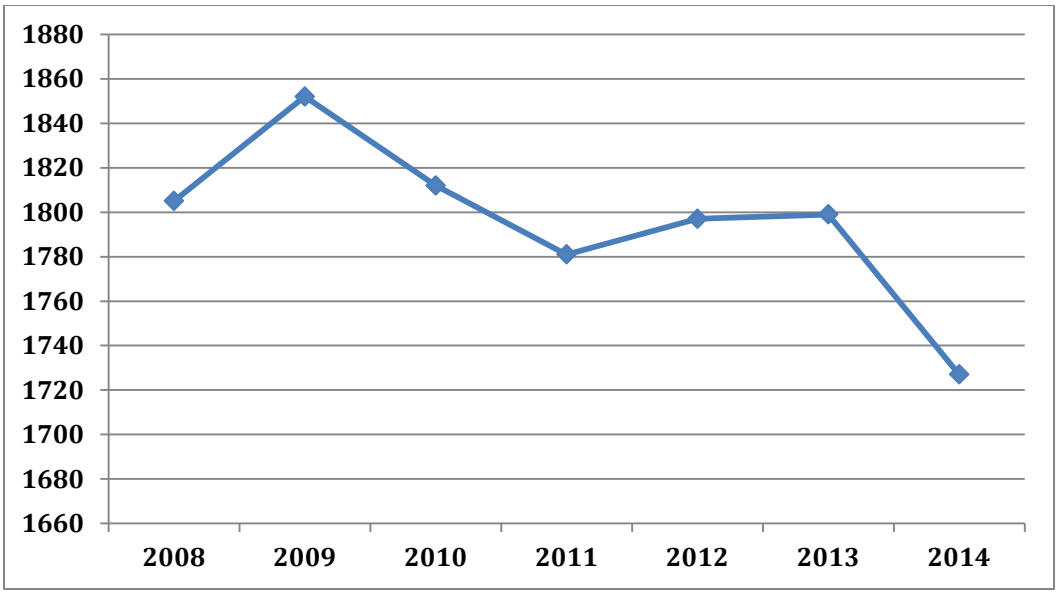


Figure 3.3.3.4. Snapper grouper for-hire permits 2008 - 2014
Source: NMFS SERO Permits

Commercial Snapper Grouper Communities in the South Atlantic

To identify commercial fishing communities where fishing has importance to the local economy, a measure called the regional quotient (RQ) is used to identify those communities which land a substantial amount of a particular species. The RQ measures the proportional distribution of commercial landings and value of a particular species. The RQ is calculated by dividing the total pounds (or value) of a species landed in a given community, by the total pounds (or value) for that species for all communities in the region. The actual percentage of RQ is not provided in the following tables to prevent any disclosure of confidential information.

Communities where snapper grouper are an important target species are depicted in **Figure 3.3.3.5** which uses a regional quotient of all snapper grouper species and includes the top 20 communities ranked by their regional quotient value of snapper grouper. Communities in North Carolina where snapper grouper make up a substantial portion of their regional quotient include Southport, Wanchese, Beaufort, Morehead City, Hampstead, Oak Island, Wilmington, and Shallotte. The South Carolina communities of Murrells Inlet, Little River, and McClellanville also contribute substantially to the regional quotient of snapper grouper overall. In Florida, the communities include Key West, Miami, Mayport, Hialeah, Marathon, Key Largo, St Augustine, and Fort Lauderdale included in the top twenty-five communities. No Georgia communities are included in the top 20, but communities such as Savannah and Townsend have vessels that depend on snapper grouper species.

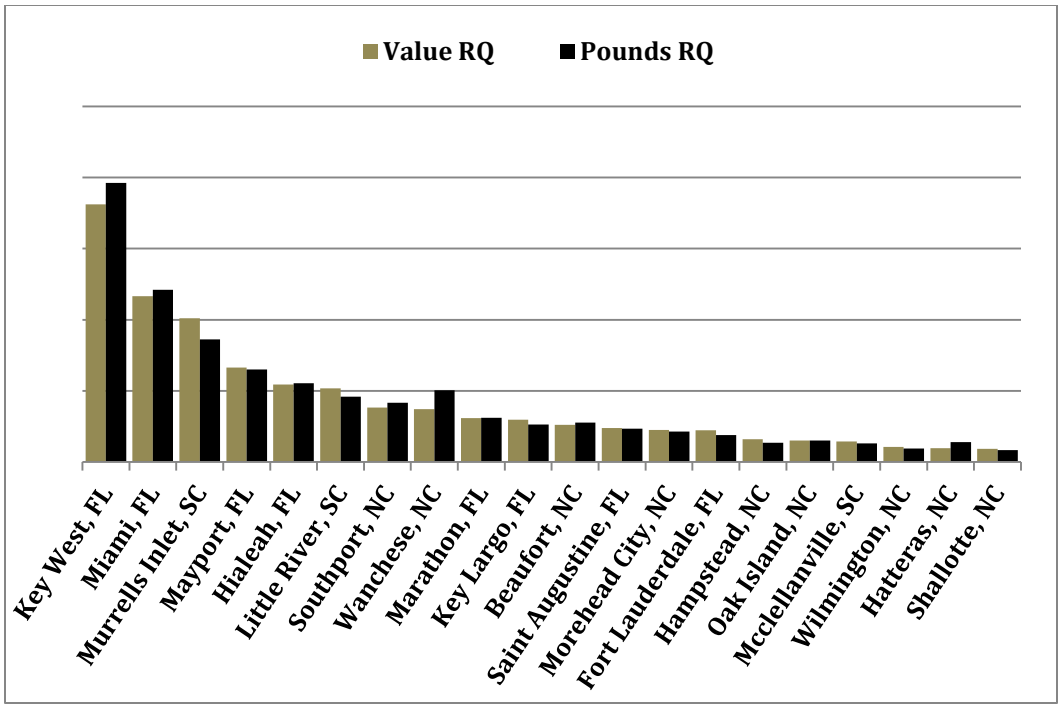


Figure 3.3.3.5. South Atlantic fishing communities ranked by total 2012 snapper grouper value RQ. Source: SERO Community ALS 2011

Commercial and Recreational Engagement and Reliance

While we can characterize the fleet landings with regard to those communities that have high regional quotients for landings and value, it is more difficult to characterize the fleet and its labor force regarding demographics and places of residence for captains and crew of vessels. There is little to no information on captains and crew, including demographic makeup of crew, so we are left with descriptions regarding the engagement and reliance of fishing communities and their social vulnerability. To further delineate which communities are more dependent upon fishing, another measure has been developed which uses the top communities identified in the RQ graphics, and applies indices of fishing engagement and reliance.

To better understand how South Atlantic fishing communities are engaged and reliant on fishing overall, several indices composed of existing permit and landings data were created to provide a more empirical measure of fishing dependence (Colburn and Jepson 2013; Jacob et al. 2012; Jepson and Colburn 2013). Fishing engagement uses the absolute numbers of permits, landings and value, while fishing reliance includes many of the same variables as engagement, but divides by population to give an indication of the per capita impact of this activity.

Using a principal component and single solution factor analysis each community receives a factor score for each index to compare to other communities. Factor scores are represented by colored bars and are standardized, therefore the mean is zero. Two thresholds of 1 and ½ standard deviation above the mean are plotted onto the graphs to help determine thresholds for significance. Because the factor scores are standardized, a score above 1 is also above one standard deviation.

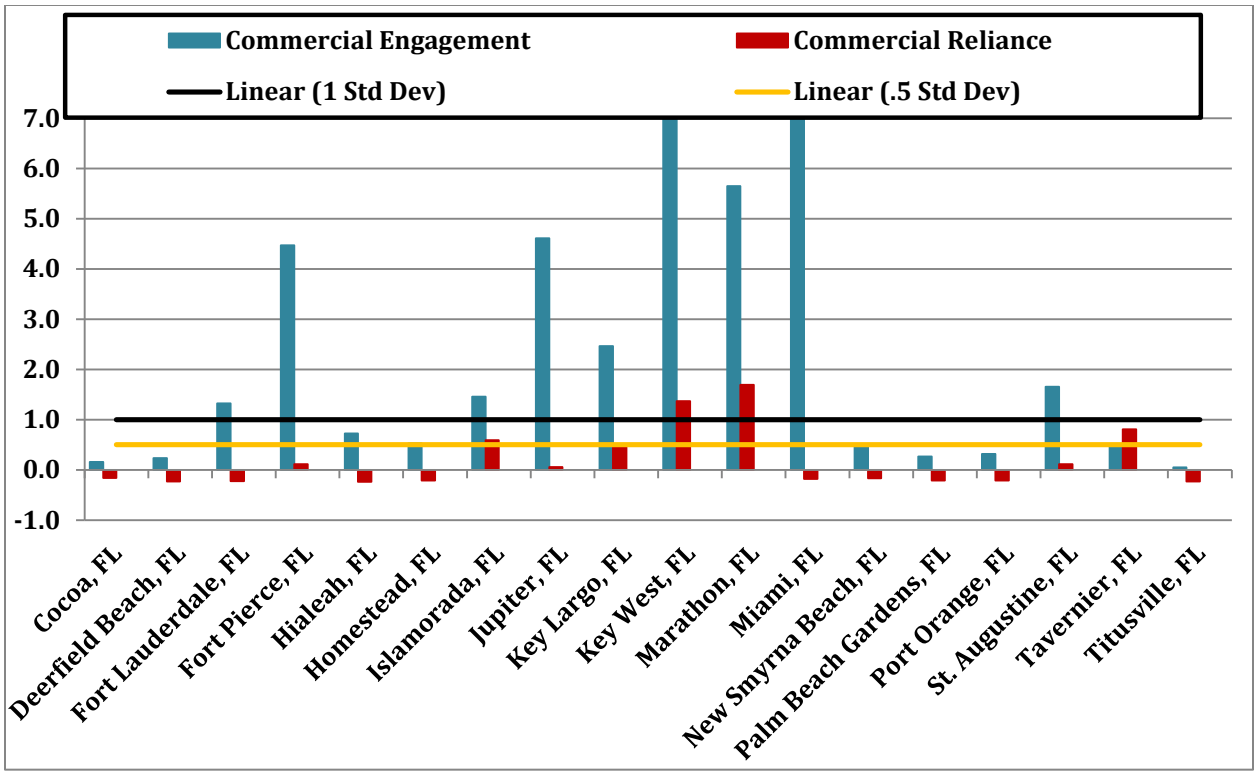


Figure 3.3.3.6. Commercial fishing engagement and reliance indices for top Florida snapper grouper communities in the South Atlantic region.
Source: SERO Social Indicator Database

The Florida communities included in **Figures 3.3.3.6** have varying combinations of reliance and engagement on commercial fishing. The communities of Key West and Marathon, Florida are considered likely dependent upon commercial fishing as they exceed both thresholds for the fishing reliance and engagement measures. Other communities might be considered commercially engaged as they exceed the highest threshold for engagement but not reliance. Those communities are: Key Largo, Miami, Ft. Pierce, Ft. Lauderdale, Islamorada and St. Augustine. Finally, communities like Islamorada, Key Largo and Tavernier might be considered reliant as they exceed the lower threshold for reliance and engagement.

As for communities outside of Florida in **Figure 3.3.3.7**, they too exhibit varying degrees of commercial engagement and reliance. The communities of Wanchese and Beaufort, North Carolina both exceed both thresholds for engagement and reliance and would be considered dependent upon commercial fishing. While the communities of Atlantic Beach and Morehead City in North Carolina may also be dependent as they exceed at least one of the thresholds for both reliance or engagement. Others seem clearly engaged or reliant as they far exceed the highest threshold for either reliance or engagement but may not be entirely dependent.

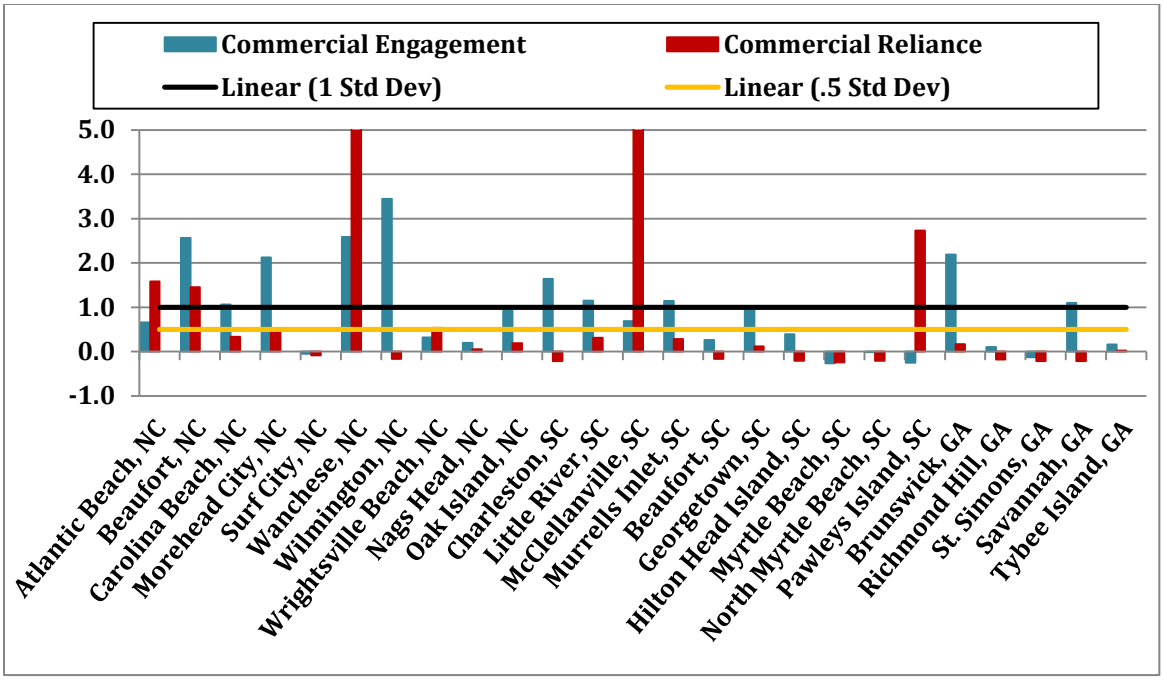


Figure 3.3.3.7. Commercial fishing engagement and reliance indices for top snapper grouper communities in the North Carolina, South Carolina and Georgia South Atlantic region.
Source: SERO Social Indicator Database

Recreational fishing is also important to many South Atlantic fishing communities. For communities outside of Florida in **Figure 3.3.3.8** several communities depend upon recreational fishing as an important part of their economy. The communities of Manteo, Atlantic Beach and Wanchese, Nags Head and Wrightsville Beach, North Carolina and Murrells Inlet, South Carolina all exceed both thresholds for both engagement and reliance. Other communities like Morehead City, Carolina Beach, Southport, Little River and Pawley's Island exceed both thresholds for at least one of the indices, which means they may be dependent upon recreational fishing, while others exceed one of the thresholds for at least one of the indices.

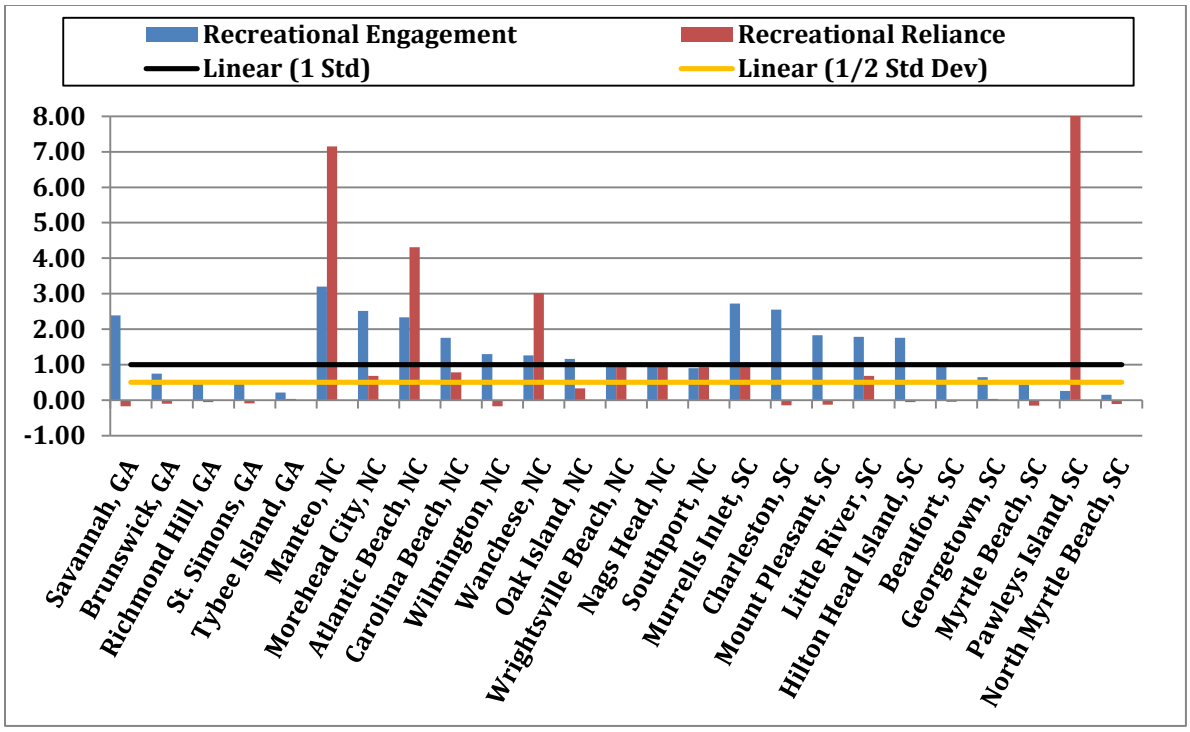


Figure 3.3.3.8. Top recreational fishing engagement and reliance indices for communities in the North Carolina, South Carolina and Georgia South Atlantic region.
Source: SERO Social Indicator Database

The Florida communities that exhibit an economy that is dependent upon recreational fishing are shown in **Figure 3.3.3.9**, with Key West, Marathon, Islamorada, Ponce Inlet, Big Pine Key and Cudjoe Key all exceeding both thresholds for both engagement and reliance. St. Augustine does exceed both thresholds for engagement and the lower threshold for reliance, so it may be exhibiting some dependence upon recreational fishing. The other communities all show some engagement in recreational fishing but little reliance. This does not mean that recreational fishing may not be important in those communities, only that its importance to the local economy is different and may not play as big a role as it might if it were more engaged and reliant.

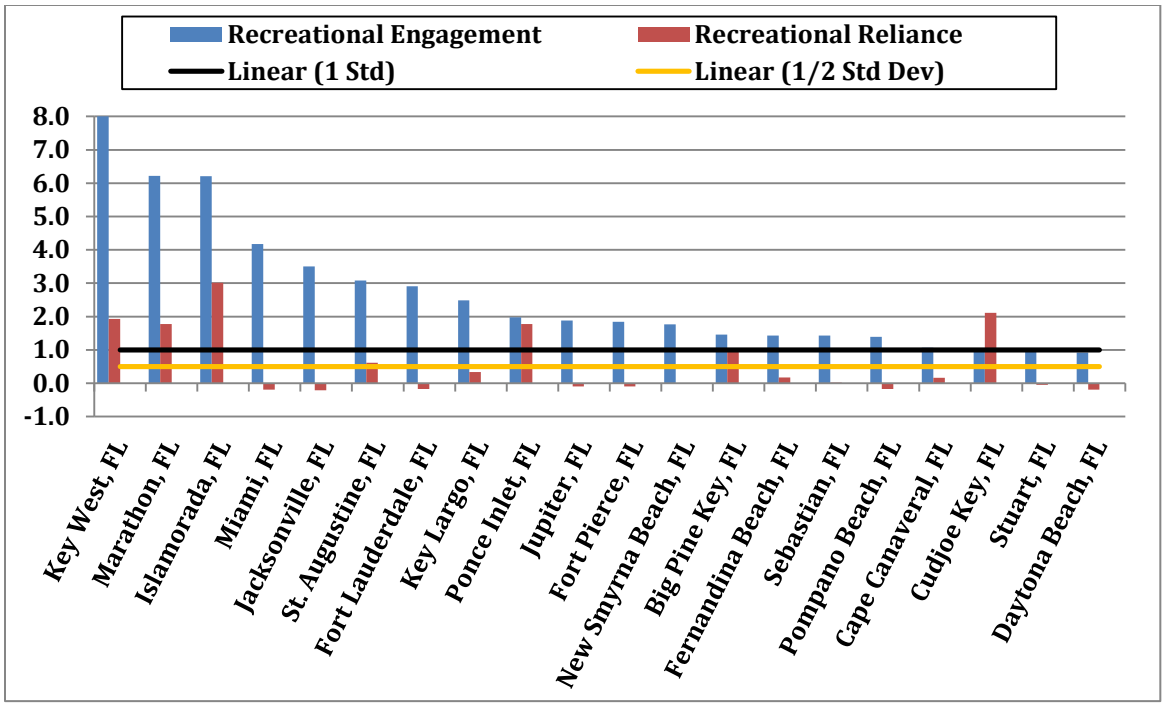


Figure 3.3.3.9. Top recreational fishing engagement and reliance indices for communities in the Florida South Atlantic region.
Source: SERO Social Indicator Database

3.3.4 Environmental Justice

In order to assess whether a community may be experiencing environmental justice (EJ) issues, a suite of indices created to examine the social vulnerability of coastal communities (Colburn and Jepson 2012; Jacob et al. 2012) is presented in **Figures 3.3.4.1** and **3.3.4.2.** The three indices are poverty, population composition, and personal disruptions. The variables included in each of these indices have been identified through the literature as being important components that contribute to a community's vulnerability. Indicators such as increased poverty rates for different groups, more single female-headed households and children under the age of 5, disruptions such as higher separation rates, higher crime rates, and unemployment all are signs of vulnerable populations. These indicators are closely aligned to previously used measures of EJ, which used thresholds for the number of minorities and those in poverty, but are more comprehensive in their assessment. Again, for those communities that exceed the thresholds it would be expected that they would exhibit vulnerabilities to sudden changes or social disruption that might accrue from regulatory change. It should be noted that some communities may not appear in these figures as there are no census data available to create the indices.

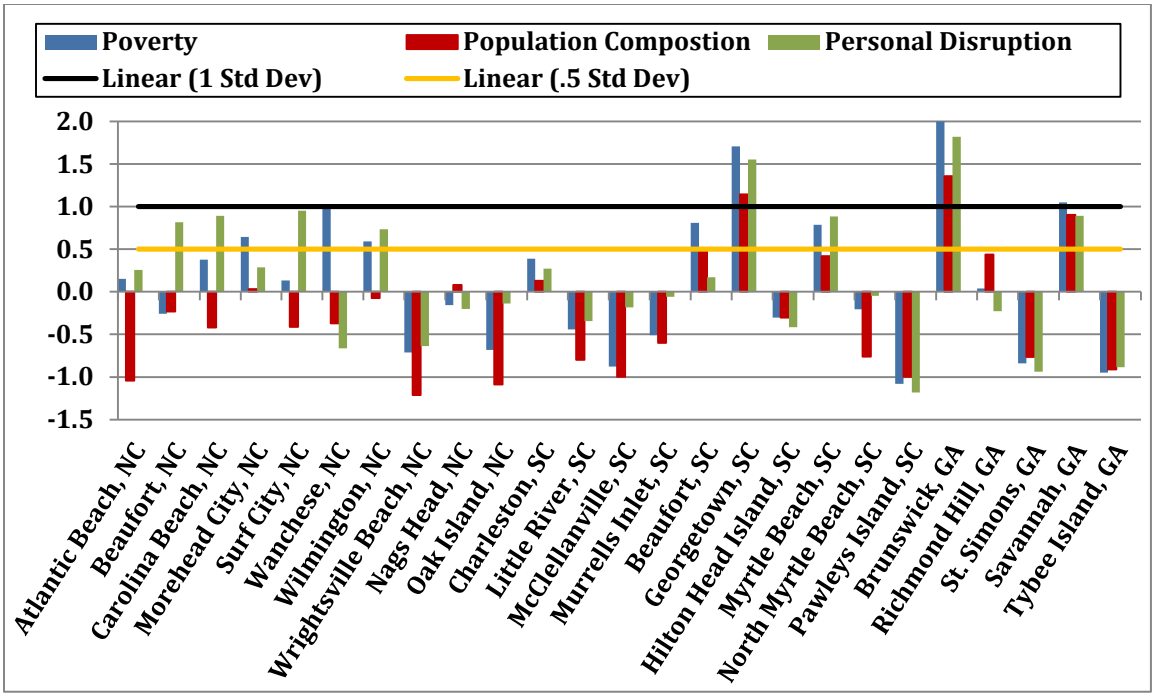


Figure 3.3.4.1. Social Vulnerability indices for fishing communities of the South Atlantic in North Carolina, South Carolina and Georgia.
Source: SERO Social Indicator Database

For those communities outside of Florida shown in Figure **3.3.4.1**, the communities of Georgetown, South Carolina and Brunswick, Georgia both exhibit high social vulnerabilities as they exceed both thresholds for all three indices. Savannah, Georgia comes close to exceeding both thresholds and would also be considered to have high social vulnerabilities. The communities of Beaufort and Myrtle Beach, South Carolina also exhibit some social vulnerability but would be considered more moderate in those vulnerabilities. Other communities demonstrate some vulnerabilities but are likely not as vulnerable and would be considered low on the scale.

Florida communities that exhibit high social vulnerabilities, like Miami and Homestead, shown in **Figure 3.3.4.2** also exceed both thresholds for all indices. The communities of Ft. Pierce and Hialeah would also be considered to have high social vulnerabilities as they exceed both thresholds for at least two indices. The communities of Ft. Lauderdale, Cocoa Beach and Deerfield Beach would all be considered to have moderate social vulnerabilities as they exceed at least one threshold for all three indices.

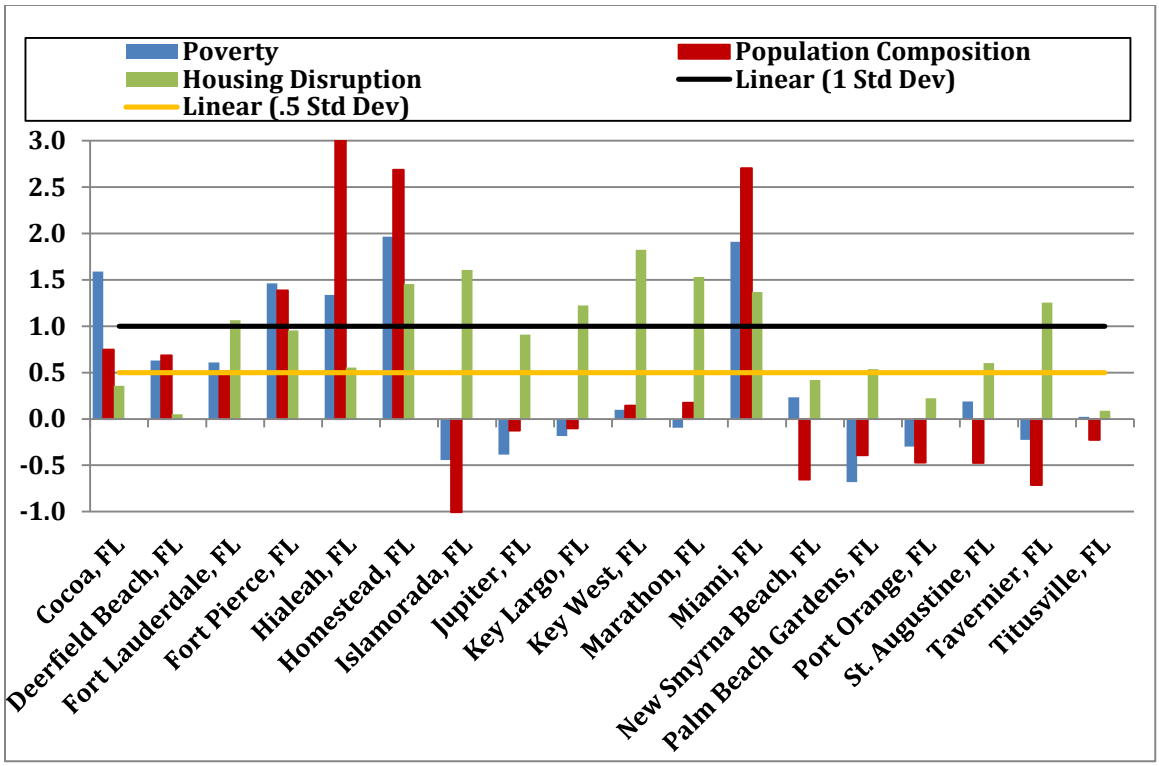


Figure 3.3.4.2 Social Vulnerability indices for fishing communities of the Florida South Atlantic.
Source: SERO Social Indicator Database

These indicators of vulnerability have been developed using secondary data at the community level. Because these types of data are not collected at the individual level by NMFS or other agencies, it is difficult to understand the social vulnerabilities that might exist on either a household or individual level. These data would need to be collected through the permitting process or a complete census of participants. Therefore, it is hard to recognize or attribute impacts that will directly affect individuals who are fishermen or work in a related business because we do not know what those specific vulnerabilities may be. Therefore, our measure of vulnerability is a broader measure at the community level and not specific to fishermen or the related businesses and their employees. Furthermore, there has been little research and relatively no data collected on subsistence fishing patterns of fishermen in the Southeast. So, impacts on subsistence fishing within the South Atlantic snapper grouper fishery cannot be assessed, other than to say we know very little and it is unlikely because it is an offshore fishery.

3.4 Administrative Environment

3.4.1 The Fishery Management Process and Applicable Laws

3.4.1.1 Federal Fishery Management

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

Responsibility for federal fishery management decision-making is shared between the U.S. Secretary of Commerce (Secretary) and eight regional fishery management councils that represent the expertise and interests of constituent states. Regional councils are responsible for preparing, monitoring, and revising management plans for fisheries needing management within their jurisdiction. The Secretary is responsible for collecting and providing the data necessary for the councils to prepare fishery management plans and for promulgating regulations to implement proposed plans and amendments after ensuring that management measures are consistent with the Magnuson-Stevens Act and with other applicable laws. In most cases, the Secretary has delegated this authority to NMFS.

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

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

3.4.1.2 State Fishery Management

The state governments of North Carolina, South Carolina, Georgia, and Florida have the authority to manage fisheries that occur in waters extending 3 nm from their respective shorelines. North Carolina's marine fisheries are managed by the Marine Fisheries Division of the North Carolina Department of Environment and Natural Resources. The Marine Resources Division of the South Carolina Department of Natural Resources regulates South Carolina's marine fisheries. Georgia's marine fisheries are managed by the Coastal Resources Division of the Department of Natural Resources. The Marine Fisheries Division of the Florida Fish and Wildlife Conservation Commission is responsible for managing Florida's marine fisheries. Each state fishery management agency has a designated seat on the Council. The purpose of state representation at the Council level is to ensure state participation in federal fishery management decision-making and to promote the development of compatible regulations in state and federal waters.

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

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

3.4.1.3 Enforcement

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

Neither NOAA/OLE nor the USCG can provide a continuous law enforcement presence in all areas due to the limited resources of NOAA/OLE and the priority tasking of the USCG. To supplement at-sea and dockside inspections of fishing vessels, NOAA entered into Cooperative Enforcement Agreements with all but one of the states in the Southeast Region (North Carolina), which granted authority to state officers to enforce the laws for which NOAA/OLE has jurisdiction. In recent years, the level of involvement by the states has increased through Joint Enforcement Agreements, whereby states conduct patrols that focus on federal priorities and, in some circumstances, prosecute resultant violators through the state when a state violation has occurred.

Administrative monetary penalties and permit sanctions are issued pursuant to the guidance found in the Policy for the Assessment of Civil Administrative Penalties and Permit Sanctions for the NOAA Office of the General Counsel – Enforcement Section. This Policy is published at the Enforcement Section's website: http://www.gc.noaa.gov/enforce-office3.html .

Chapter 4. Environmental Consequences and Comparison of Alternatives

4.1 Action 1. Modify the Special Management Zone (SMZ) Procedure

Alternatives
(preferred alternatives in bold)

1. No action. The current SMZ procedure addresses use of certain gear on areas including artificial reefs, fish attraction devices, and other modified areas of habitat used for the purpose of fishing. Possession limits can also be regulated in SMZs.

2. Preferred. Modify the SMZ procedure to include protection of any area important for spawning by designating Spawning SMZs.

4.1.1 Biological and Ecological Effects

Current SMZs do not protect important snapper grouper species spawning areas **Alternative 1 (No Action)** in part because they target artificial reefs that are generally located on non-hard bottom. **Preferred Alternative 2** would modify the SMZ procedure to include protection of natural bottom important for spawning. **Action 1** has no direct biological effects as it is administrative. **Actions 3-6** consider establishing Spawning SMZs under the modified SMZ procedure and those actions would have positive but unmeasurable biological effects.

Habitat protection is associated with the proposed Spawning SMZs in **Actions 3-6**. **Action 1** modifies the SMZ procedure and is administrative in nature; therefore, there is no direct habitat protection. **Preferred Alternative 2** would establish a procedure that can be used to establish Spawning SMZs. As persistent spawning locations for species in the snapper grouper complex are identified, they will also serve as Essential Fish Habitat-Habitat Area of Particular Concern (EFH-HAPC). As an EFH-HAPC, the National Marine Fisheries Service (NMFS) would in the essential fish habitat (EFH) consultation and permit review process, emphasize and focus conservation recommendations on eliminating or reducing the impact of non-fishing activities on these unique and limited habitats.

This action is administrative in nature and would not significantly alter the way the snapper grouper fishery is prosecuted in the South Atlantic Region. Therefore, no impacts on Endangered Species Act (ESA)-listed marine species are expected as a result of modifying the SMZ procedure.

4.1.2 Economic Effects

Alternative 1 (No Action) would not make any changes to current SMZs. Under this action, important snapper grouper species spawning areas would remain unprotected and the economic benefits associated with their protection would be foregone. **Preferred Alternative 2** would allow natural bottom habitat areas to be designated as SMZs. Such SMZs would provide increased targeted spawning area protection. Economic benefits would result from **Preferred Alternative 2** if new SMZs successfully increase future stock size and sustainability. This action is administrative in nature because it changes the policy for designating SMZs, but does not actually create new SMZs or modify existing ones. Therefore, any economic effects resulting from this action would be indirect and would depend on the specific SMZs that are selected in subsequent actions. If SMZs result in a larger stock in the future, commercial and recreational fishermen would likely experience long-term economic benefits from increased harvests and higher catch rates. If SMZs also result in larger or higher quality fish, commercial fishermen could experience an increase in ex-vessel prices and recreational fishermen could experience an increase in consumer surplus.

In the short-run, SMZs may result in negative direct and indirect economic effects to commercial and recreational fishermen. If fishermen's preferred fishing areas are closed, they may not be able to compensate for the lost harvest by fishing elsewhere or by targeting other species that potentially are less valuable. Trip costs could be increased by longer travel times to fishing grounds and increased congestion in open areas. Additionally, fishermen may incur costs associated with searching for new fishing locations and/or modifying their fishing practices.

4.1.3 Social Effects

The social effects of restricting access to fishing are discussed in detail in Amendment 14 to the Snapper Grouper FMP (SAFMC 2007) and are incorporated as a reference. In general, the benefits to fishermen and coastal communities would be associated with the biological benefits that result from prohibiting or restricting harvest in the designated area. If there is improvement in a stock and over time, more fish available, this could benefit fishermen due to the expected spillover effect of closed areas. Additionally, improved stock health that fishermen observe first hand would also help improve buy-in for closed areas.

However, in most cases there would be expected negative effects from closed areas on fishermen and fishing communities if access to fishing grounds is prohibited or restricted. For commercial fishermen and for-hire businesses that use the fishing grounds, this could negatively affect business profits. For private recreational anglers, restricted access could negatively affect fishing opportunities and trip satisfaction. Additionally, SMZs are specifically designed for spawning habitat, and this could be detrimental for fishermen who target a particular species during spawning aggregations.

Designating an area as a Spawning SMZ and prohibiting fishing for snapper grouper species would require compliance (via buy-in from the public) and enforcement. If these are lacking, the SMZ could not generate the expected biological benefits, which would negatively affect

fishermen and communities. **Section 3.3.3** describes the communities and fishermen who may be affected by establishment of SMZs.

The social effects of modifying the SMZ procedure would primarily be associated with the changes in access to the fishery resource due to SMZ designation of fishing grounds. The original intent of SMZs was to manage fishing in areas with artificial habitat and overall there have been positive social effects associated with biological benefits of existing SMZs. However, if expanding the procedure to allow designation of Spawning SMZs to include natural spawning habitat and generate biological benefits from an improved stock, there would likely be benefits to fishermen due to the spillover effect that may occur from the Spawning SMZs.

Because **Alternative 1 (No Action)** maintains the current procedure for Spawning SMZ designation, it would likely result in no or minimal social effects. **Preferred Alternative 2** could result in benefits for fishermen if areas designated as Spawning SMZs to protect natural bottom help improve a stock, but could restrict access to the fishery resource.

4.1.4 Administrative Effects

Preferred Alternative 2 would modify the SMZ procedure to include protection of natural bottom important for spawning by designating Spawning SMZs, while **Alternative 1 (No Action)** would not. **Preferred Alternative 2** could have indirect adverse effects to the administrative environment. There are logistical and economical costs of monitoring spatial and temporal fishing closures by law enforcement personnel. In addition, the South Atlantic Fishery Management Council (Council) and NMFS would need to notify the public of the regulation changes and continue to respond to public inquiries concerning the Spawning SMZs. However, these are indirect effects; the direct effects to the administrative environment are associated with the actual implementation of the Spawning SMZs (**Actions 3** through **6**). The Council's ability to protect more areas necessary for spawning, and their ability to establish/modify those areas more quickly, would likely have positive indirect effects on the environment as well as the stocks.

4.2 Action 2. Modify the framework procedure to allow modifications of and/or additional Spawning Special Management Zones (Spawning SMZs) to be added and/or modified through framework action

4.2.1 Biological and Ecological Effects

Alternatives
(preferred alternatives in bold)

1. No action. The existing framework for the Snapper Grouper FMP does not include modifying or establishing new Spawning SMZs.
2. **Preferred. Modify the Snapper Grouper FMP framework to include modifying or establishing new Spawning SMZs.**
3. Modify the framework for the Snapper Grouper FMP to include modifying existing Spawning SMZs.

The current Framework Procedure does not address Spawning SMZs, given that they are new and proposed in Amendment 36 (**Alternative 1 ((No Action)**). **Preferred Alternative 2** would provide the ability to modify or establish new Spawning SMZs through the framework procedure and would allow the Council to respond to new information more quickly. **Action 2** has no direct biological effects as it is administrative. **Actions 3-6** consider establishing Spawning SMZs that could be modified or added and those actions would have positive but unmeasurable biological effects.

Habitat protection is associated with the proposed Spawning SMZs in **Actions 3-6**. **Action 2** modifies the framework procedure to allow modifications of and/or additional Spawning SMZs and is administrative in nature; therefore, there is no direct habitat protection. **Preferred Alternative 2** would establish a procedure that can be used to modify or establish new Spawning SMZs. As persistent spawning locations for species in the snapper grouper complex are identified, they will also serve as Essential Fish Habitat-Habitat Area of Particular Concern (EFH-HAPC). As an EFH-HAPC, NMFS would emphasize and focus conservation recommendations on eliminating or reducing the impact of non-fishing activities on these unique and limited habitats in the EFH consultation and permit review process.

This action is administrative in nature and would not significantly alter the way in which the snapper grouper fishery is prosecuted in the South Atlantic Region. Therefore, no impacts on ESA-listed marine species are expected as a result of modifying the framework procedure to allow for the modification and establishment of new Spawning SMZs.

4.2.2 Economic Effects

Under **Alternative 1 (No Action)**, the Council would not be able to modify or establish new Spawning SMZs through the current Framework Procedure and the economic benefits associated with more timely and responsive changes to Spawning SMZs would be foregone. **Preferred Alternative 2** would provide the most flexibility by allowing the Council to modify or create Spawning SMZs through the Framework Procedure. This alternative would enable the Council to respond more rapidly to scientific information. **Alternative 3** would also provide increased flexibility to the Council relative to **Alternative 1 (No Action)**, but to a lesser extent than **Preferred Alternative 2**, because it would only allow modification of existing Spawning SMZs through the framework procedure.

Because this action is administrative, associated economic effects would be indirect and would depend on the details and timing of the specific framework actions that occur as a result. If the increased flexibility afforded to the Council by **Preferred Alternative 2** or **Alternative 3** leads to enhanced protection of spawning species, it would be expected to result in greater long-term economic benefits than **Alternative 1 (No Action)**. In the short-run, if spatial management becomes more volatile as a result of **Preferred Alternative 2** or **Alternative 3**, it could lead to higher short-term fishing costs, because fishing businesses and anglers would have to modify their fishing practices more frequently. Conversely, these alternatives could reduce short-term fishing costs if the Council is able to modify Spawning SMZs in response to economic concerns sooner than under **Alternative 1 (No Action)**. Because **Preferred Alternative 2** provides the Council more flexibility than **Alternative 3**, it would be expected to lead to more effective Spawning SMZ management and greater long-term economic benefits than **Alternative 3**. Short-term fishing costs would be equal to or higher under **Preferred Alternative 2** than **Alternative 3**, because **Preferred Alternative 2** would allow for greater reductions in available fishing grounds to occur through the framework procedure.

4.2.3 Social Effects

Similar to the potential effects of Action 1 on fishermen and fishing communities, the social effects of modifying the framework procedure would be associated with any biological benefits from subsequent SMZ designation or with changes in access to the resource. Additionally, modifying the framework procedure to allow SMZ changes in regulatory amendments (**Preferred Alternative 2** and **Alternative 3**) could result in regulatory changes to be on a faster track, which could limit opportunities for public input. Maintaining changes or designations to be made in a plan amendment (**Alternative 1 (No Action)**) would likely be more beneficial to fishermen by allowing more time for public involvement and opportunity to provide public comment to the Council.

4.2.4 Administrative Effects

Preferred Alternative 2 would modify the framework for the Snapper Grouper FMP to include modifying or establishing new Spawning SMZs, while **Alternative 1 (No Action)** would not. **Preferred Alternative 2** could have indirect adverse effects to the administrative

environment. There are logistical and economical costs of monitoring spatial and temporal fishing closures by law enforcement personnel. In addition, the Council and NMFS would need to notify the public of the regulation changes and continue to respond to public inquiries concerning the Spawning SMZs. However, these are indirect effects; the direct effects to the administrative environment are associated with the actual implementation of the Spawning SMZs (**Actions 3** through **6**). The Council's ability to protect more areas necessary for spawning, and their ability to establish/modify those areas more quickly, will likely have positive indirect effects on the environment as well as the stocks.

4.3 Action 3. Establish Spawning Special Management Zones (Spawning SMZ) off North Carolina

4.3.1 Biological and Ecological Effects

Alternatives
(preferred alternatives in bold)

1. No action. There are no Spawning SMZs off North Carolina.
2. Establish a Spawning SMZ in the MALCHASE WRECK area that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.
   - 2a. Malchase Wreck (2.47 mi^2)
   - 2b. Malchase Wreck (1 mi^2)
3. Establish a Spawning SMZ in the 780 BOTTOM area that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.
   - 3a. 780 Bottom (4 mi^2)
   - 3b. 780 Bottom (3 mi^2)
4. Establish a Spawning SMZ in the NC Deep Wreck (3 mi^2) that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.
5. **Preferred. Establish a Spawning SMZ in the South Cape Lookout (5 mi^2) that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.**

There are no Spawning SMZs given that they are new and proposed in Amendment 36 (**Alternative 1 ((No Action)**). **Alternative 2** would establish a 2.47 square mile (**Sub-Alternative 2a**) or a 1 square mile (**Sub-Alternative 2b**) Spawning SMZ in the Malchase Wreck area. **Alternative 3** would establish a 4 square mile (**Sub-Alternative 3a**) or a 3 square mile (**Sub-Alternative 3b**) Spawning SMZ in the 780 Bottom area. The larger the area protected, the greater the biological benefits from protecting more spawning fish and area. **Alternatives 4** and **5** would protect spawning fish and habitat in the NC Deep Reef and South Cape Lookout areas.

To the extent that spawning fish are protected from fishing there would be positive biological benefits. The available catch by location data for the commercial and headboat sectors were used to provide a quantitative estimate of potential impacts. A similar analysis was previously provided to the Snapper Grouper Advisory Panel and they indicated concern that due to data limitations, the potential impacts are not accurate. During the Public Hearing II hearings, the public was asked to provide input on how the areas under consideration would impact their catches and whether the impacts are over or under-estimated.

Little information exists off the Southeastern United States regarding the spawning locations of snapper grouper species. There is a great diversity in the spawning ecology among reef fishes. The first major division identified was between those that are resident (i.e. spawn frequently all year round within their home range) and those that are transient spawners (those that migrate relatively large distances to spawn in larger/denser aggregations during only a portion of the year (Domier and Colin 1997). More recently, this distinction was illustrated by Claydon et al. (2014) as a suite of non-linear continuums on various variables (e.g. distance migrated to spawn,

number of individuals aggregated to spawn, and duration of spawning by season and/or lunar phase). Spawning aggregation sites are commonly used by multiple species (Fine 1990, Fine 1992, Sala et al. 2001, Kobara and Heyman 2008, Kobara and Heyman 2010, Heyman & Kobara 2012); thus, identification and protection of a site used by one species may directly benefit other species.

Timing of spawning

A manuscript is in prep, which: 1) synthesizes what is known about timing of spawning for managed snapper grouper stocks relative to month and lunar phase, 2) quantitatively tests what variables are predictive of spawning activity, 3) verifies predicted spawning locations based on fisher local ecological knowledge and field validation, and 4) suggests needed data and methods for prediction and verification of the locations of spawning aggregations. The results may help the Council identify stock-specific time periods when spawning activity is highest, delineate the appropriate locations and spatiotemporal extent for no-take areas to protect spawning fish, reduce bycatch of stocks undergoing overfishing, and accelerate the rebuilding of overfished stocks.

Seasonal and lunar cues to spawning aggregation formation for key snapper grouper species were compiled from the Marine Resources Research Institute at the South Carolina Department of Natural Resource's Marine Resources Monitoring Assessment and Prediction (MARMAP) samples and supplemented with information from peer-reviewed literature, especially stock assessment reports generated through the Southeast Data, Assessment, and Review (SEDAR) process. Timing of peak spawning was noted as well as duration of spawning season (**Table 4.3.1.1**). A period of peak spawning could be identified for most stocks; often between April-August. A period of peak spawning was not identified for speckled hind or warsaw grouper, nor did MARMAP or the Southeast Fisheries-Independent Survey (SEFIS) sampling observe spawning condition females for these stocks. MARMAP/SEFIS fishery-independent sampling is most intensive from May-August, which overlaps multiple peak spawning months for gray triggerfish, white grunt, scamp, snowy grouper, red snapper, and vermilion snapper.

Table 4.3.1.1. Timing of spawning (gray shading) and peak spawning (black shading) for exploited Atlantic Ocean snapper-grouper stocks off the southeastern United States.

Stock	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	References
Black sea bass													Sedberry et al. (2006); SEDAR-25 (2011)
Blueline tilefish													Harris et al. (2004)
Cubera Snapper													pers comm. SA fisherman to WDH
Gag													McGovern et al. (1998); Sedberry et al. (2006)
Gray triggerfish													Kelly (2014)
Greater amberjack													Harris et al. (2007)
Red grouper													Burgos et al. (2007)
Red porgy													Daniel (2003); Sedberry et al. (2006)
Red snapper													White and Palmer (2004); Seberry et al. (2006)
Scamp (NC)													Matheson et al. (1986); macroscopic
Scamp (FL)													Gilmore & Jones (1992); based on courtship behavior
Scamp (29.95-32.95 °N)													Harris et al. (2002), Sedberry et al. (2006)
Snowy grouper													Wyanski et al. (2000), SEDAR-36 (2013)
Speckled hind													Ziskin et al. (2011)
Tilefish													Erickson et al. (1985); Sedberry et al. (2006)
Vermilion snapper													Cuellar et al. (1996); Sedberry et al. (2006)
White grunt													Padgett (1997); Sedberry et al. (2006)
Warsaw Grouper													Sedberry et al. (2006)

Source: Farmer NA, Heyman WD, Karnauskas M, Kobara S, Smart T, Ballenger J, Reichert M, Wyanski D, Tishler MS, Lindeman KC, Lowerre-Barbieri S, Switzer T, Solomon JJ, Sedberry GR (*in prep*) Prediction and Verification of Reef Fish Spawning Sites in the Atlantic Ocean off the southeastern United States.

Location of Spawning Fish

An evaluation of available information regarding spawning condition fish and high-resolution bathymetry available in and around SMZ sites was conducted using data from the manuscript that will be in Appendix P. Locations of spawning condition fish were identified from collections by the MARMAP program, NMFS, Southeast Fisheries Science Center's (SEFSC) SEFIS program, and the Florida Fish and Wildlife Conservation Commission's (FWC) fishery-independent spawning location sampling program for red snapper.

Since the 1970s, MARMAP has conducted fisheries-independent research within the region between Cape Lookout, North Carolina, and Ft. Pierce, Florida. The overall mission of the program is to determine distribution, relative abundance, and critical habitat of economically and ecologically important fishes of the southeastern U.S., and to relate these features to environmental factors and exploitation activities. MARMAP gear (e.g., chevron trap, bottom longlines) and methodologies have remained consistent over time, facilitating long-term comparisons. In 2010, the NMFS SEFSC Laboratory in Beaufort, North Carolina began the SEFIS fishery independent survey using video and traps, providing expanded geographic coverage to the MARMAP program's southern range.

Since 1990, MARMAP/SEFIS have collected fish for life history and histological sampling consistent with priorities set forth by the SEDAR process. Data collection efforts are concentrated between mid-April and September (Figure 1). The FWC sampling program for red snapper (*Lutjanus campechanus*) is described in detail by Lowerre-Barbieri et al. (2015). Sample sizes for MARMAP/SEFIS/FWC fishery-independent histological sampling, with number of females within 48 hours of spawning, are presented in **Table 4.3.1.2**.

A complete bathymetric layer for the Atlantic Ocean off the southeastern United States was developed within a geographic information system (GIS) from the National Oceanographic and Atmospheric Administration's (NOAA) Coastal Relief Model (CRM: www.ngdc.noaa.gov/mgg/coastal/startcrm.htm). The CRM provides a comprehensive 3 arc-second (approximately 90 m) resolution view of the U.S. coastal zone, integrating offshore bathymetry with land topography. The CRM was assimilated from numerous bathymetric sources including U.S. National Ocean Service Hydrographic Database, the U.S. Geological Survey (USGS), the Monterey Bay Aquarium Research Institute, the U.S. Army Corps of Engineers, the International Bathymetric Chart of the Caribbean Sea, the Gulf of Mexico project, and various academic institutions. Topographic data are from the USGS and the Shuttle Radar Topography Mission.

Table 4.3.1.2. Sample sizes for MARMAP/SEFIS/FWC fishery-independent histological sampling, with number of females within 48 hours of spawning ('Females'), number of females and males ('All Spawners') within 48 hours of spawning.

Common name	*Scientific name*	*Samples*	*Females*	*All Spawners*
black sea bass	*Centropristis striata*	2324	338	1185
blueline tilefish	*Caulolatilus microps*	18	8	14
gag	*Mycteroperca microlepis*	154	1	4
gray triggerfish	*Balistes capriscus*	2114	122	956
greater amberjack	*Seriola dumerili*	20	3	5
red grouper	*Epinephelus morio*	308	6	19
red porgy	*Pagrus pagrus*	3098	17	965
red snapper	*Lutjanus campechanus*	421	159	309
scamp	*Mycteroperca phenax*	743	105	150
snowy grouper	*Epinephelus niveatus*	156	48	53
speckled hind	*Epinephelus drummondhayi*	93	0	0
tilefish	*Lopholatilus chamaeleonticeps*	171	12	32
vermilion snapper	*Rhomboplites aurorubens*	1697	1124	1288
warsaw grouper	*Epinephelus nigritus*	5	0	0
white grunt	*Haemulon plumierii*	861	97	231

Additional high-resolution (3-50 m) multi-beam (MB) bathymetric layers were assimilated from NOAA, SEFIS, USGS, the U.S. Navy, and the National Centers for Coastal Ocean Science (NCCOS: http://ccma.nos.noaa.gov/ecosystems/sanctuaries/south_atlantic/data/, A. David, G. Sedberry, S. Harter, NOAA, pers. comms.). The MB bathymetric layer covered relatively small and specific shelf-edge areas in and around existing and proposed Council MPAs and SMZs.

The MARMAP/SEFIS surveys were not designed to evaluate spawning seasonality or prediction/verification of spawning aggregations; however, because females with hydrated eggs were recorded by time and location, this multi-decadal data set has proven invaluable for mining. Nonetheless, the database contains very limited data on spawning for most species, particularly those that are likely to form large, conspicuous spawning aggregations. There are various reasons for this data paucity including: difficulty of sampling the deep rocky edges where many of these fish tend to occur; lack of latitude contrast in MARMAP data (most sampling is concentrated off South Carolina); and extremely limited sampling during the winter months that comprise the spawning season for most grouper stocks. Data mining also noted a distinct lack of contrast in the broad-scale bathymetric data. High-resolution bathymetry was extremely limited, especially along the shelf-edge. In addition, many of the species best-represented in the MARMAP/SEFIS/FWC histological sampling databases may engage in group or pair spawning as opposed to classic aggregation spawning.

With those caveats in mind, the MARMAP/SEFIS/FWC data do provide insight into where spawning activity in the Southeastern United States takes place relative to proposed SMZs. The proposed SMZ sites are presented below with a left panel illustrating the location of the site relative to locations where spawning condition Snapper-Grouper stocks have been observed and a right panel illustrating the available low-resolution and high-resolution bathymetry in and around the site. It is immediately apparent that spawning along the southeastern United States is widespread, but tends to cluster geographically by stock (**Figure 4.3.1.1**, left panel). Multispecies spawning locations are relatively common, and spawning is not isolated to the

shelf-edge; in fact, many spawning locations are well inside the shelf-edge, especially for black sea bass, gray triggerfish, red snapper, and vermilion snapper (**Figure 4.3.1.1**, right panel).

Several stocks appeared to use the same spawning locations across multiple years (**Figure 4.3.1.2**). For example, vermilion snapper were observed 1990-2011 at shelf-edge sites near Edisto MPA and inshore and offshore pinnacles (**Figure 4.3.1.2**). These sites ranged in size from approximately 3.2-6.7 square nautical miles (nmi^2). Overall, vermilion snapper were observed in spawning condition over multiple years at 32 shelf-edge and inshore pinnacle sites along the coast of the southeastern U.S. Sites ranged in size from 2.3-30.3 nmi^2 (mean ± SE: 9.3 ± 1.2 nmi^2). Black sea bass were observed over multiple years spawning at 38 inshore pinnacles and shelf-edge sites ranging in size from 1.7-17.8 nmi^2 (mean ± SE: 6.1 ± 0.6 nmi^2; **Figure 4.3.1.2**). Scamp were observed spawning predominantly along the shelf edge in and around Edisto MPA with some offshore pinnacle observations. Multi-year spawning locations for scamp ranged in size from 2.3-3.5 nmi^2. Multi-annual spawning locations of snowy grouper were observed at three offshore edges near the continental rise to the south of the Northern South Carolina MPA; sites ranged in size from 9.6-13.1 nmi^2. Many sites with two years of observations were observed for red snapper, but only one 5.5 nmi^2 site contained three years of observed spawning condition fish. Gray triggerfish were observed in spawning condition over multiple years at ten sites on or just inshore of the shelf-edge; sites ranged in size from 2.6-14.9 nmi^2 (mean ± SE: 7.6 ± 1.2 nmi^2). White grunt were observed in spawning condition over multiple years at six shelf-edge and inshore sites; sites ranged in size from 3.5-10.8 nmi^2 (mean ± SE: 7.3 ± 0.9 nmi^2).

The current proposed Spawning SMZ in Actions 3-6 range in size from 0.9-26.0 nmi^2. Their effectiveness at protecting spawning fish would depend on a multitude of factors, including: (1) appropriate location containing spawning fish, (2) adequate protections and enforcement within the SMZ to prevent poaching or inadvertent take of spawning fish, and (3) adequate buffering beyond the core spawning area to prevent anglers from luring spawning fish outside the SMZ or undermining its effectiveness by fishing the lines or capitalizing on pre-spawning movements beyond the SMZ boundaries. Although many of these factors are challenging to quantify given the present state of knowledge, it stands to reason that, if appropriately located, a larger SMZ would be more effective than a smaller SMZ.

Off North Carolina, the North Carolina Deep Wreck proposed Spawning SMZ (**Alternative 2**) has never been sampled by MARMAP/SEFIS (**Figure 4.3.1.3**). No high-resolution bathymetry is available in this area, and no unique bathymetric features are visible from the low-resolution Coastal Relief Model (**Figure 4.3.1.3**).

The proposed Malchace Wreck (**Alternative 2**) and 780 Bottom (**Alternative 3**) Spawning SMZs have never been sampled by MARMAP/SEFIS (**Figure 4.3.1.4**). Low-resolution bathymetry from Esri Ocean Basemap and the NOAA Coastal Relief Model both suggest a unique backwards 'L'-shaped feature within the proposed 780 Bottom Spawning SMZ (**Alternative 3**); however, the right angle turn of this feature and the lack of contrast in the high-resolution bathymetry available within the site suggested the feature may actually be an artifact of multibeam sample processing. Further investigation with the CRM developers indicated this site was from ship-track soundings of a sparse 1955 National Ocean Service (NOS) survey

(H08246; http://www.ngdc.noaa.gov/docucomp/page?url=http://surveys.ngdc.noaa.gov/mgg/NOS/hsmdb/H08001-H10000/H08246_hsmdb.xml&view=hydro/survey&header=none). This feature is not in a later, much more detailed NOS survey from 1970 (H09060; http://www.ngdc.noaa.gov/docucomp/page?url=http://surveys.ngdc.noaa.gov/mgg/NOS/hsmdb/H08001-H10000/H09060_hsmdb.xml&view=hydro/survey&header=none), confirming that it is not a real seafloor feature but rather an artifact. Thus, although there is an interesting shelf-edge in the 780 Bottom area, the bathymetry is not as unique as the CRM map indicates. The proposed Malchace Wreck SMZ (**Alternative 2**) contains the wreck of a 333 foot, 5,800 ton freighter that was torpedoed by a German U-Boat (U-160) on April 9, 1942. The wreck has been mapped at high-resolution.

The proposed South Cape Lookout SMZ (**Alternative 5**) has been sampled by MARMAP/SEFIS and gag, gray triggerfish, red grouper, red porgy, scamp, and speckled hind have been caught in very limited quantities (**Figure 4.3.1.5**, **Table 4.3.1.3**). No spawning condition fish have been observed by this limited sampling within the current proposed SMZ boundaries; however, a spawning condition vermilion snapper has been observed to the south and several spawning condition greater amberjack have been observed less than 0.5 nmi to the north (**Figure 4.3.1.5**). There is no high-resolution bathymetry currently available within this proposed SMZ, and no unique bathymetric features are visible from the low-resolution Coastal Relief Model (**Figure 4.3.1.5**).

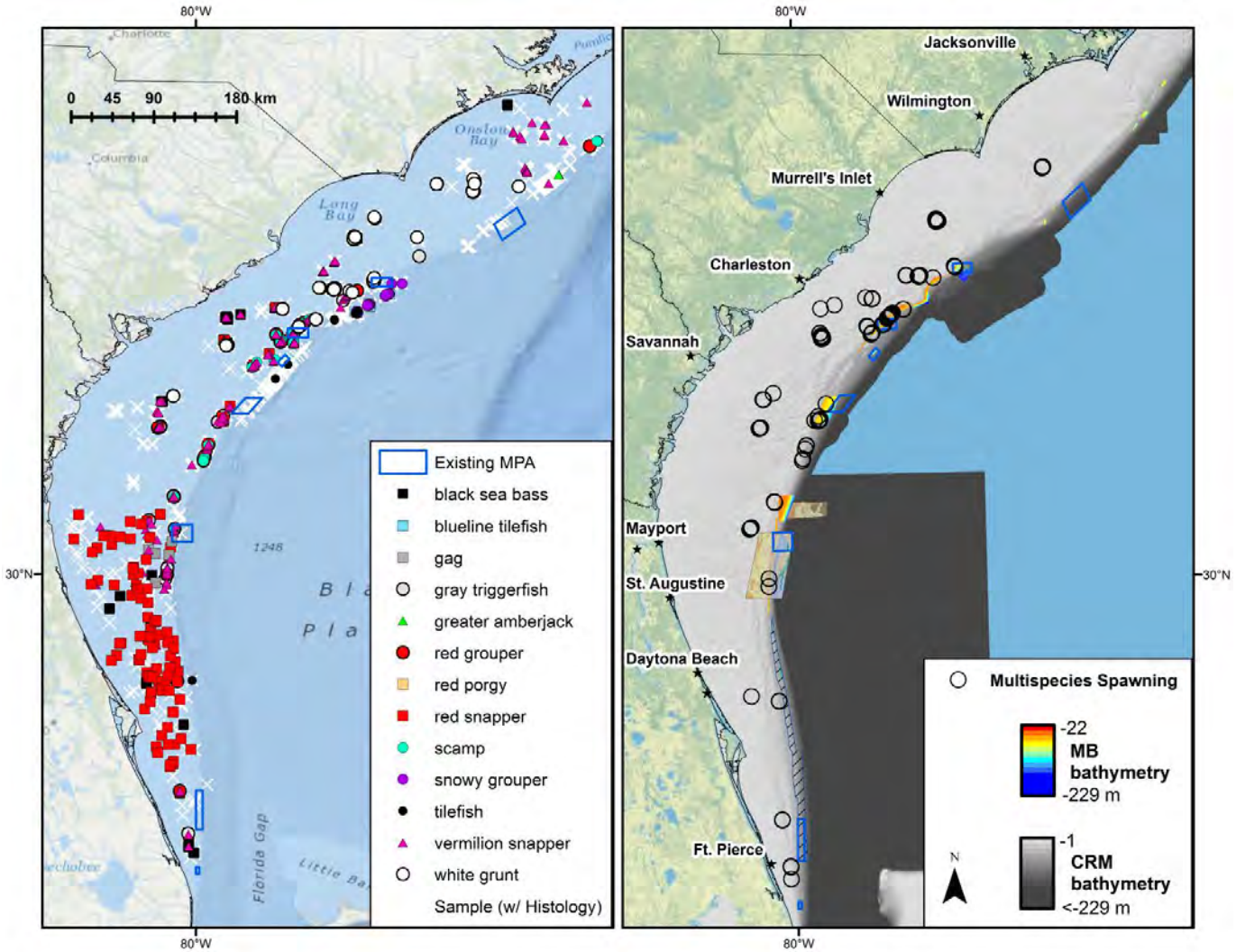


Figure 4.3.1.1. *Spawning condition females and bathymetric features.* On left, fishery-independent MARMAP/SEFIS/FWC samples of female fish within 48 hours of spawning. On right, the 90-m resolution NOAA Coastal Relief Model (CRM) and a merged layer of higher-resolution multi-beam (MB) bathymetry are shown relative to sites where spawning condition females from multiple species have been captured simultaneously (circles). Source: Basemap courtesy ESRI Ocean Basemap, National Park Service, and partners

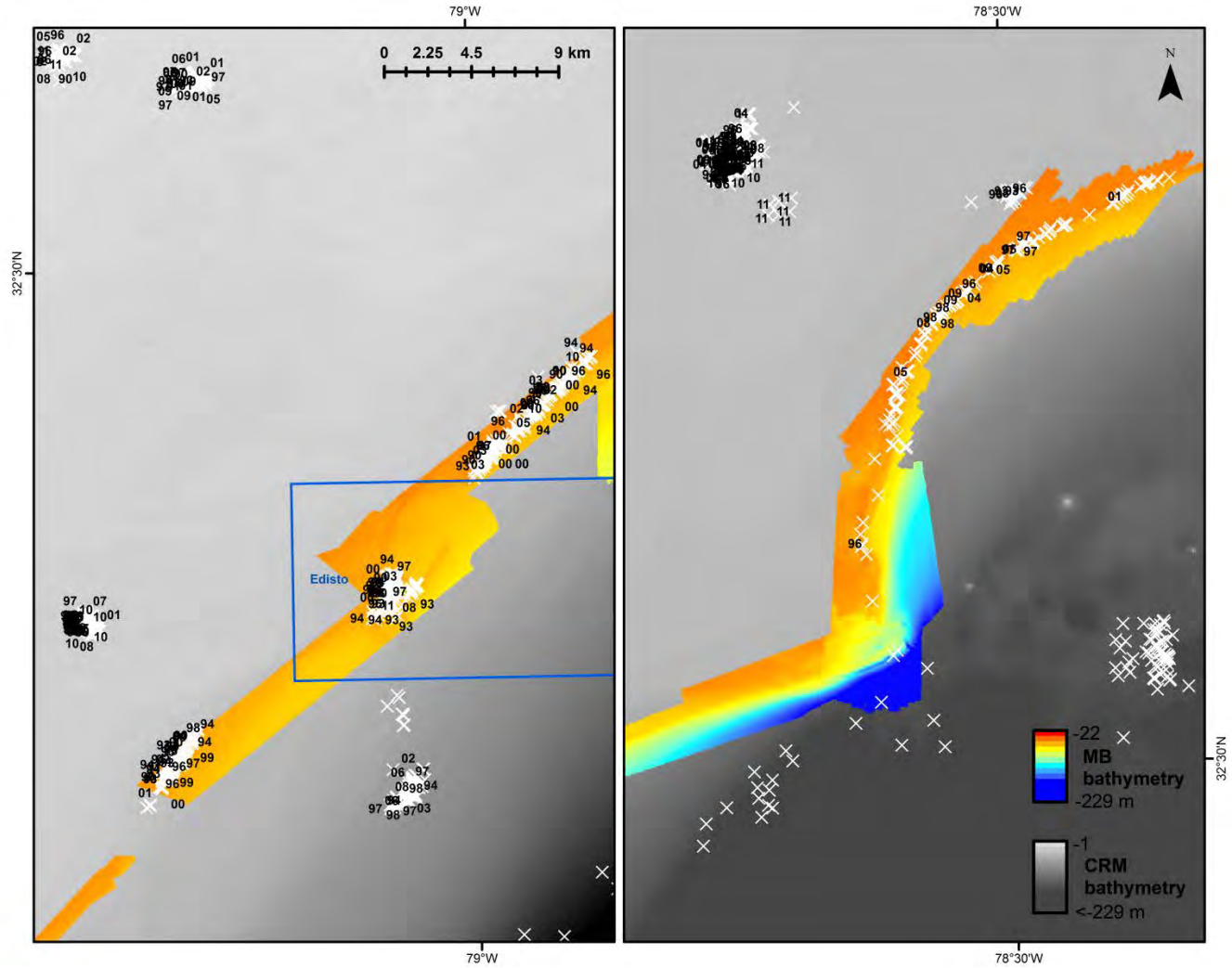


Figure 4.3.1.2. *Multi-annual observations of spawning for vermilion snapper and black sea bass*. MARMAP/SEFIS observations of spawning condition vermilion snapper near Edisto MPA (left) and black sea bass near Georgetown Hole, South Carolina (right) with years observed indicated relative to bathymetry.

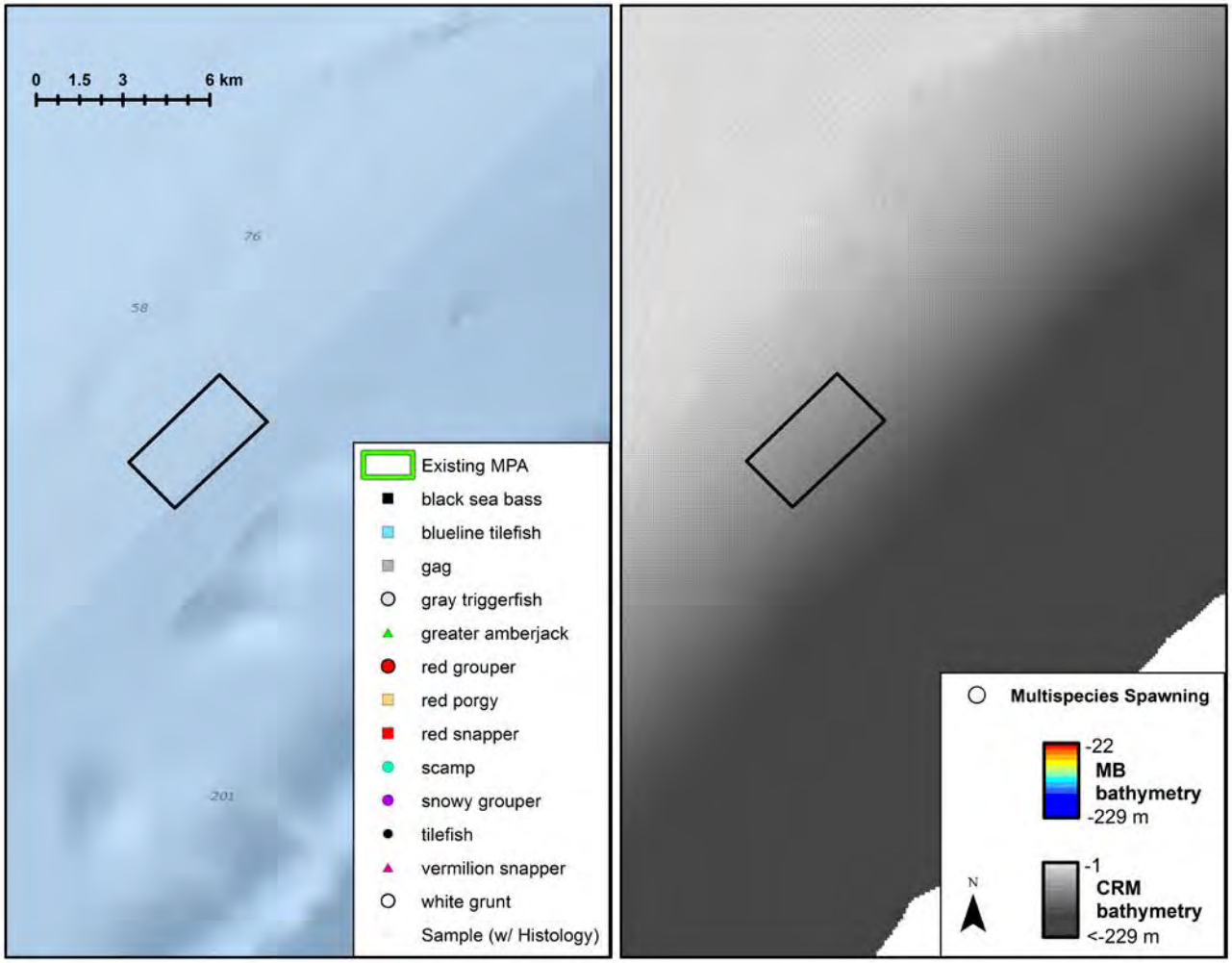


Figure 4.3.1.3. *Spawning condition females and bathymetric features off North Carolina Deep Wreck Spawning SMZ Proposed Site.* On left, fishery-independent samples of female fish within 48 hours of spawning, by species. On right, the 90-m resolution NOAA Coastal Relief Model (CRM) and a merged layer of higher-resolution multi-beam (MB) bathymetry are shown relative to sites where females of multiple species have been captured in spawning location at the same time (circles).

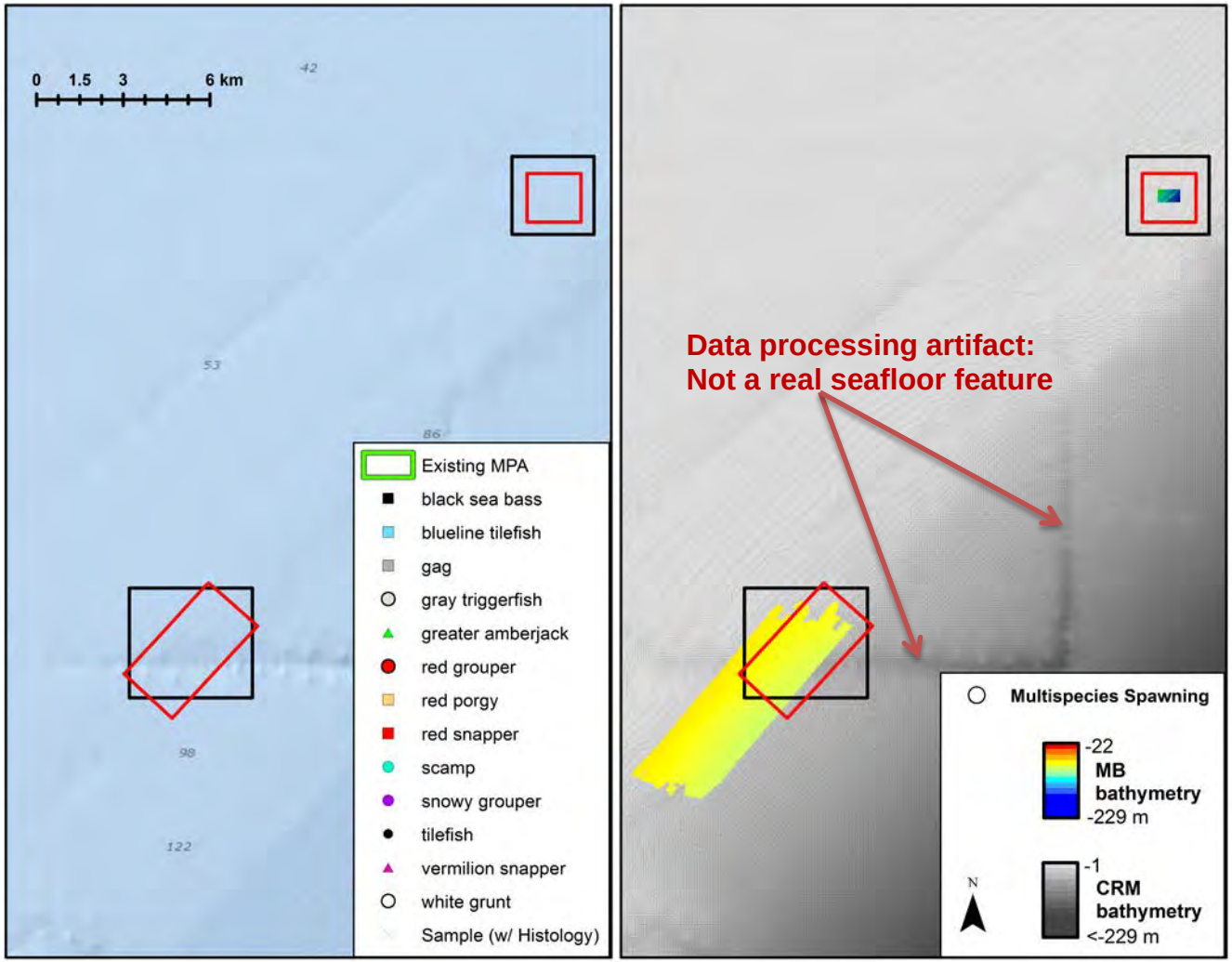


Figure 4.3.1.4. *Spawning condition females and bathymetric features off North Carolina Malchace Wreck and 780 Bottom Spawning SMZ Proposed Sites.* On left, fishery-independent samples of female fish within 48 hours of spawning, by species. On right, the 90-m resolution NOAA Coastal Relief Model (CRM) and a merged layer of higher-resolution multi-beam (MB) bathymetry are shown relative to sites where females of multiple species have been captured in spawning location at the same time (circles).

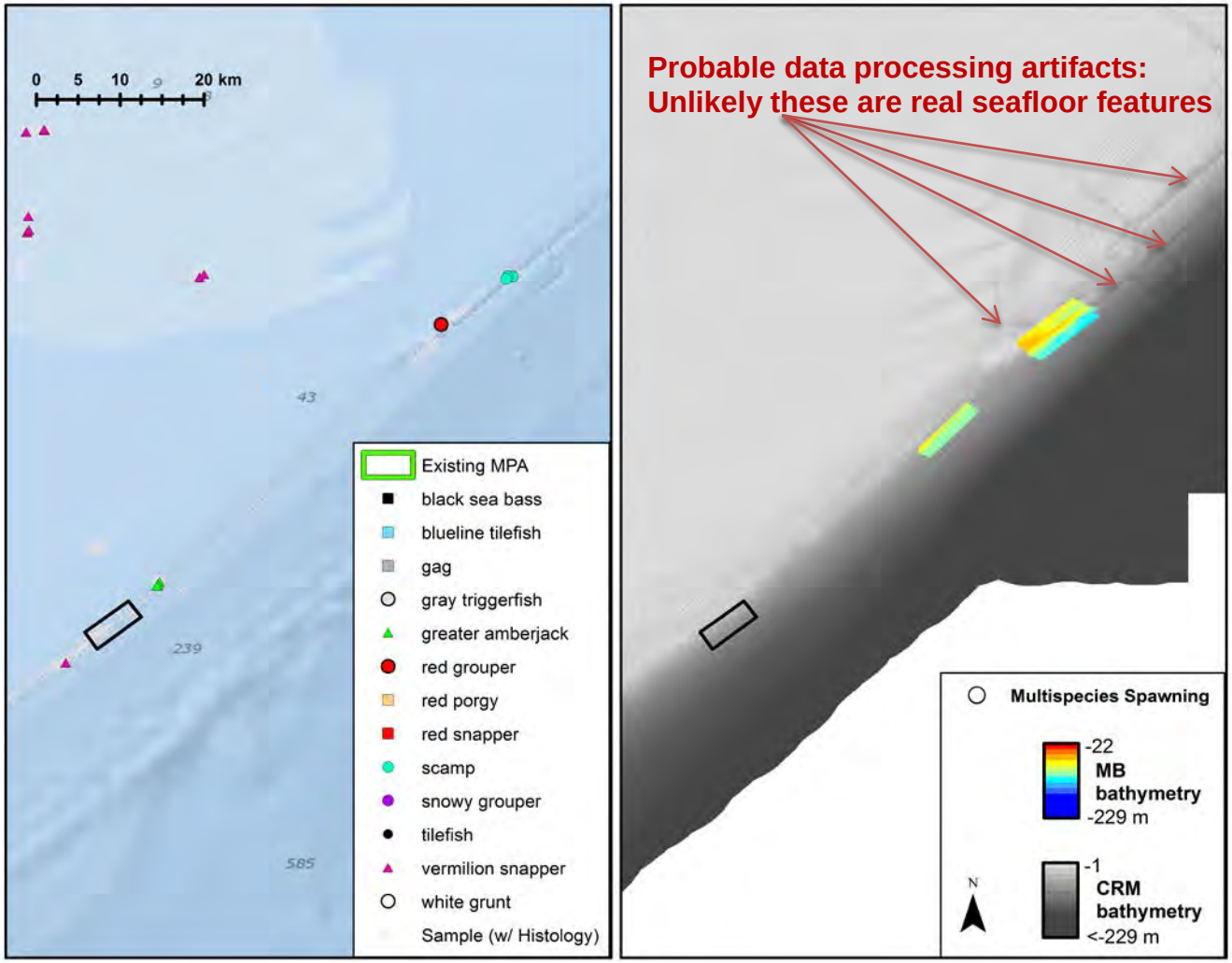


Figure 4.3.1.5. *Spawning condition females and bathymetric features off North Carolina South Cape Lookout Spawning SMZ Proposed Sites.* On left, fishery-independent samples of female fish within 48 hours of spawning, by species. On right, the 90-m resolution NOAA Coastal Relief Model (CRM) and a merged layer of higher-resolution multi-beam (MB) bathymetry are shown relative to sites where females of multiple species have been captured in spawning location at the same time (circles).

Table 4.3.1.3. Number of MARMAP sets (1996-2011) with histological samples taken within proposed SMZ alternatives.

SMZ Alternative	blueline tilefish	gag	gray triggerfish	red grouper	red porgy	red snapper	scamp	snowy grouper	speckled hind	tilefish	vermilion snapper	white grunt	Grand Total
South Cape Lookout Sub-Alternative 5a		2	1	9	2		5		2				21

Commercial logbook and headboat landings data

The SEFSC's commercial logbook program (accessed April 2015) consists of self-reported landings on a trip level from commercial fishermen. This dataset provided stock-specific landings (in pounds), primary gear used, primary area and depth of capture. Area fished was reported to 1° longitude by 1° latitude commercial logbook statistical areas. A single depth of fishing was reported in the commercial logbooks for each species per trip from 2005 onward, although they may be encountered at numerous depths during multiple sets. Logbook reported depths were rounded down to the nearest 5 meter bin. Logbook grids were parsed into depth-grids in a GIS (ESRI ArcMap 10.3) by 5 meter generalized bathymetric polygons developed from the NOAA Coastal Relief Model (http://www.ngdc.noaa.gov/mgg/coastal/coastal.html). Commercial logbook landings, by stock and year, were assigned to area-depth grids that were 1° latitude tall by 5 meter of bathymetry wide. Grids were wider inshore and more compressed at the shelf edge where bathymetry changed more rapidly. The resolution range for the commercial data where landings intersect proposed Spawning SMZ sites was 0.11 - 965.86 km^2.

The recreational headboat sector of the snapper grouper fishery was evaluated using Southeast Headboat Survey (SEHS) logbook data (accessed Feb 2015) reported by headboat operators. Headboats are large, for-hire vessels that typically accommodate 20 or more anglers on half- or full-day trips. SEHS records contain trip-level information on number of anglers, trip duration, date, area fished, landings (number of fish), and releases (number of fish) of each species. Headboat landings were summarized by stock, year, month, and area fished for the years 1973-2011. Reporting of area fished has improved through time, with resolution ranging from state level to 0.17° by 0.17° grids. As with the commercial fishery data, area fished is self-reported and this could have introduced error into the analysis. Additionally, vessels fishing in multiple areas during a trip would be constrained by the current data form to select one area fished for the trip, which limits the spatial precision of the analysis. Depth of fishing was not reported. Headboat logbook landings, by stock and year, were assigned to subgrids that were 0.17° by 0.17°. The resolution range for the headboat data where landings intersect proposed Spawning SMZ sites was 282-312 km^2.

Lost or displaced fishing opportunities

The impacts of proposed Spawning SMZs were evaluated by overlaying the Proposed SMZs upon mean landings (2012-2014), by stock, from commercial logbook and headboat logbook. The years 2012-2014 were selected as the most recent 3 years of complete data at the time of the analysis, reflecting the most current picture of the spatial distribution of fishing pressure. The total area of each logbook-area and the sliced area contained within each proposed Spawning SMZ was computed. The potential percent reduction in landings that could occur due to SMZ implementation, assuming no effort shifting, was computed as the ratio of the logbook area within the Spawning SMZ relative to the total area of each logbook-area multiplied by the percentage of mean landings within each logbook-area *i*:

$$\%Impact_i = \overline{\%Landings_i}^{2012-2014} * \frac{area_i^{protected}}{area_i^{total}}$$

This approach assumes landings are distributed uniformly within the logbook-areas and fishermen do not redistribute effort to compensate for lost catches by fishing in other areas. Redistribution of effort could partially or completely offset reductions in landings due to area closures, assuming catch rates are equivalent or effort is increased.

Discussion of Quantitative Analysis of Proposed Spawning SMZ Impacts

The Council's selection of Spawning SMZ alternatives will involve a tradeoff of predicted biological benefits and potential economic effects. In general, larger Spawning SMZs or SMZs closer to population centers are predicted to have the greatest economic impacts; however, these SMZs also provide the greatest proportional reduction in fishing pressure. Analyses suggest that none of the proposed Spawning SMZ alternatives would reduce catches by more than 2% of historical averages for any given snapper grouper stock.

Off North Carolina, the largest projected impacts were a 0.1% reduction in commercial silk snapper landings under Malchase Wreck **Sub-Alternative 2a** and a 1.4% reduction in recreational lesser amberjack landings under South Cape Lookout **Alternative 5** (**Table 4.3.1.4**). Although the relatively poor ability to resolve logbook-reported landings data to the scale of the proposed Spawning SMZs or to identify key fishing habitats within the resolution of the data makes the outputs of this quantitative analysis highly uncertain, it seems reasonable to conclude that the overall impacts across stocks for the North Carolina sites would be relatively low.

Table 4.3.1.4. Percent reductions in landings (lb ww) estimated from SMZ implementation, based on mean 2012-2014 landings.

Commercial (Source: SEFSC Commercial Logbook, April 2015)

SMZ Alternative	almaco jack	banded rudderfish	bar jack	black grouper	black sea bass	black snapper	blackfin snapper	blue runner	blueline tilefish	coney	cubera snapper	dog snapper	gag	golden tilefish	gray snapper	gray triggerfish	graysby	greater amberjack	grunts	hogfish	jolthead porgy	knobbed porgy	lane snapper	lesser amberjack	mahogany snapper
780 Bottom Sub-Alternative 3a	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
780 Bottom Sub-Alternative 3b	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Malchase Wreck Sub-Alternative 2a	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Malchase Wreck Sub-Alternative 2b	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
NC Deep Wreck Alternative 4	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
South Cape Lookout Alternative 5	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

SMZ Alternative	margate	misty grouper	mutton snapper	porkfish	queen snapper	red grouper	red hind	red porgy	red snapper	rock hind	sailors choice	sand tilefish	scamp	scup	silk snapper	snowy grouper	speckled hind	tomtate	vermilion snapper	warsaw grouper	white grunt	whitebone porgy	yellowedge grouper	yellowfin grouper	yellowtail snapper
780 Bottom Sub-Alternative 3a	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
780 Bottom Sub-Alternative 3b	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Malchase Wreck Sub-Alternative 2a	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Malchase Wreck Sub-Alternative 2b	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
NC Deep Wreck Alternative 4	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
South Cape Lookout Alternative 5	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Recreational (Source: SEFSC Southeast Headboat Survey Logbook, February 2015)

SMZ Alternative	almaco jack	atlantic spadefish	banded rudderfish	bar jack	black grouper	black sea bass	black snapper	blackfin snapper	blue runner	blueline tilefish	coney	cubera snapper	dog snapper	gag	golden tilefish	goliath grouper	gray snapper	gray triggerfish	graysby	greater amberjack	hogfish	jolthead porgy	knobbed porgy	lane snapper	lesser amberjack	mahogany snapper
780 Bottom Sub-Alternative 3a	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
780 Bottom Sub-Alternative 3b	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Malchase Wreck Sub-Alternative 2a	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Malchase Wreck Sub-Alternative 2b	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
NC Deep Wreck Alternative 4	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
South Cape Lookout Alternative 5	0.1%	0.0%	0.1%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%	0.0%	0.1%	0.0%	0.0%	1.4%	0.0%

SMZ Alternative	margate	misty grouper	mutton snapper	nassau grouper	queen snapper	red grouper	red hind	red porgy	red snapper	rock hind	sand tilefish	saucereye porgy	scamp	scup	silk snapper	snowy grouper	speckled hind	tomtate	vermilion snapper	warsaw grouper	white grunt	whitebone porgy	yellowedge grouper	yellowfin grouper	yellowmouth grouper	yellowtail snapper
780 Bottom Sub-Alternative 3a	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
780 Bottom Sub-Alternative 3b	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Malchase Wreck Sub-Alternative 2a	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Malchase Wreck Sub-Alternative 2b	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
NC Deep Wreck Alternative 4	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
South Cape Lookout Alternative 5	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%	0.2%	0.0%

This analysis has some limitations that are important to consider. First, it is reliant upon the distribution of fishing landings and effort 2012-2014 to represent future trends in landings along the shelf-edge. Fisher behavior is notoriously difficult to predict, and is subject to management regulations, availability of quota, market demands, price of fuel, weather, and other complicating factors. Second, the analysis assumes that fishing is uniformly distributed within the finest spatial scale to which the data could be parsed; for commercial, this was a 5-meter wide by 1° tall depth-grid; for recreational, this was a 1/6°x1/6° cell. If the primary landings location were located within the proposed closed area, the impact could be greater than predicted. The analysis assumes a non-directional bias associated with commercial logbook fishing locations reported; however, a single location is reported for multi-day trips that may include fishing on both the shelf-edge and in deeper waters. Available SEAMAP habitat categorization data for the South Atlantic shelf-edge could be used to further distribute commercial landings within reported depth-grids and headboat data within reported subgrids. Incorporation of a habitat suitability modeling component would likely prove unsuccessful due to the abundance of unclassified cells and errors within SEAMAP hardbottom classification assignments (NMFS-SEFSC, pers. comm.).

This analysis assumes that fishermen would not redistribute effort to offset lost fishing opportunities due to spatial closures. If the fishermen redistribute their effort to land stocks in different areas, the impact could be less than predicted. Given that all exploited stocks are managed with annual catch limits (ACLs) and projected impacts for individual stocks within a single closed area are not estimated to exceed a 2% reduction, effort shifting may allow fishermen to compensate for the spatial closure, and actual reductions in landings may be less than predicted unless the core site for the stock is below the resolution of the reported data and is located within the proposed Spawning SMZ. Some closed areas may not have adequate fishing habitats in their surroundings; in these cases, local impacts may be high even if effort redistribution at the regional offsets losses in local landings.

Finally, the analysis uses the spatial distribution of headboat fishing pressure to represent the entire recreational sector, due to the lack of spatially-resolved fishing pressure data for the private and charter sectors. The estimated impacts of proposed shelf-edge closures to headboats are much lower than commercial fishers; likely due to distance from shore off most states. It is likely that private and charter fishers would be impacted less by proposed spatial closures than headboats, as larger headboat vessels are more likely to make the long run to the shelf-edge than smaller private and charter vessels. Obviously, there would be exceptions to this trend, on a vessel-specific basis and off Florida and North Carolina, where the shelf-edge is more accessible from shore during times of calm weather.

Enforcement is a critical ingredient towards success of Spawning SMZs, as even low-levels of poaching can rapidly erode Spawning SMZ benefits (SERO-LAPP-2009-07-Rev). Configuring Spawning SMZ boundaries so that they are easily interpreted and enforced is an important consideration. Simplifying regulatory language to make long-distance determination of illegal fishing activities reduces the need for enforcement to board vessels. Mandatory use of Vessel Monitoring Systems would ease the burden on enforcement substantially (SAFMC 2012). Additional cost-effective enforcement may be achieved by the deployment of passive acoustic listening devices that could record the sounds of illegal fishing operations (SAFMC 2012).

The Council is proposing the implementation of Spawning SMZs. The fishing for, harvest, and possession of species in the snapper grouper fishery management unit (FMU) would be prohibited within the SMZs. The Council is also considering allowing transit through the Spawning SMZs with snapper grouper species onboard under certain conditions. Bycatch of the snapper grouper species within the closed areas would be significantly reduced or eliminated. Bycatch would only occur through poaching activities or while fishing for other species not in the snapper grouper FMU (e.g., dolphin, wahoo, mackerel, tuna, sharks). Bycatch while fishing for the species not in the snapper grouper FMU is unlikely as these species are pelagic species or likely not in the areas where the SMZs are being proposed. It is not clear if overall bycatch of species in the snapper grouper FMU would decrease since fishermen may transfer effort outside the closed areas.

Habitat protection associated with the proposed Spawning SMZs off North Carolina varies with each alternatives size and location. Establishing the Malchase Wreck Spawning SMZ (**Alternative 2**) would directly protect between 1 and 2.47 square miles of a known wreck site and associated hard live bottom habitat, which serves as EFH to species in the snapper grouper complex from the impact of fishing gear. Establishing the 780 Bottom Spawning SMZ (**Alternative 3**) would directly protect between 3 and 4 square miles of a shelf edge hard live bottom habitat. Establishing the North Carolina Deep Wreck Spawning SMZ (**Alternative 4**) would directly protect a known wreck site and 3 square miles of associated hard live bottom habitat. Establishing the South Cape Lookout SMZ (**Alternative 5**) would directly protect 5 square miles of a shelf edge hard live bottom habitat. In addition, as persistent spawning locations for species in the snapper grouper complex are identified, they would also serve as EFH-HAPC. As an EFH-HAPC, NMFS would in the EFH consultation and permit review process, emphasize and focus conservation recommendations on eliminating or reducing the impact of non-fishing activities on these unique and limited habitats.

As previously discussed, the effectiveness of the proposed Spawning SMZs in **Alternatives 2-5** at protecting spawning fish would depend on a multitude of factors, including: (1) appropriate location containing spawning fish, (2) adequate protections and enforcement within the Spawning SMZ to prevent poaching or inadvertent take of spawning fish, and (3) adequate buffering beyond the core spawning area to prevent anglers from luring spawning fish outside the SMZ or undermining its effectiveness by fishing the lines or capitalizing on pre-spawning movements beyond the SMZ boundaries. If appropriately located, a larger SMZ would be more effective than a smaller SMZ. Off North Carolina, the largest projected impacts were a 0.1% reduction in commercial silk snapper landings under Malchase Wreck **Sub-Alternative 2a** and a 1.4% reduction in recreational lesser amberjack landings under South Cape Lookout **Alternative 5** (**Table 4.3.1.4**). Thus, assuming all the alternatives in Action 3 contain habitat for spawning fish, the greatest biological benefits for snapper grouper species would be provided by **Alternative 5** followed by **Sub-alternative 2a**, **Sub-alternative 3a**, **Alternative 4/Sub-alternative 3b**, **Sub-alternative 2b**, and **Alternative 1**.

Regardless of the alternative or sub-alternative selected, none is anticipated to have adverse effects on listed large whales, or any distinct population segments (DPS) of Atlantic sturgeon; ESA-listed corals and smalltooth sawfish do not occur off North Carolina. Previous ESA consultations determined the hook-and-line sector of the snapper grouper fishery was not likely

to adversely affect large whales, or any DPS of Atlantic sturgeon. The effects of this action on the species that may interact with the fishery off North Carolina (i.e., sea turtles) are unclear. There is likely to be no additional biological benefit from **Alternative 1 (No Action)** because it would perpetuate the existing level of risk for interactions between these ESA-listed species and the fishery. The overall benefit of the remaining Alternatives depends on impacts on fishing effort and fishing effort distribution. Evaluating these potential changes in fishing effort and effort distribution is difficult. If these Alternatives simply displace the existing level of fishing effort, there may be no change in the likelihood interactions between the fishery and sea turtles. Conversely, if these closures actually reduce the total amount of fishing effort, the likelihood of interactions between the fishery and sea turtles may be reduced, providing biological benefits. If the latter is true, **Alternative 5** would likely be the most biologically beneficial for sea turtles, relative to **Alternative 1 (No Action)**, followed by **Sub-Alternative 3a, Alternative 4/Sub-Alternative 3b,** and **Sub-Alternative 2a** with **Sub-Alternative 2b** being the least biologically beneficial for sea turtles.

4.3.2 Economic Effects

The potential positive and negative direct economic effects for these Spawning SMZs will follow the same as those described in general under **Action 1**. As the alternatives are finalized and preferred alternatives are selected, more specific analyses can be provided for each action. Should the Council choose more than one preferred alternative (and a corresponding sub-alternative, as appropriate) for this action, the economic effects of all the preferred alternatives for both the commercial and recreational sectors will be additive. In general, the larger the Spawning SMZs, are and the more desirable the fishing areas are that would be closed, the greater the potential short-term direct and indirect negative effects will be. Should the spawning stock biomass increase for the species receiving the additional protection, it would likely have long-term direct positive economic effects, because more fish would be available to fishermen away from the Spawning SMZs.

Reductions in expected catch are very difficult to measure given the large statistical grids used for reporting catch data. A quantitative approach, as described in **Section 4.3.2**, was developed by the SERO and estimated landings reductions from areas proposed as Spawning SMZs are shown in **Table 4.3.1.4**. Off North Carolina, the largest projected impacts were a 0.1% reduction in commercial silk snapper landings under Malchase Wreck **Sub-Alternative 2a** and a 1.4% reduction in headboat lesser amberjack landings under South Cape Lookout **Alternative 5** (**Table 4.3.1.4**). The estimated reduction in commercial landings in lbs (gw) for each snapper grouper species was multiplied by the average annual price per lb (gw) (2012 through 2014)[6] for each species to obtain estimates of displaced ex-vessel revenue for each Spawning SMZ alternative. Aggregated across all snapper grouper species, Malchase Wreck **Sub-Alternative 2a** is estimated to reduce total revenue by the most in comparison to the other alternatives (**Table 4.3.2.1**). Assuming this $1,377 reduction in revenue (2014 dollars) is borne entirely by the vessels described in **Section 3.3.1**, and that they are unable to substitute landings in other areas, on average (2010 through 2014), these vessels would experience a 0.01%

[6] Average annual prices were derived from Coastal Logbook data augmented with revenue estimates as provided by the SEFSC (July 2015).

reduction in total ex-vessel revenue. **Sub-Alternative 2b**, **Sub-Alternatives 3a** and **3b**, **Alternative 4**, and **Alternative 5** are all estimated to have a smaller effect on total ex-vessel revenue than **Sub-Alternative 2a** (**Table 4.3.2.1**); however, given the high uncertainty in the model[7], it is unlikely these estimated impacts are statistically different from each other. A reasonable assumption based on the results of the model is that the reduction in total ex-vessel revenue would be minimal for all of the Spawning SMZ alternatives. If in fact fishermen are harvesting species within the proposed Spawning SMZ areas at a much higher rate than elsewhere in the South Atlantic, the true effects of these closures on ex-vessel revenue could be more substantial than predicted.

Table 4.3.2.1. Estimated reduction in ex-vessel revenue and headboat angler CS from each proposed Spawning SMZ alternative for North Carolina (2014 dollars).

SMZ alternative	Reduction in ex-vessel revenue	Reduction in headboat angler CS
Malchase Wreck Sub-Alternative 2a	$1,377	$1,218
Malchase Wreck Sub-Alternative 2b	$592	$498
780 Bottom Sub-Alternative 3a	$952	$0
780 Bottom Sub-Alternative 3b	$48	$0
NC Deep Wreck Sub-Alternative 4	$1	$0
South Cape Lookout Sub-Alternative 5	$588	$15,887

Source: SERO Social Science Branch (August 2015).

With respect to headboats, the estimated reduction in landings for each species in numbers of fish, as originally reported, was multiplied by consumer surplus (CS) values from **Section 3.3.2** to estimate the reduction in CS from each alternative[8]. The aggregate reduction in CS across all snapper grouper species for South Cape Lookout **Alternative 5** is estimated to be approximately $16,000 (2014 dollars) **(Table 4.3.2.1)**. If headboat anglers are unable to substitute landings in other areas, this would be a 0.07% reduction in total estimated CS for all snapper grouper species harvested on headboats in the South Atlantic. **Sub-Alternatives 2a** and **2b**, **Sub-Alternatives 3a** and **3b**, and **Alternative 4** are all estimated to have a smaller effect on headboat angler CS than **Alternative 5**; however, given the high uncertainty in the model, it is unlikely these impacts are statistically different from each other. A reasonable assumption based on the results of the model is that the reduction in headboat angler CS would be minimal for all of the Spawning SMZ alternatives. If in fact anglers are harvesting species within the proposed areas at a much higher rate than elsewhere in the South Atlantic, the true impacts to CS could be more substantial than predicted. CS impacts for other recreational modes, private/rental vessels and charter vessels, are unavailable because there is insufficient spatial resolution in corresponding landings data. It is expected that these other recreational modes would experience comparable reductions in landings and CS to the headboat mode

[7] The model employed here assumes uniformly distributed effort within each logbook area and no redistribution of effort after a closure.

[8] For snapper species, excluding red snapper, the WTP value of $12.37 (2014 dollars) was used. For grouper species, the WTP value of $103 (2014 dollars) was used. For red snapper, the WTP value of $81 (2014 dollars) was used. For all other species, for which there were no specific WTP values available, a WTP value for either snappers or groupers was applied on a case-by-case basis based on anectdotal evidence and comparison of commercial prices.

4.3.3 Social Effects

Section 4.1.3 describes potential effects on fishermen and fishing communities from designation of a Spawning SMZ with prohibitions on fishing for snapper grouper species, and these would be expected to be similar for **Alternatives 2** and **3**. This action would primarily affect North Carolina fishermen and communities described in the **Section 3.3.3**, but also could affect fishermen living nearby in South Carolina or the Mid-Atlantic if the fish in the exclusive economic zone (EEZ) off North Carolina. Additionally, this action could affect visitors to the North Carolina coast who travel to go fishing on private trips or for-hire trips.

In general, larger areas would be more likely to result in negative effects on fishermen due to restricted access if these areas are locations used by fishermen to target snapper grouper species. Under **Alternative 2**, **Alternative 2a** would be expected to result in more negative social effects than **Alternative 2b**. For **Alternative 3**, the negative effects on fishermen and communities would be expected to be greater in **Sub-alternative 3a**, followed by **Sub-alternative 3b**, and then **Sub-alternative 3c.** There would be no additional negative effects on fishermen expected under **Alternative 1 (No Action)**, but there could also be forfeited social benefits if the Spawning SMZs in **Alternatives 2** and **3** were not in place to protect spawning habitat.

4.3.4 Administrative Effects

Alternative 1 (No Action) would retain the existing boundaries and fishing prohibitions in the protected areas off the coast of North Carolina. As such, the alternative would retain the current level of administrative effects. There are logistical and economical costs of monitoring spatial and temporal fishing closures by law enforcement personnel. The costs may be mitigated by public compliance with the regulations. **Alternatives 2** through **5** would increase the adverse administrative effects as they would implement spatial closures in the form of Spawning SMZs. Law enforcement personnel would have new spatial closures to enforce, and the Council and NMFS would be tasked with notifying the public of the regulation changes and continue to respond to public inquiries concerning the Spawning SMZs.

During the development of Amendment 14 to the Snapper Grouper FMP, the Law Enforcement Committee and Advisory Panel (AP) jointly outlined criteria for establishing marine reserves (**Appendix B** to Amendment 14 to the Snapper Grouper FMP). In the report, they stated that enforceability of the sites would increase if the sites were large and configured in a square or rectangle, delineated in latitude and longitude, in an acceptable format to be included and identified on NOAA charts, limited in allowable activities, located away from highly populated areas, and had on-site enforcement capability. Using these points, the adverse administrative effects to law enforcement would increase from **Sub-alternative 2b** to **Sub-alternative 2a** to **Alternative 4** to **Sub-alternative 3b** to **Sub-alternative 3a** to **Alternative 5**.

4.4 Action 4. Establish Spawning Special Management Zones (Spawning SMZs) off South Carolina

4.4.1 Biological and Ecological Effects

There are no Spawning SMZs given that they are new and proposed in Amendment 36 (**Alternative 1 ((No Action)**). **Alternative 2** would establish a Spawning SMZ in the Devil's Hole/Georgetown Hole area ranging in size from 1 square mile (**Sub-Alternative 2c**) to 15.2 square miles (**Sub-Alternative 2d**). The larger the area protected, the greater the biological benefits from protecting more spawning fish and area. **Alternatives 3 and 4** would establish a 2.99 square mile Spawning SMZ in Area 51 and Area 53, areas that contain artificial reefs with no hard bottom established with the purpose of having no fishing.

To the extent that spawning fish are protected from fishing there would be positive biological benefits. The available catch by location data for the commercial and headboat sectors were used to provide a quantitative estimate of potential impacts. A similar analysis was previously provided to the Snapper Grouper Advisory Panel and they indicated concern that due to data limitations, the potential impacts are not accurate. During the Public Hearing II hearings, the public was asked to provide input on how the areas under consideration would impact their catches and whether the impacts are over or under-estimated.

Alternatives

(preferred alternatives in bold)

1. No action. There are no Spawning SMZs off South Carolina.
2. **Preferred. Establish a Spawning SMZ in the Devil's Hole/Georgetown Hole area that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.**
   - 2a. Devil's Hole/Georgetown Hole (13.5 mi^2)
   - 2b. Devil's Hole/Georgetown Hole (4 mi^2)
   - 2c. Devil's Hole/Georgetown Hole (1 mi^2)
   - 2d. Devil's Hole/Georgetown Hole (15.2 mi^2)
   - 2e. SC South (8 mi^2) (Alternative to Devils Hole)
   - **2f. Preferred. Devil's Hole/Georgetown Hole (3.1 mi^2)**
3. **Preferred. Establish a Spawning SMZ in the Area 51 site (2.99 mi^2) that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.**
4. **Preferred. Establish Spawning SMZs in the Area 53 site (2.99 mi^2) that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.**

Area 51 – established April 24, 1998. Area 51 is an experimental artificial reef site, which was established by the South Carolina Department of Natural Resources (SCDNR) to investigate the feasibility of using artificial reef materials as an experimental Marine Protected Area (MPA). By monitoring and documenting the reef community development and fisheries production of an un-fished artificial reef area, and comparing this to regularly fished areas, the potential value of artificial reef-MPAs as a supplement to traditional methods of managing fisheries could be

evaluated. Man made MPAs could also serve as effective demonstration sites in documenting the potential benefits that could be derived from larger scale MPAs where none existed at the time. Area 51 is a 1.5 mile X 1.5 mile permitted artificial reef site located in approximately 70 feet of water off the South Carolina coast. Clusters of low profile concrete reef units have been placed in several locations within the boundaries of the permitted area.

To more accurately measure the productivity of the reef, it was necessary to eliminate public fishing pressure on it by limiting public awareness and, therefore, public use of the site during the study period. The US Army Corps of Engineers allowed SCDNR to utilize a special permitting process to by-pass the standard public comment period normally required for typical open access artificial reef sites.

Observations from Area 51:
- Total number of taxa was not significantly different between fished and unfished artificial reefs. However, total biomass was significantly greater at unfished artificial reef sites, while total numbers of fishes was greater at fished sites.
- Warsaw grouper have been observed in Area 51.

Analysis: Unfished artificial reefs had significantly higher abundance of commercially and recreationally important species (i.e. black sea bass, gag) while small, schooling baitfish (scad, cigar minnows) dominated at fished sites.
- Recruitment of juveniles and sub-adults was observed at all study sites but, over time, concentrations of black sea bass increased exponentially at unfished artificial reef sites and decreased exponentially at fished sites.
- Concentrations of black sea bass on unfished artificial reef sites were higher than in any previous similar study.
- Two years after cessation of all fishing activities population levels of black sea bass remained near zero at fished sites but remained high at unfished artificial reef sites.
- Gonad analysis indicated spawning activity in black sea bass and gray triggerfish at the sites.
- Tagging studies revealed minimal movement between reef corners. After initial tagging period, (May-Aug) recaptures revealed 100% site fidelity during subsequent seasons. After a series of hurricanes passed by the coast (Arlene, Dennis, Floyd, Irene) there was migration from the sites.
- Very few tags were returned from off site; however, <u>all</u> off site recaptures were of fish originally tagged at unfished artificial reef sites, possibly because over-crowding at these sites prompted emigration.
- Trophic analysis showed that the artificial reefs served as a primary food source for both permanent and transient fish species and that reefs protected from harvest can enhance fisheries by increasing long-term habitat space, cover and food.

Graduate student theses from Area 51

Gold, Hansje. 2001. Investigation of the impact of fishing on artificial reef structure off the South Carolina coast.

Kauppert, Petra. 2002. Feeding habits and trophic relationships of an assemblage of fishes associated with a newly established artificial reef off South Carolina.

Area 53 – established April 29, 2003. Due in part to the results obtained from work on the Area 51 reef site, the South Atlantic Fishery Management Council (Council) provided funding to replicate that study design in deeper water to specifically target a wider range of snapper grouper species. The permitting process and all reef parameters for the new site, designated Area 53, were identical to Area 51 except that water depth for this site is 105 feet. In addition to the dart tags that were used in Area 51, acoustic tags were also implanted in numerous fish of several larger species on Area 53 and receiver arrays established on all four corners of the permitted area to monitor site fidelity on the reef.

Observations from Area 53:
- Diversity was not significantly different between fished and unfished artificial reef reefs. However, total abundance of black sea bass, gag, scamp, and gray triggerfish was significantly greater at unfished artificial reef sites.
- Gonad analysis indicated spawning activity in black sea bass, red porgy, and gray triggerfish at the sites.
- Tagging studies revealed high site fidelity for black sea bass, gag, scamp, red snapper, and gray triggerfish.
- Protected sites had significantly larger size and faster growth rates for black sea bass and gray triggerfish.
- Unfished reefs had greater biomass than exploited reefs; increasing the reproductive output and larval spillover of protected artificial reef systems.
- Warsaw grouper have been observed in Area 53.

Graduate student theses from Area 53

Burgess, Dany. 2008. Development of Invertebrate Assemblages on Artificial Reef Cones off South Carolina: Comparison to an Adjacent Hard-Bottom Habitat

Kolmos, Kevin. 2007. Succession and biodiversity of an artificial reef Marine Protected Area: A comparison of fish assemblages on protected and unprotected habitats.

One additional student, Jacqueline Shapo, attempted to examine the possibility of coral transplants onto the newly established reef cones to hasten invertebrate development but this attempt did not work out.

In 2014, LGL Ecological Research Associates, Inc. engaged in a cooperative research project in the South Atlantic region (LGL 2015). Camera drop video clips and fish samples were collected as part of a cooperative research project on the F/V Amy Marie, a commercial vessel owned and operated by Mark Marhefka, during three trips to Georgetown Hole during 2014. Camera drops were evaluated for signs of courtship behavior or coloration. Landed fish were tagged and the time and location of the sample and bottom water temperature were recorded. Carcasses were transferred to Marine Resources Research Institute SCDNR MARMAP. Following standard protocols biological data were recorded (fork length, standard length, weight, gonad weight), otoliths were collected for ageing the fish, and gonad tissue samples were collected and preserved and used to evaluate maturation stage using histological analysis (Harris et al. 2007; Wyanski et al. 2000). Video clips showed scamp in gray-head phase spawning coloration at numerous locations and an apparently gravid yellowfin grouper. Histological

sampling identified several sites with spawning condition blueline tilefish and scamp, along with gag, greater amberjack, mutton snapper, snowy grouper, warsaw grouper, and yellowedge grouper.

Methods for determining biological effects of Spawning SMZ implementation are discussed in detail in **Section 4.3.1**. Off South Carolina, the Devil's Hole Spawning SMZ Sub-alternatives have been sampled by MARMAP/SEFIS and they have caught blueline tilefish, gag, gray triggerfish, snowy grouper, golden tilefish, and vermilion snapper in relatively limited quantities (**Figure 4.4.1.1**, **Table 4.4.1.1**). This is a challenging location to set chevron trap gear due to the steep slope and depth; thus, sets are seldom made here (M. Reichert, pers. comm.). In Devils Hole (**Sub-Alternative 2a**) 7 female spawning condition vermilion snapper were caught on a single MARMAP set (**Table 4.4.1.2**). In addition, scamp, greater amberjack, and a warsaw grouper were taken in the area by the LGL cooperative research project (**Figure 4.4.1.1**). In Devils Hole **Sub-Alternatives 2b** and **2c** scamp and a warsaw grouper were recorded by the LGL cooperative research project (**Figure 4.4.1.1**). Devils Hole South Carolina South **Sub-Alternative 2e** is located just south of the existing Northern South Carolina MPA (**Figure 4.4.1.2**). A spawning condition female blueline tilefish and 34 spawning condition female snowy grouper were taken in Devils Hole South Carolina South out of 35 MARMAP sets (**Table 4.4.1.2**), along with snowy grouper, yellowedge grouper, scamp, blueline tilefish, and warsaw grouper recorded from the LGL cooperative research project (**Figure 4.4.1.2**). Other than the deepest edges, these proposed Spawning SMZ alternatives have been well mapped by high-resolution bathymetry and clearly contain numerous high-slope, high-curvature locations as well as holes (**Figure 4.4.1.1**, **Figure 4.4.1.2**).

Table 4.4.1.1. Number of MARMAP sets (1996-2011) with histological samples taken within proposed Spawning SMZ alternatives.

SMZ Alternative	blueline tilefish	gag	gray triggerfish	red grouper	red porgy	red snapper	scamp	snowy grouper	speckled hind	tilefish	vermilion snapper	white grunt	Grand Total
Devils Hole Sub-Alternative 2a		2	3					1			1		7
Devils Hole Sub-Alternative 2b			1					1					2
Devils Hole Sub-Alternative 2c								1					1
Devils Hole Sub-Alternative 2d			1					2		1			4
Devils Hole SC South Sub-Alternative 2e	3							35		1			39

Table 4.4.1.2. Number of females observed within 48 hours of spawning observed by MARMAP (1996-2011) within proposed SMZ alternatives.

SMZ Alternative	blueline tilefish	gray triggerfish	red snapper	scamp	snowy grouper	vermilion snapper	Grand Total
Devils Hole Sub-Alternative 2a						7	7
Devils Hole SC South Sub-Alternative 2e	1				34		35

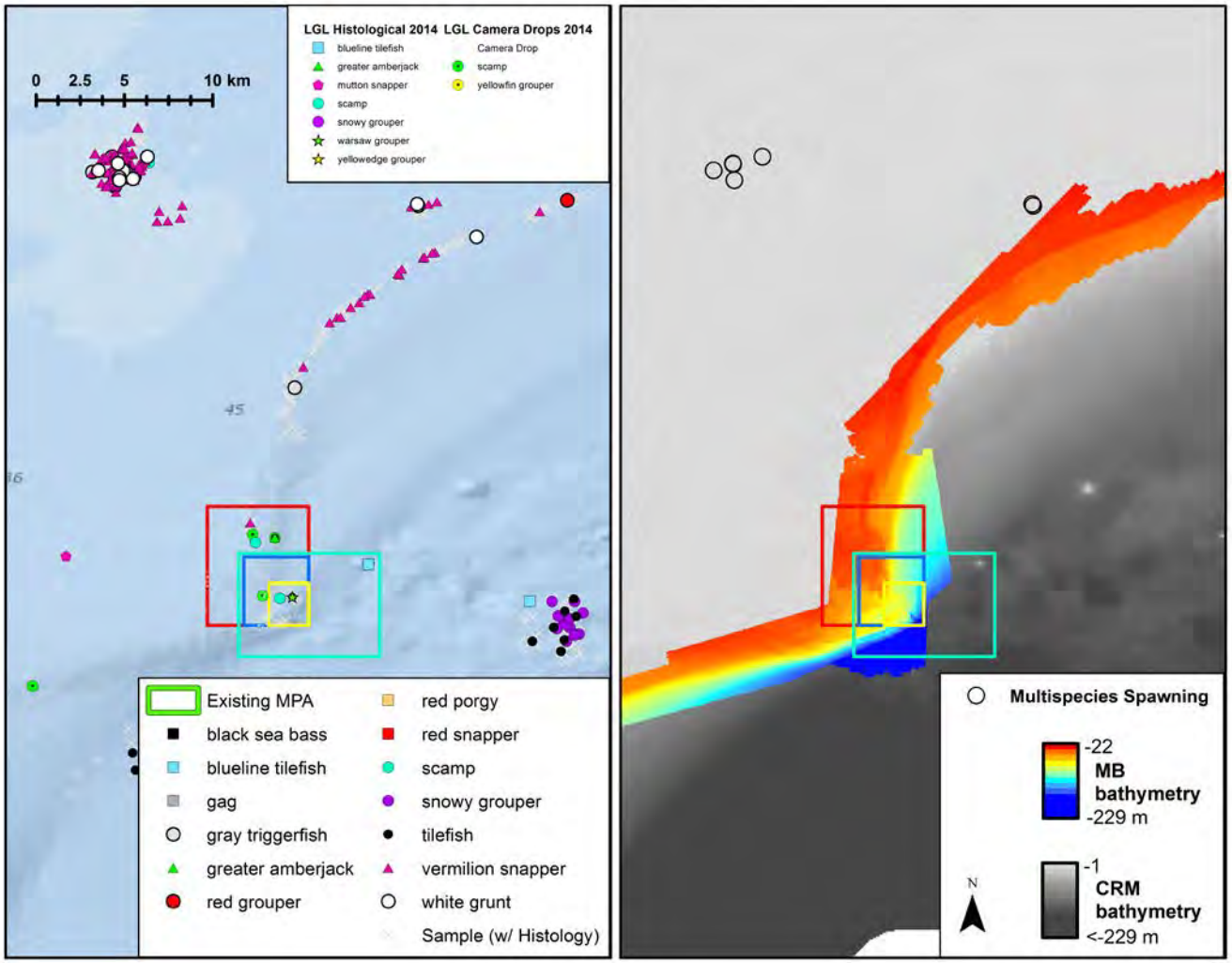


Figure 4.4.1.1. *Spawning condition females and bathymetric features off South Carolina Georgetown Hole (a.k.a. Devil's Hole) SMZ Proposed Sites*. On left, fishery-independent samples of female fish within 48 hours of spawning, by species. On right, the 90-m resolution NOAA Coastal Relief Model (CRM) and a merged layer of higher-resolution multi-beam (MB) bathymetry are shown relative to sites where females of multiple species have been captured in spawning location at the same time (circles).

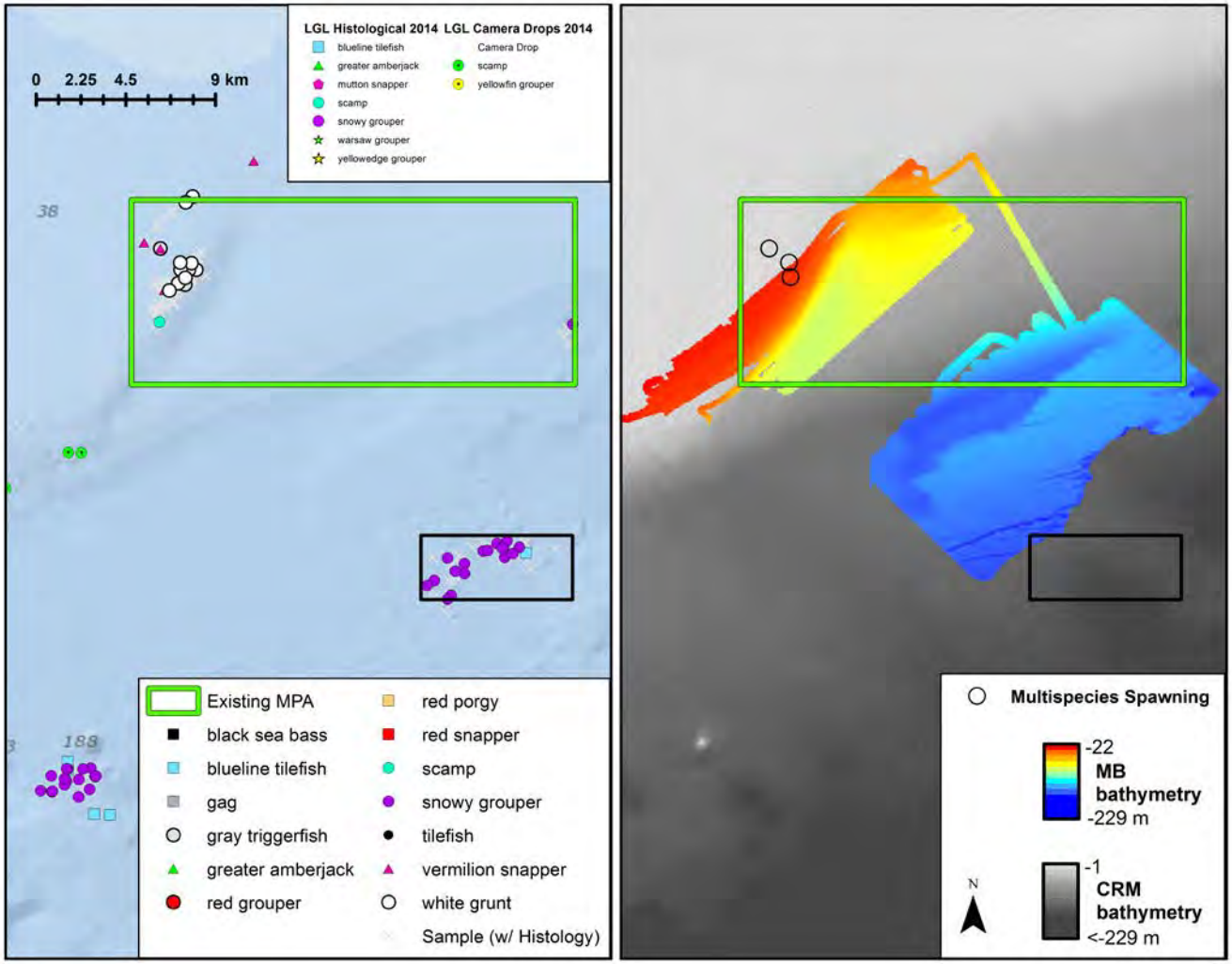


Figure 4.4.1.2. *Spawning condition females and bathymetric features off South Carolina Devil's Hole SC South Sub-Alternative 2e SMZ Proposed Site.* On left, fishery-independent samples of female fish within 48 hours of spawning, by species. On right, the 90-m resolution NOAA Coastal Relief Model (CRM) and a merged layer of higher-resolution multi-beam (MB) bathymetry are shown relative to sites where females of multiple species have been captured in spawning location at the same time (circles).

Methods for estimating reductions in catches from SMZ implementation are discussed in detail in **Section 4.3.1**. Off South Carolina, the largest projected impacts were a 0.6% reduction in commercial tomtate landings under Devils Hole **Sub-Alternative 2a** and a 0.3% reduction in recreational scamp landings under Devils Hole **Sub-Alternatives 2a/2d** (**Table 4.4.1.3**). Although the relatively poor ability to resolve logbook-reported landings data to the scale of the Spawning SMZs or to identify key fishing habitats within the resolution of the data makes the outputs of this quantitative analysis highly uncertain, it seems reasonable to conclude that the overall impacts across stocks for the South Carolina sites would be relatively low.

The Council is proposing the implementation of Spawning SMZs. The fishing for, harvest, and possession of species in the snapper grouper fishery management unit (FMU) would be prohibited within the SMZs. The Council is also considering allowing transit through the Spawning SMZs with snapper grouper species onboard under certain conditions. Bycatch of the snapper grouper species within the closed areas would be significantly reduced or eliminated. Bycatch would only occur through poaching activities or while fishing for other species not in the snapper grouper FMU (e.g., dolphin, wahoo, mackerel, tuna, sharks). Bycatch while fishing for the species not in the snapper grouper FMU is unlikely as these species are pelagic species or likely not in the areas where the SMZs are being proposed. It is not clear if overall bycatch of species in the snapper grouper FMU would decrease since fishermen may transfer effort outside the closed areas.

Table 4.4.1.3. Percent reductions in landings (lb ww) estimated from SMZ implementation, based on mean 2012-2014 landings.

Commercial (Source: SEFSC Commercial Logbook, April 2015)

SMZ Alternative	almaco jack	banded rudderfish	bar jack	black grouper	black sea bass	black snapper	blackfin snapper	blue runner	blueline tilefish	coney	cubera snapper	dog snapper	gag	golden tilefish	gray snapper	gray triggerfish	graysby	greater amberjack	grunts	hogfish	jolthead porgy	knobbed porgy	lane snapper	lesser amberjack	mahogany snapper	margate
Devils Hole Sub-Alternative 2a	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%	0.0%	0.0%
Devils Hole Sub-Alternative 2b	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Devils Hole Sub-Alternative 2c	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Devils Hole Sub-Alternative 2d	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Devils Hole SC South Sub-Alternative 2e	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

SMZ Alternative	misty grouper	mutton snapper	porkfish	queen snapper	red grouper	red hind	red porgy	red snapper	rock hind	sailors choice	sand tilefish	scamp	scup	silk snapper	snowy grouper	speckled hind	tomtate	vermilion snapper	warsaw grouper	white grunt	whitebone porgy	yellowedge grouper	yellowfin grouper	yellowtail snapper
Devils Hole Sub-Alternative 2a	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.6%	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%
Devils Hole Sub-Alternative 2b	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Devils Hole Sub-Alternative 2c	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Devils Hole Sub-Alternative 2d	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Devils Hole SC South Sub-Alternative 2e	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Recreational (Source: SEFSC Southeast Headboat Survey Logbook, February 2015)

SMZ Alternative	almaco jack	atlantic spadefish	banded rudderfish	bar jack	black grouper	black sea bass	black snapper	blackfin snapper	blue runner	blueline tilefish	coney	cubera snapper	dog snapper	gag	golden tilefish	goliath grouper	gray snapper	gray triggerfish	graysby	greater amberjack	hogfish	jolthead porgy	knobbed porgy	lane snapper	lesser amberjack	mahogany snapper
Devils Hole Sub-Alternative 2a	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Devils Hole Sub-Alternative 2b	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Devils Hole Sub-Alternative 2c	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Devils Hole Sub-Alternative 2d	0.1%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Devils Hole SC South Sub-Alternative 2e	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

SMZ Alternative	margate	misty grouper	mutton snapper	nassau grouper	queen snapper	red grouper	red hind	red porgy	red snapper	rock hind	sand tilefish	saucereye porgy	scamp	scup	silk snapper	snowy grouper	speckled hind	tomtate	vermilion snapper	warsaw grouper	white grunt	whitebone porgy	yellowedge grouper	yellowfin grouper	yellowmouth grouper	yellowtail snapper
Devils Hole Sub-Alternative 2a	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Devils Hole Sub-Alternative 2b	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Devils Hole Sub-Alternative 2c	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Devils Hole Sub-Alternative 2d	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.1%	0.0%	0.1%	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Devils Hole SC South Sub-Alternative 2e	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Habitat protection associated with the proposed Spawning SMZs off South Carolina varies with each alternatives size and location. Establishing the Devils Hole Spawning SMZ (**Alternative 2**) would directly protect between 1 and 15.2 square miles of a shelf edge and associated hard live bottom habitat, which serves as EFH to species in the snapper grouper complex from the impact of fishing gear. Establishing the South Carolina South Spawning SMZ **Sub-alternative 2e** to Devils Hole would directly protect 8 square miles of shelf edge and deep water hard live bottom habitat utilized primarily by snowy grouper and yellowedge grouper. Establishing the Area 51 and Area 53 Spawning SMZs (**Alternatives 3** and **4**) would directly protect 2.58 square miles each of primarily artificial reef and associated hard live bottom habitat established by researchers to document habitat development and species utilization patterns of unfished reef fish habitat. In addition, as persistent spawning locations for species in the snapper grouper complex are identified, they will also serve as EFH-HAPC. As an EFH-HAPC, NMFS would in the EFH consolation and permit review process, emphasize and focus conservation recommendations on eliminating or reducing the impact of non-fishing activities on these unique and limited habitats.

Off South Carolina, the largest projected impacts were a 0.6% reduction in commercial tomtate landings under Devils Hole **Sub-Alternative 2a** and a 0.3% reduction in recreational scamp landings under Devils Hole **Sub-Alternatives 2a/2d** (**Table 4.4.1.3**). If appropriately located, a larger SMZ would be more effective than a smaller SMZ. In terms of size, **Sub-alternative 2d** is the largest of the proposed Spawning SMZs, followed by **Sub-alternative 2a**. Thus, the greatest biological benefits for snapper grouper species would be provided by **Sub-alternative 2a** followed by **Sub-alternative 2d**, **Sub-alternatives 2e**, **Sub-alternative 2b**, **Sub-alternative 2c**, **Alternative 4**, **Alternative 3**, and **Alternative 1**.

Regardless of the alternative or sub-alternative selected, none is anticipated to have adverse effects on listed large whales, or any DPS of Atlantic sturgeon; ESA-listed corals and smalltooth sawfish do not occur off North Carolina. Previous Endangered Species Act (ESA) consultations determined the hook-and-line sector of the snapper grouper fishery was not likely to adversely affect large whales or any DPS of Atlantic sturgeon. For the species that may interact with the fishery off South Carolina (i.e., sea turtles), there is likely to be no additional biological benefit from **Alternative 1 (No Action)** because it would perpetuate the existing level of risk for interactions between these ESA-listed species and the fishery. The overall benefit of the remaining Alternatives depends on impacts on fishing effort and fishing effort distribution. Evaluating these potential changes in fishing effort and effort distribution is difficult. If these Alternatives simply displace the existing level of fishing effort, there may be no change in the likelihood interactions between the fishery and sea turtles. Conversely, if these closures actually reduce the total amount of fishing effort, the likelihood of interactions between the fishery and sea turtles may be reduced, providing biological benefits. If the latter were true, **Sub-Alternative 2d** would likely be the most biologically beneficial for sea turtles, relative to **Alternative 1 (No Action)** followed by **Sub-Alternative 2a, Sub-Alternative 2e, Sub-Alternative 2b,** and **Alternatives 3** and **4** with **Sub-Alternative 2c** being the least biologically beneficial for sea turtles.

4.4.2 Economic Effects

The potential positive and negative direct economic effects for these Spawning SMZs will follow the same as those described in general under **Action 1**. As the alternatives are finalized and preferred alternatives are selected, more specific analyses can be provided for each action. Should the Council choose more than one preferred alternative (and a corresponding sub-alternative, as appropriate) for this action, the economic effects of all the preferred alternatives for both the commercial and recreational sectors will be additive. In general, the larger the Spawning SMZs are, and the more desirable the fishing areas are that would be closed, the greater the potential short-term direct and indirect negative effects will be. Should the spawning stock biomass increase for the species receiving the additional protection, it would likely have long-term direct positive economic effects, because more fish would be available to fishermen away from the Spawning SMZs.

Reductions in expected catch are very difficult to measure given the large statistical grids used for reporting catch data. A quantitative approach, as described in **Section 4.3.2**, was developed by the SERO and estimated landings reductions from areas proposed as Spawning SMZs are shown in **Table 4.4.1.3**. Off South Carolina, the largest projected impacts were a 0.6% reduction in commercial tomtate landings under Devils Hole **Sub-Alternative 2a** and a 0.3% reduction in headboat scamp landings under Devils Hole **Sub-Alternative 2d** (**Table 4.4.1.3**). The estimated reduction in commercial landings in lbs (gw) for each snapper grouper species was multiplied by the average annual price per lb (gw) (2012 through 2014)[9] for each species to obtain estimates of displaced ex-vessel revenue for each Spawning SMZ alternative. Aggregated across all snapper grouper species, Devils Hole **Sub-Alternative 2a** is estimated to reduce total revenue by the most in comparison to the other alternatives (2014 dollars) (**Table 4.4.2.1**). Assuming this $5,468 reduction in revenue (2014 dollars) is borne entirely by the vessels described in **Section 3.3.1**, and that they are unable to substitute landings in other areas, on average (2010 through 2014), these vessels would experience a 0.03% reduction in ex-vessel revenue. **Sub-Alternatives 2b**, **2c**, **2d**, and **2e** are all estimated to have a smaller effect on total ex-vessel revenue than **Sub-Alternative 2a**; however, given the high uncertainty in the model[10], it is unlikely these estimated impacts are statistically different from each other. **Alternative 3** and **Alternative 4** pertain to aritifcial reef sites Area 51 and Area 53. Because these locations are undisclosed to the public, it is assumed there is no fishing activity occurring there currently. As such, **Alternative 3** and **Alternative 4** are not expected to affect ex-vessel revenue. A reasonable assumption based on the results of the model is that the reduction in total ex-vessel revenue would be minimal for all of the Spawning SMZ alternatives. If in fact fishermen are harvesting species within the proposed Spawning SMZ areas at a much higher rate than elsewhere in the South Atlantic, the true effects of these closures on ex-vessel revenue could be more substantial than predicted.

[9] Average annual prices were derived from Coastal Logbook data augmented with revenue estimates as provided by the SEFSC (July 2015).

[10] The model employed here assumes uniformly distributed effort within each logbook area and no redistribution of effort after a closure.

Table 4.4.2.1. Estimated reduction in ex-vessel revenue and headboat angler CS from each proposed Spawning SMZ alternative for South Carolina (2014 dollars).

SMZ alternative	Reduction in ex-vessel revenue	Reduction in headboat angler CS
Devils Hole Sub-Alternative 2a	$5,468	$6,539
Devils Hole Sub-Alternative 2b	$2,264	$2,402
Devils Hole Sub-Alternative 2c	$68	$908
Devils Hole Sub-Alternative 2d	$2,264	$7,915
Devils Hole SC South Sub-Alternative 2e	$9	$531

Source: SERO Social Science Branch (August 2015).

With respect to headboats, the estimated reduction in landings for each species in numbers of fish, as originally reported, was multiplied by consumer surplus (CS) values from **Section 3.3.2** to estimate the reduction in CS from each alternative[11]. The aggregate reduction in CS across all snapper grouper species for Devils Hole **Sub-Alternative 2d** is estimated to be approximately $8,000 (2014 dollars) (**Table 4.4.2.1**). This would be a 0.03% reduction in total estimated CS for all snapper grouper species harvested on headboats in the South Atlantic. **Sub-Alternatives 2a, 2b**, **2c** and **2e** are all estimated to have a smaller effect on headboat angler CS than **Alternative 5**; however, given the high uncertainty in the model, it is unlikely these impacts are statistically different from each other. **Alternative 3** and **Alternative 4** pertain to aritifcial reef sites Area 51 and Area 53. Because these locations are undisclosed to the public, it is assumed there is no fishing activity occurring there currently. As such, **Alternative 3** and **Alternative 4** are not expected to affect headboat angler CS. A reasonable assumption based on the results of the model is that the reduction in headboat angler CS would be minimal for all of the SMZ alternatives. If in fact anglers are harvesting species within the proposed areas at a much higher rate than elsewhere in the South Atlantic, the true impacts to CS could be more substantial than predicted. CS impacts for other recreational modes, private/rental vessels and charter vessels, are unavailable because there is insufficient spatial resolution in corresponding landings data. It is expected that these other recreational modes would experience comparable reductions in landings and CS to the headboat mode.

4.4.3 Social Effects

Section 4.1.3 describes potential effects on fishermen and fishing communities from designation of Spawning SMZs with prohibitions on fishing for snapper grouper species, and these would be expected to be similar for **Alternatives 2 - 4**. This action would primarily affect South Carolina fishermen and communities described in the **Section 3.3.3** but also could affect fishermen living nearby in North Carolina or Georgia if they fish in the EEZ off South Carolina. Additionally,

[11] For snapper species, excluding red snapper, the WTP value of $12.37 (2014 dollars) was used. For grouper species, the WTP value of $103 (2014 dollars) was used. For red snapper, the WTP value of $81 (2014 dollars) was used. For all other species, for which there were no specific WTP values available, a WTP value for either snappers or groupers was applied on a case-by-case basis based on anectdotal evidence and comparison of commercial prices.

this action could affect visitors to the South Carolina coast who travel to go fishing on private trips or for-hire trips.

In general, larger Spawning SMZs would more likely result in negative effects on fishermen than smaller SMZs if these areas are used by fishermen to target snapper grouper species. **Alternative 2**, **Sub-alternative 2a** would be expected to result in more negative social effects than **Sub-alternative 2b**, and **Alternative 2c** would have the least negative social effects under this action. No additional negative social effects would be expected under **Alternative 1 (No Action)**, but there could also be forfeited social benefits if the proposed Spawning SMZs in **Alternatives 2 - 4** were not in place to protect spawning habitat.

4.4.4 Administrative Effects

Alternative 1 (No Action) would retain the existing boundaries and fishing prohibitions in the protected areas off the coast of South Carolina. As such, the alternative would retain the current level of administrative effects. There are logistical and economical costs of monitoring spatial and temporal fishing closures by law enforcement personnel. The costs may be mitigated by public compliance with the regulations. **Alternatives 2** through **4** would increase the adverse administrative effects as they would implement spatial closures in the form of Spawning SMZs. Law enforcement personnel would have new spatial closures to enforce and the Council and NMFS would be tasked with notifying the public of the regulation changes and continue to respond to public inquiries concerning the Spawning SMZs. In addition, the burden on law enforcement is higher for closed areas that allow some type of fishing as would be the case if new Spawning SMZs were designated.

During the development of Amendment 14 to the Snapper Grouper FMP, the Law Enforcement Committee and AP jointly outlined criteria for establishing marine reserves (**Appendix B** to Amendment 14 to the Snapper Grouper FMP). In the report, they stated that enforceability of the sites would increase if the sites were large and configured in a square or rectangle, delineated in latitude and longitude, in an acceptable format to be included and identified on NOAA charts, limited in allowable activities, located away from highly populated areas, and had on-site enforcement capability. Using these points, the adverse administrative effects to law enforcement would increase from **Sub-alternative 2c** to **Alternative 3**/**Alternative 4** to **Sub-alternative 2b to Sub-alternative 2e** to **Sub-alternative 2a** to **Sub-alternative 2d**.

4.5 Action 5. Establish a Spawning Special Management Zone (Spawning SMZ) off Georgia

4.5.1 Biological and Ecological Effects

Alternatives
(preferred alternatives in bold)

1. **Preferred. No action. There are no Spawning SMZs off Georgia.**

2. Establish Spawning SMZs in the ST. Simons area that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.
   - 2a. St. Simons Area (14.1 mi^2)
   - 2b. St. Simons Area (9.4 mi^2)
   - 2c. St. Simons Area (4 mi^2)

There are no Spawning SMZs given that they are new and proposed in Amendment 36 (**Alternative 1 ((No Action)**). **Alternative 2** would establish a Spawning SMZ in the St. Simons 2 area ranging in size from 4 square miles (**Sub-Alternative 2c**) to 14.1 square miles (**Sub-Alternative 2a**). The larger the area protected, the greater the biological benefits from protecting more spawning fish and area.

To the extent that spawning fish are protected from fishing there would be positive biological benefits from establishing Spawning SMZs off Georgia. The available catch by location data for the commercial and headboat sectors were used to provide a quantitative estimate of potential impacts. A similar analysis was previously provided to the Snapper Grouper Advisory Panel (AP) and they indicated concern that due to data limitations, the potential impacts are not accurate. During the Public Hearing II hearings, the public will be asked to provide input on how the areas under consideration would impact their catches and whether the impacts are over or under-estimated.

Methods for determining biological effects of Spawning SMZs are discussed in detail in **Section 4.3.1**. Off Georgia, gag, gray triggerfish, red porgy, red snapper, scamp, speckled hind, vermilion snapper, and white grunt (**Figure 4.5.1.1**, **Table 4.5.1.1**) have been collected through MARMAP/SEFIS sampling in the proposed St. Simons Spawning SMZ (**Alternative 2**). A few spawning condition female gray triggerfish, red snapper, and scamp have been observed, along with numerous spawning condition female vermilion snapper in all the sub-alternatives for this SMZ (**Table 4.5.1.2**). No high-resolution bathymetry is available within these proposed SMZ alternatives; however, it is apparent from the low-resolution bathymetry that the site is located on the shelf-edge (**Figure 4.5.1.1**).

Table 4.5.1.1. Number of MARMAP sets (1996-2011) with histological samples taken within proposed SMZ alternatives.

SMZ Alternative	blueline tilefish	gag	gray triggerfish	red grouper	red porgy	red snapper	scamp	snowy grouper	speckled hind	tilefish	vermilion snapper	white grunt	Grand Total
St. Simons 2 Sub-Alternative 2a		2	36		15	4	11		7		23	1	99
St. Simons 2 Sub-Alternative 2b		2	36		15	4	11		7		23	1	99
St. Simons 2 Sub-Alternative 2c			16		7	3	7		4		16	1	54

Table 4.5.1.2. Number of females observed within 48 hours of spawning observed by MARMAP (1996-2011) within proposed SMZ alternatives.

SMZ Alternative	blueline tilefish	gray triggerfish	red snapper	scamp	snowy grouper	vermilion snapper	Grand Total
St. Simons 2 Sub-Alternative 2a		2	2	1		123	128
St. Simons 2 Sub-Alternative 2b		2	2	1		123	128
St. Simons 2 Sub-Alternative 2c		2	1	1		100	104

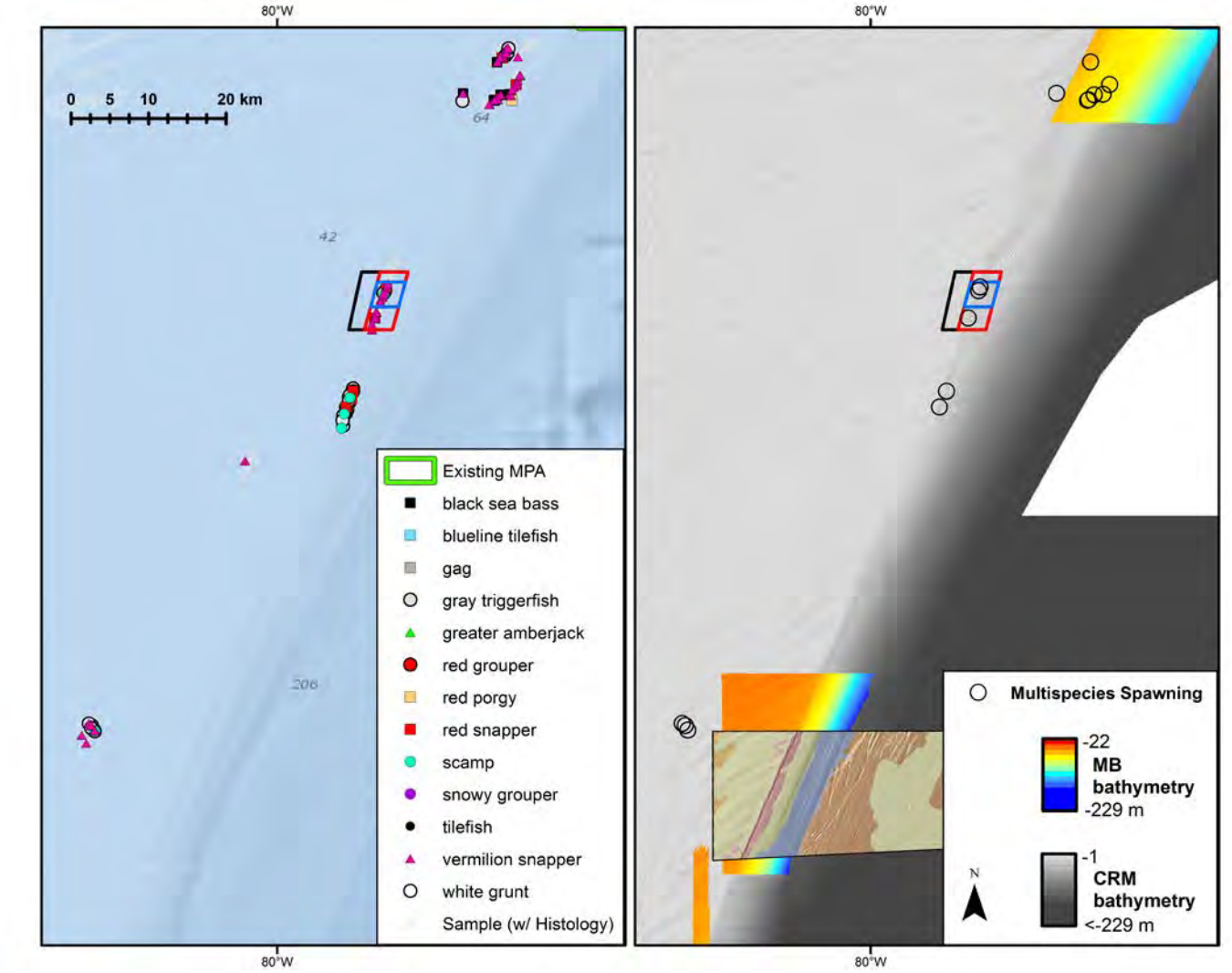


Figure 4.5.1.1. *Spawning condition females and bathymetric features off Georgia St. Simon's SMZ Proposed Sites.* On left, fishery-independent samples of female fish within 48 hours of spawning, by species. On right, the 90-m resolution NOAA Coastal Relief Model (CRM) and a merged layer of higher-resolution multi-beam (MB) bathymetry are shown relative to sites where females of multiple species have been captured in spawning location at the same time (circles).

Methods for estimating reductions in catches from SMZ implementation are discussed in detail in **Section 4.3.1**. Off Georgia, the largest projected impacts were a 0.1% reduction in commercial black snapper landings under all the St. Simons Alternatives; all recreational reductions were estimated at less than 0.0% (**Table 4.5.1.3**). Although the relatively poor ability to resolve logbook-reported landings data to the scale of the SMZs or to identify key fishing habitats within the resolution of the data makes the outputs of this quantitative analysis highly uncertain, it seems reasonable to conclude that the overall impacts across stocks for the Georgia sites will be relatively low.

Table 4.5.1.3. Percent reductions in landings (lb ww) estimated from SMZ implementation, based on mean 2012-2014 landings.

Commercial (Source: SEFSC Commercial Logbook, April 2015)

SMZ Alternative	almaco jack	banded rudderfish	bar jack	black grouper	black sea bass	black snapper	blackfin snapper	blue runner	blueline tilefish	coney	cubera snapper	dog snapper	gag	golden tilefish	gray snapper	gray triggerfish	graysby	greater amberjack	grunts	hogfish	jolthead porgy	knobbed porgy	lane snapper	lesser amberjack	mahogany snapper
St. Simons 2 Sub-Alternative 2a	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
St. Simons 2 Sub-Alternative 2b	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
St. Simons 2 Sub-Alternative 2c	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

SMZ Alternative	margate	misty grouper	mutton snapper	porkfish	queen snapper	red grouper	red hind	red porgy	red snapper	rock hind	sailors choice	sand tilefish	scamp	scup	silk snapper	snowy grouper	speckled hind	tomtate	vermilion snapper	warsaw grouper	white grunt	whitebone porgy	yellowedge grouper	yellowfin grouper	yellowtail snapper
St. Simons 2 Sub-Alternative 2a	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
St. Simons 2 Sub-Alternative 2b	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
St. Simons 2 Sub-Alternative 2c	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Recreational (Source: SEFSC Southeast Headboat Survey Logbook, February 2015)

SMZ Alternative	almaco jack	atlantic spadefish	banded rudderfish	bar jack	black grouper	black sea bass	black snapper	blackfin snapper	blue runner	blueline tilefish	coney	cubera snapper	dog snapper	gag	golden tilefish	goliath grouper	gray snapper	gray triggerfish	graysby	greater amberjack	hogfish	jolthead porgy	knobbed porgy	lane snapper	lesser amberjack	mahogany snapper
St. Simons 2 Sub-Alternative 2a	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
St. Simons 2 Sub-Alternative 2b	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
St. Simons 2 Sub-Alternative 2c	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

SMZ Alternative	margate	misty grouper	mutton snapper	nassau grouper	queen snapper	red grouper	red hind	red porgy	red snapper	rock hind	sand tilefish	saucereye porgy	scamp	scup	silk snapper	snowy grouper	speckled hind	tomtate	vermilion snapper	warsaw grouper	white grunt	whitebone porgy	yellowedge grouper	yellowfin grouper	yellowmouth grouper	yellowtail snapper
St. Simons 2 Sub-Alternative 2a	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
St. Simons 2 Sub-Alternative 2b	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
St. Simons 2 Sub-Alternative 2c	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

The Council is proposing the implementation of Spawning SMZs. The fishing for, harvest, and possession of species in the snapper grouper fishery management unit (FMU) would be prohibited within the SMZs. The Council is also considering allowing transit through the Spawning SMZs with snapper grouper species onboard under certain conditions. Bycatch of the snapper grouper species within the closed areas would be significantly reduced or eliminated. Bycatch would only occur through poaching activities or while fishing for other species not in the snapper grouper FMU (e.g., dolphin, wahoo, mackerel, tuna, sharks). Bycatch while fishing for the species not in the snapper grouper FMU is unlikely as these species are pelagic species or likely not in the areas where the SMZs are being proposed. It is not clear if overall bycatch of species in the snapper grouper FMU would decrease since fishermen may transfer effort outside the closed areas.

Off Georgia, the largest projected impacts were a 0.1% reduction in commercial black snapper landings under all the St. Simons Alternatives; all recreational reductions were estimated at less than 0.0% (**Table 4.5.1.3**). If appropriately located, a larger SMZ would be more effective than a smaller SMZ. In terms of size, the greatest biological benefits for snapper grouper species would be provided by **Sub-alternative 2a** followed by **Sub-alternative 2c**, **Sub-alternative 2c,** and **Alternative 1**.

Habitat protection associated with the proposed Spawning SMZs off Georgia varies with each alternatives size and location. Establishing the St. Simons 2 Spawning SMZ (**Alternative 2**) would directly protect between 4 and 14.1 square miles of shelf edge hard live bottom habitat which serves as essential fish habitat for species in the snapper grouper complex from the impact of fishing gear. In addition, as persistent spawning locations for species in the snapper grouper complex are identified, they would also serve as Essential Fish Habitat-Habitat Area of Particular Concern (EFH-HAPC). As an EFH-HAPC, NMFS would in the EFH consultation and permit review process, emphasize and focus conservation recommendations on eliminating or reducing the impact of non-fishing activities on these unique and limited habitats.

Regardless of the alternative or sub-alternative selected, none is anticipated to have adverse effects on listed large whales or any distinct population segments (DPS) of Atlantic sturgeon; ESA-listed corals and smalltooth sawfish do not occur off Georgia. Previous ESA consultations determined the hook-and-line sector of the snapper grouper fishery was not likely to adversely affect large whales or any DPS of Atlantic sturgeon. For the species that may interact with the fishery (i.e., sea turtles), there is likely to be no additional biological benefit from **Alternative 1 (No Action)** because it would perpetuate the existing level of risk for interactions between these ESA-listed species and the fishery. The overall benefit of the remaining alternatives depends on impacts on fishing effort and fishing effort distribution. Evaluating these potential changes in fishing effort and effort distribution is difficult. If these alternatives simply displace the existing level of fishing effort, there may be no change in the likelihood interactions between the fishery and sea turtles. Conversely, if these closures actually reduce the total amount of fishing effort, the likelihood of interactions between the fishery and sea turtles may be reduced, providing biological benefits. If the latter is true, **Sub-Alternative 2a** would likely be the most biologically beneficial for sea turtles, relative to **Alternative 1 (No Action)**, followed by **Sub-Alternative 2b** with **Sub-Alternative 2c** being the least biologically beneficial for sea turtles.

4.5.2 Economic Effects

The potential positive and negative direct economic effects for these Spawning SMZs will follow the same as those described in general under **Action 1**. As the alternatives are finalized and preferred alternatives are selected, more specific analyses can be provided for each action. In general, the larger the Spawning SMZs are, and the more desirable the fishing areas are that would be closed, the greater the potential short-term direct and indirect negative effects will be. Should the spawning stock biomass increase for the species receiving the additional protection, it would likely have long-term direct positive economic effects, because more fish would be available to fishermen away from the Spawning SMZs.

Reductions in expected catch are very difficult to measure given the large statistical grids used for reporting catch data. A quantitative approach, as described in **Section 4.3.2**, was developed by the SERO and estimated landings reductions from areas proposed as Spawning SMZs are shown in **Table 4.5.1.3**. Off Georgia, the projected impacts were indistinguishable across the St. Simons Alternatives, with the largest projected impact being a 0.1% reduction in commercial black snapper landings; all reductions in headboat landings were estimated at less than 0.0% (**Table 4.5.1.3**). The estimated reduction in commercial landings in lbs (gw) for each snapper grouper species was multiplied by the average annual price per lb (gw) (2012 through 2014)[12] for each species to obtain estimates of displaced ex-vessel revenue for each Spawning SMZ alternative. Aggregated across all snapper grouper species, **Sub-Alternatives 2a**, **2b**, and **2c** are each estimated to reduce total revenue by approximately $2,500 (2014 dollars) (**Table 4.5.2.1**). Assuming this reduction in revenue is borne entirely by the vessels described in **Section 3.3.1** and that they are unable to substitute landings in other areas, on average (2010 through 2014), these vessels would experience a 0.01% reduction in ex-vessel revenue. These estimates are highly uncertain because they assume uniformly distributed effort within spatial grids. If in fact fishermen are harvesting species within the proposed Spawning SMZ areas at a much higher rate than elsewhere in the South Atlantic, the true effects of these closures on ex-vessel revenue could be more substantial than predicted.

Table 4.5.2.1. Estimated reduction in ex-vessel revenue and headboat angler CS from each proposed Spawning SMZ alternative for Georgia (2014 dollars).

SMZ alternative	Reduction in ex-vessel revenue	Reduction in headboat angler CS
St. Simons 2 Sub-Alternative 2a	$2,505	$0
St. Simons 2 Sub-Alternative 2b	$2,504	$0
St. Simons 2 Sub-Alternative 2c	$2,504	$0

Source: SERO Social Science Branch (August 2015).

With respect to headboats, there is no estimated reduction in landings from St. Simons **Sub-Alternatives 2a**, **2b**, and **2c** and therefore no estimated impact to consumer surplus (CS). CS impacts for other recreational modes, private/rental vessels and charter vessels, are unavailable

[12] Average annual prices were derived from Coastal Logbook data augmented with revenue estimates as provided by the SEFSC (July 2015).

because there is insufficient spatial resolution in corresponding landings data. It is expected that these other recreational modes would experience comparable reductions in landings and CS to the headboat mode. These estimates are highly uncertain because they assume uniformly distributed effort within spatial grids; however, it seems reasonable to assume that the proposed Spawning SMZ areas would have only a small effect if any on recreational CS.

4.5.3 Social Effects

Section 4.1.3 describes potential effects on fishermen and fishing communities from designation of a Spawning SMZs with prohibitions on fishing for snapper grouper species. These effects would be expected to be similar for **Alternatives 2 - 3**. Action 5 would primarily affect Georgia fishermen and communities described in the **Section 3.3.3** but also could affect fishermen living nearby in South Carolina and Florida if they fish in the EEZ off Georgia. Additionally, this action could affect visitors to the Georgia coast who travel to go fishing on private trips or for-hire trips.

In general, larger Spawning SMZs would be more likely to result in negative social effects to fishermen than smaller areas if these locations are used by fishermen to target snapper grouper species. Enhanced negative effects could be experienced by Georgia fishermen due to the relative proportion of closed area in the EEZ off Georgia because the Georgia coast is small. **Alternative 2**, **Sub-alternative 2a** would be expected to result in more negative social effects than **Sub-alternative 2b**, and **Alternative 2c** would have the least social effects under this action. For **Alternative 3**, the negative effects on fishermen and communities would be expected to be greater in **Sub-alternative 3a**, followed by **Sub-alternative 3b**, and then **Sub-alternative 3c.** There would be no additional negative effects on fishermen expected under **Alternative 1 (No Action)**, but there could be forfeited social benefits if the **Alternatives 2 - 3** Spawning SMZs were not in place to protect spawning habitat.

4.5.4 Administrative Effects

Alternative 1 (No Action) would retain the existing fishing boundaries and prohibitions in the protected areas off the coast of Georgia. As such, the alternative would retain the current level of administrative effects. There are logistical and economical costs of monitoring spatial and temporal fishing closures by law enforcement personnel. The costs may be mitigated by public compliance with the regulations. **Alternative 2** would increase the adverse administrative effects as they would implement spatial closures in the form of Spawning SMZs. Law enforcement personnel would have new spatial closures to enforce and the Council and NMFS would be tasked with notifying the public of the regulation changes and continue to respond to public inquiries concerning the Spawning SMZs. In addition, the burden on law enforcement is higher for closed areas that allow some type of fishing as would be the case if new Spawning SMZs were designated.

During the development of Amendment 14 to the Snapper Grouper FMP, the Law Enforcement Committee and AP jointly outlined criteria for establishing marine reserves

(**Appendix B** to Amendment 14 to the Snapper Grouper FMP). In the report, they stated that enforceability of the sites would increase if the sites were larger and configured in a square or rectangle, delineated in latitude and longitude, in an acceptable format to be included and identified on NOAA charts, limited in allowable activities, located away from highly populated areas, and had on-site enforcement capability. Using these points, the adverse administrative effects to law enforcement would increase from **Sub-alternative 2c** to **Sub-alternative 2b to Sub-alternative 2a.**

4.6 Action 6. Establish Spawning Special Management Zones (Spawning SMZs) off Florida

4.6.1 Biological and Ecological Effects

Alternatives
(preferred alternatives in bold)

1. No action. There are no Spawning SMZs off Florida.

2. **Preferred. Establish a Spawning SMZ in the Warsaw Hole area that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.**
   2a. Warsaw Hole (2 mi^2)
   Preferred. 2b. Warsaw Hole (1 mi^2)
   2c. Warsaw Hole (4 mi^2)

3. Establish a Spawning SMZ in the Daytona Steeples area that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.
   3a. Daytona Steeples (6 mi^2)
   (area of apparent high relief in the 27 square mile footprint)
   3b. Daytona Steeples (12 mi^2)
   3c. Daytona Steeples (6 mi^2)

There are no Spawning SMZs given that they are new and proposed in Amendment 36 (**Alternative 1 ((No Action)**). **Alternative 2** would establish a Spawning SMZ in the Warsaw Hole area ranging in size from 4 square mile (**Sub-Alternative 2c**) to 1 square mile (**Sub-Alternative 2b**). The larger the area protected, the greater the biological benefits from protecting more spawning fish and area.

To the extent that spawning fish are protected from fishing there would be positive biological benefits. The available catch by location data for the commercial and headboat sectors were used to provide a quantitative estimate of potential impacts. A similar analysis was previously provided to the Snapper Grouper Advisory Panel (AP) and they indicated concern that due to data limitations, the potential impacts are not accurate. During the Public Hearing II hearings, the public was asked to provide input on how the areas under consideration would impact their catches and whether the impacts are over or under-estimated.

Methods for determining biological effects of Spawning SMZ are discussed in detail in **Section 4.3.1**. Off Florida, the proposed Daytona Steeples Spawning SMZ (**Alternative 3**) has never been sampled by MARMAP/SEFIS/FWC (**Figure 4.6.1.1**, **Table 4.6.1.1**). Several sites inshore and southwest of the proposed SMZ have records of spawning condition gray triggerfish, red grouper, red snapper, vermilion snapper, and white grunt (**Figure 4.6.1.1**). No high-resolution sampling has been conducted to date within the proposed Spawning SMZ sites; however, high-resolution sampling to the north has shown the presence of numerous pinnacle features inshore of the shelf-edge.

The proposed Warsaw Hole Spawning SMZ (**Alternative 2**) has never been sampled by MARMAP/SEFIS/FWC (**Figure 4.6.1.2**, **Table 4.6.1.1**). This site was identified by the Council's MPA Expert Working Group as having contained aggregations of warsaw grouper. The NOAA Ship Nancy Foster completed a multibeam survey of this site prior to the June 2015 Council meeting and returned some compelling high-resolution bathymetry showing the presence of a deep, wide sinkhole (lip at ~300 feet, bottom at ~400 feet, width ~ 1,150 feet) with numerous interesting ledge features extending to the west, an additional smaller hole to the east, and a unique embayment feature to the southeast. Only the largest proposed Spawning SMZ (**Sub-alternative 2c**) captures all of these features.

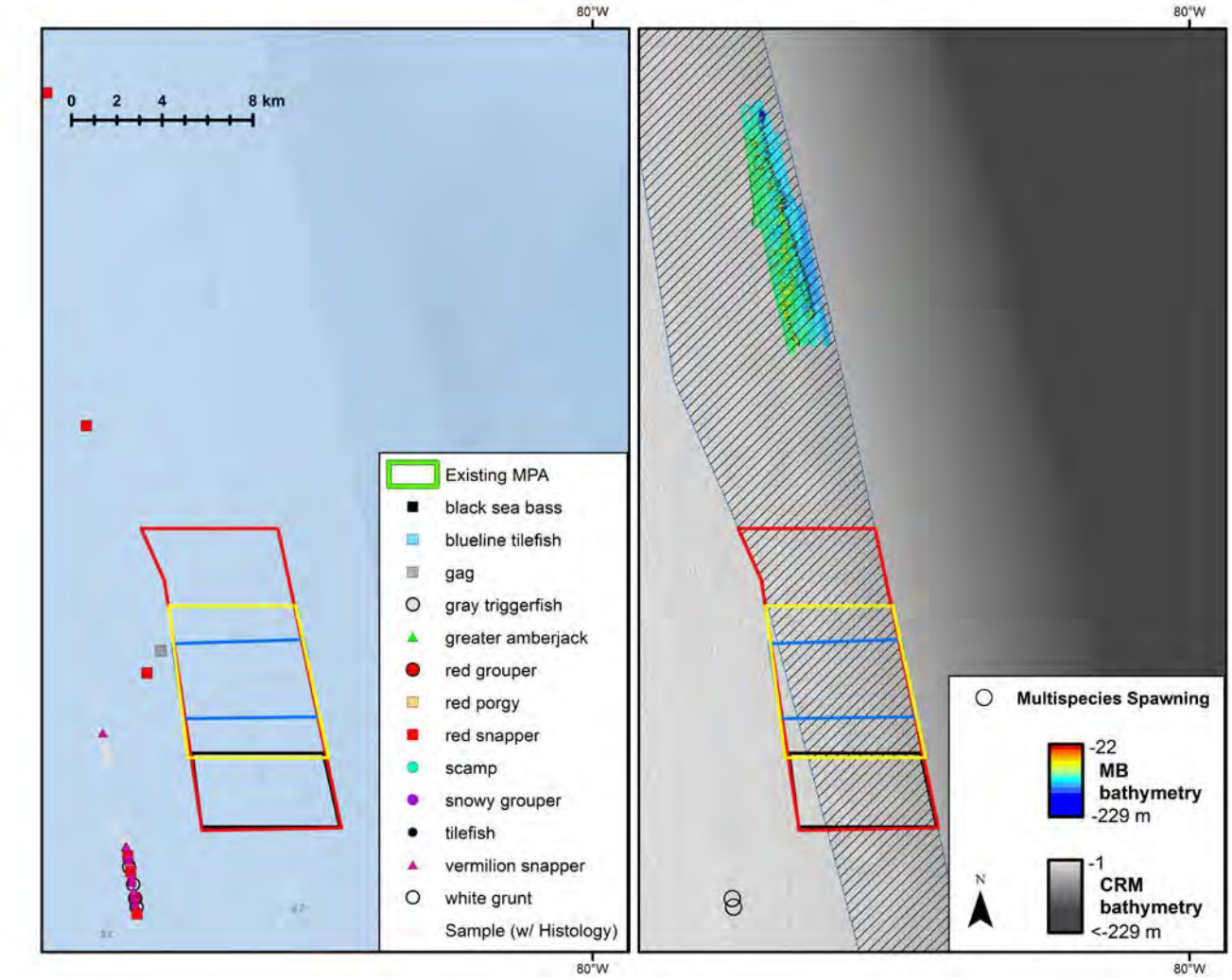


Figure 4.6.1.1. *Spawning condition females and bathymetric features off Florida Daytona Steeples SMZ Proposed Sites.* On left, fishery-independent samples of female fish within 48 hours of spawning, by species. On right, the 90-m resolution NOAA Coastal Relief Model (CRM) and a merged layer of higher-resolution multi-beam (MB) bathymetry are shown relative to sites where females of multiple species have been captured in spawning location at the same time (circles).

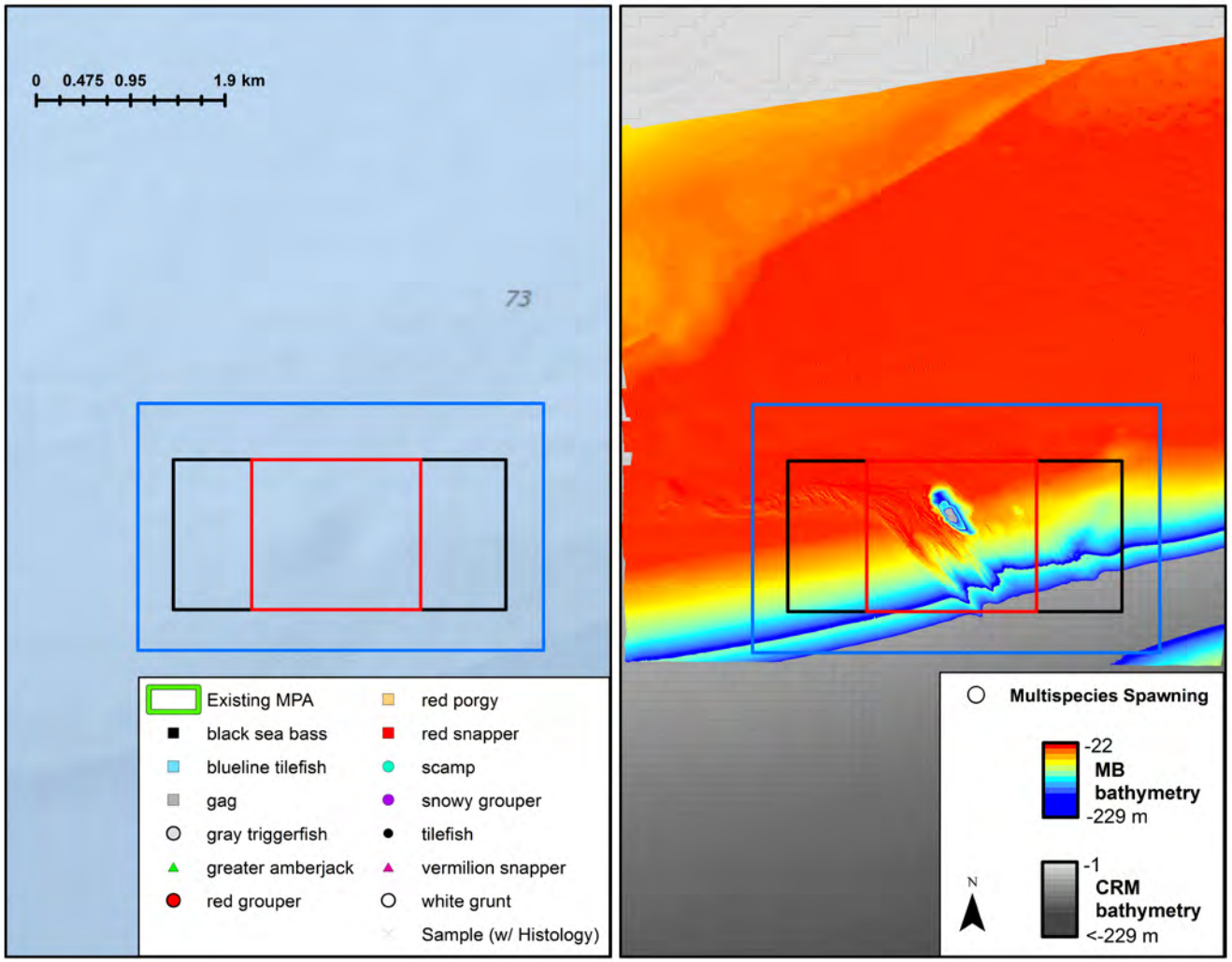


Figure 4.6.1.2. *Spawning condition females and bathymetric features off Florida Warsaw Hole SMZ Proposed Sites.* On left, fishery-independent samples of female fish within 48 hours of spawning, by species. On right, the 90-m resolution NOAA Coastal Relief Model (CRM) and a merged layer of higher-resolution multi-beam (MB) bathymetry are shown relative to sites where females of multiple species have been captured in spawning location at the same time (circles).

Methods for estimating reductions in catches from implementation of Spawning SMZs are discussed in detail in **Section 4.3.1**. Off Florida, the largest projected impacts were a 1.2% reduction in commercial blackfin snapper landings under all the Warsaw Hole Alternatives (**Table 4.6.1.1**). No reductions in harvest for recreational stocks were estimated above 0.1% (**Table 4.6.1.1**). Although the relatively poor ability to resolve logbook-reported landings data to the scale of the Spawning SMZs or to identify key fishing habitats within the resolution of the data makes the outputs of this quantitative analysis highly uncertain, it seems reasonable to conclude that the overall impacts across stocks for the Florida sites would be relatively low.

Table 4.6.1.1. Percent reductions in landings (lb ww) estimated from SMZ implementation, based on mean 2012-2014 landings.

Commercial (Source: SEFSC Commercial Logbook, April 2015)

SMZ Alternative	almaco jack	banded rudderfish	bar jack	black grouper	black sea bass	black snapper	blackfin snapper	blue runner	blueline tilefish	coney	cubera snapper	dog snapper	gag	golden tilefish	gray snapper	gray triggerfish	graysby	greater amberjack	grunts	hogfish	jolthead porgy	knobbed porgy	lane snapper	lesser amberjack	mahogany snapper
Daytona Steeples Smaller Area in 3a	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Daytona Steeples Sub-Alternative 3a	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Daytona Steeples Sub-Alternative 3b	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Daytona Steeples Sub-Alternative 3c	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Warsaw Hole Sub-Alternative 2a	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Warsaw Hole Sub-Alternative 2b	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Warsaw Hole Sub-Alternative 2c	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

SMZ Alternative	margate	misty grouper	mutton snapper	porkfish	queen snapper	red grouper	red hind	red porgy	red snapper	rock hind	sailors choice	sand tilefish	scamp	scup	silk snapper	snowy grouper	speckled hind	tomtate	vermilion snapper	warsaw grouper	white grunt	whitebone porgy	yellowedge grouper	yellowfin grouper	yellowtail snapper
Daytona Steeples Smaller Area in 3a	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Daytona Steeples Sub-Alternative 3a	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Daytona Steeples Sub-Alternative 3b	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Daytona Steeples Sub-Alternative 3c	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Warsaw Hole Sub-Alternative 2a	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Warsaw Hole Sub-Alternative 2b	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Warsaw Hole Sub-Alternative 2c	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Recreational (Source: SEFSC Southeast Headboat Survey Logbook, February 2015)

SMZ Alternative	almaco jack	atlantic spadefish	banded rudderfish	bar jack	black grouper	black sea bass	black snapper	blackfin snapper	blue runner	blueline tilefish	coney	cubera snapper	dog snapper	gag	golden tilefish	goliath grouper	gray snapper	gray triggerfish	graysby	greater amberjack	hogfish	jolthead porgy	knobbed porgy	lane snapper	lesser amberjack	mahogany snapper
Daytona Steeples Smaller Area in 3a	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Daytona Steeples Sub-Alternative 3a	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Daytona Steeples Sub-Alternative 3b	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Daytona Steeples Sub-Alternative 3c	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Warsaw Hole Sub-Alternative 2a	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Warsaw Hole Sub-Alternative 2b	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Warsaw Hole Sub-Alternative 2c	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

SMZ Alternative	margate	misty grouper	mutton snapper	nassau grouper	queen snapper	red grouper	red hind	red porgy	red snapper	rock hind	sand tilefish	saucereye porgy	scamp	scup	silk snapper	snowy grouper	speckled hind	tomtate	vermilion snapper	warsaw grouper	white grunt	whitebone porgy	yellowedge grouper	yellowfin grouper	yellowmouth grouper	yellowtail snapper
Daytona Steeples Smaller Area in 3a	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Daytona Steeples Sub-Alternative 3a	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%
Daytona Steeples Sub-Alternative 3b	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Daytona Steeples Sub-Alternative 3c	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Warsaw Hole Sub-Alternative 2a	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Warsaw Hole Sub-Alternative 2b	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Warsaw Hole Sub-Alternative 2c	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

The Council is proposing the implementation of Spawning SMZs. The fishing for, harvest, and possession of species in the snapper grouper FMU would be prohibited within the SMZs. The Council is also considering allowing transit through the Spawning SMZs with snapper grouper species onboard under certain conditions. Bycatch of the snapper grouper species within the closed areas would be significantly reduced or eliminated. Bycatch would only occur through poaching activities or while fishing for other species not in the snapper grouper FMU (e.g., dolphin, wahoo, mackerel, tuna, sharks). Bycatch while fishing for the species not in the snapper grouper FMU is unlikely as these species are pelagic species or likely not in the areas where the Spawning SMZs are being proposed. It is not clear if overall bycatch of species in the snapper grouper FMU would decrease since fishermen may transfer effort outside the closed areas.

Habitat protection associated with the proposed Spawning SMZs off the east coast of Florida varies with each alternatives size and location. Establishing the Warsaw Hole Spawning SMZ (**Alternative 3**) would directly protect between 1 and 4 square miles of a shelf edge and associated hard live bottom habitat, which serves as essential fish habitat to species in the snapper grouper complex from the impact of fishing gear. Establishing the Daytona Steeples Spawning SMZ (**Alternative 2**) would directly protect between 6 and 12 square miles of habitat associated with deep water coral ecosystem also serving as a Coral HAPC. In addition, as persistent spawning locations for species in the snapper grouper complex are identified, they would also serve as EFH-HAPC. As an EFH-HAPC, NMFS would in the EFH consultation and permit review process, emphasize and focus conservation recommendations on eliminating or reducing the impact of non-fishing activities on these unique and limited habitats.

Off Florida, the largest projected impacts were a 1.2% reduction in commercial blackfin snapper landings under all the Warsaw Hole Alternatives (**Table 4.6.1.1**). No reductions in harvest for recreational stocks were estimated above 0.1% (**Table 4.6.1.1**). If appropriately located, a larger SMZ would be more effective than a smaller SMZ. In terms of size, the greatest biological benefits for snapper grouper species would be provided by **Sub-alternative 3b** followed by **Sub-alternatives 3a** and **3c**, **Sub-alternative 2c, Sub-alternative 2a, Sub-alternative 2b,** and **Alternative 1**.

Regardless of the alternative or sub-alternative selected, none is anticipated to have adverse effects on listed *Acropora* species, large whales, or any distinct population segments (DPS) of Atlantic sturgeon. Previous ESA consultations determined the hook-and-line sector of the snapper grouper fishery was not likely to adversely affect ESA-listed corals, large whales, or any DPS of Atlantic sturgeon. For the species that may interact with the fishery (i.e., sea turtles and smalltooth sawfish), there is likely to be no additional biological benefit from **Alternative 1 (No Action)** because it would perpetuate the existing level of risk for interactions between these ESA-listed species and the fishery. The overall benefit of the remaining alternatives depends on impacts on fishing effort and fishing effort distribution. Evaluating these potential changes in fishing effort and effort distribution is difficult. If these alternatives simply displace the existing level of fishing effort, there may be no change in the likelihood interactions between the fishery and sea turtles and smalltooth sawfish. Conversely, if these closures actually reduce the total amount of fishing effort, the likelihood of interactions between the fishery and these species may be reduced, providing biological benefits. If the latter is true, **Alternative 3b** would likely be the

most biologically beneficial for sea turtles and smalltooth sawfish, relative to **Alternative 1 (No Action)**, followed by **Sub-Alternative 3a** and **3b, Sub-Alternative 2c, Sub-Alternative 2a** with **Sub-Alternative 2b** being the least biologically beneficial for sea turtles and smalltooth sawfish.

4.6.2 Economic Effects

The potential positive and negative direct economic effects for these Spawning SMZs will follow the same as those described in general under **Action 1**. As the alternatives are finalized and preferred alternatives are selected, more specific analyses can be provided for each action. Should the Council choose more than one preferred alternative (and a corresponding sub-alternative, as appropriate) for this action, the economic effects of all the preferred alternatives for both the commercial and recreational sectors will be additive. In general, the larger the Spawning SMZs are, and the more desirable the fishing areas are that would be closed, the greater the potential short-term direct and indirect negative effects will be. Should the spawning stock biomass increase for the species receiving the additional protection, it would likely have long-term direct positive economic effects, because more fish would be available to fishermen away from the Spawning SMZs.

Reductions in expected catch are very difficult to measure given the large statistical grids used for reporting catch data. A quantitative approach, as described in **Section 4.3.2**, was developed by the SERO and estimated landings reductions from areas proposed as Spawning SMZs are shown in **Table 4.6.1.1**. Off Florida, the largest projected impacts were a 1.2% reduction in commercial blackfin snapper landings under all the Warsaw Hole **Alternatives 2a-2c** (**Table 4.6.1.1**). Daytona Steeples **Sub-Alternative 3a**, however, is estimated to have the largest economic impact in terms of displaced ex-vessel revenue, as discussed below. The estimated reduction in commercial landings in lbs (gw) for each snapper grouper species was multiplied by the average annual price per lb (gw) (2012 through 2014)[13] for each species to obtain estimates of displaced ex-vessel revenue for each Spawning SMZ alternative. Aggregated across all snapper grouper species, Daytona Steeples **Sub-Alternative 3a** is estimated to reduce total revenue by approximately $3,700 (2014 dollars) (**Table 4.6.2.1**). Assuming this reduction in revenue is borne entirely by the vessels described in **Section 3.3.1** and that they are unable to substitute landings in other areas, on average (2010 through 2014), these vessels would experience a 0.02% reduction in ex-vessel revenue. **Sub-Alternatives 2a**, **2b**, and **2c**, and **Sub-Alternatives 3b** and **3c** are all estimated to have a smaller effect on total ex-vessel revenue than **Sub-Alternative 3a**; however, given the high uncertainty in the model[14], it is unlikely these estimated impacts are statistically different from each other. A reasonable assumption, based on the results of the model, is that the reduction in total ex-vessel revenue would be minimal for all of the Spawning SMZ alternatives. If in fact fishermen are harvesting species within the proposed Spawning SMZ areas at a much higher rate than elsewhere in the South Atlantic, the true effects of these closures on ex-vessel revenue could be more substantial than predicted.

[13] Average annual prices were derived from Coastal Logbook data augmented with revenue estimates as provided by the SEFSC (July 2015).

[14] The model employed here assumes uniformly distributed effort within each logbook area and no redistribution of effort after a closure.

Table 4.6.2.1. Estimated reduction in ex-vessel revenue and headboat angler CS from each proposed Spawning SMZ alternative for Florida (2014 dollars).

SMZ alternative	Reduction in ex-vessel revenue	Reduction in headboat angler CS
Warsaw Hole Sub-Alternative 2a	$931	$912
Warsaw Hole Sub-Alternative 2b	$931	$34
Warsaw Hole Sub-Alternative 2c	$931	$1,831
Daytona Steeples Sub-Alternative 3a	$3,717	$1,647
Daytona Steeples Sub-Alternative 3b	$2,735	$0
Daytona Steeples Sub-Alternative 3c	$2,735	$423

Source: SERO Social Science Branch (August 2015).

The estimated reduction in headboat landings for each species in numbers of fish, as originally reported, was multiplied by consumer surplus (CS) values from **Section 3.3.2** to estimate the reduction in CS from each alternative[15]. Warsaw Hole **Sub-Alternative 2c** is estimated to have the largest economic impact to recreational fishermen, with approximately a $1,800 (2014 dollars) loss in CS (**Table 4.6.2.1**). This would be a 0.01% reduction in total estimated CS for all snapper grouper species harvested on headboats in the South Atlantic. **Sub-Alternatives 2a** and **2b**, and **Sub-Alternatives 3a**, **3b**, and **3c** are all estimated to have a smaller effect on headboat angler CS than **Alternative 2c**; however, given the high uncertainty in the model, it is unlikely these impacts are statistically different from each other. A reasonable assumption based on the results of the model is that the reduction in headboat angler CS would be minimal for all of the Spawning SMZ alternatives. If in fact anglers are harvesting species within the proposed areas at a much higher rate than elsewhere in the South Atlantic, the true impacts to CS could be more substantial than predicted. CS impacts for other recreational modes, private/rental vessels and charter vessels, are unavailable because there is insufficient spatial resolution in corresponding landings data. It is expected that these other recreational modes would experience comparable reductions in landings and CS to the headboat mode.

4.6.3 Social Effects

Section 4.1.3 describes potential effects on fishermen and fishing communities from designation of a Spawning SMZs with prohibitions on fishing for snapper grouper species. These effects would be expected to be similar for **Alternatives 2 - 3**. Action 6 would primarily affect Florida fishermen and communities described in the **Section 3.3.3** but also could affect fishermen living nearby in South Carolina and Georgia if they fish in the EEZ off Florida. Additionally, this action could affect visitors to the Florida coast who travel to go fishing on private trips or for-hire trips.

[15] For snapper species, excluding red snapper, the WTP value of $12.37 (2014 dollars) was used. For grouper species, the WTP value of $103 (2014 dollars) was used. For red snapper, the WTP value of $81 (2014 dollars) was used. For all other species, for which there were no specific WTP values available, a WTP value for either snappers or groupers was applied on a case-by-case basis based on anectdotal evidence and comparison of commercial prices.

In general, larger Spawning SMZs would be more likely to result in negative social effects on fishermen than smaller areas if these locations used by fishermen to target snapper grouper species. Negative social effects could be more pronounced for Florida fishermen due to effects of the regulations associated with the Oculina Experimental Closed Area, Oculina HAPCs, and MPAs off the Florida east coast (Helies et al. 2011). Under **Alternative 2**, **Sub-alternative 2a** would be expected to result in more negative social effects than **Sub-alternative 2b**. For **Alternative 3**, the negative effects on fishermen and communities would be expected to be greater in **Sub-alternative 3a**, followed by **Sub-alternative 3b**, and then **Sub-alternative 3c.** There would be no additional negative effects on fishermen expected under **Alternative 1 (No Action)**, but there could also be forfeited social benefits if the SMZs in **Alternatives 2-3** were not in place to protect spawning habitat.

4.6.4 Administrative Effects

Alternative 1 (No Action) would retain the existing fishing boundaries and prohibitions in the protected areas off the coast of Florida. As such, the alternative would retain the current level of administrative effects. There are logistical and economical costs of monitoring spatial and temporal fishing closures by law enforcement personnel. The costs may be mitigated by public compliance with the regulations. **Alternatives 2** and **3** would increase the adverse administrative effects as they would implement spatial closures in the form of Spawning SMZs. Law enforcement personnel would have new spatial closures to enforce and the Council and NMFS would be tasked with notifying the public of the regulation changes and continue to respond to public inquiries concerning the Spawning SMZs. In addition, the burden on law enforcement is higher for closed areas that allow some type of fishing as would be the case if new Spawning SMZs were designated.

During the development of Amendment 14 to the Snapper Grouper FMP, the Law Enforcement Committee and AP jointly outlined criteria for establishing marine reserves (**Appendix B** to Amendment 14 to the Snapper Grouper FMP). In the report, they stated that enforceability of the sites would increase if the sites were larger and configured in a square or rectangle, delineated in latitude and longitude, in an acceptable format to be included and identified on NOAA charts, limited in allowable activities, located away from highly populated areas, and had on-site enforcement capability. Using these points, the adverse administrative effects to law enforcement would increase from **Sub-alternative 2b** to **Sub-alternative 2a** to **Sub-alternative 2c** to **Sub-alternative 3a/Sub-alternative 3c** to **Sub-alternative 3b.**

4.7 Action 7. Align the boundaries of the Charleston Deep Artificial Reef MPA with the U.S. Army Corps of Engineers' Permitted Artificial Reef Area

Alternatives
(preferred alternatives in bold)

1. No action. The existing Charleston Deep Artificial Reef MPA boundaries are: The northwest corner at 32°4' N, 79°12'W; the northeast corner at 32°8.5'N, 79° 7.75'W; the southwest corner at 32°1.5'N, 79°9.3'W; and the southeast corner at 32°6'N, 79°5'W.
2. **Preferred. Move the Charleston Deep Artificial Reef MPA 1.4 miles to the northwest to match the boundary of the U.S. Army Corps of Engineers' permitted artificial reef area.**

4.7.1 Biological and Ecological Effects

Action 7 proposes to move the existing footprint of the Charleston Deep Artificial Reef MPA. The surrounding area is non-hardbottom, so there are no negative short-term biological effects. The new boundary would encompass the material recently placed on-site and over the long-term, as fish accumulate on the site, there would be positive biological effects.

Habitat protection associated with moving the existing MPA would be the same under **Alternative 2** as is currently provided through **Alternative 1 (No Action)** given the area is the same size and the bottom is sandy. This area will also serve as Essential Fish Habitat-Habitat Area of Particular Concern (EFH-HAPC). As an EFH-HAPC, NMFS would in the EFH consultation and permit review process, emphasize and focus conservation recommendations on eliminating or reducing the impact of non-fishing activities on these unique and limited habitats.

Regardless of the alternative selected, none is anticipated to have adverse effects on listed *Acropora* species, large whales, or any distinct population segments (DPS) of Atlantic sturgeon. Previous Endangered Species Act (ESA) consultations determined the hook-and-line sector of the snapper grouper fishery was not likely to adversely affect *Acropora* species, large whales, or any DPS of Atlantic sturgeon. For the species that may interact with the fishery (i.e., sea turtles and smalltooth sawfish), there is likely to be no additional biological benefit from **Alternative 1 (No Action)** because it would perpetuate the existing level of risk for interactions between these ESA-listed species and the fishery. **Alternative 2** would result in the same size area being closed and there is no difference from **Alternative 1 (No Action)**.

4.7.2 Economic Effects

Action 7 reflects a modification of an artificial reef MPA that was created in an area where fishermen were not currently fishing. The current area encompassed by the Charleston Deep Artificial Reef MPA **Alternative 1 (No Action)**, does not encompass the location of the vessels sunk to create the artificial reef. The proposed shifting of the MPA boundaries in **Preferred Alternative 2** does not increase the size of the MPA, it only makes modifications to fit the

currently permitted site. **Alternative 1 (No Action)** would allow fishermen to fish on the sunken vessel site as if it was an artificial reef created to enhance direct fishing opportunities and it would not be used for its original purpose. While the vessels were recently deployed, there currently is not much fishing known to occur on the vessel that is outside the current MPA boundaries. Therefore, expected direct negative economic effects, if they occur at all, are likely to be minimal. However, **Preferred Alternative 2** has the potential to increase future, long-term direct positive economic effects by increasing spawning sites free from human predation.

4.7.3 Social Effects

Any social effects associated with this action would most likely be associated with any economic effects (**Section 4.7.2**) and on benefits to fishermen from protected artificial reefs. Aligning the boundaries of the area with the current artificial structures in place (**Preferred Alternative 2**) would be expected to be more beneficial than **Alternative 1 (No Action)** by protecting the structures that are specifically intended to contribute to habitat and fish biomass. As noted in **Section 4.7.2**, the level of fishing at the area is unknown, but potential negative effects on fishermen due to restricted access to fishing are expected to be minimal under **Preferred Alternative 2** due to the recent deployment of the structures.

4.7.4 Administrative Effects

Alternative 1 (No Action) would retain the existing boundaries for the Charleston Deep Artificial Reef MPA. As such, the alternative increase administrative effects since law enforcement efforts could potentially be confounded due to a portion of the artificial reef being located outside the boundaries of the MPA. **Preferred Alternative 2** would shift the boundary of the existing Charleston Deep Artificial Reef MPA to match the new boundary of the artificial reef site. This requires that the boundary be shifted 1.4 miles to the northwest. **Preferred Alternative 2** would result in beneficial administrative effects as the prohibition would now cover the artificial reef site.

4.8 Action 8. Establish Transit and Anchoring Provisions

Alternatives
(preferred alternatives in bold)

1. No action. Do not establish transit and anchoring provisions in the proposed Spawning SMZs. There are no Spawning SMZs in place and, if established, anchoring within the Spawning SMZ and transiting with snapper grouper species onboard would be allowed.

2. **Preferred. In the proposed Spawning SMZs, allow transit with snapper grouper species aboard a vessel when fishing gear is properly stowed as defined below.**

3. **Preferred. Prohibit anchoring by fishing vessels in the proposed Spawning SMZs.**
   3a. Prohibit anchoring by fishing vessels in all Spawning SMZs.
   3b. Prohibit anchoring by fishing vessels in all Spawning SMZs except Area 51 and Area 53.

4.8.1 Biological and Ecological Effects

There are no direct effects from allowing transit (**Alternative 2**) as long as no fishing occurs within the Spawning SMZs. Prohibiting anchoring in the proposed Spawning SMZs (**Alternative 3**) would have positive biological effects by reducing damage to the habitat from anchors.

Habitat protection associated with the transit and anchoring provisions depend on the alternative chosen. **Alternative 2** would allow transit and would not affect habitat as the gear would be stowed and fishing not allowed. **Alternative 3** would prohibit anchoring in the proposed Spawning SMZs and would provide more habitat protection.

With respect to ESA-listed species, this action would not significantly alter the way the snapper grouper fishery is prosecuted in the South Atlantic Region. Therefore, no impacts on ESA-listed marine species are expected as a result establishing transit and anchoring provisions.

4.8.2 Economic Effects

The intent of **Action 8** is to lessen potential negative economic effects on snapper grouper fishermen by allowing transit through the closed Spawning SMZ areas created or modified by **Actions 3 - 7.** This would provide fishermen more direct access to and from their fishing grounds. **Alternative 1 (No Action)** would prohibit vessels with snapper grouper species on board from transiting through or anchoring in the Spawning SMZs. Under **Alternative 1 (No Action)**, fishermen may incur travel and opportunity costs associated with avoiding closed areas. **Alternative 2** would allow transit through Spawning SMZs to occur, provided fishing gear is properly stowed. It is expected that fishermen would only transit through the Spawning SMZs if the opportunity cost of gear stowage is less than the combined travel and opportunity costs of avoidance (i.e., there is a positive net benefit). As such, **Alternative 2** would result in either positive or neutral economic effects relative to **Alternative 1 (No Action)**. **Alternative 3** would prohibit anchoring by fishing vessels in Spawning SMZs. Because vessels would not be allowed to fish in the Spawning SMZ, this alternative would not be expected to have any economic effects.

4.8.3 Social Effects

Transit provisions specified in **Alternative 2** are expected to be beneficial to fishermen, dealers, and associated businesses. Allowing vessels to transit through closed areas to land fish harvested in open areas, with specifications for gear stowing, could reduce potential negative effects of unnecessary travel just to avoid closed areas to offload legally caught fish. Transit provisions that enable a fishing trip to be shorter in duration would allow fishermen to spend less time on the water due to the reduced travel time and also support safety at sea. **Alternative 1 (No Action)** would not allow for any of these benefits to fishermen. Prohibiting anchoring under **Alternative 3** would be expected to result in social benefits by contributing to spawning habitat protection.

4.8.4 Administrative Effects

Alternative 1 (No Action) would not allow transit through the Spawning SMZs with species in the snapper grouper fishery management unit onboard. **Alternative 2** could result in an increased administrative burden as it would allow transit with gear properly stowed thus increasing the level of needed enforcement. During the development of Amendment 14 to the Snapper Grouper FMP, the Law Enforcement Committee and AP jointly outlined criteria for establishing marine reserves (**Appendix B** to Amendment 14 to the Snapper Grouper FMP). In the report, they stated that enforceability of the sites would increase if the sites were to limit allowable activities. However, at their March 2015 meeting, the Law Enforcement AP stated that transit provisions should be consistent with existing provisions for other areas as this would help prevent unintentional violations and make enforcement easier. **Alternatives 2** and **3** would match the regulations in the eight current MPAs specified through Amendment 14 to the Snapper Grouper FMP. **Alternative 3** could decrease adverse administrative effects by not allowing anchoring inside of the Spawning SMZs.

4.9 Action 9. Establish a Sunset Provision for the Spawning SMZs

Alternatives
(preferred alternatives in bold)

1. No action. The Spawning SMZs would not automatically expire through a sunset provision.
2. The Spawning SMZs will sunset 10 years after implementation if not reauthorized.
   - 2a. Apply the sunset provision to all Spawning SMZs.
   - 2b. Apply the sunset provision to all Spawning SMZs except Area 51 and Area 53.
3. The Spawning SMZs will sunset 7 years after implementation if not reauthorized.
   - 3a. Apply the sunset provision to all Spawning SMZs.
   - 3b. Apply the sunset provision to all Spawning SMZs except Area 51 and Area 53.
4. The Spawning SMZs will sunset 5 years after implementation if not reauthorized.
   - 4a. Apply the sunset provision to all Spawning SMZs.
   - 4b. Apply the sunset provision to all Spawning SMZs except Area 51 and Area 53.

4.9.1 Biological and Ecological Effects

Alternative 1 (No Action) would not establish a sunset provision and any Spawning SMZs established through Amendment 36 would remain in place until modified by the Council. **Alternative 2** would require action by the Council to extend the Spawning SMZs beyond 10 years.

Habitat protection associated with the sunset provision depends on the alternative chosen. **Alternative 1 (No Action)** would not allow the Spawning SMZs to automatically expire and would maintain the level of habitat protection provided by the Spawning SMZs. **Alternative 2** would have the Spawning SMZs automatically sunset in 10 years if not reauthorized resulting in lost habitat protection in direct proportion to the amount of area reopened.

The effect this action has on ESA-listed species is unclear. It is difficult to determine what biological benefit, if any, would be realized by ESA-listed species from the implementation of Spawning SMZs. If their implementation has little to no biological benefit, than there is likely to be little difference in the biological benefits of **Alternative 1 (No Action)** and **Alternative 2**. Conversely, if establishing Spawning SMZs proves biologically beneficial to ESA-listed species, the ensuring those SMZs do no automatically expire (**Alternative 1 (No Action)**) may be more biologically beneficial, if **Alternative 2** removes those SMZs.

4.9.2 Economic Effects

Alternative 2 compared to **Alternative 1 (No Action)** could have positive economic effects if any of the alternatives selected as preferred alternatives in **Actions 3 – 6** are determined not to be effective. **Alternative 2** requires that Spawning SMZs be reviewed. Regardless of the outcome of the review, Spawning SMZs would go away if they are not specifically reauthorized. If a Spawning SMZ is not reauthorized, it would benefit all fishermen by increasing the size of the allowable fishing area. However, if a particular Spawning SMZ has documented proof of sufficient spawning, reopening it could forego long-term economic benefits by reducing the

future biomass that would have been expected to occur as a result of spawning protection. The size of the economic effects for **Action 9** cannot be estimated without data on fish populations at the time a Spawning SMZ would be considered for reopening. However, in the long term, **Alternative 2** is expected to have the same or increased economic benefits as **Alternative 1 (No Action)**.

4.9.3 Social Effects

The expected social effects of a sunset provision on the proposed Spawning SMZs (**Alternative 2**) could include both positive and negative effects on fishermen and communities. Expected positive effects would be associated with ensuring that the SMZs would be reviewed for effectiveness or be eliminated due to non-action. Adoption of a sunset provision would provide accountability for the Council in reviewing and determining whether the Spawning SMZs are contributing to management goals to avoid the SMZs being removed. In this way, fishermen and associated communities have more of a guarantee that the Spawning SMZs would function as the Council intends, or the SMZs would be modified or removed, than there would be under **Alternative 1 (No Action)**. However, a sunset provision under **Alternative 2** could also have more negative effects on fishermen and communities than under **Alternative 1 (No Action)** if an evaluation is not possible (due to shortage in funding, staff, etc.) and the Spawning SMZs are removed, but actually are contributing to protection of spawning snapper grouper species. Removing effective Spawning SMZs could have negative long-term effects on fishermen and communities by contributing to negative biological effects.

4.9.4 Administrative Effects

Alternative 1 (No Action) would not allow the Spawning SMZs to automatically expire (sunset provision). **Alternative 2** would implement a sunset provision where the regulations would expire 10 years after implementation if not reauthorized. **Alternative 2** would increase adverse administrative effects as it would require the Council and NMFS to take action to retain the Spawning SMZs. This would require development of a framework amendment and rulemaking.

Chapter 5. Council's Rationale for the Preferred Alternatives

5.1 Action 1. Modify the Special Management Zone (SMZ) Procedure

Alternatives
(preferred alternatives in bold)

1. No action. The current SMZ procedure addresses use of certain gear on areas including artificial reefs, fish attraction devices, and other modified areas of habitat used for the purpose of fishing. Possession limits can also be regulated in SMZs.

2. Preferred. Modify the SMZ procedure to include protection of any area important for spawning by designating Spawning SMZs.

Snapper Grouper Advisory Panel Comments and Recommendations

The Snapper Grouper Advisory Panel (AP) approved a motion that the South Atlantic Fishery Management Council (Council) take the alternative approach to establish Spawning Special Management Zones (SMZs) to scoping in August regardless of the outcome of a lawsuit on Regulatory Amendment 11, and preserve the ability to limit fishing on more species than just snapper grouper species (i.e., all species in the snapper grouper fishery management unit).

Law Enforcement Advisory Panel Comments and Recommendations

The Law Enforcement Advisory Panel (LEAP) reviewed Amendment 36 during their March 2015 meeting. The LEAP had the following comments/concerns:

- The distance from shore making enforcement of Spawning Special Management Zones (SMZs) difficult.
- The Council should consider marking protected areas with buoys. However, buoys can be an issue if they are close to shipping channels, etc.
- Transit provisions should be consistent with existing provisions for other areas. This would help prevent unintentional violations and make enforcement easier.
- The Council should refer to guidelines on enforceability when designing closed areas. Consider that fishermen currently have advanced equipment on their boats.
- Spawning SMZs should be included in NOAA charts (paper and electronic).
- Enforcement of Spawning SMZs is possible, but it is limited so buy-in is critical.

Scientific and Statistical Committee Comments and Recommendations

The Scientific and Statistical Committee (SSC) received an overview presentation on Amendment 36 during their April 2015 meeting. The most relevant SSC comments, concerns, and discussion points included:

- The SSC asked the objective of establishing SMZs (monitoring/research should be aimed at whether or not the objective is met). The reply was that the objective was to detect and protect spawning fish.
- The current sample size is small (i.e., the number of sites and trips surveyed for spawning activity), but sampling needs to continue and should be expanded. The smaller the area the more difficult it will be to obtain samples.
- North of the Florida Keys, spawning by snapper grouper species seems to be characterized by groups of individuals, not 'true spawning aggregations.' This needs to be properly articulated to stakeholders and the public so expectations of success are not unrealistic.
- The SSC suggests that intensive/high resolution ichthyoplankton sampling be conducted in cooperation with MARMAP at the SMZ sites during the spawning season of target species to detect the presence of spawning. Also, deploy satellite-tracked drifters for a better understanding of circulation on the Spawning SMZ sites. This will allow evaluation of where the larvae are being transported to or retained for the site, and to put circulation at the site in the larger regional circulation context.
- Exercise caution when organizing a citizen science program to ensure that valid collection procedures are followed.
- Continue multi-beam sonar mapping to connect these regions by mapping the reefs between them.
- Woods Hole Oceanographic Institute (WHOI) and the University of Massachusetts Dartmouth have a lot of experience using underwater camera equipment to monitor marine resources, as well as underwater ROVs.
- Interview people who were around when speckled hind and warsaw grouper were more abundant to get an idea of where they were historically caught to focus monitoring efforts.
- Physical oceanographers and Southeast Coastal Ocean Observing Regional Association (SECOORA) have autonomous underwater vehicles (AUVs) for monitoring ocean characteristics and may be willing to put passive devices on their AUVs to help monitor fishery resources.

Council's Choice for Preferred Alternative

The Council concluded that the Spawning SMZ procedure should be modified to include protection of natural bottom important for spawning by designating Spawning SMZs. Protecting fish within these areas would provide protection for the fish resident in these areas and provide protection while they are spawning.

5.2 Action 2. Modify the Framework Procedure to Allow Modifications of and/or Additional Spawning Special Management Zones (Spawning SMZs)

Snapper Grouper Advisory Panel Comments and Recommendations

The Snapper Grouper Advisory Panel (AP) did not have any specific comments on this action.

Law Enforcement Advisory Panel Comments and Recommendations

The Law Enforcement Advisory Panel (LEAP) reviewed Amendment 36 during their March 2015 meeting. The LEAP had the following comments/concerns:

- The distance from shore making enforcement of Spawning Special Management Zones (SMZs) difficult.
- The Council should consider marking protected areas with buoys. However, buoys can be an issue if they are close to shipping channels, etc.
- Transit provisions should be consistent with existing provisions for other areas. This would help prevent unintentional violations and make enforcement easier.
- The Council should refer to guidelines on enforceability when designing closed areas. Consider that fishermen currently have advanced equipment on their boats.
- Spawning SMZs should be included in NOAA charts (paper and electronic).
- Enforcement of Spawning SMZs is possible, but it is limited so buy-in is critical.

Alternatives

(preferred alternatives in bold)

1. No action. The existing framework for the Snapper Grouper FMP does not include modifying or establishing new Spawning SMZs.
2. **Preferred. Modify the Snapper Grouper FMP framework to include modifying or establishing new Spawning SMZs.**
3. Modify the framework for the Snapper Grouper FMP to include modifying existing Spawning SMZs.

Scientific and Statistical Committee Comments and Recommendations

The Scientific and Statistical Committee (SSC) received an overview presentation on Amendment 36 during their April 2015 meeting. The most relevant SSC comments, concerns, and discussion points are included in **Section 5.1**. The SSC will review Amendment 36 at their October 2015 meeting. The Council will address the SSC comments during their December 2015 meeting when the Council is scheduled to approve Amendment 36 for formal review and implementation.

Council's Choice for Preferred Alternative

The Council concluded that the framework procedure should be modified to allow modifications of and/or additional Spawning SMZs. Protecting fish within these areas would provide protection for the fish resident in these areas and provide protection while they are spawning.

5.3 Action 3. Establish New Spawning Special Management Zones (Spawning SMZs) off North Carolina

Snapper Grouper Advisory Panel Comments and Recommendations

At their April 2015 meeting, the Snapper Grouper Advisory Panel (AP) approved the following motions:
MOTION: COUNCIL CONSIDER 2B AND 3C OFF NC AS SPAWNING SMZs.
APPROVED BY AP (7/3)

MOTION: INCLUDE AN AREA NORTH OF THE 780 B0TTOM (40,005.5 ON THE NORTH AND 26,905.5 ON THE SOUTH) AS AN ALTERNATIVE TO THE 780 BOTTOM.
APPROVED BY AP (11/0)

Law Enforcement Advisory Panel Comments and Recommendations

The Law Enforcement Advisory Panel (LEAP) reviewed Amendment 36 during their March 2015 meeting. The LEAP had the following comments/concerns:

- The distance from shore making enforcement of Spawning Special Management Zones (SMZs) difficult.
- The Council should consider marking protected areas with buoys. However, buoys can be an issue if they are close to shipping channels, etc.
- Transit provisions should be consistent with existing provisions for other areas. This would help prevent unintentional violations and make enforcement easier.
- The Council should refer to guidelines on enforceability when designing closed areas. Consider that fishermen currently have advanced equipment on their boats.
- Spawning SMZs should be included in NOAA charts (paper and electronic).
- Enforcement of Spawning SMZs is possible, but it is limited so buy-in is critical.

Alternatives
(preferred alternatives in bold)

1. No action. There are no Spawning SMZs off North Carolina.
2. Establish a Spawning SMZ in the MALCHASE WRECK area that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.
3. 2a. Malchase Wreck (2.47 mi^2)
4. 2b. Malchase Wreck (1 mi^2)
5. Establish a Spawning SMZ in the 780 BOTTOM area that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.
6. 3a. 780 Bottom (4 mi^2)
7. 3b. 780 Bottom (3 mi^2)
8. Establish a Spawning SMZ in the NC Deep Wreck (3 mi^2) that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.
9. **Preferred. Establish a Spawning SMZ in the South Cape Lookout (5 mi^2) that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.**

Scientific and Statistical Committee Comments and Recommendations

The Scientific and Statistical Committee (SSC) received an overview presentation on Amendment 36 during their April 2015 meeting. The most relevant SSC comments, concerns, and discussion points are included in **Section 5.1**. The SSC will review the Council's preferred alternatives for Spawning SMZs at their October 2015 meeting. The Council will address the SSC comments during their December 20154 meeting when the Council is scheduled to approve Amendment 36 for formal review and implementation.

Council's Choice for Preferred Alternative

The Council concluded that Spawning SMZs should be established in North Carolina. Protecting fish within these areas would provide protection for the fish resident in these areas and provide protection while they are spawning. The Council is requesting the public's input on which Spawning SMZs should be established.

5.4 Action 4. Establish New Spawning Special Management Zones (Spawning SMZs) off South Carolina

Snapper Grouper Advisory Panel Comments and Recommendations

At their April 2015 meeting, the Snapper Grouper Advisory Panel (AP) approved the following motions:

MOTION: SUPPORT THE GEORGETOWN HOLE AREA BUT NO LARGER THAN 3.1 SQUARE MILE AND ADD ALTERNATIVE FOR AREA 51 AND 53. APPROVED BY AP (10/0)

MOTION: COUNCIL CONSIDER AN AREA ADDING TO THE NORTHERN SC MPA TO THE SOUTH AND OFFSHORE TO BE EVALUATED AS AN ALTERNATIVE TO THE GEORGETOWN HOLE. APPROVED BY AP (10/0)

Law Enforcement Advisory Panel Comments and Recommendations

The Law Enforcement Advisory Panel (LEAP) reviewed Amendment 36 during their March 2015 meeting. The LEAP had the following comments/concerns:

- The distance from shore making enforcement of Spawning Special Management Zones (SMZs) difficult.
- The Council should consider marking protected areas with buoys. However, buoys can be an issue if they are close to shipping channels, etc.
- Transit provisions should be consistent with existing provisions for other areas. This would help prevent unintentional violations and make enforcement easier.
- The Council should refer to guidelines on enforceability when designing closed areas. Consider that fishermen currently have advanced equipment on their boats.
- Spawning SMZs should be included in NOAA charts (paper and electronic).
- Enforcement of Spawning SMZs is possible, but it is limited so buy-in is critical.

Alternatives

(preferred alternatives in bold)

1. No action. There are no Spawning SMZs off South Carolina.
2. **Preferred. Establish a Spawning SMZ in the Devil's Hole/Georgetown Hole area that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.**
   - 2a. Devil's Hole/Georgetown Hole (13.5 mi^2)
   - 2b. Devil's Hole/Georgetown Hole (4 mi^2)
   - 2c. Devil's Hole/Georgetown Hole (1 mi^2)
   - 2d. Devil's Hole/Georgetown Hole (15.2 mi^2)
   - 2e. SC South (8 mi^2) (Alternative to Devils Hole)
   - **2f. Preferred. Devil's Hole/Georgetown Hole (3.1 mi^2)**
3. **Preferred. Establish a Spawning SMZ in the Area 51 site (2.99 mi^2) that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.**
4. **Preferred. Establish Spawning SMZs in the Area 53 site (2.99 mi^2) that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.**

Scientific and Statistical Committee Comments and Recommendations

The Scientific and Statistical Committee (SSC) received an overview presentation on Amendment 36 during their April 2015 meeting. The most relevant SSC comments, concerns, and discussion points are included in **Section 5.1**. The SSC will review the Council's preferred alternatives for Spawning SMZs at their October 2015 meeting. The Council will address the SSC comments during their December 20154 meeting when the Council is scheduled to approve Amendment 36 for formal review and implementation.

Council's Choice for Preferred Alternative

The Council concluded that Spawning SMZs should be established in South Carolina. Protecting fish within these areas would provide protection for the fish resident in these areas and provide protection while they are spawning. The Council is requesting the public's input on which Spawning SMZs should be established.

5.5 Action 5. Establish New Spawning Special Management Zones (Spawning SMZs) off Georgia

Alternatives
(preferred alternatives in bold)

1. **Preferred. No action. There are no Spawning SMZs off Georgia.**

2. Establish Spawning SMZs in the ST. Simons area that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.
   - 2a. St. Simons Area (14.1 mi^2)
   - 2b. St. Simons Area (9.4 mi^2)
   - 2c. St. Simons Area (4 mi^2)

Snapper Grouper Advisory Panel Comments and Recommendations

At their April 2015 meeting, the AP approved the following motions:
MOTION: COUNCIL CONSIDER AREA BETWEEN 25 AND 35 MILES EAST OF ST. SIMONS (LAT/LONG TO BE PROVIDED) APROVED BY AP (6/0)

MOTION: COUNCIL CONSIDER 2C OFF GA AND REMOVE 18 SQUARE MILES FROM THE EXISTING GEORGIA MPA APPROVED BY AP (6/0)

MOTION: COUNCIL CONSIDER ALL ALTERNATIVES 3A-3C AS WELL AS 3D (SMALLER) APPROVED BY AP (5/0)

Law Enforcement Advisory Panel Comments and Recommendations

The Law Enforcement Advisory Panel (LEAP) reviewed Amendment 36 during their March 2015 meeting. The LEAP had the following comments/concerns:

- The distance from shore making enforcement of Spawning Special Management Zones (SMZs) difficult.
- The Council should consider marking protected areas with buoys. However, buoys can be an issue if they are close to shipping channels, etc.
- Transit provisions should be consistent with existing provisions for other areas. This would help prevent unintentional violations and make enforcement easier.
- The Council should refer to guidelines on enforceability when designing closed areas. Consider that fishermen currently have advanced equipment on their boats.
- Spawning SMZs should be included in NOAA charts (paper and electronic).
- Enforcement of Spawning SMZs is possible, but it is limited so buy-in is critical.

Scientific and Statistical Committee Comments and Recommendations

The Scientific and Statistical Committee (SSC) received an overview presentation on Amendment 36 during their April 2015 meeting. The most relevant SSC comments, concerns, and discussion points are included in **Section 5.1**. The SSC will review the Council's preferred

alternatives for Spawning SMZs at their October 2015 meeting. The Council will address the SSC comments during their December 20154 meeting when the Council is scheduled to approve Amendment 36 for formal review and implementation.

Council's Choice for Preferred Alternative

The Council concluded that Spawning SMZs should be established in Georgia. Protecting fish within these areas would provide protection for the fish resident in these areas and provide protection while they are spawning. The Council is requesting the public's input on which Spawning SMZs should be established.

5.6 Action 6. Establish New Spawning Special Management Zones (Spawning SMZs) off Florida

Alternatives
(preferred alternatives in bold)

1. No action. There are no Spawning SMZs off Florida.
2. **Preferred. Establish a Spawning SMZ in the Warsaw Hole area that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.**
   - 2a. Warsaw Hole (2 mi^2)
   - **Preferred. 2b. Warsaw Hole (1 mi^2)**
   - 2c. Warsaw Hole (4 mi^2)
3. Establish a Spawning SMZ in the Daytona Steeples area that prohibits fishing for, harvest, and/or possession of species in the snapper grouper fishery management unit year-round.
   - 3a. Daytona Steeples (6 mi^2) (area of apparent high relief in the 27 square mile footprint)
   - 3b. Daytona Steeples (12 mi^2)
   - 3c. Daytona Steeples (6 mi^2)

Snapper Grouper Advisory Panel Comments and Recommendations

At their April 2015 meeting, the AP approved the following motions:
MOTION: COUNCIL CONSIDER 2A FOR WARSAW HOLE AS A SPAWNING SMZ AS PREFERRED.
APPROVED BY AP (5/4)

MOTION: COUNCIL CONSIDER 3C OFF DAYTONA STEEPLES AS PREFERRED.
APPROVED BY AP (13/0)

Law Enforcement Advisory Panel Comments and Recommendations

The Law Enforcement Advisory Panel (LEAP) reviewed Amendment 36 during their March 2015 meeting. The LEAP had the following comments/concerns:

- The distance from shore making enforcement of Spawning Special Management Zones (SMZs) difficult.
- The Council should consider marking protected areas with buoys. However, buoys can be an issue if they are close to shipping channels, etc.
- Transit provisions should be consistent with existing provisions for other areas. This would help prevent unintentional violations and make enforcement easier.
- The Council should refer to guidelines on enforceability when designing closed areas. Consider that fishermen currently have advanced equipment on their boats.
- Spawning SMZs should be included in NOAA charts (paper and electronic).
- Enforcement of Spawning SMZs is possible, but it is limited so buy-in is critical.

Scientific and Statistical Committee Comments and Recommendations

The Scientific and Statistical Committee (SSC) received an overview presentation on Amendment 36 during their April 2015 meeting. The most relevant SSC comments, concerns, and discussion points are included in **Section 5.1**. The SSC will review the Council's preferred

alternatives for Spawning SMZs at their October 2015 meeting. The Council will address the SSC comments during their December 20154 meeting when the Council is scheduled to approve Amendment 36 for formal review and implementation.

Council's Choice for Preferred Alternative

The Council concluded that Spawning SMZs should be established in Florida. Protecting fish within these areas would provide protection for the fish resident in these areas and provide protection while they are spawning. The Council is requesting the public's input on which Spawning SMZs should be established.

5.7 Action 7. Move the Existing Charleston Deep Artificial Reef MPA 1.4 miles to the Northwest to Match the Boundary of the Permitted Site

Snapper Grouper Advisory Panel Comments and Recommendations

At their April 2015 meeting, the AP approved the following motion:
MOTION: CHOOSE ALTERNATIVE 2, MOVING THE EXISTING CHARLESTON DEEP ARTIFICIAL REEF MPA 1.4 MILES TO THE NORTHWEST, AS PREFERRED
APPROVED BY AP (13/0)

Alternatives
(preferred alternatives in bold)

1. No action. The existing Charleston Deep Artificial Reef MPA boundaries are: The northwest corner at 32°4' N, 79°12'W; the northeast corner at 32°8.5'N, 79° 7.75'W; the southwest corner at 32°1.5'N, 79°9.3'W; and the southeast corner at 32°6'N, 79°5'W.

2. **Preferred. Move the Charleston Deep Artificial Reef MPA 1.4 miles to the northwest to match the boundary of the U.S. Army Corps of Engineers' permitted artificial reef area.**

Law Enforcement Advisory Panel Comments and Recommendations

The Law Enforcement Advisory Panel (LEAP) reviewed Amendment 36 during their March 2015 meeting. The LEAP had the following comments/concerns:

- The distance from shore making enforcement of Spawning Special Management Zones (SMZs) difficult.
- The Council should consider marking protected areas with buoys. However, buoys can be an issue if they are close to shipping channels, etc.
- Transit provisions should be consistent with existing provisions for other areas. This would help prevent unintentional violations and make enforcement easier.
- The Council should refer to guidelines on enforceability when designing closed areas. Consider that fishermen currently have advanced equipment on their boats.
- Spawning SMZs should be included in NOAA charts (paper and electronic).
- Enforcement of Spawning SMZs is possible, but it is limited so buy-in is critical.

Scientific and Statistical Committee Comments and Recommendations

The Scientific and Statistical Committee (SSC) received an overview presentation on Amendment 36 during their April 2015 meeting. The most relevant SSC comments, concerns, and discussion points are included in **Section 5.1**. The SSC will review the Council's preferred alternative at their October 2015 meeting. The Council will address the SSC comments during their December 20154 meeting when the Council is scheduled to approve Amendment 36 for formal review and implementation.

Council's Choice for Preferred Alternative

The Council concluded that the existing MPA should be moved to the new boundary to match the new permitted area of the artificial reef. Protecting fish within this area would provide protection for the fish resident in these areas and provide protection while they are spawning. The Council is requesting the public's input on this action.

5.8 Action 8. Establish Transit and Anchoring Provisions

Snapper Grouper Advisory Panel Comments and Recommendations

At their April 2015 meeting, the AP approved the following motion:
MOTION: AP SUPPORT TRANSIT PROVISION AND ANCHORING PROHIBITION IN THE SPAWNING SMZs AS PREFERRED (ALTERNATIVES 2 AND 3).
APPROVED BY AP (14/0)

Law Enforcement Advisory Panel Comments and Recommendations

The Law Enforcement Advisory Panel (LEAP) reviewed Amendment 36 during their March 2015 meeting. The LEAP had the following comments/concerns:

- The distance from shore making enforcement of Spawning Special Management Zones (SMZs) difficult.
- The Council should consider marking protected areas with buoys. However, buoys can be an issue if they are close to shipping channels, etc.
- Transit provisions should be consistent with existing provisions for other areas. This would help prevent unintentional violations and make enforcement easier.
- The Council should refer to guidelines on enforceability when designing closed areas. Consider that fishermen currently have advanced equipment on their boats.
- Spawning SMZs should be included in NOAA charts (paper and electronic).
- Enforcement of Spawning SMZs is possible, but it is limited so buy-in is critical.

Alternatives
(preferred alternatives in bold)

1. No action. Do not establish transit and anchoring provisions in the proposed Spawning SMZs. There are no Spawning SMZs in place and, if established, anchoring within the Spawning SMZ and transiting with snapper grouper species onboard would be allowed.

2. **Preferred. In the proposed Spawning SMZs, allow transit with snapper grouper species aboard a vessel when fishing gear is properly stowed as defined below.**

3. **Preferred. Prohibit anchoring by fishing vessels in the proposed Spawning SMZs.**
   3a. Prohibit anchoring by fishing vessels in all Spawning SMZs.
   3b. Prohibit anchoring by fishing vessels in all Spawning SMZs except Area 51 and Area 53.

Scientific and Statistical Committee Comments and Recommendations

The Scientific and Statistical Committee (SSC) received an overview presentation on Amendment 36 during their April 2015 meeting. The most relevant SSC comments, concerns, and discussion points are included in **Section 5.1**. The SSC will review the Council's preferred alternative at their October 2015 meeting. The Council will address the SSC comments during their December 20154 meeting when the Council is scheduled to approve Amendment 36 for formal review and implementation.

Council's Choice for Preferred Alternative

The Council is considering whether to allow transit and prohibit anchoring within the Spawning SMZs. Allowing transit would reduce the economic impacts on fishermen. Prohibiting anchoring would make enforcement more effective and protect habitat within the Spawning SMZs. The Council is requesting the public's input on this action.

5.9 Action 9. Establish a Sunset Provision for the Spawning SMZs.

Alternatives
(preferred alternatives in bold)

1. No action. The Spawning SMZs would not automatically expire through a sunset provision.
2. The Spawning SMZs will sunset 10 years after implementation if not reauthorized.
   2a. Apply the sunset provision to all Spawning SMZs.
   2b. Apply the sunset provision to all Spawning SMZs except Area 51 and Area 53.
3. The Spawning SMZs will sunset 7 years after implementation if not reauthorized.
   3a. Apply the sunset provision to all Spawning SMZs.
   3b. Apply the sunset provision to all Spawning SMZs except Area 51 and Area 53.
4. The Spawning SMZs will sunset 5 years after implementation if not reauthorized.
   4a. Apply the sunset provision to all Spawning SMZs.
   4b. Apply the sunset provision to all Spawning SMZs except Area 51 and Area 53.

Snapper Grouper Advisory Panel Comments and Recommendations

The Snapper Grouper AP has not reviewed this provision yet.

Law Enforcement Advisory Panel Comments and Recommendations

The Law Enforcement Advisory Panel (LEAP) reviewed Amendment 36 during their March 2015 meeting. The sunset provision was not included at that time. The LEAP will review this provision at their next opportunity.

Scientific and Statistical Committee Comments and Recommendations

The Scientific and Statistical Committee (SSC) received an overview presentation on Amendment 36 during their April 2015 meeting. The most relevant SSC comments, concerns, and discussion points are included in **Section 5.1**. The SSC will review the Council's preferred alternative at their October 2015 meeting. The Council will address the SSC comments during their December 20154 meeting when the Council is scheduled to approve Amendment 36 for formal review and implementation.

Council's Choice for Preferred Alternative

The Council is considering a sunset provision to ensure Spawning SMZ sites are monitored and evaluated to document spawning withing the sites. The intent is for the Council to review whether the SMZs are meeting their purpose at the end of 3, 5, 7, and 9 years or at the end or 3, 6, and 9 years. Under **Alternative 2**, all Spawning SMZs would cease to exist 10 years after implementation unless the Council extends them through a framework amendment to the Snapper Grouper FMP. The Council is requesting the public's input on this action.

Chapter 6. Cumulative Effects

As directed by the National Environmental Policy Act (NEPA), federal agencies are mandated to assess not only the indirect and direct impacts, but the cumulative impacts of proposed actions as well. NEPA defines a cumulative impact as *"the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time"* (40 C.F.R. 1508.7). Cumulative effects can either be additive or synergistic. A synergistic effect is when the combined effects are greater than the sum of the individual effects.

Various approaches for assessing cumulative effects have been identified, including checklists, matrices, indices, and detailed models (MacDonald 2000). The Council on Environmental Quality (CEQ) offers guidance on conducting a Cumulative Effects Analysis (CEA) in a report titled "Considering Cumulative Effects under the National Environmental Policy Act". The report outlines 11 items for consideration in drafting a CEA for a proposed action.

1. Identify the significant cumulative effects issues associated with the proposed action and define the assessment goals.
2. Establish the geographic scope of the analysis.
3. Establish the timeframe for the analysis.
4. Identify the other actions affecting the resources, ecosystems, and human communities of concern.
5. Characterize the resources, ecosystems, and human communities identified in scoping in terms of their response to change and capacity to withstand stress.
6. Characterize the stresses affecting these resources, ecosystems, and human communities and their relation to regulatory thresholds.
7. Define a baseline condition for the resources, ecosystems, and human communities.
8. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities.
9. Determine the magnitude and significance of cumulative effects.
10. Modify or add alternatives to avoid, minimize, or mitigate significant cumulative effects.
11. Monitor the cumulative effects of the selected alternative and adapt management.

This CEA for the biophysical environment will follow a modified version of the 11 steps. Cumulative effects for the socio-economic environment will be analyzed separately.

6.1 Biological and Ecological

1. Identify the significant cumulative effects issues associated with the proposed action and define the assessment goals.

CEQ cumulative effects guidance states that this step is done through three activities. The three activities and the location in the document are as follows:

I. The direct and indirect effects of the proposed actions **(Chapter 4)**;
II. Which resources, ecosystems, and human communities are affected **(Chapter 3)**; and
III. Which effects are important from a cumulative effects perspective **(information revealed in this CEA)**.

2. Establish the geographic scope of the analysis.

The immediate impact area would be the federal 200-mile limit of the Atlantic off the coasts of North Carolina, South Carolina, Georgia, and east Florida to Key West, which is also the South Atlantic Fishery Management Council's (Council) area of jurisdiction. In light of the available information, the extent of the boundaries would depend upon the degree of fish immigration/emigration and larval transport, whichever has the greatest geographical range. Therefore, the proper geographical boundary to consider effects on the biophysical environment is larger than the entire South Atlantic exclusive economic zone (EEZ). The ranges of affected species are described in **Section 3.2**. The most measurable and substantial effects would be limited to the South Atlantic region.

3. Establish the timeframe for the analysis.

Establishing a timeframe for the CEA is important when the past, present, and reasonably foreseeable future actions are discussed. It would be advantageous to go back to a time when there was a natural, or some modified (but ecologically sustainable) condition. However, data collection for many fisheries began when species were already fully exploited. Therefore, the timeframe for analyses should be initiated when data collection began for the various fisheries. In determining how far into the future to analyze cumulative effects, the length of the effects will depend on the species and the alternatives chosen. Long-term evaluation is needed to determine if management measures have the intended effect of improving stock status. Monitoring should continue indefinitely for all species to ensure that management measures are adequate for preventing overfishing in the future.

4. Identify the other actions affecting the resources, ecosystems, and human communities of concern

Listed are other past, present, and reasonably foreseeable actions occurring in the South Atlantic region. These actions, when added to the proposed management measures, may result in cumulative effects on the biophysical environment.

I. Fishery-related actions affecting the snapper grouper species addressed in this amendment

A. Past

The reader is referred to **Appendix D** for past regulatory activity for species in the Snapper Grouper FMP. Past regulatory activity for the relevant snapper grouper species in this amendment is listed below.

Amendment 9 to the Snapper Grouper FMP (SAFMC 1998a) established minimum size limits for yellowtail snapper, red grouper, black grouper, gag, yellowfin grouper, yellowmouth grouper, and scamp; and created a 20-fish aggregate recreational bag limit for snapper grouper species without a bag limit (with the exception of tomtate and blue runner), including yellowtail snapper. The amendment also prohibited the sale and purchase of gag, red porgy, and black grouper during March and April; and included blueline tilefish, gag, and black grouper within the 5-fish aggregate grouper bag limit, of which no more than 2 fish could be gag or black grouper (individually or in combination). Also included was a provision whereby vessels with longline gear aboard could only possess snowy grouper, warsaw grouper, yellowedge grouper, misty grouper, golden tilefish, blueline tilefish, and sand tilefish. The Council approved Amendment 9 at their December 1998 meeting. The final rule published in the *Federal Register* on January 25, 1999, and became effective on February 24, 1999.

Amendment 14 to the Snapper Grouper FMP (SAFMC 2007) was implemented on February 12, 2009. Amendment 14 established eight Type II marine protected areas (MPAs) where fishing for and retention of snapper grouper species is prohibited (as is the use of shark bottom longlines), but trolling for pelagic species such as tuna, dolphin, and billfish is allowed. The intent was to achieve a more natural sex ratio, age, and size structure of all species within the MPAs, while minimizing adverse social and economic effects. The Council approved Amendment 14 at their June 2007 meeting. The final rule published in the *Federal Register* on January 13, 2009, and became effective on February 12, 2009.

Amendment 15B to the Snapper Grouper FMP (SAFMC 2008b) became effective on December 16, 2009. Management measures in Amendment 15B included a prohibition of the sale of bag limit caught snapper grouper species for fishermen not holding a federal commercial permit for South Atlantic snapper grouper; an action to adopt, when implemented, the Atlantic Coastal Cooperative Statistics Program release, discard and protected species module to assess and monitor bycatch, allocations for snowy grouper, and management reference points for golden tilefish. Biological benefits from Amendment 15B are not expected to result in a significant cumulative biological effect when added to anticipated biological impacts under this amendment. The Council approved Amendment 15B at their June 2008 meeting. The final rule published in the *Federal Register* on November 16, 2009, and became effective on December 16, 2009.

Amendment 17B to the Snapper Grouper FMP (SAFMC 2010b), which was implemented on January 31, 2011, established annual catch limits (ACL), annual catch targets (ACT), and accountability measures (AMs) for 8 species experiencing overfishing; modified management measures to limit total mortality to the ACL; and updated the framework procedure for specification of total allowable catch. Amendment 17B also prohibited the harvest and possession of deepwater snapper grouper species (snowy grouper, blueline tilefish, yellowedge grouper, misty grouper, queen snapper, and silk snapper) at depths greater than 240 feet. The intent of this measure was to reduce bycatch of speckled hind and warsaw grouper. The Council approved Amendment 17B at their September 2010 meeting. The final rule published in the *Federal Register* on December 30, 2010.

Regulatory Amendment 9 to the Snapper Grouper FMP (SAFMC 2011a) reduced the black sea bass recreational bag limit from 15 fish per person per day to 5 fish per person per day. The final rule published in the *Federal Register* on June 15, 2011.

The Comprehensive ACL Amendment (SAFMC 2011c) includes ACLs and AMs for federally managed species not undergoing overfishing in four FMPs (Snapper Grouper, Dolphin Wahoo, Golden Crab, and *Sargassum*). Actions contained within the Comprehensive ACL Amendment included: (1) Removal of species from the snapper grouper fishery management unit; (2) designation of ecosystem component species; (3) allocations; (4) management measures to limit recreational and commercial sectors to their ACLs; (5) AMs; and (6) any necessary modifications to the range of regulations. The Council approved the Comprehensive ACL Amendment in September 2011. The final rule published in the *Federal Register* on March 16, 2012, and became effective on April 16, 2012.

Regulatory Amendment 11 to the Snapper Grouper FMP (SAFMC 2011b) eliminated the harvest prohibition of some deepwater snapper grouper species, including blueline tilefish, in waters greater than 240 feet deep that was established through Amendment 17B. The Council approved Regulatory Amendment 11 in August 2011. The final rule was published on May 10, 2012**,** with an effective date the same day.

Amendment 18A to the Snapper Grouper FMP (SAFMC 2012a) established measures to limit participation and effort for black sea bass. Amendment 18A established an endorsement program than enables snapper grouper fishermen with a certain catch history to harvest black sea bass with pots. In addition, Amendment 18A included measures to reduce bycatch in the black sea bass pot sector, modified the rebuilding strategy, and other necessary changes to management of black sea bass as a result of a 2011 stock assessment. The Council approved Amendment 18A in December 2011. The amendment was partially approved and the final rule published in the *Federal Register* on June 1, 2012. Regulations became effective on July 1, 2012.

Regulatory Amendment 12 to the Snapper Grouper FMP (SAFMC 2012c) established a golden tilefish longline endorsement program, and trip limit for golden tilefish commercial fishermen who did not qualify for an endorsement. The final rule for Regulatory Amendment 12 became effective on October 9, 2012.

Amendment 18B (SAFMC 2013a) to the Snapper Grouper FMP was approved by the Council at their June 2012 meeting and addressed golden tilefish. The amendment established initial eligibility requirements for a golden tilefish longline endorsement program, allocated golden tilefish quota between gear groups, and specified commercial trip limits for those who did not qualify for the longline endorsement. Amendment 18B was approved by the Secretary of Commerce on January 25, 2013, and the final rule published in the *Federal Register* on April 23, 2013 (78 FR 23858) with an effective date of May 23, 2013.

At their March 2012 meeting, the Council requested development of Regulatory Amendment 13 (SAFMC 2013b) to the Snapper Grouper FMP to allow for adjustment of allocations and ACLs based on the new landings information from the Marine Recreational Information Program. Regulatory Amendment 13 was approved by the Council at their December 2012 meeting. The National Marine Fisheries Service (NMFS) published the final rule on June 17, 2013, and regulations became effective on July 17, 2013.

At their September 2012 meeting, the Council requested development of Regulatory Amendment 15 to the Snapper Grouper FMP (SAFMC 2013c) to adjust the yellowtail snapper ABC and ACL based on results from a recent assessment and remove the provision that the commercial harvest of all shallow water grouper species is prohibited when the gag quota is met. The Council approved Regulatory Amendment 15 at their December 2012 and the regulations were effective on September 12, 2013. Additionally, at the Council's request while they were developing Regulatory Amendment 15, NMFS implemented an emergency rule under the Magnuson-Stevens Fishery Conservation and Management Act to increase the commercial sector's ACL based upon the new stock assessment (77 FR 66744, November 7, 2012).

The Council has worked directly with other agencies to protect spawning aggregations of snapper grouper species in the Riley's Hump site in the Dry Tortugas, Florida Keys (Lindeman et al. 2000, Cowie-Haskell and Delaney 2003, and Burton et al. 2005).

B. Present

In addition to snapper grouper fishery management issues being addressed in this amendment, other snapper grouper amendments and amendment affecting the snapper grouper fishery have been developed concurrently and have been implemented or are in the process of approval and implementation.

The Joint South Atlantic/Gulf of Mexico Generic Charter/Headboat Reporting in the South Atlantic Amendment (GMFMC and SAFMC 2013a) requires that all federally-permitted headboats on the South Atlantic report their landings information electronically, and on a weekly basis in order to improve the timeliness and accuracy of harvest data. The proposed rule published in the *Federal Register* on September 27, 2013. The final rule published on December 27, 2013, and regulations became effective on January 27, 2014.

At their September 2012 meeting, the Council directed staff to develop Amendment 27 to the Snapper Grouper FMP (SAFMC 2014c) to address issues related to blue runner, and extension of

management into the Gulf of Mexico for Nassau grouper. The amendment also changed the existing snapper grouper framework procedure to allow for more timely adjustments to ACLs. The proposed rule published in the *Federal Register* on September 27, 2013. The final rule published on December 27, 2013, and regulations became effective on January 27, 2014.

The Joint Dealer Reporting Amendment (GMFMC and SAFMC 2013b) has been approved for Secretarial Review by the Gulf of Mexico and South Atlantic Fishery Management Councils. This amendment is intended to improve the timeliness and accuracy of fisheries data reported by permitted dealers. The amendment would also create one dealer permit for all federally-permitted dealers in the southeast region. Requiring dealers to report landings data weekly will help to improve in-season quota monitoring efforts, which will increase the likelihood that AMs could be more effectively implemented prior to ACLs being exceeded. The notice of availability of the amendment and the proposed rule published on December 19, 2013, and January 2, 2014, respectively. The final rule published in the *Federal Register* on April 9, 2014 (79 FR 19490) with an effective date of August 7, 2014.

The Council has recently completed and is developing amendments for coastal migratory pelagic species, golden crab, dolphin-wahoo, shrimp, and octocorals. See the Council's Web site at http://www.safmc.net/ for further information on Council-managed species.

C. Reasonably Foreseeable Future

The Joint Commercial Logbook Reporting Amendment would require electronic reporting of landings information by federally-permitted commercial vessels, which would increase the timeliness and accuracy of landings data.

The Joint Charter Boat Reporting Amendment would require charter vessels to regularly report their landings information electronically each week. Including charter boats in the recreational harvest reporting system would further improve the agency's ability to monitor recreational catch rates in-season.

The South Atlantic Council initiated development of the Comprehensive Accountability Measures (AM) and Dolphin Allocation Amendment at their September 2013 meeting. In December 2013, the South Atlantic Council changed the range of actions to only include AMs for snapper grouper species and golden crab, and sector allocations for dolphin. The South Atlantic Council reviewed drafts of the amendment at the December 2013, March 2014, and June 2014 meetings. Public hearings took place in August 2014, and the South Atlantic Council took final action to approve the amendment for formal review in December 2014.

Amendment 26 (included in the Comprehensive Ecosystem-Based Amendment 3) is currently being developed and may propose changes to the bycatch data collection programs in all the fisheries in the South Atlantic.

II. Non-Council and other non-fishery related actions, including natural events affecting the species in this amendment

A. Past
B. Present
C. Reasonably foreseeable future

Climate Change

The Environmental Protection Agency's deepwater horizon webpage (http://www.epa.gov/climatechange/) provides basic background information on measured or anticipated effects from global climate change. A compilation of scientific information on climate change can be found in the United Nations Intergovernmental Panel on Climate Change's Fifth Assessment Report (IPCC 2013). Those findings are incorporated here by reference and are summarized. Global climate change can affect marine ecosystems through ocean warming by increased thermal stratification, reduced upwelling, sea level rise, and through increases in wave height and frequency, loss of sea ice, and increased risk of diseases in marine biota. Decreases in surface ocean pH due to absorption of anthropogenic carbon dioxide emissions may affect a wide range of organisms and ecosystems. These influences could negatively affect biological factors such as productivity, species distributions and range, recruitment, larval and juvenile survival, migration, community structure, timing of biological events, prey availability, and susceptibility to predators (Osgood 2008).

In the southeast, general impacts of climate change have been predicted through modeling, with few studies on specific effects to species. Warming sea temperature trends in the southeast have been documented, and animals must migrate to cooler waters, if possible, if water temperatures exceed survivable ranges (Needham et al. 2012). Higher water temperatures may also allow invasive species to establish communities in areas they may not have been able to survive previously. An area of low oxygen, known as the dead zone, forms in the northern Gulf of Mexico (Gulf) each summer, which has been increasing in recent years. Climate change may contribute to this increase by increasing rainfall that in turn increases nutrient input from rivers. This increased nutrient load causes algal blooms that, when decomposing, reduce oxygen in the water (Kennedy et al. 2002, Needham et al. 2012). Other potential impacts of climate change to the southeast include increases in hurricanes, decreases in salinity, altered circulation patterns, coral bleaching and sea level rise (Osgood 2008). The combination of warmer water and expansion of salt marshes inland with sea-level rise may increase productivity of estuarine-dependent species in the short term. However, in the long term, this increased productivity may be temporary because of loss of fishery habitats due to wetland loss (Kennedy et al. 2002). Actions from this amendment are not expected to significantly contribute to climate change through the increase or decrease in the carbon footprint from fishing.

Weather Variables

Hurricane season is from June 1 to November 30, and accounts for 97% of all tropical activity affecting the Atlantic basin. These storms, although unpredictable in their annual occurrence, can devastate areas when they occur. Although these effects may be temporary,

those fishing-related businesses whose profitability is marginal may go out of business if a hurricane strikes.

Deepwater-Horizon Oil Spill

On April 20, 2010, an explosion occurred on the Deepwater Horizon MC252 oil rig, resulting in the release of an estimated 4.9 million barrels of oil into the Gulf. In addition, 1.84 million gallons of Corexit 9500A dispersant were applied as part of the effort to constrain the spill. The cumulative effects from the oil spill and response may not be known for several years.

The oil spill affected more than one-third of the Gulf area from western Louisiana east to the panhandle of Florida and south to the Campeche Bank in Mexico. The impacts of the Deepwater Horizon MC252 oil spill on the physical environment are expected to be significant and may be long-term. Oil is dispersed on the surface, and because of the heavy use of dispersants, oil is also documented as being suspended within the water column, some even deeper than the location of the broken well head. Floating and suspended oil washed onto shore in several areas of the Gulf, as well as non-floating tar balls. Whereas suspended and floating oil degrades over time, tar balls are more persistent in the environment and can be transported hundreds of miles. Oil on the surface of the water could restrict the normal process of atmospheric oxygen mixing into and replenishing oxygen concentrations in the water column. In addition, microbes in the water that break down oil and dispersant also consume oxygen; this could lead to further oxygen depletion. Zooplankton that feed on algae could also be negatively impacted, thus allowing more of the hypoxia-fueling algae to grow.

The highest concern is that the oil spill may have impacted spawning success of species that spawn in the summer months, either by reducing spawning activity or by reducing survival of the eggs and larvae. Effects on the physical environment, such as low oxygen, could lead to impacts on the ability of larvae and post-larvae to survive, even if they never encounter oil. In addition, effects of oil exposure may create sub-lethal effects on the eggs, larva, and early life stages. The stressors could potentially be additive, and each stressor may increase the susceptibility to the harmful effects of the other.

The oil from the spill site was not detected in the South Atlantic region, and does not likely pose a threat to the South Atlantic species addressed in this amendment. However, the effects of the oil spill on snapper grouper species would be taken into consideration in future Southeast Data Assessment and Review assessments. Indirect and inter-related effects on the biological and ecological environment of the snapper grouper fishery in concert with the Deepwater Horizon MC252 oil spill are not well understood. Changes in the population size structure could result from shifting fishing effort to specific geographic segments of populations, combined with any anthropogenically induced natural mortality that may occur from the impacts of the oil spill. The impacts on the food web from phytoplankton, to zooplankton, to mollusks, to top predators may be significant in the future.

5. Characterize the resources, ecosystems, and human communities identified in scoping in terms of their response to change and capacity to withstand stress.

In terms of the biophysical environment, the resources/ecosystems identified in earlier steps of the CEA are the fish populations directly or indirectly affected by the regulations. This step should identify the trends, existing conditions, and the ability to withstand stresses of the environmental components.

The species most likely to be impacted by alternatives considered in this environmental impact statement are snapper-grouper species. Trends in the condition of these species are determined through the Southeast Data, Assessment and Review (SEDAR) process if they are assessed. More information on the SEDAR process and assessed species that are included in this amendment can be found in **Section 3.2.1** and information on other affected species can be found in **Section 3.2.1** and is hereby incorporated by reference.

6. Characterize the stresses affecting these resources, ecosystems, and human communities and their relation to regulatory thresholds.

This step is important in outlining the current and probable stress factors on snapper grouper species identified in the previous steps. The goal is to determine whether these species are approaching conditions where additional stresses could have an important cumulative effect beyond any current plan, regulatory, or sustainability threshold (CEQ 1997). Sustainability thresholds can be identified for some resources, which are levels of impact beyond which the resources cannot be sustained in a stable state. Other thresholds are established through numerical standards, qualitative standards, or management goals. The CEA should address whether thresholds could be exceeded because of the contribution of the proposed action to other cumulative activities affecting resources.

Fish populations

In addition to the information in **Item Number 6** of this CEA, the reader is directed to **Section 3.2.1** of this document for more details regarding the species addressed in this amendment. The results of SEDAR assessments determine the stock status of many managed species.

7. Define a baseline condition for the resources, ecosystems, and human communities.

The purpose of defining a baseline condition for the resource and ecosystems in the area of the proposed action is to establish a point of reference for evaluating the extent and significance of expected cumulative effects. The SEDAR assessments show trends in biomass, fishing mortality, fish weight, and fish length going back to the earliest periods of data collection. For a detailed discussion of the baseline conditions of species addressed in this amendment including blueline tilefish, the reader is referred to the sources referenced in **Item Number 6** of this CEA.

8. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities.

The cause and effect relationship of fishing and regulatory actions is shown in **Table 6.1.1**

Table 6.1.1. The cause and effect relationship of fishing and regulatory actions within the time period of the Cumulative Effects Analysis (CEA).

Time period/dates	Cause	Observed and/or Expected Effects
Pre-January 12, 1989	Habitat destruction, growth overfishing of vermilion snapper.	Damage to snapper grouper habitat, decreased yield per recruit of vermilion snapper.
January 1989	Trawl prohibition to harvest fish (Snapper Grouper Amendment 1; SAFMC 1988).	Increase yield per recruit of vermilion snapper; eliminate trawl damage to live bottom habitat.
Pre-January 1, 1992	Overfishing of many snapper grouper species.	Spawning stock ratio of these species is estimated to be less than 30% indicating that they are overfished.
January 1992	Prohibited gear: fish traps south of Cape Canaveral, FL; entanglement nets; longline gear inside of 50 fathoms; powerheads and bangsticks in designated SMZs off SC. Size/Bag limits: 10" TL vermilion snapper (recreational only); 12" TL vermilion snapper (commercial only); 10 vermilion snapper/person/day; aggregate grouper bag limit of 5/person/day; and 20" TL gag, red, black, scamp, yellowfin, and yellowmouth grouper size limit (Snapper Grouper Amendment 4; SAFMC 1991).	Reduce mortality of snapper grouper species.
Pre-June 27, 1994	Damage to *Oculina* habitat.	Noticeable decrease in numbers and species diversity in areas of *Oculina* off FL
July 1994	Prohibition of fishing for and retention of snapper grouper species (HAPC renamed Oculina Experimental Closed Area (OECA)(Snapper Grouper Amendment 6; SAFMC 1993).	Initiated the recovery of snapper grouper species in OECA.
1992-1999	Declining trends in biomass and overfishing continue for a number of snapper grouper species including golden tilefish.	Spawning potential ratio for golden tilefish is less than 30% indicating that they are overfished.
July 1994	Snapper Grouper Amendment 6 (SAFMC 1993).	Commercial quota for golden tilefish; commercial trip limits for golden tilefish; include golden tilefish in grouper recreational aggregate bag limits.
February 24, 1999	Snapper Grouper Amendment 9 (SAFMC 1998a).	All S-G without a bag limit: aggregate recreational bag limit 20 fish/person/day, excluding tomtate and blue runners. Vessels with longline gear aboard may only possess snowy, warsaw, yellowedge, and misty grouper, and golden, blueline and sand tilefish.
Effective October 23, 2006	Stock assessments indicate black sea bass vermilion snapper, red porgy, and	Management measures implemented to end overfishing of these species.

Time period/dates	Cause	Observed and/or Expected Effects
	snowy grouper are undergoing overfishing. Snapper grouper FMP Amendment 13C (SAFMC 2006)	
Effective February 12, 2009	Recognized need to provide additional protection to deepwater snapper grouper species, and to protect spawning locations. Snapper grouper FMP Amendment 14 (SAFMC 2007).	Use MPAs as a management tool to promote the optimum size, age, and genetic structure of slow growing, long-lived deepwater snapper grouper species (e.g., speckled hind, snowy grouper, warsaw grouper, yellowedge grouper, misty grouper, golden tilefish, blueline tilefish, and sand tilefish). Gag and vermilion snapper occur in some of these areas.
Effective March 20, 2008	Stock assessments indicate snowy grouper, black sea bass, and red porgy are overfished. Snapper grouper FMP Amendment 15A (SAFMC 2008a).	Establish rebuilding plans and SFA parameters for snowy grouper, black sea bass, and red porgy.
Effective Dates Dec 16, 2009, to Feb 16, 2010.	Concern that bag limit sales of snapper grouper species obfuscates accurate reporting of landings data. Snapper grouper FMP Amendment 15B (SAFMC 2008b).	End double counting in the commercial and recreational reporting systems by prohibiting the sale of bag-limit caught snapper grouper, and minimize impacts on sea turtles and smalltooth sawfish.
Effective Date July 29, 2009	Stock assessment indicates gaga is experiencing overfishing and is approaching an overfished condition. Snapper grouper FMP Amendment 16 (SAFMC 2009a).	Protect spawning aggregations and snapper grouper in spawning condition by increasing the length of the spawning season closure, decrease discard mortality by requiring the use of dehooking tools, reduce overall harvest of gag and vermilion snapper to end overfishing.
Effective Date January 4, 2010	Stock assessment indicated red snapper is overfished and undergoing overfishing. Red Snapper Interim Rule.	Prohibit commercial and recreational harvest of red snapper from January 4, 2010, to June 2, 2010 with a possible 186-day extension. Reduce overfishing of red snapper while long-term measures to end overfishing are addressed in Amendment 17A.
Effective Dates June 3, 2010, to Dec 5, 2010	Stock assessment indicated red snapper is overfished and undergoing overfishing. Extension of Red Snapper Interim Rule	Extended the prohibition of red snapper to reduce overfishing of red snapper while long-term measures to end overfishing are addressed in Amendment 17A.
Effective Date December 4, 2010	Stock assessment indicated red snapper is overfished and undergoing overfishing. Snapper Grouper FMP Amendment 17A (SAFMC 2010a).	Specified SFA parameters for red snapper; ACLs and ACTs; management measures to limit recreational and commercial sectors to their ACTs; accountability measures. Establish rebuilding plan for red snapper. Large snapper grouper area closure inn EEZ of NE Florida. Emergency rule delayed the effective date of the snapper grouper closure.

Time period/dates	Cause	Observed and/or Expected Effects
Effective Date January 31, 2011	Reauthorized Magnuson-Stevens Act requires ACLs for all species undergoing overfishing. Snapper Grouper Amendment 17B (SAFMC 2010b).	Specified ACLs and ACTs; management measures to limit recreational and commercial sectors to their ACTs; AMs, for species undergoing overfishing. Established a harvest prohibition of six snapper grouper species in depths greater than 240 feet.
Effective Date June 1, 2011	New red snapper assessment indicates stock is undergoing overfishing and is overfished but area closures approved in Amendment 17B are not needed. Regulatory Amendment 10 (SAFMC 2010c).	Removed of snapper grouper area closure approved in Amendment 17A.
Effective Date July 15, 2011	Additional management measures are considered to help ensure overfishing of black sea bass, vermilion snapper, and gag does not occur. Desired to have management measures slow the rate of capture to prevent derby fisheries. Regulatory Amendment 9 (SAFMC 2011a)	Harvest management measures for black sea bass; commercial trip limits for gag, vermilion snapper, and greater amberjack
Effective Date May 10, 2012	New analysis demonstrates prohibition to harvest of 6 deepwater species in Amendment 17B is not an effective measure to reduce bycatch of speckled hind and warsaw grouper. Regulatory Amendment 11 (SAFMC 2011b)	Removed the harvest prohibition of six deepwater snapper grouper species implemented in Amendment 17B.
Effective Date April 16, 2012	Reauthorized Magnuson-Stevens Act requires ACLs for species not undergoing overfishing. Comprehensive ACL Amendment (SAFMC 2011c).	ACLs ACTs, and AMs for species not experiencing overfishing; accountability measures; an action to remove species from the fishery management unit as appropriate; and management measures to limit recreational and commercial sectors to their ACTs.
Effective Date July 11, 2012	Stock assessment indicates red grouper is overfished and undergoing overfishing. Amendment 24 (Red Grouper) (SAFMC 2011d).	Established a rebuilding plan for red grouper, specified ABC, and established ACL, ACT and revised AMs for the commercial and recreational sectors.
Effective Date July 1, 2012	Need to slow rate of harvest in black sea bass pot sector to ease derby conditions. Amendment 18A (SAFMC 2012a).	Established an endorsement program for black sea bass commercial sector; established a trip limit; specified requirements for deployment and retrieval of pots; made improvements to data reporting for commercial and for-hire sectors
Effective Dates: September 17, 2012 (commercial); September 14, 2012 (recreational)	As red snapper stock rebuilds some limited harvest of red snapper can occur, as long as rebuilding is not compromised. Temporary Rule through Emergency Action (Red snapper).	Established limited red snapper fishing seasons (commercial and recreational) in 2012.

Time period/dates	Cause	Observed and/or Expected Effects
Effective Date January 7, 2013	Clarification of action in Amendment 18A for black sea bass pot endorsement transferability was needed. Amendment 18A Transferability Amendment.	Reconsidered action to allow for transfer of black sea bass pot endorsements that was disapproved in Amendment 18A.
Effective Date October 26, 2012	Some wreckfish catch shares have become available over time. Amendment 20A (Wreckfish) (SAFMC 2012b).	Redistributed inactive wreckfish shares.
Effective Date October 9, 2012	Stock assessment indicates golden tilefish overfishing has been ended and catch levels can be increased. Regulatory Amendment 12 (SAFMC 2012c).	Adjusted the golden tilefish ACL based on the results of a new stock assessment and modified the recreational golden tilefish AM.
Effective Date May 23, 2013	There is a need to reduce effort in the commercial longline sector that targets golden tilefish to ease derby conditions. Snapper Grouper Amendment 18B (SAFMC 2013a)	Establish a commercial longline endorsement program for golden tilefish; establish an appeals process; allocate the commercial ACL by gear; establish trip limit for the hook-and-line sector.
Target 2014	There is a need to control recreational harvest of snapper grouper species with very small ACLs. Snapper Grouper Amendment 22 (under development).	Develop a recreational tag program for snapper grouper species in the South Atlantic.
Effective Date July 17, 2013	The recreational data collection system has changed from MRFSS to MRIP. ACLs and allocations in place utilize MRFSS data. Regulatory Amendment 13. (SAFMC 2013b).	Adjust ACLs and allocations for unassessed snapper grouper species with MRIP recreational estimates
Effective Date January 27, 2014	Blue runner are caught primarily in state waters of FL, and it is not clear if federal management is needed. Nassau grouper is no longer managed by Gulf Council. Council would like to be able to make adjustment to ACLs more quickly after a stock assessment has been completed. Snapper Grouper Amendment 27 (SAFMC 2014c).	Establish the Council as the managing entity for yellowtail and mutton snappers and Nassau grouper in the Southeast U.S., modify the SG framework; modify placement of blue runner in an FMU or modify management measures for blue runner
Effective Date August 23, 2013	As the red snapper stock rebuilds, some allowable harvest could occur if rebuilding is not affected. Snapper Grouper Amendment 28 (SAFMC 2013d).	Modify red snapper management measures including the establishment of a process to determine future annual catch limits and fishing seasons.
Target 2015	Council's SSC has identified new methods to estimate ABC for data poor species. Snapper Grouper Amendment 29 (SAFMC 2014b).	Update ABCs, ACLs, and ACTs for snapper grouper species based on recommendations from SSC.
Effective Date September 12, 2013	New stock assessments completed for vermilion snapper and red porgy. Regulatory Amendment 18 (SAFMC 2013g).	Adjust ACLs and management measure for vermilion snapper and red porgy based on results from new update assessment.
Effective Date September 23, 2013	New stock assessment for black sea bass indicates the stock is rebuilt and catch levels can be increased.	Increase recreational and commercial ACLs for black sea bass.

Time period/dates	Cause	Observed and/or Expected Effects
	Regulatory Amendment 19 (SAFMC 2013f).	Black sea bass pots prohibited from November 1 through April 30 (effective October 23, 2013).
Effective Date September 5, 2013	New stock assessment indicates catch levels of yellowtail snapper can be increased. Accountability measures for gag can be adjusted because effective means are in place to ensure overfishing does not occur. Regulatory Amendment 15 (SAFMC 2013c).	Increase yellowtail snapper ACL, remove accountability measure for gag that closes commercial harvest for all shallow water grouper species when the gag ACL is met. Reduce gag ACL to account for dead discards when fishermen target co-occurring shallow water grouper species.
Effective Date January 27, 2014	Southeast Fisheries Science Center has established a program that allows headboats to report landings through electronic means. Generic For-Hire Reporting Amendment (GMFMC and SAFMC 2013a).	Require all federally-permitted headboats in the South Atlantic to report landings information electronically and on a weekly basis.
Target 2015	Joint Commercial Logbook Reporting Amendment (under development)	Require all federally-permitted commercial fin fish fishermen in the southeast to report electronically.
Effective Date Dec 8, 2014	Regulatory Amendment 14 (SAFMC 2013e).	Change the fishing years for greater amberjack and black sea bass, change in AMs for vermilion snapper and black sea bass, and modify the gag trip limit.
Target 2015	Generic AM and dolphin allocation amendment (SAFMC 2015a).	Modify AMs for snapper grouper species and golden crab. Modify allocations for dolphin.
Target 2015	Joint Charterboat Reporting Amendment (under development)	Require all federally-permitted charterboats to report landings information electronically.
Target 2015	Amendment 33 (SAFMC 2015b)	Require fillets of snapper grouper species lawfully harvested from the Bahamas to be brought into the United States through the Atlantic EEZ, to have the skin intact.
Effective Date July 1, 2015	Amendment 29 (SAFMC 2014b)	Update the ABC control rule for snapper grouper species using the only reliable catch stocks (ORCS) methodology, and update management measures for gray triggerfish to lengthen the fishing season.
Effective Date November 6, 2014	Regulatory Amendment 21 (SAFMC 2014a)	Modify MSST for 8 snapper grouper species including blueline tilefish.
Effective Date March 30, 2015	Amendment 32 (SAFMC 2014e)	End overfishing of blueline tilefish.

Time period/dates	Cause	Observed and/or Expected Effects
Effective Date August 20, 2015	Regulatory Amendment 20 (SAFMC 2014d)	Update ACLs and management measures for snowy grouper.
Target 2015	Regulatory Amendment 22 (SAFMC 2015c)	Update ACLs and management measures for gag and wreckfish.
Target 2016	Regulatory Amendment 16 (under development)	Modify November-April black sea bass pot prohibition.

9. Determine the magnitude and significance of cumulative effects.

When species in the snapper grouper fishery management unit are assessed, stock status may change as new information becomes available. In addition, changes in management regulations, fishing techniques, social/economic structure, etc. can result in shifts in the percentage of harvest between user groups over time. As such, the Council has determined that certain aspects of the current management system should be restructured as necessary. As shown in **Table 6.1.1** above, a number of amendments could be implemented in the near future.

None of the impacts from the proposed management actions have been determined to be significant. See **Chapter 4** for the detailed discussions of the magnitude of the impacts of the preferred alternatives on the social and economic environment.

Amendment 36 would establish Spawning SMZs to protect spawning fish and their habitat. The cumulative effects of the actions are not expected to significantly affect the magnitude of bycatch, diversity and ecosystem structure of fish communities, or safety at sea of fishermen targeting snapper grouper, and other species managed by the Council. Based on the cumulative effects analysis presented herein, the actions contained in this EIS, in combination with actions that have been implemented in the past, or will be implemented in the future, are not expected to result in any significant cumulative impacts. See **Chapter 4** for the detailed discussions of the magnitude of the impacts of the alternatives on the social and economic environment.

The actions in this EIS are not likely to result in direct, indirect, or cumulative effects to unique areas, such as significant scientific cultural or historical resources, parkland, prime farmlands, wetlands, wild and scenic rivers or ecologically critical areas. The USS Monitor, Gray's Reef, and Florida Keys National Marine Sanctuaries are within the boundaries of the South Atlantic EEZ. The proposed action is not expected to substantially decrease fishing effort and the spatial and/or temporal distribution of current fishing effort within the snapper grouper fishing of the South Atlantic region. As described in **Chapter 4**, if the proposed Spawning SMZs are implemented, vessels would likely displace fishing effort. As the overall fishing effort is not expected to significantly change from the proposed actions, the proposed actions are not likely to cause loss or destruction of these national marine sanctuaries.

10. Modify or add alternatives to avoid, minimize, or mitigate significant cumulative effects.

The cumulative effects on the biophysical environment are expected to be negligible. Avoidance, minimization, and mitigation are not applicable. The proposed action is not related to other actions with individually insignificant, but cumulatively significant impacts. The actions contained in the EIS, in combination with actions that have been implemented in the past, or will be implemented in the future, are not expected to result in any significant cumulative impacts. As described in **Chapter 4**, if the proposed Spawning SMZs are implemented, vessels would likely displace fishing effort. As the overall fishing effort is not expected to significantly from the proposed actions, the proposed actions are not likely to cause loss or destruction of these

national marine sanctuaries. Therefore, the cumulative effects of the actions are not expected to significantly affect the magnitude of bycatch, diversity and ecosystem structure of fish communities, or safety at sea of fishermen targeting snapper grouper, and other species managed by the Council. Based on the cumulative effects analysis presented herein, the proposed actions will not have any significant cumulative impacts combined with other past, present, and foreseeable future actions.

11. Monitor the cumulative effects of the selected alternative and adopt management.

The effects of the proposed actions are, and will continue to be, monitored through collection of data by NMFS, states, stock assessments and stock assessment updates, life history studies, and other scientific observations. The proposed action relates to the harvest of indigenous species in the Atlantic, and the activity being altered does not itself introduce non-indigenous species, and is not reasonably expected to facilitate the spread of such species through depressing the populations of native species. Additionally, these actions do not propose any activity, such as increased ballast water discharge from foreign vessels, which is associated with the introduction or spread on non-indigenous species.

6.2 Socioeconomic

The actions in Amendment 36 will establish special management zones that will restrict access to certain fishing grounds for both commercial and recreational fishermen. In general, the benefits to fishermen and coastal communities will be associated with the biological benefits that result from prohibiting or restricting harvest in the designated area. If there is improvement in a stock and over time there are more fish available, this could benefit fishermen due to the expected spillover effect of closed areas. Additionally, improved stock health that fishermen observe first hand will also help improve buy-in for closed areas.

The proposed actions, specifically the action to create the South Carolina SMZs, could result in negative economic and social effects from closed areas on fishermen and fishing communities if access to fishing grounds is prohibited or restricted. For commercial fishermen and for-hire businesses that use the fishing grounds, this could negatively affect business profits. For private recreational anglers, restricted access could negatively affect fishing opportunities and trip satisfaction. Additionally, SMZs are specifically designed for spawning habitat, and this could be detrimental for fishermen who target a particular species during spawning aggregations. However, the current level of fishing in several of the proposed SMZs is low, and there may be less negative social and economic effects.

Designating an area as an SMZ and prohibiting fishing for snapper grouper species will require compliance (via buy-in) and enforcement. If these are lacking, the SMZ could not generate the expected biological benefits, which would negatively affect fishermen and communities. **Section 3.3.3** describes the communities and fishermen who may be affected by establishment of SMZs.

Because of the recent overall downturn in the economy, any action that restricts economic opportunity may have detrimental social and/or economic effects for commercial and for-hire businesses. The commercial and for-hire sectors of the snapper grouper fishery have seen significant changes in regulatory actions with limited entry, catch limits, trip limits and other management measures. Likewise, the private recreational sector has also been affected by restricted access to fishery resources through catch limits, bag limits, and closed areas. The proposed actions in Amendment 36 may further limit access to the snapper grouper fishery in addition to existing regulations in place that already have negative social and economic effects on commercial and for-hire fishing businesses, along with private recreational fishing opportunities.

The cumulative social and economic effects of past, present, and future amendments may be described as limiting fishing opportunities in the short-term, with some exceptions of actions that alleviate some negative social and economic impacts. The intent of these amendments is to improve prospects for sustained participation in the respective fisheries over time and the proposed actions in this amendment are expected to result in some important long-term benefits to the commercial and for-hire fishing fleets, fishing communities and associated businesses, and private recreational anglers. The proposed changes in this amendment that could affect access to several important species in the South Atlantic region may contribute to changes in the snapper grouper fishery within the context of the current economic and regulatory environment at the local and regional level.

Chapter 7. List of Preparers

Table 7.1.1. List of Amendment 36 preparers.

Name	Agency/Division	Area of Amendment Responsibility
Andy Herndon	NMFS/PR	Protected Resources Biologist
Brian Cheuvront	SAFMC	Economist
Gregg Waugh	SAFMC	Deputy Executive Director/IPT co-lead
Roger Pugliese	SAFMC	Senior Fishery Biologist/IPT co-lead
Kari MacLauchlin	SAFMC	Fishery Social Scientist
Mike Errigo	SAFMC	Fishery Biologist/Data
Myra Brouwer	SAFMC	Fishery Biologist
Chip Collier	SAFMC	Fishery Scientist
Rick DeVictor	NMFS/SF	Fishery Biologist/IPT co-lead
David Records	NMFS/SF	Economist
Nick Farmer	NMFS/SF	Fishery Biologist
Mike Jepson	NMFS/SF	Fishery Social Scientist

NMFS = National Marine Fisheries Service, SAFMC = South Atlantic Fishery Management Council, SF = Sustainable Fisheries Division, PR = Protected Resources Division, SERO = Southeast Regional Office, HC = Habitat Conservation Division, GC = General Counsel, Eco=Economics

Table 7.1.2. List of Amendment 36 interdisciplinary plan team members.

Name	Organization	Title
Larry Perruso	SEFSC	Economist
Mike Burton	SEFSC	Fishery Biologist
Andy Herndon	NMFS/PR	Protected Resources Biologist
Jennyh Lee	NMFS/PR	Protected Resources Biologist
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David Dale	NMFS/HC	EFH Specialist
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Gregg Waugh	SAFMC	Deputy Executive Director
Jack McGovern	NMFS/SF	Fishery Biologist
Nick Farmer	NMFS/SF	Fishery Biologist
Chip Collier	SAFMC	Fishery Scientist
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Ken Lindemen	SAFMC Contractor	Scientist
Michelle Tishler	SAFMC Contractor	Scientist
Adam Bailey	NMFS/SF	Regulation Writer
Mike Errigo	SAFMC	Data Analyst
Mike Jepson	NMFS/SF	Fishery Social Scientist
Monica Smit-Brunello	NMFS SERO/GC	Attorney
Myra Brouwer	SAFMC	Fishery Biologist
Jeff Radonski	NOAA/OLE	Supervisory Criminal Investigator
Rick DeVictor	NMFS/SF	Fishery Biologist
Roger Pugliese	SAFMC	Sr. Fishery Biologist
David Records	NMFS/SF	Economist

NMFS = National Marine Fisheries Service, SAFMC = South Atlantic Fishery Management Council, SF = Sustainable Fisheries Division, PR = Protected Resources Division, SERO = Southeast Regional Office, HC = Habitat Conservation Division, GC = General Counsel, Eco=Economics

Chapter 8. List of Agencies, Organizations, and Persons to Whom Copies of the Statement are Sent

Responsible Agency

Amendment 36:
South Atlantic Fishery Management Council
4055 Faber Place Drive, Suite 201
Charleston, South Carolina 29405
(843) 571-4366 (TEL)
Toll Free: 866-SAFMC-10
(843) 769-4520 (FAX)
safmc@safmc.net

Environmental Impact Statement:
NMFS, Southeast Region
263 13th Avenue South
St. Petersburg, Florida 33701
(727) 824-5301 (TEL)
(727) 824-5320 (FAX)

List of Agencies, Organizations, and Persons to Whom Copies of the Statement are Sent

Environmental Protection Agency
SAFMC Law Enforcement Advisory Panel
SAFMC Snapper Grouper Advisory Panel
SAFMC Scientific and Statistical Committee
North Carolina Coastal Zone Management Program
South Carolina Coastal Zone Management Program
Georgia Coastal Zone Management Program
Florida Coastal Zone Management Program
Florida Fish and Wildlife Conservation Commission
Georgia Department of Natural Resources
South Carolina Department of Natural Resources
North Carolina Division of Marine Fisheries
North Carolina Sea Grant
South Carolina Sea Grant
Georgia Sea Grant
Florida Sea Grant
Atlantic States Marine Fisheries Commission
Gulf and South Atlantic Fisheries Development Foundation
National Marine Fisheries Service
- Washington Office
- Office of Ecology and Conservation
- Southeast Regional Office
- Southeast Fisheries Science Center

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