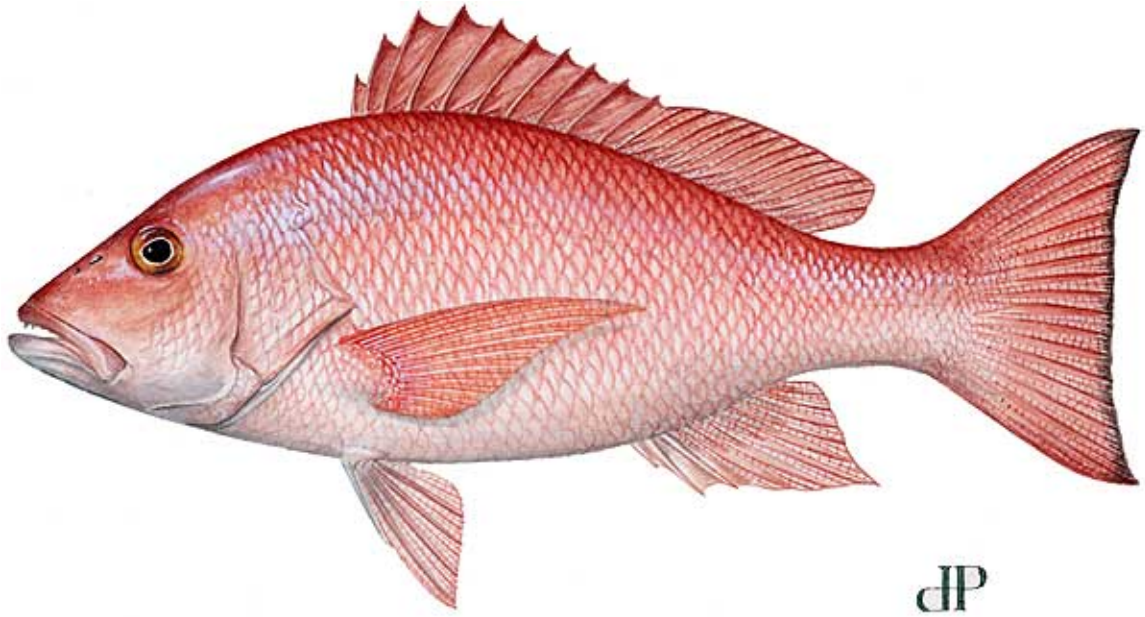
Draft Environmental Assessment

Interim Measures to Address Overfishing of Red Snapper in the South Atlantic Region



Prepared By: NOAA Fisheries Service
Southeast Regional Office
April 2009

ABBREVIATIONS AND ACRONYMS

ACL	Annual Catch Limits
ACT	Annual Catch Targets
AM	Accountability Measures
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
CEA	Cumulative Effects Analysis
CS	Consumer Surplus
DEIS	Draft Environmental Impact Statement
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EFH-HAPC	Essential Fish Habitat - Habitat Area of Particular Concern
EIS	Environmental Impact Statement
ESA	Endangered Species Act of 1973
F	A measure of the instantaneous rate of fishing mortality
$F_{40\%SPR}$	Fishing mortality that will produce a static SPR = 40%.
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
FONSI	Finding of No Significant Impact
FTE	Full time Equivalent
M	Natural mortality rate
MARFIN	Marine Fisheries Initiative
MARMAP	Marine Resources Monitoring Assessment and Prediction Program
MFMT	Maximum Fishing Mortality Threshold
MMPA	Marine Mammal Protection Act of 1972
MRFSS	Marine Recreational Fisheries Statistics Survey
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MSST	Minimum Stock Size Threshold
MSY	Maximum Sustainable Yield
NEPA	National Environmental Policy Act of 1969
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOR	Net operating Revenue
OFL	Overfishing Limit

OY	Optimum Yield
PS	Producer Surplus
R	Recruitment
RIR	Regulatory Impact Review
SAFE Report	Stock Assessment and Fishery Evaluation Report
SAMFC	South Atlantic Fishery Management Council
SDDP	Supplementary Discard Data Program
SEDAR	Southeast Data, Assessment, and Review
SEFSC	Southeast Fisheries Science Center
SERO	Southeast Regional Office
SSC	Scientific and Statistical Committee
TL	Total length
T_{MIN}	The length of time in which a stock could rebuild to B_{MSY} in the absence of fishing mortality
USCG	U.S. Coast Guard

INTERIM RULE TO THE FISHERY MANAGEMENT PLAN FOR THE SNAPPER-GROUPER FISHERY OF THE SOUTH ATLANTIC REGION

INCLUDING A DRAFT ENVIRONMENTAL ASSESSMENT AND DRAFT REGULATORY IMPACT REVIEW

Proposed actions:	**Seasonal closure to immediately address overfishing of red snapper.**
Lead agency:	EA - NOAA Fisheries Service
For Further Information Contact:	
	Roy E. Crabtree, Ph.D. NOAA Fisheries, Southeast Region 263 13th Avenue South St. Petersburg, FL 33701 727-824-5301

ABSTRACT

The South Atlantic Fishery Management Council (Council) was notified by the National Marine Fisheries Service (NMFS) on July 8, 2008, that red snapper in the South Atlantic region are undergoing overfishing and are overfished according to the current definition of the minimum stock size threshold. The Council is developing Amendment 17 to the Snapper-Grouper Fishery Management Plan for the South Atlantic Region (Amendment 17), which would establish management measures to end overfishing and rebuild the red snapper stock. At the March 2009 meeting, the Council voted (7-6) to request an interim rule to end overfishing of red snapper. In a letter dated March 23, 2009, the Council requested NOAA Fisheries Service implement a prohibition on the harvest and possession of red snapper through interim measures. The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requires the Council to prepare a plan amendment or proposed regulations to end overfishing within one year of notification that a stock is overfished.

The measures analyzed in this document include: No action; a four month seasonal closure of the red snapper fishery; and a seasonal closure for 180 days with the possible extension for 186 days.

TABLE OF CONTENTS

ABSTRACT V
LIST OF APPENDICES IX
LIST OF FIGURES X
LIST OF TABLES XI
TABLE OF CONTENTS FOR THE ENVIRONMENTAL ASSESSMENT XIII
Summary XIV
1 Introduction 1
1.1 Background 1
1.2 Fishery Conservation and Management Authority 3
1.3 Purpose and Need 3
1.4 Proposed Interim Federal Action 4
1.5 Related NEPA Documents in Development 4
1.6 History of Management 6
2 Alternatives Considered 8
2.1 Description of Alternatives 8
2.2 Comparison of Alternatives 10
3 AFFECTED ENVIRONMENT 11
3.1 Habitat 11
3.1.1 Inshore/Estuarine Habitat 11
3.1.2 Offshore Habitat 11
3.1.3 Essential Fish Habitat 13
3.1.4 Habitat Areas of Particular Concern 13
3.2 Biological/Ecological Environment 14
3.2.1 Species Most Impacted By This FMP Amendment 14
3.2.2 Red snapper assessment and stock status 15
3.2.3 Science Underlying the Management of Snapper-Grouper Species Most Impacted By This FMP Amendment 15
3.2.4 Other Affected Council-Managed Species 16
3.3 Protected Species in the Action Area 17
3.4 Human Environment 18
3.4.1 Description of the Fishery 18
3.4.1.1 Commercial Fishery 18
3.4.1.1.1 Gear and Fishing Behavior 18
3.4.1.1.2 Landings, Ex-vessel Value, Price, and Effort 19
3.4.1.1.3 The South Atlantic Snapper-Grouper Fishery by State 22
3.4.1.1.4 The South Atlantic Snapper-Grouper Fishery by Gear 25
3.4.1.1.5 The Commercial Fishery for Red Snapper 27
3.4.1.1.6 Average Annual Total Dockside (Ex-vessel) Revenues 32
3.4.1.1.7 Economic Impacts of the Commercial Fishery 33
3.4.1.1.8 Imports 34
3.4.1.2 Recreational Fishery 34
3.4.1.2.1 Harvest 34
3.4.1.2.3 Permits 40
3.4.1.2.4 Economic Value 41
3.4.1.2.5 Financial Operations of the Charter and Headboat Sectors 43

3.4.2 Social and Cultural Environment ... 44
3.4.2.1 North Carolina ... 47
3.4.2.1.1 Carteret County ... 48
3.4.2.1.2 Communities ... 49
3.4.2.1.3 Brunswick County ... 49
3.4.2.2 South Carolina ... 50
3.4.2.2.1 Charleston County ... 51
3.4.2.2.2 Georgetown County ... 52
3.4.2.2.3 Horry County ... 53
3.4.2.3 Georgia ... 54
3.4.2.3.1 McIntosh County ... 55
3.4.2.4 Florida ... 56
3.4.2.4.1 Duval County ... 57
3.4.2.4.2 St. Johns County ... 58
3.4.2.4.3 Volusia County ... 59
3.4.2.4.4 Brevard County ... 60
4 ENVIRONMENTAL CONSEQUENCES ... 62
4.1 Alternatives Considered ... 62
4.1.1 Biological Effects ... 62
4.1.2 Economic Effects ... 71
4.1.3 Social Effects ... 80
4.1.4 Administrative Effects ... 81
4.2 Bycatch Practicability Analysis ... 82
4.2.1 Population Effects for the Bycatch Species ... 83
4.2.1.1 Background ... 83
4.2.1.2 Commercial Fishery ... 83
4.2.1.3 Recreational Fishery ... 86
4.2.1.4 Finfish Bycatch Mortality ... 87
4.2.1.5 Practicability of Management Measures in Directed Fisheries Relative to their Impact on Bycatch and Bycatch Mortality ... 88
4.2.2 Ecological Effects due to Changes in the Bycatch ... 89
4.2.3 Changes in the Bycatch of Other Fish Species and Resulting Population and Ecosystem Effects ... 89
4.2.4 Effects on Marine Mammals and Birds ... 90
4.2.5 Changes in Fishing, Processing, Disposal, and Marketing Costs ... 91
4.2.6 Changes in Fishing Practices and Behavior of Fishermen ... 91
4.2.7 Changes in Research, Administration and Enforcement Costs and Management Effectiveness ... 91
4.2.8 Changes in the Economic, Social, or Cultural Value of Fishing Activities and Non-Consumptive Uses of Fishery Resources ... 92
4.2.9 Changes in the Distribution of Benefits and Costs ... 92
4.2.10 Social Effects ... 92
4.2.11 Conclusion ... 92
4.3 Cumulative Effects ... 93
4.3.1 Physical Environment ... 93
4.3.2 Habitat and EFH ... 94

4.3.3 Fishery Resources 94
4.3.4 Protected Resources 94
4.3.5 Social and Economic Environment 95
4.3.6 Summary of Cumulative Impacts 95
4.4 Unavoidable Adverse Effects 96
4.5 Effects of the Fishery on the Environment 96
4.6 Damage to Ocean and Coastal Habitats 96
4.7 Relationship of Short-Term Uses and Long-Term Productivity 97
4.8 Irreversible and Irretrievable Commitment of Resources 97
4.9 Monitoring and Mitigation Needs 97
4.10 Unavailable or Incomplete Information 97
5 Regulatory Impact Review 99
6 Regulatory Flexibility Act Analysis 101
7 List of Preparers 106
8 List of Agencies, Organizations, and Persons To Whom Copies of the Statement Are Sent 107
9 REFERENCES 108

LIST OF APPENDICES

Appendix 1: History of Management for the Snapper-Grouper Fishery

LIST OF FIGURES

Figure 1-1. Jurisdictional boundaries of the South Atlantic Fishery Management Council. 1
Figure 3.1 Logbook reported commercial landings of snapper-grouper from South Atlantic waters. 19
Figure 3-2. Commercial landings of red snapper, 1950-2006 27
Figure 3-3. Annual landings and dockside revenues for red snapper, 1993-2007..... 28
Figure 3-4. Average annual dockside prices for red snapper, in current 29
dollars and 2007 dollars. 29
Figure 3-5. Seasonal distribution of red snapper landings, 1993-2007. 29
Figure 3-6. Number of Snapper-grouper Commercial Permits 2001-2007. (NMFS SERO Permits Database) 45
Figure 3-7. Counties with Red Snapper Landings Ranked High or Medium on Average from 2003-2007. (Source: NOAA Fisheries Service, Southeast Fisheries Science Center ACLS) 46
Figure 3-8. North Carolina communities in Counties with Medium to High Red Snapper Landings on Average 2003-2007. (Source: NOAA Fisheries Service, Southeast Fisheries Science Center ACLS) 48
Figure 3-9. South Carolina Communities in Counties with Medium to High Red Snapper Landings on Average. (Source: NOAA Fisheries Service, Southeast Fisheries Science Center ACLS) 51
Figure 3-10. Communities in Georgia Counties with Medium to High Red Snapper Landings on Average 2003-2007. (Source: NOAA Fisheries Service, Southeast Fisheries Science Center ACLS) 55
Figure 3-11. Communities in Florida Counties with Medium to High Red Snapper Landings on Average from 2003-2007. (Source: NOAA Fisheries Service, Southeast Fisheries Science Center ACLS) 57
Figure 4-1. Estimated recruitment of age-1 red snapper..... 63
Figure 4-2. Age structure of the red snapper population. 64
Figure 4-3. Mean age of red snapper. 64
Figure 4-4. Estimated time series of red snapper biomass relative..... 65
to B_{MSY} proxy..... 65
Figure 4-5. Predicted seasonal distribution of red snapper landings, without and with the simulated effects of Snapper-Grouper Amendments 13C, 15A and 16..... 72

LIST OF TABLES

Table 1-1. Species in the Snapper-Grouper Fishery Management Unit (FMU)..... 2
Table 1-2. History of management for red snapper. 7
Table 2-1. Summary of effects of alternatives under consideration. 10
Table 3-3. Annual landings and dockside (ex-vessel) revenues for trips with at least one pound of species in the snapper-grouper fishery management unit in the South Atlantic, 2003-2007. 20
Table 3-4. Fishing effort and distribution of landings for trips with at least one pound of species in the snapper-grouper fishery management unit in the South Atlantic, 2003-2007..... 21
Table 3-5. Average annual landings and dockside revenues for trips with at least one pound of species in the snapper-grouper fishery, averages for 2003-2007 by state. 23
Table 3-6. Average annual landings (in thousands of pounds, whole weights) on trips that landed at least one pound of snapper-grouper species: averages for 2003-2007, by state and species group..... 24
Table 3-7. Average annual dockside revenues in thousands of 2007 dollars for trips that landed at least one pound of snapper-grouper species: averages for 2003-2007 by state and species group..... 25
Table 3-8. North Carolina communities in Counties with Medium to High Red Snapper Landings on Average 2003-2007. (Source: NOAA Fisheries Service, Southeast Fisheries Science Center ACLS) 26
Table 3-9. Annual landings, dockside revenues and fishing effort, trips and boats with landings of at least one pound of red snapper, 2003-2007. 30
Table 3-10. Annual landings and dockside revenues on trips with red snapper as the top source of trip revenue, 2003-2007. 31
Table 3-11. Annual landings and dockside revenues on trips with red snapper as a lesser source of trip revenue, 2003-2007. 31
Table 3-12. Annual landings of red snapper for trips with at least one pound of red snapper, by region and primary gear, 2003-2007. 32
Table 3-13. U.S. imports of snappers and groupers, 2001-2006. 34
Table 3-14. Harvest of snapper-grouper species by mode in the South Atlantic, 2003-2007..... 35
Table 3-15. Harvest of snapper-grouper species by state in the South Atlantic, 2003-2007..... 35
Table 3-16. Harvest of red snapper (pounds) by mode in the South Atlantic, 2003-2007.. 35
Table 3-17. Harvest of red snapper (pounds) by state in the South Atlantic, 2003-2007.36
Table 3-18. Bag composition for red snapper catch trips, 2003-2007..... 36
Table 3-19. Average annual headboat harvests (1,000 pounds), 2003-2007..... 37
Table 3-20. Recreational effort for the snapper-grouper fishery in the South Atlantic, in thousand trips, by mode, 2003-2007..... 39
Table 3-21. Recreational effort for the snapper-grouper fishery in the South Atlantic, in thousand trips, by state, 2003-2007. 39

Table 3-22. Recreational effort for the red snapper fishery in the South Atlantic, in thousand trips, by mode, 2003-2007. 39
Table 3-23. Recreational effort for the red snapper fishery in the South Atlantic, in thousand trips, by state, 2003-2007. 40
Table 3-24. Estimate of headboat angler days for the U.S. South Atlantic. 40
Table 3-25. South Atlantic snapper-grouper for-hire permit holders by home port state, 2003-2007. 41
Table 3-26. Summary of expenditures on saltwater trips. 42
Table 4-1. MRFFS landings (number A+B1) of red snapper by state, 2003-2007. 66
Table 4-2. MRFSS number of red snapper released alive (B2) among states, 2003-2007. 66
Table 4-3. Species taken on commercial trips when at least 1 pound of red snapper was caught. Based on ALS data from 2003-2007. 67
Table 4-4. Species taken on headboat trips when at least 1 red snapper was caught. Based on data from 2003-2007. 68
Table 4-5. Species taken on MRFSS trips when at least 1 red snapper was caught. Based on data from 2003-2007. 68
Table 4-6. Percentage of red snapper (commercial) landed by month in FL, GA, SC, and NC during 2003-2007 (lbs gutted weight) by state and month. 69
Table 4-7. Average gag headboat landings 2003-2007 (percentage) by state and month. 69
Table 4-8. Average red snapper MRFSS landings 2003-2007 (A+B1 Number, percent) by state and month. 70
Table 4-9. Average commercial, headboat, and MRFSS landings (lbs gutted weight) during 2003-2007. 71
Table 4-10. Average estimated change in vessel net operating revenue (NOR) and number of fishing trips associated with the prohibition of red snapper harvest, 2003-2007. 74
Table 4-11. Average red snapper target effort in the South Atlantic, by month, 2003-2007. 76
Table 4-12. Average estimated change in economic value (2008 $), consumer surplus (CS) and vessel net operating revenue (NOR), associated with the loss of red snapper (fish) or red snapper fishing trips, by month, 2003-2007. CB = charterboat; HB = headboat. 78
Table 4-13. Snapper-grouper fishery effort for the South Atlantic. 83
Table 4-14. Annual number of trips reporting discards, percentage of trips that discarded red snapper, number of red snapper discarded per trip, and expanded number of discarded red snapper per year in the South Atlantic. Average number of trips during 2001-2006 was 15,500. Source: NMFS SEFSC Logbook Program. 84
Table 4-15. The 50 most commonly discarded species during 2001-2006 for the South Atlantic. Values represent total for 2001-2006 from NMFS discard logbook. 84
Table 4-16. Estimated number total catch (A+B1+B2), harvests (A+B1), and released (B2) fish in numbers for the South Atlantic during 2001-2006. 86
Table 4-17. Total red snapper retained and released on sampled headboat trips during 2004-2007. 86
Table 4.18. Estimated time series of dead discards (1000 fish) for commercial handline (D.c.hal), headboat (D.hb), and general recreational (D.rec). 87

TABLE OF CONTENTS FOR THE ENVIRONMENTAL ASSESSMENT

Abstract..……V

Summary…….XIV

Purpose and need……3

Alternatives…….8

Affected environment…….11

Environmental consequences……..62

List of preparers……..106

List of agencies, organizations, and persons
to whom copies of the statement are sent…….107

Summary

Purpose and Need

Red Snapper is managed within the Fishery Management Plan for the Snapper-Grouper Fishery of the South Atlantic Region (FMP). The South Atlantic Fishery Management Council (Council) was notified by the National Marine Fisheries Service (NMFS) on July 8, 2008, that red snapper in the South Atlantic region are undergoing overfishing and are overfished according to the current definition of the minimum stock size threshold. The Council is developing Amendment 17 to the Snapper-Grouper Fishery Management Plan for the South Atlantic Region (Amendment 17), which would establish management measures to end overfishing and rebuild the red snapper stock. At the March 2009 meeting, the Council voted (7-6) to request an interim rule to end overfishing of red snapper. In a letter dated March 23, 2009, the Council requested NOAA Fisheries Service implement a prohibition on harvest and possession of red snapper through interim measures. The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requires the Council to prepare a plan amendment or proposed regulations to end overfishing within one year of notification that a stock is overfished.

Immediate, short-term, and focused federal action is needed to reduce overfishing of red snapper in the South Atlantic region while long-term management measures are developed and implemented. The purpose of the federal action analyzed in this environmental assessment (EA) is to immediately reduce total commercial and recreational fishing mortality on red snapper in the South Atlantic region to address overfishing of the species with minimal adverse social and economic consequences, and maximum administration and enforcement efficiency, while permanent management measures are being developed in Amendment 17.

Description of Alternatives

Alternative 1: No action

Implement no changes to current regulations for the harvest of red snapper.

Preferred Alternative 2: No harvest of red snapper in the exclusive economic zone (EEZ) off of Florida, Georgia, North Carolina and South Carolina.

Implement interim regulations that would establish a closure of the red snapper fishery for 180 days that applies to both the commercial and recreational sectors; during which no harvest, possession, and/or sale of red snapper would be allowed. There is the possibility of this alternative being extended for an additional 186 days after the public has had the opportunity to comment.

Alternative 3: Four month seasonal closure

Implement interim regulations that would establish a four month closure of the red snapper fishery that applies to both commercial and recreational sectors; during which no harvest or possession of red snapper would be allowed.

For a person on board a vessel for which a federal commercial or charter/headboat permit for the South Atlantic snapper-grouper fishery has been issued, provisions proposed in **Alternatives 2 and 3** would apply regardless of whether the fish are harvested and/or possessed in state or federal waters.

Affected Environment

The affected environment of the proposed action includes the EEZ off of the coasts of North Carolina, South Carolina, Florida, and Georgia. The biological environment is described in Section 3.0. A description of the human environment is provided in Section 3.4.

Environmental Consequences

A complete analysis of the environmental impacts of these alternatives is included in Section 4.0.

Summary of Biological Impacts

Alternative 1, the status quo, would not provide relief to the red snapper population and the stock would continue to experience overfishing. If the interim rule was implemented in summer 2009, **Preferred Alternative 2** would prohibit recreational and commercial harvest of red snapper for six months during the peak spawning season and when almost half of the landings have occurred in recent years (Table 4-9). **Preferred Alternative 2** would prohibit all harvest, possession and/or sale of red snapper from the South Atlantic EEZ as well as red snapper harvested by federally permitted vessels that fish in state waters. Under **Preferred Alternative 2**, this prohibition would remain in effect for 180 days and could be extended for an additional 186 days; thereby remaining in effect for one full year. The target date for implementation is assumed to be July 1. It is expected that the prohibition would remain in effect until replaced by permanent actions implemented through Amendment 17.

Alternative 3 would prohibit all harvest (retention) and sale of all red snapper from the South Atlantic EEZ as well as red snapper harvested by federally permitted vessels that fish in state waters for four months. Similar to **Preferred Alternative 2**, **Alternative 3** would prohibit fishing for and retention of red snapper during the period of peak spawning if measures were put into place during summer 2009. **Alternative 3** could not be extended. The biological effect of **Preferred Alternative 2** would be greater than **Alternative 3**, which would close fishing for a shorter time frame (four months).

Summary of Economic Impacts

Under **Alternative 1**, the status quo, both the red snapper commercial and recreational fisheries could continue to operate as they currently do, with no short term reductions in the number of harvested fish, trips taken, or changes in economic value. Because the resource is overfished, however, the current amount of harvest would not be expected to persist, nor could they legally be allowed to continue. Under **Preferred Alternative 2 and Alternative 3,** fishermen would likely suffer reductions in revenue. The impacts are likely to be more severe under **Preferred Alternative 2** compared to **Alternative 3** due to the length of the closed season.

Summary of Social Impacts

Alternative 1, the no action alternative, would have the least impact in the short term. However, it would delay the recovery of red snapper in the long term, which may lead to more restrictive management measures in the future. Under **Alternatives 2 and 3**, fishermen harvesting red snapper would suffer reductions in catch and some reduction in revenue. This could have negative but possibly limited social effects for fishermen because these actions occur during a time of increasing regulation and economic distress. The impacts would be more severe under **Preferred Alternative 2** rather than the seasonal closure under **Alternative 3**.

Summary of Administrative Impacts

Alternative 1 would place no new administrative burden on the agency as current management measures would remain in place and no new management measures or enforcement burden would be created. **Preferred Alternative 2** would have a slightly higher enforcement burden as the closure would extend through the duration of the interim rule period (180 days with a possible extension for an additional 186 days) while **Alternative 3** would have less of an enforcement burden as it would only be implemented for 4 months.

Preferred Alternative 2 and Alternative 3 would have similar administrative burdens as both would require coordination between NOAA Fisheries Service, NOAA Office of Law Enforcement, and the US Coast Guard, as well as state and local enforcement offices. These alternatives would also require the development of outreach materials such as fishery bulletins, web page content, and other education to ensure compliance with the interim regulations.

1 Introduction

1.1 Background

Management of the federal snapper-grouper fishery located off the South Atlantic in the 3-200 nautical mile (nm) U.S. Exclusive Economic Zone (EEZ) is conducted under the Fishery Management Plan for the Snapper-Grouper Fishery (SAFMC 1983) (Figure 1-1). The FMP and its amendments are developed under the Magnuson-Stevens Act, other applicable federal laws, and executive orders (E.O.s) and affect the management of 73 species (Table 1-1). This document addresses the management of red snapper through the promulgation of an interim rule while permanent management measures can be developed to end overfishing of red snapper in the South Atlantic.

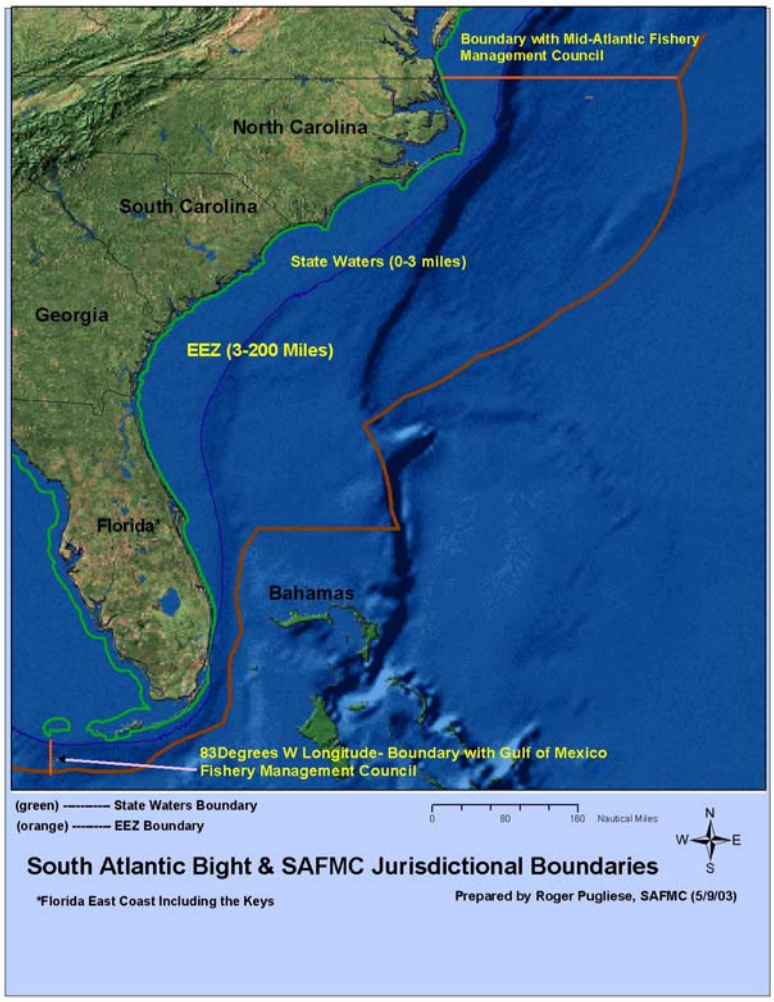


Figure 1-1. Jurisdictional boundaries of the South Atlantic Fishery Management Council.

Table 1-1. Species in the Snapper-Grouper Fishery Management Unit (FMU).

Almaco jack, *Seriola rivoliana*
Atlantic spadefish, *Chaetodipterus faber*
Banded rudderfish, *Seriola zonata*
Bank sea bass, *Centropristis ocyurus*
Bar jack, *Caranx ruber*
Black grouper, *Mycteroperca bonaci*
Black margate, *Anisotremus surinamensis*
Black sea bass, *Centropristis striata*
Black snapper, *Apsilus dentatus*
Blackfin snapper, *Lutjanus buccanella*
Blue runner, *Caranx crysos*
Blueline tilefish, *Caulolatilus microps*
Bluestriped grunt, *Haemulon sciurus*
Coney, *Cephalopholis fulva*
Cottonwick, *Haemulon melanurum*
Crevalle jack, *Caranx hippos*
Cubera snapper, *Lutjanus cyanopterus*
Dog snapper, *Lutjanus jocu*
French grunt, *Haemulon flavolineatum*
Gag, *Mycteroperca microlepis*
Golden tilefish, *Lopholatilus chamaeleonticeps*
Goliath grouper, *Epinephelus itajara*
Grass porgy, *Calamus arctifrons*
Gray (mangrove) snapper, *Lutjanus griseus*
Gray triggerfish, *Balistes capriscus*
Graysby, *Cephalopholis cruentata*
Greater amberjack, *Seriola dumerili*
Hogfish, *Lachnolaimus maximus*
Jolthead porgy, *Calamus bajonado*
Knobbed porgy, *Calamus nodosus*
Lane snapper, *Lutjanus synagris*
Lesser amberjack, *Seriola fasciata*
Longspine porgy, *Stenotomus caprinus*
Mahogany snapper, *Lutjanus mahogoni*
Margate, *Haemulon album*
Misty grouper, *Epinephelus mystacinus*
Mutton snapper, *Lutjanus analis*
Nassau grouper, *Epinephelus striatus*
Ocean triggerfish, *Canthidermis sufflamen*
Porkfish, *Anisotremus virginicus*
Puddingwife, *Halichoeres radiatus*
Queen snapper, *Etelis oculatus*
Queen triggerfish, *Balistes vetula*
Red grouper, *Epinephelus morio*
Red hind, *Epinephelus guttatus*
Red porgy, *Pagrus pagrus*
Red snapper, *Lutjanus campechanus*
Rock hind, *Epinephelus adscensionis*
Rock Sea Bass, *Centropristis philadelphica*
Sailors choice, *Haemulon parra*
Sand tilefish, *Malacanthus plumieri*
Saucereye porgy, *Calamus calamus*
Scamp, *Mycteroperca phenax*
Schoolmaster, *Lutjanus apodus*
Scup, *Stenotomus chrysops*
Sheepshead, *Archosargus probatocephalus*
Silk snapper, *Lutjanus vivanus*
Smallmouth grunt, *Haemulon chrysargyreum*
Snowy grouper, *Epinephelus niveatus*
Spanish grunt, *Haemulon macrostomum*
Speckled hind, *Epinephelus drummondhayi*
Tiger grouper, *Mycteroperca tigris*
Tomtate, *Haemulon aurolineatum*
Yellow jack, *Caranx bartholomaei*
Yellowedge grouper, *Epinephelus flavolimbatus*
Yellowfin grouper, *Mycteroperca venenosa*
Yellowmouth grouper, *Mycteroperca interstitialis*
Yellowtail snapper, *Ocyurus chrysurus*
Vermilion snapper, *Rhomboplites aurorubens*
Warsaw grouper, *Epinephelus nigritus*
White grunt, *Haemulon plumieri*
Whitebone porgy, *Calamus leucosteus*
Wreckfish, *Polyprion americanus*

1.2 Fishery Conservation and Management Authority

The Magnuson–Stevens Act serves as the principal federal statute authorizing the management of fisheries and resources within the EEZ. The Magnuson-Stevens Act invests the authority of fishery resource management in the Secretary of Commerce (Secretary), who is advised by eight regional fishery management councils. Each council has authority over fisheries in its specific region and provides management recommendations to National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) for fisheries in their particular region. The Secretary delegates fishery management authority to NMFS.

For each fishery that requires conservation and management, or that requires data collection, councils are chiefly responsible for the preparation of FMP and amendments as needed (MSA sec. 302(h)). Councils transmit these FMPs and amendments to NMFS for review and approval, partial approval, or disapproval. If approved, NMFS implements the FMP or amendment through regulations (MSA Sec. 304).

The Magnuson-Stevens Act has provisions to allow for the promulgation of interim rules to reduce overfishing. An interim rule may remain in effect for 180 days and may be extended for 186 days provided the public has had an opportunity to comment and the Council is actively preparing a plan amendment to address the overfishing. Interim rules are subject to the National Environmental Policy Act (NEPA) requirements and must be consistent with other applicable laws.

National Environmental Policy Act Requirements

All fishery management actions that NMFS implements are subject to the requirements of NEPA (NEPA; 42 U.S.C. 4331, *et seq.*). NEPA provides a mandate and framework to consider all reasonably foreseeable environmental effects of proposed actions and to involve and inform the public in the decision-making process. NEPA compliance for fishery management actions is further guided by regulations issued by the Council on Environmental Quality (40 C.F.R. Parts 1500-1508), and those issued by NOAA Administrative Order 216-6, "Implementing the National Environmental Policy Act."

In compliance with NEPA, this document serves as an EA of the proposed interim federal action requested by the Council. The Council's jurisdiction encompasses the EEZ waters off of Florida, Georgia, North Carolina and South Carolina. For this environmental assessment, the proposed interim federal action would be established under the FMP, which is outlined in Section 1.1.

1.3 Purpose and Need

The Council was notified on July 8, 2008, red snapper in the South Atlantic region are undergoing overfishing and are overfished according the current definition of the minimum stock size threshold. Within one year of notification that a stock is overfished, the Magnuson-Stevens Act requires the Council to prepare a plan amendment or proposed regulations to end overfishing. At the March 2009 meeting, the Council voted (7-6) to request an interim rule to end overfishing of red snapper. In a letter dated March 23, 2009, the Council requested NOAA Fisheries Service implement a prohibition on harvest and possession of red snapper through

interim measures. The Council is developing Amendment 17 to the FMP, which would establish management measures to end overfishing and rebuild the red snapper stock.

Immediate, short-term, and focused federal action is needed to reduce overfishing of red snapper in the South Atlantic region while the long-term management measures are developed and implemented through Amendment 17. The purpose of the federal action analyzed in this EA is to immediately, during the 2009 calendar year, reduce total commercial and recreational fishing mortality on red snapper in the South Atlantic region to address overfishing of the species with minimal adverse social and economic consequences and maximum administration and enforcement efficiency. The red snapper interim rule would immediately address overfishing of red snapper while permanent management measures could be implemented that address the issue of overfishing in the long term.

1.4 Proposed Interim Federal Action

The proposed interim federal action is a prohibition on the harvest, possession, and/or sale of red snapper by commercial and recreational fishermen for 180 days. For a person on board a vessel for which a federal commercial or charter vessel/headboat permit for the South Atlantic snapper-grouper fishery has been issued, the provisions of the closure would apply regardless of whether the fish are harvested in state or federal waters. This action, if implemented during summer 2009, is expected to coincide with peak spawning of red snapper and would address overfishing of red snapper while permanent management measures can be developed in Amendment 17, regardless of the date of implementation for interim measures.

1.5 Related NEPA Documents in Development

Amendment 15B

Amendment 15B is under development and, if approved by the Secretary of Commerce, is expected to be implemented in fall 2009. Amendment 15 B would: Update management reference points for golden tilefish, define interim allocations for snowy grouper and red porgy, prohibit bag limit sales of snapper-grouper species in the South Atlantic unless the vessel owner possesses a federal snapper-grouper commercial permit, implement a plan to monitor and assess bycatch, minimize impacts of incidental take on sea turtles and smalltooth sawfish, and modify permit renewal and transferability requirements.

The NOA for the draft environmental impact statement (DEIS) was published on November 9, 2007, with a comment period ending January 11, 2008. Updated economic information affecting the analysis of the bag limit sale provision became available after publication of the NOA for the DEIS. Therefore, in April 2008, a Supplemental DEIS was prepared in accordance with provisions set forth in the National Environmental Policy Act to supplement the existing DEIS with updated economic analysis concerning the bag limit sale provision in Amendment 15B.

The NOA for the Supplemental DEIS for Amendment 15B was published on April 25, 2008, and comments were accepted through June 9, 2008. After considering the updated economic

analysis and associated public comments, the Council took final action on Amendment 15B on June 13, 2008, reaffirming its position on the sale of snapper-grouper caught under the bag limit in the preferred alternative.

Amendment 15B contains an integrated EIS.

Amendment 16

Amendment 16 to the Snapper-Grouper FMP has been approved and is expected to be implemented by summer 2009. Amendment 16 includes measures intended to: End overfishing of gag and vermilion snapper and reduce overfishing of black grouper and red grouper; protect shallow-water grouper species during their spawning season; establish status determination criteria for gag and vermilion snapper; and reduce bycatch of snapper-grouper species in the South Atlantic.

Measures to End Overfishing
Amendment 16 will implement management measures which will be applied to the commercial and recreational sectors of the snapper-grouper fishery. These measures include: A four month spawning season closure of the recreational and commercial harvest of shallow-water grouper species including gag, black grouper, red grouper, scamp, rock hind, red hind, coney, graysby, yellowfin grouper, yellowmouth grouper, and tiger grouper; directed commercial quotas for gag and vermilion snapper; a reduction in the recreational bag limits for shallow-water grouper species and vermilion snapper; and a seasonal closure for the recreational vermilion snapper fishery.

Set Fishing Parameters for Gag and Vermilion Snapper
Amendment 16 will implement new status determination criteria for gag and vermilion snapper, including maximum sustainable yield, optimum yield, and minimum stock size threshold, which reflect current scientific information as provided by stock assessments and approved by the Council's Scientific and Statistical Committee (SSC).

Reduce Bycatch Mortality of Snapper-Grouper Species
Amendment 16 will require the use of dehooking devices, as necessary, to reduce bycatch mortality of incidentally caught snapper-grouper species.

A Final Environmental Impact Statement (EIS) is integrated into Amendment 16. The FEIS can be found at http://safmc.net/. The notice of availability (NOA) for Amendment 16 was published on December 24, 2008, with a comment period ending on February 23, 2009. The proposed rule for Amendment 16 was published in the *Federal Register* on February 6, 2009 (74 FR 6257), with a public comment period ending on March 9, 2009. The Secretary approved all actions with the exception of the venting tool provision on March 25, 2009.

Amendment 17 to the Snapper-Grouper FMP

As previously discussed, Amendment 17 is under development and is expected to be implemented in 2010. Amendment 17 would: Establish annual catch limits (ACLs), annual

catch targets (ACTs) and accountability measures (AMs) for species experiencing overfishing and rebuild the red snapper stock; modify management measures as needed to limit harvest to the ACL or ACT; specify status determination criteria for red snapper; specify a rebuilding plan for red snapper; and update the framework procedure for specification of TAC.

Amendment 17 will contain an integrated EIS.

Amendment 18 to the Snapper-Grouper FMP

Amendment 18 is under development and was the subject of public scoping meetings in January and February 2009. Amendment 18 may address the following changes to the management regime: Limiting participation and effort in the golden tilefish fishery (possibly endorsements or limited access program); limiting participation and effort in the black sea bass pot fishery (possibly endorsements or limited access program); extending the range of the Snapper-Grouper FMP north through the Mid-Atlantic and New England Council areas; separating the snowy grouper quota into regions/states; separating the gag recreational ACL into region or state ACTs; changing the golden tilefish fishing year; improving data reporting; changing the wreckfish fishery Individual Transferable Quota (ITQ) program; and designating essential fish habitat (EFH) in new areas in the Mid-Atlantic and New England as part of a possible extension of the Snapper-Grouper FMP north.

Amendment 18 will contain an integrated EIS.

Comprehensive ACL Amendment

The Comprehensive ACL Amendment is under development and was the subject of public scoping meetings in January and February 2009. The Comprehensive ACL Amendment would: Establish ACLs, ACTs and AMs for species not currently undergoing overfishing (includes species in the snapper-grouper, dolphin, wahoo, and golden crab fisheries); establish allocations between recreational, commercial, and for-hire sectors; and establish management measures to limit total mortality (landings and discards) and ensure the ACL is not exceeded.

The Comprehensive ACL Amendment will contain an integrated EIS.

1.6 History of Management

For a complete history of management of the snapper-grouper fishery, see Appendix 1. A brief history of management for the red snapper stock is described below and in Table 1-2.

In 1983, the Snapper-Grouper Fishery Management Plan established a size limit of 12 inches total length (TL) for red snapper to maximize the yield per recruit (SAFMC 1983). In 1990, scientists recommended increased minimum size limits for red snapper to achieve reductions necessary to end overfishing. In response, the Council developed Amendment 4 (SAFMC 1991), which imposed new regulations including an increase in the minimum size limit of red snapper taken by recreational and commercial fishermen from 12 inches TL to 20 inches TL and an aggregate bag limit of 10 snapper (excluding vermilion snapper) with no more than 2 red snapper

included in the aggregate bag limit. Amendment 4 also established a 15 year rebuilding plan for red snapper. These regulations were determined to be sufficient to end overfishing based on the science available at the time. However, SEDAR 15 (2008) indicates many more red snapper are being released by the recreational sector than are retained. Since release mortality rates are estimated by SEDAR 15 (2008) to be 40 percent for the recreational sector and 90 percent for the commercial sector, the increased size limit many not have had the intended effect of enhancing stock status. SEDAR 15 (2008) indicates the large number of discards combined with high release mortality rates is one of the major factors contributing to overfishing of red snapper in the South Atlantic. Permit requirements for the commercial snapper-grouper fishery were established in 1991 by Amendment 3 (SAFMC 1990). Amendment 8 (1998) created a limited entry system for the fishery and established two types of permits based on the historic landings associated with a particular permit (For more information, see Section 4.1.3).

Table 1-2. History of management for red snapper.

Description of Action	FMP/Amendment	Effective Date
Four inch trawl mesh size and 12 inch TL minimum size limit	Snapper-Grouper FMP	8/31/1983
Prohibit trawls	Snapper-Grouper Amend 1	1/12/1989
Required permit to fish for, land or sell snapper-grouper species	Snapper-Grouper Amend 3	1/31/1991
Prohibited gear: fish traps except bsb traps north of Cape Canaveral, FL; entanglement nets; longline gear inside 50 fathoms; bottom longlines to harvest wreckfish; powerheads and bangsticks in designated SMZs off S. Carolina. Established 20 inch TL minimum size and a 10 snapper/person/day bag limit, excluding vermilion snapper, and allowing no more than 2 red snapper.	Snapper-Grouper Amend 4	1/1/1992
Oculina Experimental Closed Area.	Snapper-Grouper Amend 6	6/27/1994
Limited entry program; transferable permits and 225 pound non-transferable permits.	Snapper-Grouper Amend 8	12/14/1998
Vessels with longline gear aboard may only possess snowy grouper, warsaw grouper, yellowedge grouper, misty grouper, golden tilefish, blueline tilefish, and sand tilefish.	Snapper-Grouper Amend 9	2/24/1999
Approved definitions for overfished and overfishing. MSST = [(1-M) or 0.5 whichever is greater]*B_{MSY}. MFMT = F_{MSY}	Snapper-Grouper Amend 11	12/2/1999
Extended for an indefinite period the regulation prohibiting fishing for and possessing snapper grouper species within the *Oculina* experimental Closed Area.	Snapper-Grouper Amend 13A	4/26/2004
Established eight Type 2 Marine Protected Areas (MPAs) in federal waters ranging from North Carolina to Florida in which fishing for or retention of snapper grouper species is prohibited but other types of legal fishing are allowed.	Snapper-Grouper Amend 14	2/12/2009

2 Alternatives Considered

Alternatives considered in detail, with the exception of the no action alternative, include management measures that address the purpose and need of the proposed interim federal action. That is, the following alternatives target an immediate reduction in red snapper harvest in the South Atlantic region for a portion of the 2009 calendar year.

Section 2.1 outlines alternatives considered by the Council in this interim rule and Section 2.2 provides a brief comparison of their environmental consequences (For a more in depth analysis of the alternatives, see Section 4.0).

2.1 Description of Alternatives

Alternative 1: No action
Implement no changes to current regulations for the harvest of red snapper.

Preferred Alternative 2: No harvest of red snapper in the EEZ off of Florida, Georgia, North Carolina and South Carolina.
Implement interim regulations that would establish a closure of the red snapper fishery for 180 days that applies to both the commercial and recreational sectors; during which no harvest, possession, and/or sale of red snapper would be allowed.

Alternative 3: Four month seasonal closure
Implement interim regulations that would establish a four month closure of the red snapper fishery that applies to both commercial and recreational sectors; during which no harvest, possession, and/or sale of red snapper would be allowed.

For a person on board a vessel for which a federal commercial or charter/headboat permit for the South Atlantic snapper-grouper fishery has been issued, provisions proposed in **Alternatives 2 and 3** would apply regardless of whether the fish are harvested or possessed in state or federal waters.

<u>History of the Action</u>

The Council received notification from NOAA Fisheries Service on July 8, 2008, that red snapper stock in the South Atlantic is experiencing overfishing and is in an overfished condition. Within one year of notification of an overfishing determination, the Magnuson-Stevens Act requires a plan amendment or proposed regulations be developed to end overfishing. As a result, the Council began to prepare Amendment 17 to the FMP to address overfishing limits (OFLs), ACLs, ACTs, and AMs of species experiencing overfishing, as well as a rebuilding plan and management measures to end overfishing of red snapper. It is anticipated the Council will approve Amendment 17 for review by the Secretary in late 2009, with implementation in early 2010. The Council voted at the December 2008 meeting to not move forward with an interim rule on red snapper due to concern that the interim rule would sunset before permanent

management measures could be implemented, resulting in a lack of continuity in management for the red snapper fishery.

At the March 2009 meeting, the Council voted (7-6) to request an interim rule to end overfishing of red snapper. In a letter dated March 23, 2009, the Council requested NOAA Fisheries Service implement a prohibition on harvest and possession of red snapper through interim measures. This EA is intended to describe and analyze the biological, economic, social, and administrative impacts of these measures.

In the South Atlantic, red snapper are found from North Carolina to the Florida Keys but are most commonly landed from areas off of northeast Florida and Georgia. To end overfishing of red snapper, Amendment 17, which is being developed by the Council, is considering a prohibition on the on harvest and possession of red snapper along with area closures where all harvest of snapper-grouper species would be prohibited. Interim measures can only be applied to species experiencing overfishing; therefore, measures such as a prohibition on the harvest of all snapper-grouper species could not be included in an interim rule. Area closures for just red snapper are not being considered in this interim rule because red snapper are found throughout the South Atlantic EEZ and the intent of the interim rule is to reduce overfishing to the maximum extent while permanent measures are being developed in Amendment 17. Further, the high landings of red snapper off northeastern Florida could partly be a function of high regional effort.

2.2 Comparison of Alternatives

Table 2-1. Summary of effects of alternatives under consideration.

	Alternatives		
	Alternative 1. (No Action).	**Preferred Alternative 2: Closure of the red snapper fishery for the duration of the interim rule**	**Alternative 3: Four month spawning season closure of the red snapper fishery to coincide with spawning season.**
Biological Impacts	Negative on red snapper stocks which continue to experience overfishing.	Positive to the red snapper population as it provides longer closure than **Alternative 3**, more protection during spawning season. May lead to higher rates of discards if fishing methods don't change.	Positive to the red snapper population as it ensures that harvest will be prohibited during spawning season. May lead to higher rates of discards if fishing continues in areas of high red snapper concentrations.
Economic Impacts	In the short term, there will be no positive or negative impacts from this alternative. In the long run, the economic impacts will be negative.	Short-term: Negative due to 180 days (with possible extension of an additional 186 days) of lost fishing opportunities for red snapper.	Short term: Negative due to 4 months of lost fishing opportunities for red snapper.
Social Impacts	Short term: Neither positive or negative; Long term: Highly negative.	Short term: Minimal economic impacts may create social disruption due to current U.S. economic situation; Long term: Positive on fishing community and fishing sectors.	Short term: Minimal economic impacts may create social disruption due to current U.S. economic situation; Long term: Positive on fishing community and fishing sectors.
Administrative Impacts	Short term: Neither positive or negative; Long term: May lead to increased restriction in the future which will have negative administrative impacts.	Increased enforcement burden for longer period of time than **Alternative 3**. Administrative impacts similar for **Alternatives 2 and 3**.	Increased administrative and enforcement burden for longer period of time than **Alternative 1**.

3 AFFECTED ENVIRONMENT

3.1 Introduction

This chapter describes the environmental resources that may be affected by the proposed interim federal action, under each of the alternatives identified in Chapter 2. For more information on the affected environment for the snapper-grouper fishery, see Amendment 16 (SAFMC, 2009).

3.1 *Habitat*

3.1.1 Inshore/Estuarine Habitat

Red snapper are considered to be a mid-shelf snapper species although they may utilize inshore, estuarine and offshore habitats. Many snapper-grouper species, including red snapper 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 snapper-grouper 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 diurnal feeding migrations or seasonal shifts in cross-shelf distributions. More detail on these habitat types is found in Sections 3.2.1 and 3.2.2 of the Council's Habitat Plan (SAFMC 1998).

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 11° to 27° C (52° to 81° F) due to the proximity of the Gulf Stream, with lower shelf habitat temperatures varying from 11° to 14° C (52° to 57° F). Water depths range from 16 to 27 meters (54 to 90 feet) or greater for live-bottom habitats, 55 to 110 meters (180 to 360 feet) for the shelf-edge habitat, and from 110 to 183 meters (360 to 600 feet) for lower-shelf habitat areas.

The exact extent and distribution of productive snapper-grouper habitat on the continental shelf north of Cape Canaveral is unknown. Current data suggest from 3 to 30 percent 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 invertebrates, moderate relief reefs from 0.5 to 2 meters (1.6 to 6.6 feet), 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, the continental shelf narrows from 56 to 16 kilometers (35 to 10 miles) wide, thence reducing 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 feet). 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 meters (89 and 331 feet) isobaths from Cape Hatteras, NC to Cape Canaveral, FL is reef habitat. Although the benthic communities found in water depths between 100 and 300 meters (328 and 984 feet) from Cape Hatteras, NC to Key West, FL 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.

Man-made artificial reef structures are also utilized to attract fish and increase fish harvests; however, research on man-made 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 unvegetated areas of little or no relief.

The distribution of coral and live hard bottom habitat as presented in the 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 included in Appendix E of the Habitat Plan (SAFMC 1998). These maps are also available on the Internet at the Council's following Internet Mapping System website: http://ocean.floridamarine.org/efh_coral/ims/viewer.htm.

The South Carolina Department of Natural Resources, NOAA/Biogeographic Characterization Branch, and the Council cooperatively generated additional information on managed species' use of offshore fish habitat. Plots of the spatial distribution of offshore species were generated from the Marine Resources Monitoring, Assessment, and Prediction Program (MARMAP) data (Figures 35-41) in the Habitat Plan (SAFMC 1998). The plots should be considered 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 presented in Appendix E of the Habitat Plan (SAFMC 1998), 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 be generated through the Council's Internet Mapping System at the following web address: http://ocean.floridamarine.org/efh_coral/ims/viewer.htm.

3.1.3 Essential Fish Habitat

Essential fish habitat (EFH) is defined in the 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.

EFH utilized by snapper-grouper species in this region 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 183 meters [600 feet (but to at least 2,000 feet for wreckfish)] where the annual water temperature range is sufficiently warm to maintain adult populations of members of this largely tropical fish complex. EFH includes the spawning area in the water column above the adult habitat and the additional pelagic environment, including *Sargassum*, required for survival of larvae and growth up to and including settlement. In addition, the Gulf Stream is also EFH because it provides a mechanism to disperse snapper-grouper larvae.

For specific life stages of estuarine dependent and near shore snapper-grouper species, EFH includes areas inshore of the 30 meters (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 habitats.

3.1.4 Habitat Areas of Particular Concern

Areas which meet the criteria for essential fish habitat-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; near shore 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). Areas that meet the criteria for designating essential fish habitat-habitat areas of particular concern include habitats required during each life stage (including egg, larval, postlarval, juvenile, and adult stages).

In addition to protecting habitat from fishing related degradation though FMP regulations, the Council, in cooperation with NOAA Fisheries Service, actively comments on non-fishing projects or policies that may impact essential fish habitat. The Council adopted a habitat policy and procedure document that established a four-state Habitat Advisory Panel and adopted a comment and policy development process. With guidance from the Advisory Panel, the Council has developed and approved habitat 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; and alterations to riverine, estuarine and nearshore flows (Appendix C of Habitat Plan; SAFMC 1998).

3.2 *Biological/Ecological Environment*

3.2.1 Species Most Impacted By This FMP Amendment

Red Snapper *Lutjanus campechanus*

Red snapper is part of the mid-shelf snapper-grouper complex that includes scamp, gag, vermilion snapper, red porgy, gray triggerfish and red grouper, among other species. Red snapper is found from North Carolina to the Florida Keys, and throughout the Gulf of Mexico to the Yucatan (Robins and Ray 1986). It can be found at depths from 10 to 190 meters (33-623 feet). Adults usually occur over rocky bottoms. Juveniles inhabit shallow waters and are common over sandy or muddy bottom habitat (Allen 1985).

The maximum size reported for this species is 100 centimeters (39.7 inches) TL (Allen 1985, Robins and Ray 1986) and 22.8 kilograms (50 pounds) (Allen 1985). 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 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). Manooch et al. (1998) estimated M at 0.25 but the maximum age in their study was 25 years (Manooch and Potts 1997).

Red snapper have two distinct sexes which are determined at hatching. In the U.S. South Atlantic Bight and in the Gulf of Mexico, Grimes (1987) reported that size at first maturity is 23.7 centimeters (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 centimeters (7.9 inches) TL, and the largest immature male was 37.8 centimeters (15 inches) TL. Fifty percent of males are mature at 22.3 cm (8.8 in) TL, while 50% of females are mature at 37.8 centimeters (15 inches) TL. Males are present in 86 percent of age 1, 91 percent of age 2, 100 percent of age 3, 98 percent of age 4, and 100 percent of older age fish. Mature females are present in 0 percent of age 1, 53 percent of age 2, 92 percent of age 3, 96 percent of age 4, and 100 percent 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 (Szedlemayr and Lee 2004).

3.2.2 Red snapper assessment and stock status

Based on the 2008 SEDAR assessment, red snapper is overfished and experiencing overfishing. A statistical catch-at-age model (SCA) and a surplus-projection model (ASPIC) were considered in this assessment. Data used in the assessment consist of records of commercial catch for the handline (hook-and-line) and dive fisheries, logbook data from the recreational headboat fishery, and Marine Recreational Fisheries Statistics Survey (MRFSS) data from the private and charter recreational sector. The bulk of landings of red snapper come from the recreational fishery, which have exceeded the landings of the commercial fishery by 2-3 fold over the assessment period. Total landings were variable, with a downward trend through the 1990s.

The fishing mortality (F) is compared to what the fishing mortality would be if the fishery were operating at the level of maximum fishing (F_{MSY}). The Council is considering two proxies for F_{MSY} in Amendment 17, $F_{30\%SPR}$ and $F_{40\%SPR}$. The ratio of F to the respective proxies for F_{MSY} suggests a generally increasing trend in fishing mortality from the 1950s through the mid-1980s. This indicates that overfishing has been occurring since the early 1970s, with the 2006 estimate of $F/F_{30\%SPR} = 5.39$ and $F/F_{40\%SPR}$ at 7.67 (March 19, 2009 Projection; SEDAR 15 2008). Therefore, regardless of the proxy for F_{MSY} adopted by the Council in Amendment 17, the red snapper stock is experiencing overfishing.

Estimated abundance-at-age shows a cropping off or truncation of the oldest ages from the 1950s into the 1980s. Fish of age 10 and above are practically non-existent in the population. Estimated biomass-at-age follows a similar pattern of truncation as seen in the abundance data. Total biomass and spawning biomass show nearly identical trends with a sharp decline during the 1950s and 1960s, continued decline during the 1970s, and stable but low levels since 1980. Numbers of age-1 fish have declined during the same period, however notably strong year classes occurred in 1983 and 1984, and again in 1998 and 1999.

[Note: Additional detail is presented in Section 4.]

3.2.3 Science Underlying the Management of Snapper-Grouper Species Most Impacted By This FMP Amendment

The status of red snapper has recently been assessed under the Southeast Data Assessment and Review (SEDAR) process in 2008. Results of that assessment indicate red snapper has been undergoing overfishing since the 1970s. There is some controversy with the results of the SEDAR 15 (2008) assessment because fishermen are reporting higher catches of red snapper in 2007-2008 than in previous years. However, these higher landings are not unexpected because the stock assessment indicated that there was high recruitment in recent years. High numbers of young-of-the-year (recruitment) of red snapper is episodic and dependent upon the synergistic effect of favorable environmental conditions such as water temperature and availability of food,

which enhance the survival of eggs and newly hatched larvae. Since the last year of data incorporated into the SEDAR stock assessment was 2006, high recruitment of red snapper may have occurred in recent years, which was not captured by the assessment. SEDAR, the Council's SSC, and the SEFSC indicate the determination that red snapper is overfished and experiencing overfishing is based on the best available scientific information.

The SEDAR process consists of a series of workshops aimed at ensuring that each assessment is based on the best available scientific information. First, representatives from NOAA Fisheries Service, state agencies, and the Council, as well as experts from non-governmental organizations and academia, participate in a data workshop. The purpose of a data workshop is to assemble and review available fishery-dependent and fishery-independent data and information on a stock, develop consensus about what constitutes the best available scientific information on the stock, how that information should be used in an assessment, and what type of stock assessment model should be employed.

Second, assessment biologists from these agencies and organizations participate in a stock assessment workshop, where data from the data workshop are input into one or more stock assessment models (e.g., production, age-structured, length structured, etc.) to generate estimates of stock status and fishery status. Generally, multiple runs of each model are conducted: base runs and a number of additional runs to examine sensitivity of results to various assumptions (e.g., different natural mortality rates, different data sets/catch periods, etc.).

Finally, a stock assessment review workshop is convened to provide representatives from the Center for Independent Experts (CIE) the opportunity to peer review the results of the stock assessment workshop. Representatives from NOAA Fisheries Service, the South Atlantic Council, and constituent groups may attend and observe the review but the actual review is conducted by the CIE. The SSC then reviews the report of the stock assessment review workshop.

The review portion of the SEDAR process has helped improve the acceptance of stock assessments. However, continued lack of basic fishery data has resulted in uncertainty in the results of some assessments. As a result, each SEDAR Review Panel has identified a detailed list of research and data needs (see Section 4.3).

3.2.4 Other Affected Council-Managed Species

Red snapper are often incidentally caught while fishing for other snapper-grouper species such as red grouper, black grouper, black sea bass, gag, and vermilion snapper.

A prohibition of harvest of red snapper may increase fishing effort on these co-occurring species. However, Amendment 16 includes management measures to restrict harvest of red grouper, black grouper, and vermilion snapper, as well as other shallow-water grouper species. A detailed description of the life history of these species is provided in the Snapper-Grouper SAFE report (NMFS 2005).

3.3 *Protected Species in the Action Area*

Endangered Species Act

Species protected under the ESA occurring in the South Atlantic include: Five species of sea turtle (green, hawksbill, Kemp's ridley, leatherback, and loggerhead); six species of marine mammals (sperm, sei, fin, blue, humpback, and North Atlantic right whale); the smalltooth sawfish; and two *Acropora* coral species (elkhorn [*Acropora palmata*] and staghorn [*A. cervicornis*]). Designated critical habitat for the northern right whale and *Acropora spp.* also occur within the South Atlantic region. A more detailed description of the protected species found in the action area of the snapper-grouper fishery is contained in previous amendments (Amendment 13C (SAFMC 2006), Amendment 15A (SAFMC 2008a), Amendment 15B (under review), and Amendment 16 (SAFMC 2008c) and is incorporated herein by reference.

The impacts of the South Atlantic snapper-grouper fishery on ESA-listed species were evaluated in a biological opinion on the continued authorization of snapper-grouper fishing under the Snapper-Grouper FMP as amended through Amendment 13C (NMFS 2006). The opinion stated the fishery was not likely to adversely affect Northern right whale critical habitat or marine mammals. The opinion concluded the snapper-grouper fishery would adversely affect sea turtles and smalltooth sawfish, but was not likely to jeopardize their continued existence.

NOAA Fisheries Service has also recently conducted an informal Section 7 consultation evaluating the impacts of the South Atlantic snapper-grouper fishery on ESA-listed *Acropora* species. The consultation concluded that the continued operation of the snapper-grouper fishery was not likely to adversely affect newly listed *Acropora* species.

Acropora Critical Habitat

On November 26, 2008, a final rule designating *Acropora* critical habitat was published in the *Federal Register* (73 FR 72210). In a consultation memorandum dated December 2, 2008, and pursuant to Section 7 of the ESA, NOAA Fisheries Service concluded the continued authorization of the snapper-grouper fishery is not likely to adversely affect *Acropora* critical habitat pursuant to Section 7 of the ESA. The gear types used in the snapper-grouper fishery do not affect consolidated hard substrate or dead coral skeletons in any manner that would appreciably alter the biological or physical characteristics which make them suitable for larval settlement or coral regeneration.

Marine Mammal Protection Act

There are 31 different species of marine mammals that may occur in the EEZ of the South Atlantic region. All 31 species are protected under the MMPA and six are also listed as endangered under the ESA (i.e., sperm, sei, fin, blue, humpback, and North Atlantic right whales). There are no known interactions between the South Atlantic snapper-grouper hook-and-line fishery and marine mammals.

The South Atlantic black sea bass pot fishery is listed as a Category II Fishery under the MMPA because of the possibility of entanglement with black sea bass pots. This fishery does not target red snapper but they are occasionally caught as bycatch in the pots. All other components of the fishery are listed as Category III because of the remote likelihood of or no known incidental mortality or serious injury of marine mammals.

3.4 Human Environment

3.4.1 Description of the Fishery

A more detailed description of the snapper-grouper fishery is contained in previous amendments (Amendment 13C (SAFMC 2006), Amendment 15A (SAFMC 2008a), Amendment 15B (SAFMC, under review), and Amendment 16 (SAFMC 2008c)) and is incorporated herein by reference. The following sections summarize key information relevant to this amendment.

3.4.1.1 Commercial Fishery

3.4.1.1.1 Gear and Fishing Behavior

The commercial snapper-grouper fishery utilizes vertical lines, longlines, black sea bass pots/traps, spears, and powerheads (i.e., spears with spring-loaded firearms). Vertical lines are used from the North Carolina/Virginia border to the Atlantic side of Key West, Florida. The majority of hook and line fishermen use either electric or hydraulic reels (bandit gear) and generally have 2-4 bandit reels per boat. The majority of the bandit fleet fishes year round for snapper-grouper with the only seasonal differences in catch associated with the regulatory spawning season closures in March and April for gag. Most fluctuations in fishing effort in this fishery are a result of the weather. Trips can be limited during hurricane season and also during the winter months from December through March. Some fishermen stop bandit fishing to target king mackerel when they are running.

The use of bottom longlines is allowed north of St. Lucie Inlet, Florida, in depths greater than 50 fathoms. Bottom longline gear is used to target primarily snowy grouper and golden tilefish. Longline boats are typically bigger than bandit boats, their trips are longer, and they cost more to operate because they operate farther offshore. A longline spool generally holds about 15 miles of cable. Longlines are fished from daylight to dark because sea lice consume the flesh of hooked fish at night. The fishery formerly operated all year with little or no seasonal fluctuation barring hurricane disruption. However, since Amendment 13C imposed a more restrictive quota for golden tilefish in 2006, the quota for the commercial fishery has been met during summer months.

Spears or powerheads are most commonly used off Florida and are illegal for killing snapper-grouper species in South Carolina and in Special Management Zones.

Black sea bass pots are used exclusively to target black sea bass, though bycatch of other snapper-grouper species is allowed. Many participants in the black sea bass fishery are active in other fisheries, including the recreational charter fishery during the summer months. Many snapper-grouper permit holders maintain pot endorsements but are not active in the pot fishery.

3.4.1.1.2 Landings, Ex-vessel Value, Price, and Effort

Landings of all species in the snapper-grouper management unit averaged 6.4 million pounds from 2003 through 2007, with an average annual dockside value of $13.0 million in current year dollars and $13.8 million in 2007 dollars (Table 3-3).[1] Since 1993, landings of snapper-grouper have exhibited a downward trend with year-to-year variation (Figure 3-1).

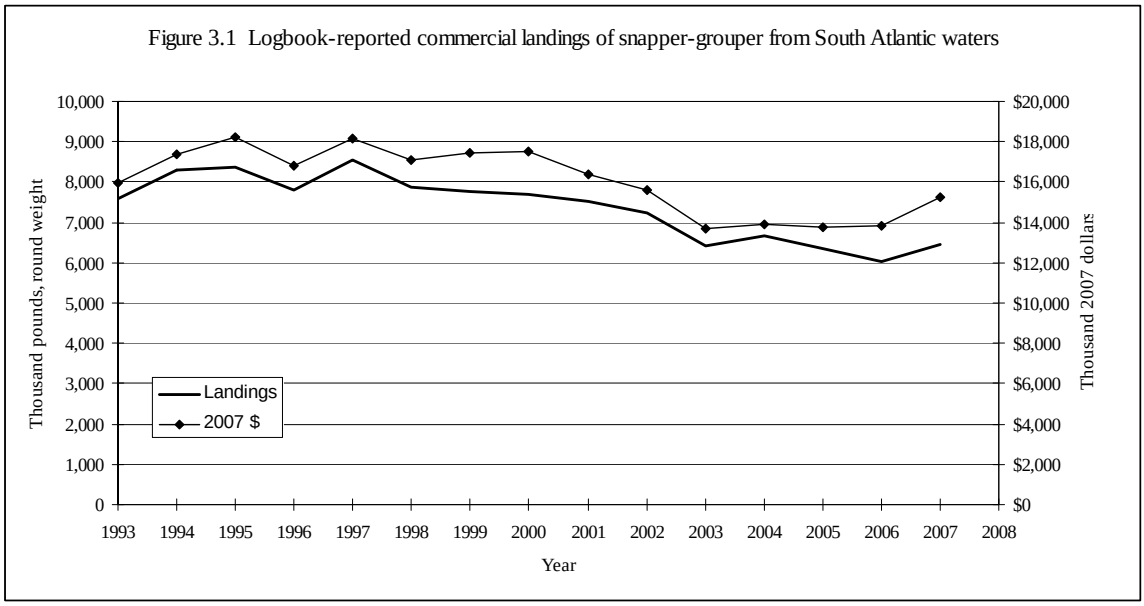


Figure 3.1 Logbook reported commercial landings of snapper-grouper from South Atlantic waters.

The shallow-water groupers and mid-shelf snappers (including red snapper) are the largest species groups by volume and value within the snapper-grouper fishery. Vermilion snapper in the mid-shelf snapper group is the largest volume species in the fishery, and accounts for 15 percent of total landings and 18 percent of dockside revenues on trips with at least one pound of snapper-grouper species. Gag is the largest volume shallow-water grouper, and accounts for 9

[1] Federally permitted commercial snapper-grouper fishermen are required to report their landings by species by trip to NOAA Fisheries Service Southeast Fisheries Science Center logbook program. However, they do not report prices or revenues on their logbook sheets. Therefore, trip revenues were approximated as reported landings from individual logbook reports multiplied by average monthly prices for each species as calculated from the NOAA Fisheries Service Accumulated Landings System (ALS). To obtain values in 2007 dollars, the BLS Consumer Price Index for urban dwellers was used to adjust for the effects overall price inflation in the U.S. economy at the consumer level.

percent of total landings and 9 percent of dockside revenues on trips that landed at least one pound of snapper-grouper species. Fishermen also landed an average of 1.9 million pounds of non-snapper-grouper species worth $2.3 million in 2007 dollars on trips that landed at least one pound of species in the snapper-grouper management unit. These trips included trips that targeted species in the snapper-grouper management unit and trips that landed snapper-grouper species while targeting non-snapper-grouper species.

Table 3-3. Annual landings and dockside (ex-vessel) revenues for trips with at least one pound of species in the snapper-grouper fishery management unit in the South Atlantic, 2003-2007.

Item	2003	2004	2005	2006	2007	Average
	Trips with at least one pound of snapper-grouper					
Landings of snapper-grouper, thousand pounds, whole wt	6,471	6,693	6,365	6,112	6,528	6,434
Dockside revenue from snapper-grouper, thousand current $	$12,214	$12,155	$12,316	$13,069	$15,435	$13,038
Dockside revenue from snapper-grouper, thousand 2007 $	$13,762	$13,340	$13,078	$13,431	$15,426	$13,807
Price/lb (whole wt) for snapper-grouper	$1.89	$1.82	$1.93	$2.14	$2.36	$2.03
Bureau of Labor Statistics (BLS) Producer price index for #2 diesel fuel, index=100 for 2007	43	54	80	92	100	67
Landings of other species, same trips, thousand pounds	2,092	1,651	1,751	2,116	2,122	1,946
Dockside revenue from other species, same trips, thousand 2007 $	$2,149	$2,001	$2,225	$2,394	$2,738	$2,301

Source: NOAA Fisheries Service, Southeast Fisheries Science Center logbook database as of September 22, 2008, and Accumulated Landings System data base as of September 17, 2008. The BLS Consumer Price Index for all Urban Consumers was used to adjust dockside revenues and average annual prices for inflation.

Landings and dockside revenues varied between 2003 and 2007 for species in the snapper-grouper management unit (Table 3-3). While lower in 2007 than in 2003, the numbers for trips, days away from port and vessels varied during 2003-2006 (Table 3-4). Part of the variation in snapper-grouper landings overall appears to be attributable to landings of vermilion snapper, which experienced a significant decline in 2003 due to unusually cold water temperatures in the summer and fall of 2003. Landings of vermilion snapper recovered in 2004 and 2005, declined in 2006, and recovered in 2007.

Table 3-4. Fishing effort and distribution of landings for trips with at least one pound of species in the snapper-grouper fishery management unit in the South Atlantic, 2003-2007.

Item	2003	2004	2005	2006	2007	Average
	Trips with at least one pound of snapper-grouper					
Number of trips	16,545	15,045	13,756	13,224	14,753	14,665
Days away from port	27,556	24,820	22,794	23,160	24,216	26,296
Number of vessels landing snapper-grouper	931	905	857	868	889	890
Number of vessels landing 101-1,000 lbs of snapper-grouper	245	225	242	258	261	246
Number of vessels landing 1001-5000 lbs of snapper-grouper	270	263	239	228	225	245
Number of vessels landing 5,001-10,000 lbs of snapper-grouper	104	96	86	64	86	87
Number of vessels landing 10,001-50,000 lbs of snapper-grouper	152	133	123	127	134	134
Number of vessels landing more than 50,000 lbs of snapper-grouper	20	32	29	27	28	27
Number of permitted vessels	1059	1001	909	874*	877	944
Number of vessels with transferable permits	828	782	721	697*	718	749
Number of vessels with non-transferable permits	231	219	188	177	159	195
Number of dealer permits	271	269	268	251		265

Source: NOAA Fisheries Service, Southeast Fisheries Science Center logbook database as of September 22, 2008 and NOAA Fisheries Service, Southeast Regional Office permits database.
*The number of vessels with transferable permits seems low (697) in 2006, possibly because of database problems, which would affect both the estimate of the number of transferable permits and total permits for 2006.

The number of boats with snapper-grouper permits has exhibited a downward trend since 1999 (1,251 permits). There were 1,059 permits in 2003 and 877 in 2007 (Table 3-4). Two types of permits were created with the limited access program for the snapper-grouper fishery that was implemented in 1998. The number of transferable permits that allow an unlimited harvest per trip was 828 in 2003 and 718 in 2007 compared with 938 in 1999. The number of vessels with non-transferable permits with a 225-pound trip limit declined year-by-year from 313 in 1999 to 213 in 2003 and 159 in 2007. The number of transferable permits declined, in part, because new entrants into the fishery must buy two permits and retire one as the condition for entry into the fishery. Furthermore, it is likely that the number of vessels in the snapper-grouper fishery

declined for economic reasons. For example, fuel prices doubled between 2003 and 2005 and continued to increase through mid-2008. By contrast, average annual prices for species in the snapper-grouper management unit were relatively flat (Table 3-3, average annual prices represented by the ratio of annual commercial revenues to landings in current year dollars). The number of fish dealers with permits to operate in the snapper-grouper fishery reached a maximum in 2003 (271) and has declined since then (Table 3-4).

From 2003 through 2007, an average of 890 boats averaged 14,665 trips per year on which at least one pound of snapper-grouper species was landed (Table 3-4). On average, 493 boats landed at least 1,000 pounds of snapper-grouper species annually; 248 boats landed at least 5,000 pounds; 161 boats landed at least 10,000 pounds; and 27 boats landed at least 50,000 pounds of snapper-grouper species.

3.4.1.1.3 The South Atlantic Snapper-Grouper Fishery by State

The following discussion provides annual averages from 2003 to 2007. To maintain the confidentiality of individual reporting units, summaries are provided for regions defined as North Carolina, South Carolina, Georgia and northeast Florida combined, and central and south Florida combined. The northeast Florida region consists of trips landed in Nassau, Duval, and St. Johns Counties, and the central and south Florida region consists of trips landed from Flagler through Miami-Dade Counties and trips from Atlantic waters off the Florida Keys and landed in Monroe County.

The average annual quantities of snapper-grouper species harvested from 2003-2007 included 1.82 million pounds worth $3.74 million (in 2007 dollars) per year in North Carolina, 1.60 million pounds worth $3.80 million in South Carolina, 0.73 million pounds worth $1.65 million in Georgia and northeast Florida, and 0.79 million pounds worth $1.61 million in central and south Florida, and 1.50 million pounds worth $3.0 million in the Florida Keys (Table 3-5). Snapper-grouper landings by state were not proportional to total days fished in each state. Boats in central and south Florida, and the Florida Keys made 73 percent of the trips that landed species in the snapper-grouper management unit and accounted for 35 percent of the total snapper-grouper harvest. Conversely, boats in other states accounted for relatively larger portions of the total snapper-grouper harvest. Boats in North Carolina made 18 percent of the trips and landed 28 percent of the snapper-grouper harvest. Boats in South Carolina made 6 percent of the trips and landed 25 percent of the harvest. Boats in Georgia and northeast Florida made 32 percent of the trips and landed 12 percent of the snapper-grouper harvest. Boats in South Carolina and Georgia and northeast Florida took fewer but longer trips than their counterparts in North Carolina or central and south Florida and the Florida Keys.

Table 3-5. Average annual landings and dockside revenues for trips with at least one pound of species in the snapper-grouper fishery, averages for 2003-2007 by state.

Item	North Carolina	South Carolina	Georgia and Northeast Florida	Central and South Florida	Florida Keys	South Atlantic
	Trips with at least one pound of snapper-grouper					
Snapper-grouper landings, thousand pounds, whole wt	1,816	1,591	734	790	1,504	6,434
Percentage of South Atlantic snapper-grouper landings, by state	28%	25%	11%	12%	23%	100%
Dockside revenue, snapper-grouper, thousand 2007 $	$3,738	$3,795	$1,651	$1,615	$3,008	$13,807
Landings of other species, same trips, thousand lbs	286	125	54	1,293	188	1,946
Dockside revenue, other species, same trips, thousand 2007 $	$389	$182	$123	$1,406	$202	$2,301
Number of boats*	175	64	46	342	294	921
Number of trips	2,607	916	486	4,691	5,964	14,665
Percent of trips	18%	6%	3%	32%	41%	100%
Number of days	4,727	4,702	1,946	5,473	7,661	24,509
Trips per boat	14.9	14.2	10.6	13.7	20.3	15.9
Days per trip	1.8	5.1	4.0	1.2	1.3	1.7

Source: NOAA Fisheries Service, Southeast Fisheries Science Center logbook database as of September 22, 2008, and Accumulated Landings System data base as of September 17, 2008. The BLS Consumer Price Index for all Urban Consumers was used to adjust dockside revenues and average annual prices for inflation. *Some boats land in more than one area.

Gag and other shallow-water groupers and vermilion snapper and other mid-shelf snappers (i.e. red snapper) tend to be landed in North Carolina, South Carolina, and Georgia and northeast Florida, while jacks and shallow-water snappers tend to be landed in central and south Florida (Tables 3-6 and 3-7). The species groups that accounted for more than 10 percent of total landings and revenues in North Carolina include shallow-water groupers with nearly 24 percent of total pounds landed and nearly 34 percent of total revenues on trips with at least one pound of snapper-grouper species; black sea bass with 19 percent of total landings and 17 percent of total revenues; and mid-shelf snappers with 18 percent of total landings and 23 percent of total revenues. In South Carolina, the shallow-water groupers accounted for 32 percent of total pounds and 46 percent of total revenues, and the mid-shelf snappers accounted for 21 percent of total pounds and 23 percent of total revenues. In Georgia and northeast Florida, mid-shelf snappers accounted for 44 percent of total pounds and 51 percent of total revenues; shallow-water groupers accounted for 19 percent of total pounds and 27 percent of total revenues; and jacks accounted for 17 percent of total pounds and 7 percent of total revenues. In central and south Florida, coastal pelagics accounted for 49 percent of total pounds and 38 percent of total revenues, and jacks accounted for 12 percent of total pounds and 7 percent of total revenues, while tilefish accounted for 11 percent of total pounds and 17 percent of total revenue

on trips with at least one pound of snapper-grouper species. Fishermen in central and south Florida tend to catch larger quantities of non-snapper-grouper species such as mackerels.

Table 3-6. Average annual landings (in thousands of pounds, whole weights) on trips that landed at least one pound of snapper-grouper species: averages for 2003-2007, by state and species group.

Item	North Carolina		South Carolina		Georgia and Northeast Florida		Central and South Florida		Florida Keys		South Atlantic	
	1000 lbs	col %	1000 lbs	col %	1000 lbs	col %	1000 lbs	col %	1000 lbs	col %	1000 lbs	col %
Shallow-water groupers	504	24%	555	32%	152	19%	107	5%	100	6%	1,418	17%
Deep water groupers	84	4%	78	5%	5	1%	28	1%	59	3%	254	3%
Tilefish	78	4%	112	6%	1	0%	227	11%	12	1%	430	5%
Shallow-water snappers	10	0%	20	1%	21	3%	128	6%	887	52%	1,065	13%
Mid-shelf snappers	375	18%	366	21%	347	44%	33	2%	15	1%	1,136	14%
Triggerfish / Spadefish	131	6%	77	4%	56	7%	5	0%	2	0%	271	3%
Jacks	111	5%	159	9%	132	17%	240	12%	406	24%	1,047	12%
Grunts / porgies	127	6%	92	5%	14	2%	16	1%	24	1%	274	3%
Sea basses	395	19%	133	8%	6	1%	6	0%	0	0%	540	6%
Snapper-grouper	1,816	86%	1,591	93%	734	93%	790	38%	1,504	89%	6,434	77%
Coastal pelagics	216	10%	52	3%	34	4%	1,016	49%	81	5%	1,399	17%
Sharks	9	0%	19	1%	6	1%	195	9%	77	5%	306	4%
Tunas	22	1%	2	0%	1	0%	1	0%	0	0%	25	0%
Other	39	2%	54	3%	13	2%	81	4%	30	2%	217	3%
All species	2,102	100%	1,717	100%	787	100%	2,083	100%	1,692	100%	8,380	100%

Source: NOAA Fisheries Service, Southeast Fisheries Science Center logbook database as of September 22, 2008.

Table 3-7. Average annual dockside revenues in thousands of 2007 dollars for trips that landed at least one pound of snapper-grouper species: averages for 2003-2007 by state and species group.

Item	North Carolina		South Carolina		Georgia and Northeast Florida		Central and Southeast Florida		Florida Keys		South Atlantic	
	$1,000, 2007$	col %	$1,000, 2007$	col %	$1,000, 2007$	col %	$1,000, 2007$	col %	$1,000, 2007$	col %	$1,000, 2007$	col %
Shallow-water groupers	$1,404	34%	$1,847	46%	$475	27%	$338	11%	$272	8%	$4,336	27 %
Deep water groupers	$216	5%	$219	5%	$13	1%	$77	3%	$156	5%	$680	4%
Tilefish	$100	2%	$203	5%	$2	0%	$518	17%	$15	0%	$838	5%
Shallow-water snappers	$23	1%	$52	1%	$51	3%	$330	11%	$2,112	66%	$2,567	16 %
Mid-shelf snappers	$969	23%	$933	23%	$909	51%	$100	3%	$37	1%	$2,947	18 %
Triggerfish / Spadefish	$109	3%	$62	2%	$48	3%	$4	0%	$2	0%	$225	1%
Jacks	$106	3%	$161	4%	$126	7%	$223	7%	$396	12%	$1,011	6%
Grunts / porgies	$122	3%	$90	2%	$18	1%	$16	1%	$20	1%	$266	2%
Sea basses	$689	17%	$229	6%	$10	1%	$10	0%	$0	0%	$937	6%
Snapper-grouper	$3,738	91%	$3,795	95%	$1,651	93%	$1,615	53%	$3,008	94%	$13,807	86 %
Coastal pelagics	$299	7%	$100	3%	$66	4%	$1,139	38%	$104	3%	$1,708	11 %
Sharks	$4	0%	$11	0%	$2	0%	$78	3%	$23	1%	$118	1%
Tunas	$44	1%	$4	0%	$1	0%	$2	0%	$0	0%	$50	0%
Other species	$42	1%	$67	2%	$55	3%	$187	6%	$75	2%	$425	3%
All species	$4,127	100 %	$3,977	100 %	$1,775	100 %	$3,020	100 %	$3,210	100 %	$16,108	100 %

Source: NOAA Fisheries Service, Southeast Fisheries Science Center logbook database as of September 22, 2008, and Accumulated Landings System data base as of September 17, 2008. The BLS Consumer Price Index for all Urban Consumers was used to adjust dockside revenues and average annual prices for inflation.

3.4.1.1.4 The South Atlantic Snapper-Grouper Fishery by Gear

The following discussion provides annual averages from 2003 to 2007. To maintain the confidentiality of individual reporting units, summaries are provided for vertical lines, longlines, black sea bass pots, and all other gears combined. The all-other-gear category includes trolling lines, nets, and other gear types.

Most of the snapper-grouper harvest, including vermilion snapper and gag, is taken by some type of vertical hook-and-line gear. The exceptions include black sea bass, which is harvested primarily with black sea bass pots and golden tilefish and yellowedge grouper, which are harvested primarily with bottom longlines. Some species, such as snowy grouper, are harvested by both vertical lines and longlines. Longlines also are used in the shark fishery and may catch species in the snapper-grouper management unit as secondary species.

The average quantities of snapper-grouper species harvested from 2003-2007 included 5.18 million pounds worth $11.31 million (in 2007 dollars) per year with vertical lines, 0.41 million pounds worth $0.90 million with longlines, 0.12 million pounds worth $0.17 million with black sea bass pots, and 0.51 million pounds worth $0.86 million with other gears (Table 3-8). Trips with vertical lines accounted for 78 percent of all trips that landed species in the snapper-grouper management unit and 82 percent of the total snapper-grouper harvest. Trips with longlines tend to be longer than trips with other gears. Longline trips accounted for 2 percent of the trips and 6 percent of the snapper-grouper harvest. Trips with black sea bass pots represented 5 percent of the trips and accounted for 2 percent of the harvest, while trips with other gear types represented 11 percent of the trips and 8 percent of the harvest.

Table 3-8. North Carolina communities in Counties with Medium to High Red Snapper Landings on Average 2003-2007. (Source: NOAA Fisheries Service, Southeast Fisheries Science Center ACLS)

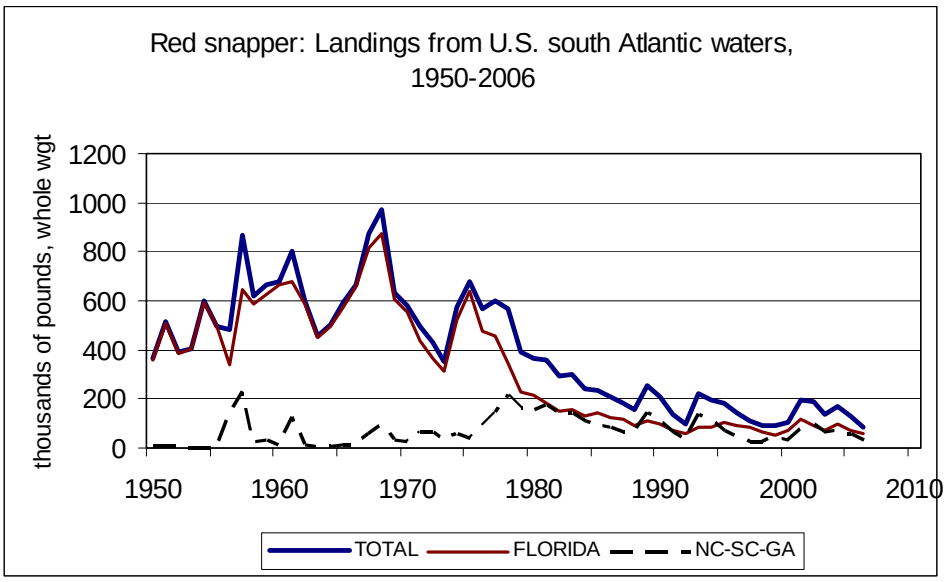
Item	Diving	Hook & Line	Longline	Traps	Other gear	Total
	Trips with at least one pound of snapper-grouper					
Landings of snapper-grouper, thousand pounds, whole weight	219	5,185	408	116	506	6,434
Percentage of landings	3%	81%	6%	2%	8%	100%
Revenue, snapper-grouper, thousand 2007 $	$571	$11,314	$895	$168	$861	$13,807
Percentage of 2007 $	4%	82%	6%	1%	6%	100%
Landings of other species, same trips, thousand pounds	49	674	265	941	17	1,946
Percentage of landings, other	3%	35%	14%	48%	1%	100%
Revenue from other species, same trips, thousand 2007 $	$191	$958	$153	$980	$19	$2,301
Percentage of total	8%	42%	7%	43%	1%	100%
Number of boats*	65	723	27	50	245	1,110
Number of trips	648	11,405	246	690	1,676	14,665
Percent of trips	4%	78%	2%	5%	11%	100%
Number of days	920	19,910	924	944	1,811	24,509
Trips per boat	10.0	15.8	9.0	13.8	6.8	13.2
Days per trip	1.4	1.7	3.8	1.4	1.1	1.7

Source: NOAA Fisheries Service, Southeast Fisheries Science Center logbook database as of September 22, 2008, and Accumulated Landings System data base as of September 17, 2008. The BLS Consumer Price Index for all Urban Consumers was used to adjust dockside revenues and average annual prices for inflation. *Some boats employ more than one gear.

3.4.1.1.5 The Commercial Fishery for Red Snapper

A small commercial fishery for red snapper along the Atlantic coast has existed at least since 1902 when 155,000 pounds (lbs) were landed, primarily in Georgia.[2] The fishery continued at relatively low levels until after World War II. Landings jumped to approximately 250,000 lbs in 1945 and 363,000 lbs in 1950. Landings fluctuated along a generally increasing trend through 1968 when they peaked at 974,000 lbs, and then declined to less than 100,000 lbs in 2006 (Figure 3-2). Commercial landings of red snapper averaged 540,000 lbs per year from 1950-1959, 678,000 lbs per year from 1960-1969, 524,000 lbs per year from 1970-1979, 259,000 lbs per year from 1980-1989, and 147,000 lbs per year from 1990-2000.

Figure 3-2. Commercial landings of red snapper, 1950-2006



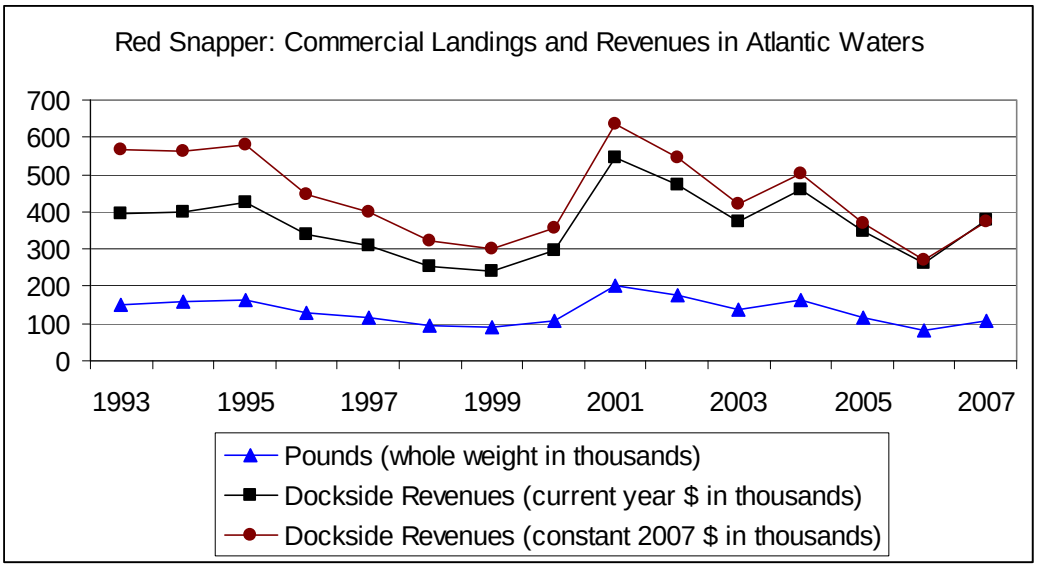
Source: SEDAR 15.

Fishermen along the east coast of Florida dominated the commercial fishery for red snapper until the mid-1970s, and accounted for more than 90 percent of landings from 1950-1975 (Figure 3-2). Geographic expansion of the fishery occurred during the late 1970s. Landings increased in Georgia, South Carolina and North Carolina and declined in Florida. Since 1980, landings in Florida have averaged approximately 55 percent of the total fishery.

[2] NOAA. 1990. Historical catch statistics: Atlantic and Gulf coast states, 1879-1989. Current Fishery Statistics 9010, NMFS Fishery Statistics Division, 107p.

Logbook data provide additional details about the commercial fishery for red snapper.[3] Between 1993 and 2007, commercial landings of red snapper in federal waters ranged from a high of 202,000 lbs (whole weight) worth approximately $544,000 in current year dollars in 2001 to a low of 81,000 lbs worth $263,000 in 2006 (Figure 3-3). Preliminary data for 2007 indicate that commercial fishermen landed approximately 108,000 lbs of red snapper worth $377,000 in current year dollars. Dockside revenues and pounds landed fluctuate in the same direction, which suggests that ex-vessel demand is price elastic. The policy implication is that regulations that reduce industry landings in the short-term are expected to reduce dockside revenues in the short-term. Conversely, dockside revenues are expected to increase over time if regulation successfully increases biomass and landings.

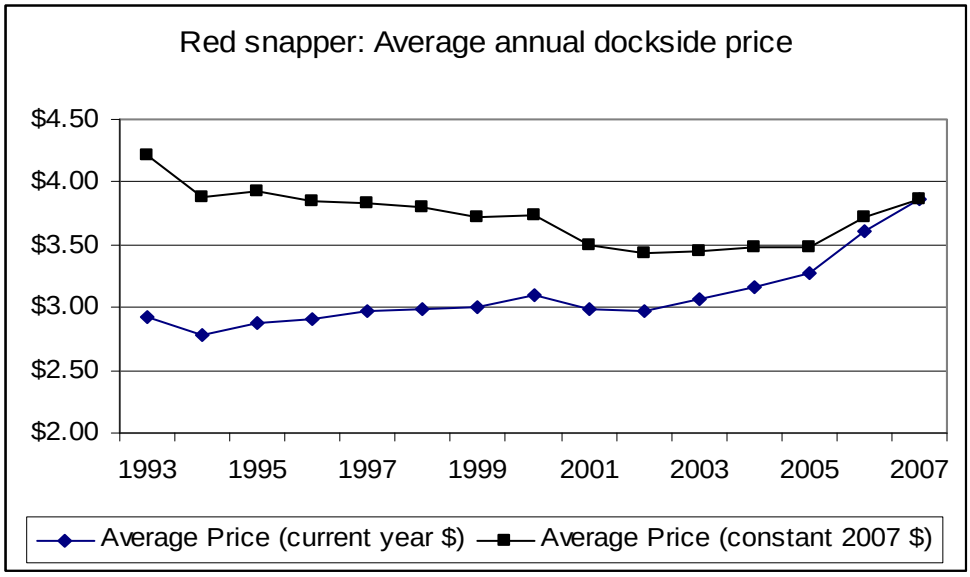
Figure 3-3. Annual landings and dockside revenues for red snapper, 1993-2007.



Average annual dockside prices for red snapper increased steadily in current year dollars (Figure 3-4). However, prices in constant 2007 dollars (after adjusting for the effects of inflation as measured by the consumer price index for all urban consumers) declined through 2002 before increasing in 2006 and 2007.

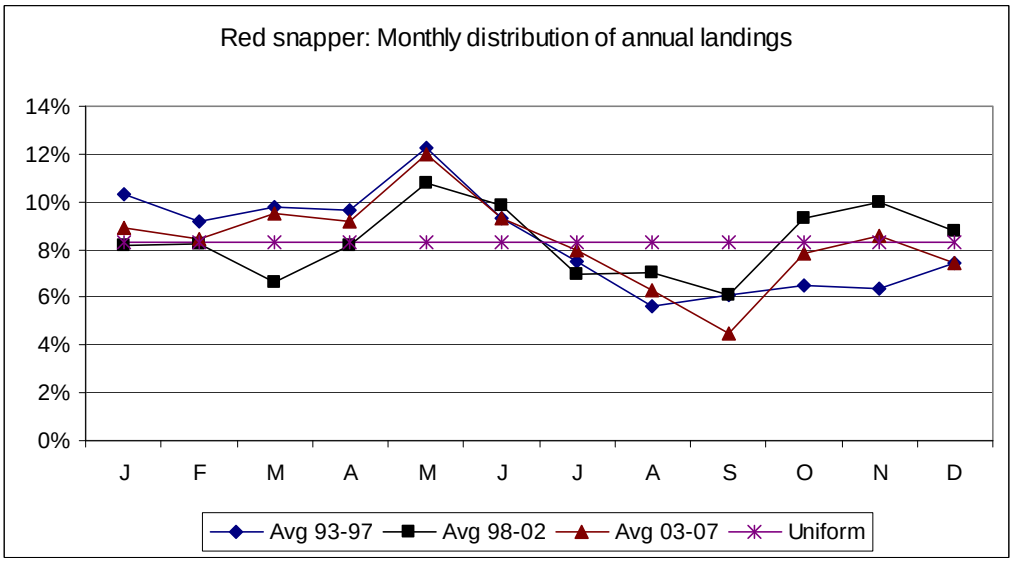
[3] Fishermen with a permit to fish in federal waters are required to submit a logbook report to the NMFS with information about landings, gear type, approximate location of trip and date of landing. Trip revenues were calculated as landings multiplied by average prices from the NMFS Accumulated Landings System. The logbook database does not include landings from trips in state waters by fishermen who do not have Federal permits.

Figure 3-4. Average annual dockside prices for red snapper, in current dollars and 2007 dollars.



Although the seasonal distribution of landings varied from 1993-2007, landings tend to be highest in May and lowest in September (Figure 3-5). During the 5-year period from 2003-2007, landings were above average from March through June, below average in August and September, and about average between October and February when compared to a uniform distribution of landings throughout the year.

Figure 3-5. Seasonal distribution of red snapper landings, 1993-2007.



On average between 2003 and 2007, 220 vessels reported 1,385 trips that landed at least one pound of red snapper (Table 3-9). These trips totaled an annual average of 121,000 lbs of red

snapper worth $364,000 in current year dollars, and produced an average of 8.26 million pounds of other species worth $14.85 million. Clearly, red snapper was not the primary revenue species on most of these trips. An average of 102 vessels landed less than 100 lbs of red snapper per year, 84 vessels landed between 101 and 1,000 lbs of red snapper per year, and 34 vessels landed more than 1,000 lbs of red snapper per year.

Table 3-9. Annual landings, dockside revenues and fishing effort, trips and boats with landings of at least one pound of red snapper, 2003-2007.

Item	2003	2004	2005	2006	2007	Average
	Trips and boats with at least one pound of red snapper					
Number of trips with at least one pound of red snapper	1,639	1,476	1,341	1,153	1,315	1,385
Landings of red snapper, thousand pounds, whole weight	136	161	117	81	108	121
Dockside revenue from red snapper, thousand current $	$374	$459	$346	$263	$377	$364
Dockside revenue from red snapper, thousand 2007 $	$422	$505	$368	$271	$376	$388
Dockside price, current $ / pound	$2.76	$2.85	$2.95	$3.25	$3.49	$3.02
Landings of all species, same trips, thousand pounds	2,252	2,292	2,199	1,679	2,059	2,096
Dockside revenue, all species, same trips, thousand 2007 $	$5,190	$5,105	$4,969	$3,990	$5,131	$4,877
Dockside revenue, all species, all trips, same boats, thousand 2007 $	$9,448	$8,886	$8,992	$9,286	$12,286	$9,780
Number of boats that landed red snapper	236	217	216	206	225	220
Number of boats landing 1-100 lbs per year of red snapper	106	87	97	106	114	102
Number of boats landing 101-1000 lbs per year of red snapper	91	86	86	74	81	84
Number of boats landing more than 1,000 lbs per year of red snapper	39	44	33	26	30	34

Source: NOAA Fisheries Service, Southeast Fisheries Science Center logbook database as of September 22, 2008, and Accumulated Landings System data base as of September 17, 2008. The BLS Consumer Price Index for all Urban Consumers was used to adjust dockside revenues and average annual prices for inflation.

Red snapper is part of the mid-shelf snapper-grouper complex that includes scamp, gag, vermilion snapper, red porgy, gray triggerfish and red grouper, among other species. Red snapper was the primary source of trip revenue on an average of 163 trips per year (Table 3-10) and a lesser source of revenue on 1,222 trips per year (Table 3-11). Therefore, red snapper was the primary source of trip revenue on less than 12 percent of the total number of trips on which they were landed. These trips accounted for approximately 30 percent of the total commercial harvest of red snapper, with an annual average of 38,000 lbs of red snapper worth $117,000 in

current dollars and 49,000 lbs of other species worth $96,000 (Table 3-10). Trips with red snapper as a lesser source of revenue accounted for an annual average of 82,000 lbs of red snapper worth $247,000 in current dollars and 8.2 million pounds (MP) of other species worth $14.7 million (Table 3-11). Red snapper were most commonly caught on trips with vermilion snapper, gag or scamp as the primary revenue species on the trip. Red snapper were landed primarily from South Carolina through central Florida, with approximately 45 percent of the catch occurring in Georgia and northeast Florida (Table 3-12). Trips with vertical lines as the primary gear accounted for nearly 90 percent of red snapper landings (Table 3-12).

Table 3-10. Annual landings and dockside revenues on trips with red snapper as the top source of trip revenue, 2003-2007.

Item	2003	2004	2005	2006	2007	Average
	Trips with red snapper as the top source of trip revenue					
Trips	172	198	157	140	149	163
Boats	80	76	66	58	61	68
Landings of red snapper on trips with red snapper as the top source of revenue, thousand pounds	43	58	29	27	35	38
Dockside revenue for red snapper on trips with red as the top source of revenue, thousand 2007 $	$134	$183	$91	$93	$125	$125
Landings of other species, same trips	63	75	38	29	41	49
Dockside revenue for other species, same trips, thousand 2007 $	$133	$153	$78	$66	$86	$103

Source: NOAA Fisheries Service, Southeast Fisheries Science Center logbook database as of September 22, 2008, and Accumulated Landings System data base as of September 17, 2008. The BLS Consumer Price Index for all Urban Consumers was used to adjust dockside revenues and average annual prices for inflation.

Table 3-11. Annual landings and dockside revenues on trips with red snapper as a lesser source of trip revenue, 2003-2007.

Item	2003	2004	2005	2006	2007	Average
	Trips with red snapper as a lesser source of trip revenue					
Trips	1,467	1,278	1,184	1,013	1,166	1,222
Boats	224	204	199	191	213	206
Landings of red snapper on trips with red snapper as a lesser source of revenue, thousand pounds	93	103	89	54	73	82
Dockside revenues for red snapper on trips with red snapper as a lesser source of revenue, thousand 2007 $	$288	$321	$277	$178	$251	$263
Landings of other species, same trips	2,053	2,057	2,044	1,569	1,910	1,927
Dockside revenue for other species, same trips, thousand 2007 $	$4,635	$4,447	$4,524	$3,653	$4,669	$4,386

Source: NOAA Fisheries Service, Southeast Fisheries Science Center logbook database as of September 22, 2008, and Accumulated Landings System data base as of September 17, 2008. The BLS Consumer Price Index for all Urban Consumers was used to adjust dockside revenues and average annual prices for inflation.

Table 3-12. Annual landings of red snapper for trips with at least one pound of red snapper, by region and primary gear, 2003-2007.

	2003	2004	2005	2006	2007	Average
	Trips with at least one pound of red snapper					
Red snapper caught off North Carolina, thousand pounds	15	10	7	6	5	9
Red snapper caught off South Carolina, thousand pounds	37	43	38	20	25	33
Red snapper caught off Georgia and northeast Florida, thousand pounds	65	90	46	34	52	58
Red snapper caught off central and southeast Florida, thousand pounds	16	16	23	17	25	19
Red snapper caught off Florida Keys, thousand pounds	3	1	2	4	1	2
Red snapper caught with vertical lines, thousand pounds	122	147	103	72	90	107
Red snapper caught with dive gear, thousand pounds	11	13	11	7	16	12
Red snapper caught with other gear, thousand pounds	3	1	2	2	1	2

Source: NOAA Fisheries Service, Southeast Fisheries Science Center logbook database as of September 22, 2008.

3.4.1.1.6 Average Annual Total Dockside (Ex-vessel) Revenues

As seen in Table 3-4, the number of vessels permitted to operate in the snapper-grouper fishery from 2003-2007 ranged from 1,059 vessels to 877 vessels (recall that, although the number of vessels in 2006 was lower than the 2007 total, this is likely due to unidentified data problems because under the limited access program for this fishery the number of permitted vessels cannot increase from year to year), or an average of 955 vessels per year (it is noted that this average may be low due to the 2006 data issues). However, over the 2004-2006 fishing years, an average of only 717 vessels per year that were permitted to operate in the fishery actually recorded snapper-grouper sales (SAFMC 2008a). The average annual dockside (ex-vessel) value of snapper-grouper sold by these vessels was approximately $12.96 million (nominal dollars), while the value of all other species sold by these vessels was approximately $14.33 million (nominal dollars), or total average annual revenues of approximately $27.29 million. The average annual dockside revenue per vessel from the sales of all marine species for this period was approximately $38,000.

The transference of the revenues from the bag limit sales prohibition of Amendment 15B (SAFMC 2008a) to the federal commercial snapper-grouper sector is expected to result in an estimated increase of approximately $3,400 per vessel if compatible regulations are adopted by all states, and from approximately $2,300 to $2,700 if no states adopt compatible regulations. As a result, the average annual dockside revenue per vessel from the sales of all marine species is estimated to increase approximately $40,000 to $41,000 if Amendment 15B is approved and implemented. Conversely, the management measures in Amendment 16 (SAFMC 2009) are projected to reduce the net revenues to the snapper-grouper fleet as a result of the proposed gag and vermilion snapper management measures by approximately $2,700 per vessel. However, because this estimate is a reduction in net revenues (net of certain operating costs) rather than gross ex-vessel revenues, it cannot be directly deducted from the estimated average revenues per vessel already listed. It can, however, be concluded that the expected average reduction in dockside revenues per vessel as a result of Amendment 16 is expected to be greater than $2,700 and the resultant average annual dockside revenue per vessel in the snapper-grouper fishery is expected to be less than $38,000.

It should be noted that Tables 3-4 and 3-5 contain information on the numbers of vessels that harvested snapper-grouper over the period 2003-2007 (an average of 944 vessels per year), as well as total average annual dockside revenues from snapper-grouper ($13.8 million) and all other species harvested on these trips ($2.3 million). Combining these figures results in an average annual dockside revenue of approximately $17,000 per vessel, a value that is considerably lower than the $38,000 discussed above. The lower value, however, was derived from an analysis of federal logbook data, whereas the higher value was derived from an analysis of state trip ticket data (each of the South Atlantic states manage their own trip ticket programs). Federal logbooks are not required for all fisheries that a vessel may participate in, whereas state trip tickets require the reporting of all marine harvests and sales landed in that state. Thus, the trip ticket data is the more appropriate source of information on total revenues from the sale of marine species. However, a comparable analysis of state trip ticket data for 2003-2007 is not available and the 2004-2006 results are currently the best available information.

3.4.1.1.7 Economic Impacts of the Commercial Fishery

Estimates of the output (sales) and job (full time equivalent (FTE)) impacts of the commercial snapper-grouper or red snapper fishery are not available. USDOC (2009) contains estimates of the economic impacts of the 2006 South Atlantic commercial fishing industry, but these estimates are for all commercial fisheries combined and are not delineated by species or species group. Also, the results for Florida reflect the economic impact of commercial fishing for the entire state and not just eastern Florida. Overall, the South Atlantic commercial fishing industry (including all of Florida) in 2006 generated approximately $6.486 billion in total sales impacts and approximately 131,000 total employment impacts. Additionally, the South Atlantic commercial fishing industry generated approximately $3.542 billion in total income impacts in 2006. While estimates of the impacts of the snapper-grouper fishery are not available, it is noted that revenues from all snapper-grouper species comprised approximately four percent of the total revenues from all commercial landings in 2006, with shrimp, blue crab, and flounder, in order, the top revenue species.

3.4.1.1.8 Imports

Imports have been a major source of seafood supply in the U.S., and the domestic snapper-grouper market is not an exception. For the period 2003-2006, imports of fresh and frozen snappers and groupers have stayed relatively high, averaging approximately 44.7 million pounds (Table 3-13), compared to the average South Atlantic snapper-grouper landings for the same period of 6.77 million pounds (Table 3-3). Clearly, imports dominate the snapper-grouper market. At an annual average of $79.2 million for the years 2001-2006, imports dwarf the average annual $12.99 million dockside value of South Atlantic snapper-grouper landings. Dominance of imports in the snapper-grouper market may be expected to limit the movement of domestic ex-vessel prices that may result from changes in domestic landings of snappers and groupers as a result of management change.

Table 3-13. U.S. imports of snappers and groupers, 2001-2006.

YEAR	Pounds of imports by product form Millions of pounds*			Value of imports by product form Millions of dollars		
	FRESH	FROZEN	TOTAL	FRESH	FROZEN	TOTAL
2001	31.1	8.4	39.4	$51.7	$10.6	$62.3
2002	33.4	9.2	42.6	$57.1	$12.3	$69.5
2003	34.3	10.2	44.5	$58.9	$14.4	$73.3
2004	33.3	9.8	43.1	$61.7	$13.9	$75.6
2005	35.9	13.8	49.7	$72.0	$21.0	$93.0
2006	35.2	13.4	48.6	$78.8	$22.9	$101.7
Average	33.9	10.8	44.7	$63.4	$15.9	$79.2

Source: NOAA Fisheries, Foreign Trade Database.
*Weights are not converted to equivalent whole weights.

3.4.1.2 Recreational Fishery

The recreational fishery is comprised of the private and for-hire sectors. The private sector includes anglers fishing from shore (all land-based structures) and private/rental boats. The for-hire sector is composed of the charterboat and headboat (also called partyboat) sectors. Charterboats generally carry fewer passengers and charge a fee on an entire vessel basis, whereas headboats carry more passengers and payment is per person. The type of service, from a vessel- or passenger-size perspective, affects the flexibility to search different fishing locations during the course of a trip and target different species since larger concentrations of fish are required to satisfy larger groups of anglers.

3.4.1.2.1 Harvest

Recreational snapper-grouper harvest in the South Atlantic was variable during the period 2003-2007, averaging slightly below 11 MP (Table 3-14). On average, the private/shore mode of fishing accounted for the largest harvests at around 7.23 MP. Over the same period, the charterboat sector harvested an average of 1.97 MP per year and the headboat sector harvested 1.69 MP. Harvests by state also fluctuated during the same period (Table 3-15). On average,

Florida accounted for most of the snapper-grouper harvest in the South Atlantic at approximately 6.83 MP per year, followed by North Carolina (2.07 MP), South Carolina (1.41 MP), and Georgia (0.64 MP).

Table 3-14. Harvest of snapper-grouper species by mode in the South Atlantic, 2003-2007.

Year	Charterboat[1]	Headboat[2]	Shore and Private/Rental Boat[1]	Total
2003	2,301,303	1,375,688	7,265,886	10,942,877
2004	1,517,384	1,889,010	6,688,596	10,094,990
2005	2,313,468	1,649,210	6,123,049	10,085,727
2006	1,998,902	1,648,405	7,282,328	10,929,635
2007	1,697,350	1,893,031	8,777,570	12,367,950
Average	1,965,681	1,691,068	7,227,485	10,884,235

Source: The Headboat Survey, NOAA Fisheries, SEFSC, Beaufort Lab and MRFSS database, NOAA Fisheries, NMFS, SERO.
[1] Pounds of A and B1 fish estimated from the MRFSS Survey.
[2] The total annual estimate of headboat catch derived from data collected through the NMFS headboat survey.

Table 3-15. Harvest of snapper-grouper species by state in the South Atlantic, 2003-2007.

Year	Florida	Georgia	South Carolina	North Carolina
2003	7,848,011	770,993	1,042,157	1,281,714
2004	5,970,816	763,609	1,625,212	1,735,353
2005	6,696,212	622,302	852,105	1,915,107
2006	6,474,221	746,982	1,466,944	2,241,489
2007	7,173,255	320,927	2,079,880	3,199,767
Average	6,832,503	644,962	1,413,259	2,074,686

Source: The Headboat Survey, NOAA Fisheries, SEFSC, Beaufort Lab and MRFSS database, NOAA Fisheries, NMFS, SERO.

Recreational red snapper harvest in the South Atlantic is presented in Tables 3-16 and 3-17. On average, over 2003-2007, the private/rental sector has accounted for approximately 52 percent of read snapper harvests (Table 3-16). Within the for-hire mode, charterboats are the dominant sector. Over 80 percent of harvests, on average, occur in Florida (Table 3-17).

Table 3-16. Harvest of red snapper (pounds) by mode in the South Atlantic, 2003-2007..

Year	Charterboat[1]	Headboat[2]	Private/Rental Boat[1]	Total
2003	131,493	41,353	147,194	320,040
2004	120,797	80,348	173,139	374,284
2005	116,733	58,695	139,543	314,971
2006	100,460	41,431	138,924	280,815
2007	57,158	37,459	243,753	338,370
Average	105,328	51,857	168,511	325,696

Source: Headboat Survey, NOAA Fisheries, SEFSC, Beaufort Lab and MRFSS database, NOAA Fisheries, NMFS, SERO.
[1] Pounds of A and B1 fish estimated from the MRFSS Survey. No recorded shore harvest.
[2] The total annual estimate of headboat catch derived from data collected through the NMFS headboat survey.

Table 3-17. Harvest of red snapper (pounds) by state in the South Atlantic, 2003-2007.

Year	Florida	Georgia	North Carolina	South Carolina
2003	250,216	8,757	14,275	46,791
2004	297,442	39,355	16,489	6,499
2005	253,227	36,276	11,313	20,183
2006	237,150	29,876	8,539	6,079
2007	300,114	15,350	2,962	21,200
Average	267,630	25,923	10,716	20,150

Source: Headboat Survey, NOAA Fisheries, SEFSC, Beaufort Lab and MRFSS database, NOAA Fisheries, NMFS, SERO.

Combining the information in Tables 3-14 and 3-16 to examine the relative importance of red snapper recreational harvest to total snapper-grouper recreational harvest, the average annual red snapper harvest in terms of pounds landed over the period 2003-2007 accounted for approximately five percent, 3 percent, and 2 percent of the average annual total snapper-grouper harvest for the charterboat, headboat, and private angler sectors, respectively.

Bag composition analysis of the MRFSS data over this same period, demonstrates that, for all intercepted trips that caught red snapper, the most commonly caught species in terms of numbers of fish were black sea bass, vermilion snapper, red snapper, tomtate, and gray triggerfish (Table 3-18). These five species accounted for, on average, 72 percent of the total bag of all species. Other than sharpnose shark (approximately three percent; data not shown), no other species averaged more than two percent. It should be noted that these results reflect raw intercept fish counts and do not reflect any weighting as occurs in the generation of final harvest estimates. These species largely remain the top species when the data is examined by mode (sharpnose shark replaces gray triggerfish for the charterboat mode), however, the relative importance changes. For the private boat mode, the top three species are red snapper, black sea bass, and tomtate. For the charterboat sector, vermilion snapper is the most common species, followed by black sea bass, and red snapper.

Table 3-18. Bag composition for red snapper catch trips, 2003-2007.

	All Modes	
Species	Number of Fish in Intercept*	Percent Total
Black Sea Bass	6,094	23.30%
Vermilion Snapper	5,966	22.81%
Red Snapper	3,787	14.48%
Tomtate	1,962	7.50%
Gray Triggerfish	929	3.55%
	Charterboat	
Vermilion Snapper	5,309	28.62%

	All Modes	
Species	Number of Fish in Intercept*	Percent Total
Black Sea Bass	4,570	24.64%
Red Snapper	2,207	11.90%
Tomtate	762	4.11%
Gray Triggerfish	741	3.99%
	Private	
Red Snapper	1,538	22.63%
Black Sea Bass	1,307	19.23%
Tomtate	1,179	17.35%
Vermilion Snapper	352	5.18%
Sharpnose Shark	265	3.90%

Source: MRFSS database, NOAA Fisheries, NMFS, SERO.
*The number of fish equal the recorded numbers of fish (measured or reported caught) in the raw intercept data and not extrapolated total catch of these species for the entire fishery.

An alternative bag composition analysis over the same 2003-2007 period (data not shown) examining all fish harvested on red snapper target trips (it should be noted that the results in the previous paragraph cover all red snapper catch trips) across all modes interestingly shows red snapper to comprise a lower proportion of total catch than on red snapper catch trips, ranging from a low of 2 percent in 2006 to a high of 10 percent in 2005. The most common alternative single or group species for red snapper target trips were vermilion snapper, ranging from a low of 16 percent in 2005 to a high of 41 percent in 2003, and bottom/reef fish, a group comprised of combined non-grouper or snapper reef fish species, of which black sea bass and grunts are likely the dominant species, ranging from a low of 25 percent in 2003 to a high of 53 percent in 2007. It would normally be expected that target anglers would be more successful than general fishermen in catching a particular species, but the available data in this case does not support this assumption. Evaluation by mode revealed similar results for red snapper, which comprised 1 percent (private mode, 2003) to 10 percent (both modes, multiple years) of the total bag, and reinforced the relatively greater importance of bottom/reef fish to private anglers (26 percent (2003) to 71 percent (2004) of the total bag) and vermilion snapper to charter anglers (23 percent (2005) to 53 percent (2004) of the total bag).

Similar evaluation of headboat data is not available. However, in addition to the information provided above which showed that total average annual red snapper harvests in terms of pounds landed from 2003-2007 accounted for approximately three percent of total snapper-grouper harvests, red snapper accounted for only approximately two percent of total harvests of all species (Table 3-19). In terms of pounds harvested, over this period, red snapper was the fifteenth most important species for the headboat sector.

Table 3-19. Average annual headboat harvests (1,000 pounds), 2003-2007.

Species	Harvest LBS	Percent Total
Vermilion Snapper	395.4	17.05%
King Mackerel	194	8.37%
Black Sea Bass	177.6	7.66%

Species	Harvest LBS	Percent Total
White Grunt	174.2	7.51%
Gray Triggerfish	112.2	4.84%
Yellowtail Snapper	102.4	4.42%
Greater Amberjack	81	3.49%
Sharpnose Shark	77.2	3.33%
Scamp	73.2	3.16%
Gray Snapper	72.6	3.13%
Gag	69.6	3.00%
Little Tunny	65.2	2.81%
Red Porgy	62.2	2.68%
Banded Rudderfish	55.8	2.41%
Red Snapper	51.9	2.24%
Red Grouper	50.6	2.18%
All Species	2,319	100.00%

Source: Headboat Survey, NOAA Fisheries, SEFSC, Beaufort Lab, NOAA Fisheries, NMFS, SERO.

3.4.1.2.2 Effort

Recreational effort derived from the MRFSS can be characterized in terms of the number of trips as follows:

1. 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 second primary target for the trip. The species did not have to be caught.
2. 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.
3. Total recreational trips - The total estimated number of recreational trips in the South Atlantic, regardless of target intent or catch success.

Estimates of recreational effort for the entire snapper-grouper fishery in the South Atlantic for the shore, charterboat, and private boat modes were derived using the method described in Holiman (1996) and are provided in Table 3-20 for trips by mode and Table 3-21 for trips by state. The total column refers to the total number of trips taken by anglers in the South Atlantic snapper-grouper fishery and not to the sum of catch and target trips.

In the South Atlantic, total angler trips were highest for the shore mode, followed by the private mode, and then by the charter mode (Table 3-20). However, the average number of snapper-grouper catch trips was highest for the private mode and lowest for the charter mode. The same was true for snapper-grouper target trips. For the charter mode, both catch and target trips peaked in 2005 and decreased thereafter. Shore mode catch trips dropped from 2003 to 2004 but steadily increased thereafter; shore mode target trips fell from 2003 to 2005 and increased thereafter. Catch trips for the private mode fell in 2004 but increased thereafter, with relatively high levels in the last two years; target trips declined through 2005 and picked up in the last two years. Florida registered the highest total angler trips, followed in order by North Carolina,

South Carolina, and Georgia (Table 3-21). The same pattern holds for catch trips but not for target trips. South Carolina registered slightly higher target trips than North Carolina.

Table 3-20. Recreational effort for the snapper-grouper fishery in the South Atlantic, in thousand trips, by mode, 2003-2007.

	Charter Mode Trips			Shore Mode Trips			Private Mode Trips		
	Catch	Target	Total	Catch	Target	Total	Catch	Target	Total
2003	118	23	412	1,103	263	10,872	2,105	648	9,963
2004	129	28	418	987	209	11,186	1,985	477	9,488
2005	373	69	971	1,095	195	11,240	2,096	473	9,886
2006	285	68	834	1,276	272	12,511	2,603	530	10,749
2007	129	40	501	1,400	321	11,938	2,851	668	13,137
Avg.	207	45.6	627	1,172	252	11,549	2,328	559	10,644

Source: MRFSS database, NOAA Fisheries, NMFS, SERO.

Table 3-21. Recreational effort for the snapper-grouper fishery in the South Atlantic, in thousand trips, by state, 2003-2007.

	Florida			Georgia			South Carolina			North Carolina		
	Catch	Target	Total	Catch	Target	Total	Catch	Target	Total	Catch	Target	Total
2003	2,860	723	11,444	92	46	971	143	86	2,098	231	80	6,733
2004	2,530	532	10,800	90	26	960	191	84	2,224	289	71	7,107
2005	2,835	579	12,200	96	28	859	178	60	2,188	454	70	6,849
2006	3,325	633	13,349	71	28	799	248	133	2,670	520	76	7,276
2007	3,807	784	15,169	104	20	926	137	109	2,529	332	116	6,951
Avg.	3,071	650	12,592	90	29	903	179	94	2,341	365	82	6,983

Source: MRFSS database, NOAA Fisheries, NMFS, SERO.

Red snapper catch and target effort is provided in Tables 3-22 and 3-23. Red snapper is not a significant target or catch species across the South Atlantic, with red snapper target effort accounting for less than one quarter of one percent, on average, of total recreational trips from 2003-2007, and red snapper catch effort accounting for less than one half of one percent of total recreational trips. The majority of both target and catch trips occurs in the private mode (Table 3-22), and a large majority of both types of trips occurs in Florida (Table 3-23).

Table 3-22. Recreational effort for the red snapper fishery in the South Atlantic, in thousand trips, by mode, 2003-2007.

	Charter Mode Trips			Shore Mode Trips			Private Mode Trips		
	Catch	Target	Total	Catch	Target	Total	Catch	Target	Total
2003	17	3	412	1	6	10,872	47	34	9,963
2004	15	3	418	4	5	11,186	58	46	9,488
2005	16	2	971	1	2	11,240	57	28	9,886
2006	14	3	834	0	3	12,511	50	24	10,749
2007	12	3	501	2	5	11,938	103	49	13,137
Avg.	15	3	627	2	4	11,549	63	36	10,644

Source: MRFSS database, NOAA Fisheries, NMFS, SERO.

Table 3-23. Recreational effort for the red snapper fishery in the South Atlantic, in thousand trips, by state, 2003-2007.

	Florida			Georgia			South Carolina			North Carolina		
	Catch	**Target**	**Total**	**Catch**	**Target**	**Total**	**Catch**	**Target**	**Total**	**Catch**	**Target**	**Total**
2003	59	43	11,444	1	0	971	3	0	2,098	1	0	6,733
2004	69	52	10,800	6	1	960	1	0	2,224	1	0	7,107
2005	67	31	12,200	5	1	859	1	0	2,188	1	0	6,849
2006	56	25	13,349	6	4	799	1	2	2,670	1	0	7,276
2007	106	45	15,169	7	1	926	4	12	2,529	0	0	6,951
Avg.	71	39	12,592	5	1	903	2	3	2,341	1	0	6,983

Source: MRFSS database, NOAA Fisheries, NMFS, SERO.

Similar analysis of recreational effort is not possible for the headboat sector because headboat data are not collected at the angler level. Estimates of effort in the headboat sector are provided in terms of angler days, or the number of standardized 12-hour fishing days. Despite the inability to associate headboat effort with specific species, the stationary bottom nature of headboat fishing, as opposed to trolling, suggests that all headboat trips and, hence, angler days, are snapper-grouper trips by intent, though not necessarily success.

Headboat angler days are presented in Table 3-24. Due to confidentiality considerations, headboat effort data for Georgia were combined with Florida data. For the period 2003-2007, total headboat angler days fluctuated around the mean of 240,980 days. On average, Florida accounted for the largest number of angler days (164,492), or about 68 percent of all headboat angler days. Although all headboat angler days are presumed to target snapper-grouper species, similar to the effort results for the private and charter modes, headboat red snapper effort likely predominantly occurs in Florida waters.

Table 3-24. Estimate of headboat angler days for the U.S. South Atlantic.

Year	Florida	South Carolina	North Carolina	Total
2003	145,011	36,556	22,998	206,568
2004	173,701	50,461	27,255	253,421
2005	171,078	34,036	31,573	238,692
2006	175,522	56,074	25,736	259,338
2007	157,150	60,729	29,002	246,881
Average	164,492	47,571	27,312	240,980

Source: The Headboat Survey, NOAA Fisheries, SEFSC, Beaufort Lab.

3.4.1.2.3 Permits

For-hire vessels in the South Atlantic are required to have a snapper-grouper for-hire permit to fish for or possess snapper-grouper species in the EEZ. The number of permitted vessels for the period 2003-2007 is provided in Table 3-25. This sector operates as an open access fishery and not all permitted vessels are necessarily active in the fishery. Some vessel owners may purchase open access permits as insurance for uncertainties in the fisheries in which they actually operate.

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. While the total number of permits increased over this period, the number of vessels with both for-hire and commercial permits remained flat through 2006, but decreased by almost 20 percent in 2007 relative to the previous years. The majority of snapper-grouper for-hire permitted vessels were home-ported in Florida, followed by North Carolina and South Carolina.

A for-hire permit does not distinguish whether the vessel operates as a charterboat or headboat. However, 82 vessels were included in the SEFSC Headboat Survey vessel list in 2007, with 48 homeported in Florida and Georgia, and 20 and 14 vessels homeported in North Carolina and South Carolina, respectively.

Table 3-25. South Atlantic snapper-grouper for-hire permit holders by home port state, 2003-2007.

	Number of vessels issued for-hire vessel permits						**Number of vessels with both a for-hire permit and a commercial snapper-grouper permit**					
Home Port State	**2003**	**2004**	**2005**	**2006**	**2007**	**Avg.**	**2003**	**2004**	**2005**	**2006**	**2007**	**Avg.**
Florida	957	1,084	1,119	1,108	1,140	**1,082**	148	151	148	151	122	**144**
North Carolina	206	232	254	284	315	**258**	45	42	43	46	40	**43**
South Carolina	122	108	121	119	129	**120**	34	33	33	34	24	**32**
Georgia	36	27	33	33	30	**32**	4	2	2	2	3	**3**
Virginia	5	13	10	10	8	**9**		4	3	2		**3**
Other States	69	48	51	62	69	**60**	8	3	5	3	2	**4**
Gulf States	82	82	79	65	63	**74**						
Total	**1,477**	**1,594**	**1,667**	**1,681**	**1,754**	**1,635**	**239**	**235**	**234**	**238**	**191**	**227**

Source: Southeast Permits Database, NOAA Fisheries, SERO.

3.4.1.2.4 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 the cost 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, among others, 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.

An estimate of the value lost on each trip when the harvest of red snapper harvest is prohibited is provided in the economic analysis prepared for the early closure of the red snapper season in the Gulf of Mexico (NOAA 2008). Specifically, starting from a 2 fish bag limit, the loss in CS on each trip when an angler cannot keep any red snapper is $53.53 in 2008 dollars. This loss in value applies to anglers fishing on trips for grouper, red snapper, dolphin, or king mackerel in the marine waters of the Gulf of Mexico or South Atlantic and captures the condition that the quality of trips for other species is also adversely affected by the prohibition of red snapper harvest.

In addition to anglers receiving economic value as measured by the consumer surplus associated with fishing, for-hire businesses receive value from the services they provide. Producer surplus (PS) is the measure of the economic value these operations receive. PS is the difference between the revenue a business receives for a good or service, such as a charter or headboat trip, and the cost the business incurs to provide that good or service. Estimates of the PS associated with for-hire trips are not available. However, proxy values in the form of net operating revenue are also provided in NOAA (2008). These values are not PS estimates because they are not net of crew costs and returns to the owner. The estimated net operating revenues per angler trip for the for-hire sector are $162 for a charterboat trip and $78 for a headboat trip.

3.4.1.2.5 Economic Impacts of the Recreational Fishery

The value estimates provided in the previous section should not be confused with angler expenditures or economic activity. While 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. However, angler expenditures benefit a number of sectors that provide goods and services for salt-water sport fishing. Gentner *et al.* (2001) provides estimates of saltwater recreational fishing trip expenditures (Table 3-26). These estimates do not include expenditures in Monroe County, Florida, or expenditures in the headboat sector.

Expenditure data are used to generate estimates of the economic impact of the recreational fishery. Similar to the situation with the commercial fishery, estimates of the output (sales) and job (full time equivalent (FTE)) impacts of the recreational snapper-grouper or red snapper fishery are not available. USDOC (2009) contains estimates of the economic impacts of the 2006 South Atlantic recreational fishery, but these estimates are for the entire recreational fishery for all marine species combined and are not delineated by species or species group. Overall, the South Atlantic recreational fishery in 2006 generated approximately $9.624 billion in total sales impacts and approximately 87,000 total employment impacts. Additionally, the recreational sector generated approximately $4.954 billion in value added impacts. While estimates of the impacts of the snapper-grouper or red snapper recreational fishery are not available, it is noted that snapper-grouper target effort accounted for, on average and not including the headboat sector, only four percent of the total recreational trips from 2003-2007, while red snapper target effort accounted for less than one half of one percent of total recreational trips (Tables 3-20 and 3-22).

Table 3-26. Summary of expenditures on saltwater trips.

	North Carolina		South Carolina		Georgia		Florida	
Item	**Resident**	**Non Resident**	**Resident**	**Non Resident**	**Resident**	**Non Resident**	**Resident**	**Non Resident**
Shore mode trip expenses	$63.61	$75.53	$54.12	$104.27	$31.78	$115.13	$36.90	$141.30
Private/rental boat trip expenses	$71.28	$92.15	$35.91	$67.07	$161.34	$77.51	$66.59	$94.15
Charter mode trip expenses	$201.66	$110.71	$139.72	$220.97	$152.45	$155.90	$96.11	$196.16
Charter fee-average-per day	$133.76	$70.59	$114.26	$109.97	$73.68	$80.99	$71.37	$100.79

Source: 1999 MRFSS add-on survey (Gentner *et al.* 2001).

3.4.1.2.5 Financial Operations of the Charter and Headboat Sectors

Holland *et al.* (1999) estimated that the charterboat fee in the South Atlantic ranged from $292 to $2,000. The actual cost depended on state, trip length, and the variety of services offered by the charter operation. Depending on the state, the average fee for a half-day trip ranged from $296 to $360, for a full day trip the range was $575 to $710, and for an overnight trip the range was $1,000 to $2,000. Most (>90 percent) Florida charter operators offered half-day and full-day trips and about 15 percent of the fleet offered overnight trips. In comparison, only about 3 percent of operations in the other South Atlantic states offered overnight trips.

For headboats, the average fee in Florida was $29 for a half-day trip and $45 for a full day trip. For North and South Carolina, the average base fee was $34 per person for a half-day trip and $61 per person for a full day trip. Most of these headboat trips operated in federal waters in the South Atlantic (Holland *et al.* 1999).

Capital investment in charter vessels averaged $109,301 in Florida, $79,868 for North Carolina, $38,150 for South Carolina and $51,554 for Georgia (Holland *et al.* 1999). Charterboat owners incur expenses for inputs such as fuel, ice, and tackle in order to offer the services required by their passengers. Most expenses incurred in 1997 by charter vessel owners were on crew wages and salaries and fuel. The average annual charterboat business expenditures incurred was $68,816 for Florida vessels, $46,888 for North Carolina vessels, $23,235 for South Carolina vessels, and $41,688 for vessels in Georgia in 1997. The average capital investment for headboats in the South Atlantic was approximately $220,000 in 1997. Total annual business expenditures averaged $135,737 for headboats in Florida and $105,045 for headboats in other states in the South Atlantic.

The 1999 study on the for-hire sector in the Southeastern U.S. presented two sets of average gross revenue estimates for the charter and headboat sectors in the South Atlantic (Holland *et al.*, 1999). The first set of estimates were those reported by survey respondents and were as follows:

$51,000 for charterboats on the Atlantic coast of Florida; $60,135 for charterboats in North Carolina; $26,304 for charterboats in South Carolina; $56,551 for charterboats in Georgia; $140,714 for headboats in Florida; and $123,000 for headboats in the other South Atlantic states (Holland *et al*., 1999). The authors generated a second set of estimates using the reported average trip fee, average number of trips per year, and average number of passengers per trip (for the headboat sector) for each vessel category for Florida vessels. Using this method, the resultant average gross revenue figures were $69,268 for charterboats and $299,551 for headboats. Since the calculated estimates were considerably higher than the reported estimates (22 percent higher for charterboats and 113 percent higher for headboats), the authors surmised that this was due to sensitivity associated with reporting gross receipts, and subsequent under reporting. Alternatively, the respondents could have overestimated individual components of the calculated estimates. Although the authors only applied this methodology to Florida vessels, assuming the same degree of under reporting in the other states results in the following estimates in average gross revenues: $73,365 for charterboats in North Carolina, $32,091 for charterboats in South Carolina; $68,992 for charterboats in Georgia; and $261,990 for headboats in the other South Atlantic states.

It should be noted that the study's authors were concerned that while the reported gross revenue figures may be underestimates of true vessel income, the calculated values could overestimate gross income per vessel from for-hire activity (Holland *et al.*, 1999). Some of these vessels are also used in commercial fishing activities and that income is not reflected in these estimates. Although more current statistics are not available, the reader should recognize that current financial statistics, including both fees and costs, are likely higher today than reported in the 1999 study.

3.4.2 Social and Cultural Environment

Permit requirements for the commercial snapper-grouper fishery were established in 1998 by Amendment 8 (SAFMC 1997). The amendment created a limited entry system for the commercial fishery and established two types of permits based on the historic landings associated with a particular permit. Those who could demonstrate a certain amount of landings over a certain time period received transferable permits that did not limit the number of pounds of snapper-grouper that could be landed from federal waters (hereafter referred to as "unlimited commercial permits"). Vessels with verified landings, but did not meet the threshold were issued permits that allowed them to land 225 pounds of snapper-grouper species from federal waters each trip (hereafter referred to as "limited commercial permits"). These permits were not transferable. New entry into the fishery required the purchase of two unlimited permits from existing permit holders for exchange for a new permit. This "two for one" system was intended to gradually decrease the number of permits in the fishery. These restrictions only applied to the commercial snapper-grouper permit.

Over time the limited entry system has reduced capacity in the commercial fishery as evidenced by the reduction in the number of permits over the eight year period beginning in 2001 through 2007 (Figure 3-6). There was a 34 percent decrease in the number of unlimited permits and a 54 percent decrease in the number of limited permits during that time period. This downward trend in permits is reflected in other measures of effort that also show a decline, i.e. number of trips,

landings, etc. (See SAFMC 2008c, Amendment 16). 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 have had a widespread affect 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 different fishing communities.

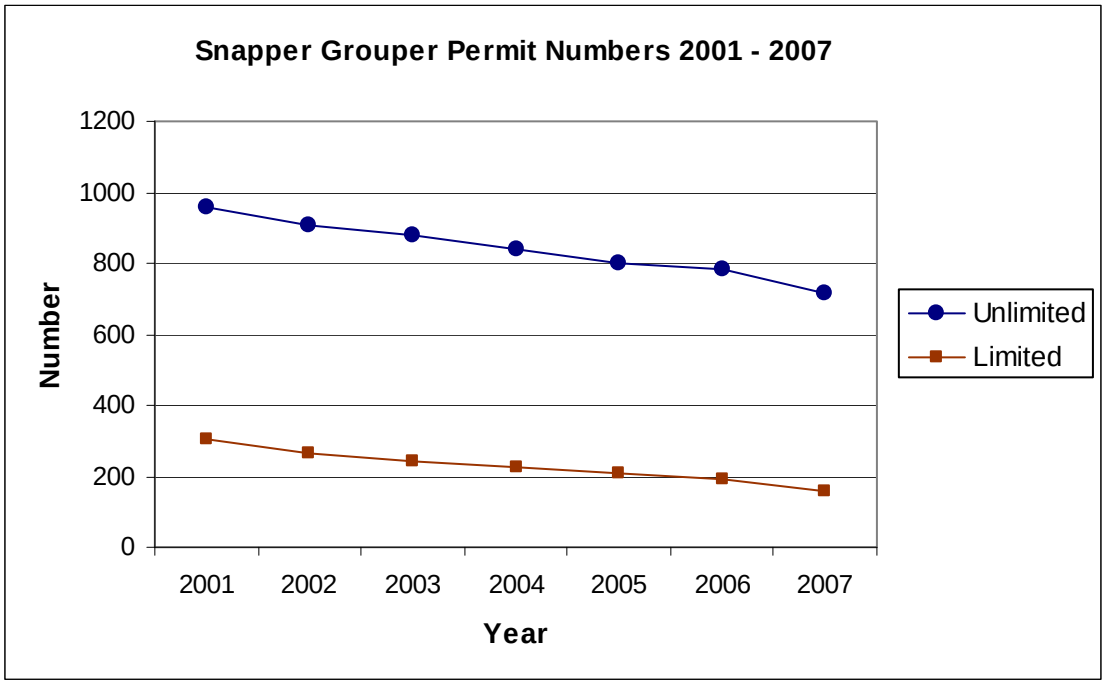


Figure 3-6. Number of Snapper-grouper Commercial Permits 2001-2007. (NMFS SERO Permits Database)

The recreational fishery has experienced permit requirements in the for-hire sector as vessels in the South Atlantic are required to have a snapper-grouper for-hire permit to fish for or possess snapper-grouper species in the EEZ. The number of permitted vessels for the period 2003-2007 is provided in Table 3-25.

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. As discussed earlier most of the increases were for strictly for-hire business, 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 a number also home-ported in North Carolina and South Carolina.

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 studies on the general identification of fishing communities have been undertaken in the past few years, little social or cultural investigation into the nature of the snapper-grouper fishery itself has occurred. A socioeconomic study by Waters *et al.* (1997) covered the general characteristics of the fishery in the South Atlantic, but those data are now over 10 years old and do not capture more recent important changes in the fishery. Cheuvront and Neal (2004) conducted survey work with the North Carolina commercial snapper-grouper fishery south of Cape Hatteras, but did not include ethnographic research on communities dependent upon fishing.

In order to discuss the fishing communities that are associated with the red snapper fishery, some measures to ensure confidentiality will need to be implemented as the number of vessels and dealers that are placed within a community can often be less than 3 or there may be one dealer who handles a significant amount of landings of red snapper. Therefore, this description will begin at the county level then follow with a description of the communities within in each county.

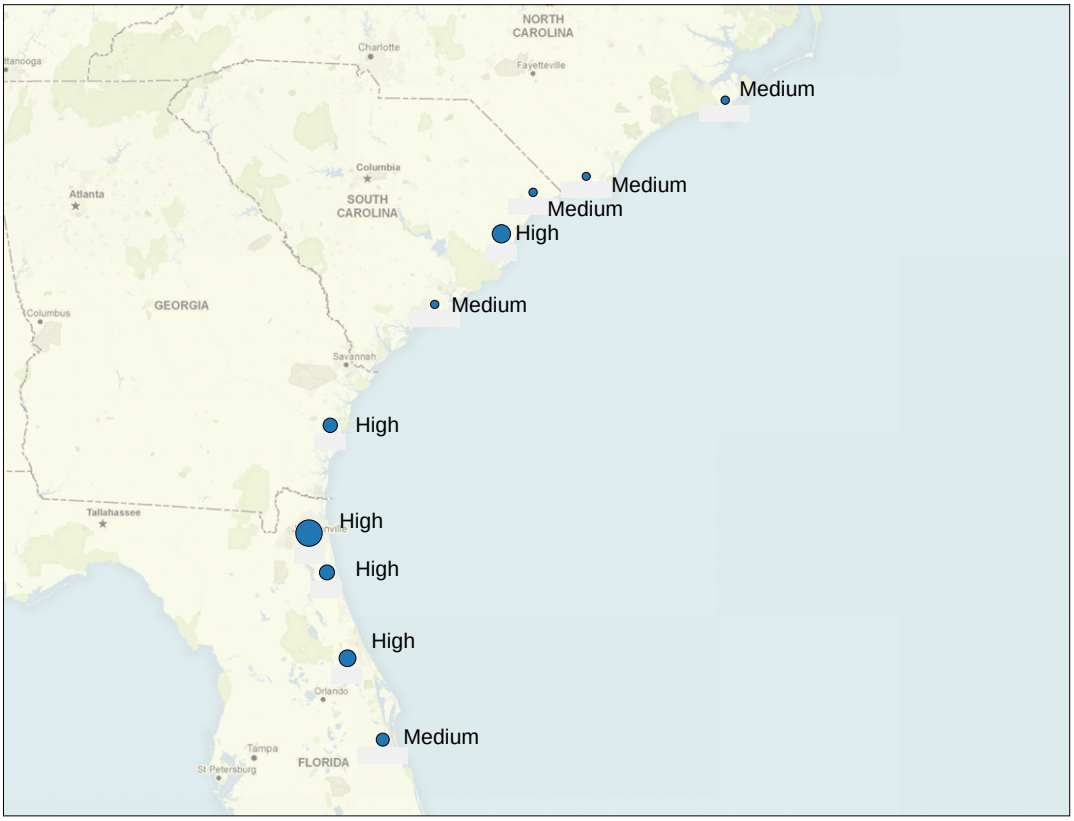


Figure 3-7. Counties with Red Snapper Landings Ranked High or Medium on Average from 2003-2007. (Source: NOAA Fisheries Service, Southeast Fisheries Science Center ACLS)

Based upon a range of landings, counties were categorized according to their average landings into three groups: Low, Medium and High. The range of landings cannot be provided as it may

violate confidentiality for some counties with very few dealers. Therefore, the discussion of communities affected by the interim rule will be narrowed to those communities within the counties classified with medium or high red snapper landings as these would be those most likely to see the largest impact (Figure 3-7).

The most recent study of fishing communities in the South Atlantic has been the community profiles assembled in Jepson et. al (2005). Updates for some communities appear in amendments to Council fishery management plans that have drawn on more recent research that focuses on a particular state or community. These original profiles and updates will be referenced in this discussion with some additional data added where available.

3.4.2.1 North Carolina

Commercial Fishing

There has been a steady decline in the number of federal commercial snapper-grouper permits in North Carolina since 1999, with 194 unlimited commercial permits in 1999 to only 139 in 2004 and approximately 123 by 2008. Limited commercial permits similarly declined from 36 to 16 in 2004 and have fallen to approximately 10 limited permits in 2008 (NMFS SERO Permit Database).

State license sale and use statistics for all types of licenses also indicate an overall decrease since 1994. While the overall number of state licenses to sell any species of fish or shellfish increased from 6,781 in 1994 to 9,712 in 2001/2002, the number of license holders actually reporting sales decreased from 6,710 in 1994/1995 to 5,509 in 2001/2002 (SAFMC 2006).

North Carolina fishermen demographics are detailed in Cheuvront and Neal (2004). Ninety eight percent of surveyed fishermen were white and 58 percent had completed some college or had graduated from college. Of those who chose to answer the question, 27 percent of respondents reported a household income of less than $30,000 per year, and 21 percent made at least $75,000 per year. On average, respondents had been fishing for 18 years, and had lived in their communities for 27 years.

Cheuvront and Neal (2004) also provided an overview of how North Carolina commercial snapper-grouper fishermen carry out their fishery. Approximately 65 percent of surveyed fishermen indicated year-round fishing. Gag is the fish most frequently targeted by these fishermen, with 61 percent of fishermen targeting gag at some point in the year, despite the prohibition of commercial sales and limit to the recreational bag limit in March and April. Vermilion snapper (36.3 percent) and black sea bass (46 percent) are the next most frequently targeted species. Red snapper was not a major targeted species with only 4.8 percent of fishermen targeting that species.

Recreational Fishing

Recreational fishing is popular along the North Carolina coast with data showing that North Carolina, until recently, has seen an increase in total recreational fishing participation that has equaled Florida's east coast (See SAFMC 2006). A brief discussion of public boat ramps and local recreational fishing clubs, as well as sources of information used by these anglers, can be found in SAFMC (2006). As of 2007, there were 315 snapper-grouper charter permits issued to North Carolina residents, which is an increase from 284 in 2006 (See Table 3-25). Although there has been an increase in participation and permits, red snapper remains a very small percentage of recreational harvest (see Table 3-17) and rarely is it targeted effort for North Carolina recreational fishermen (see Table 3-23).

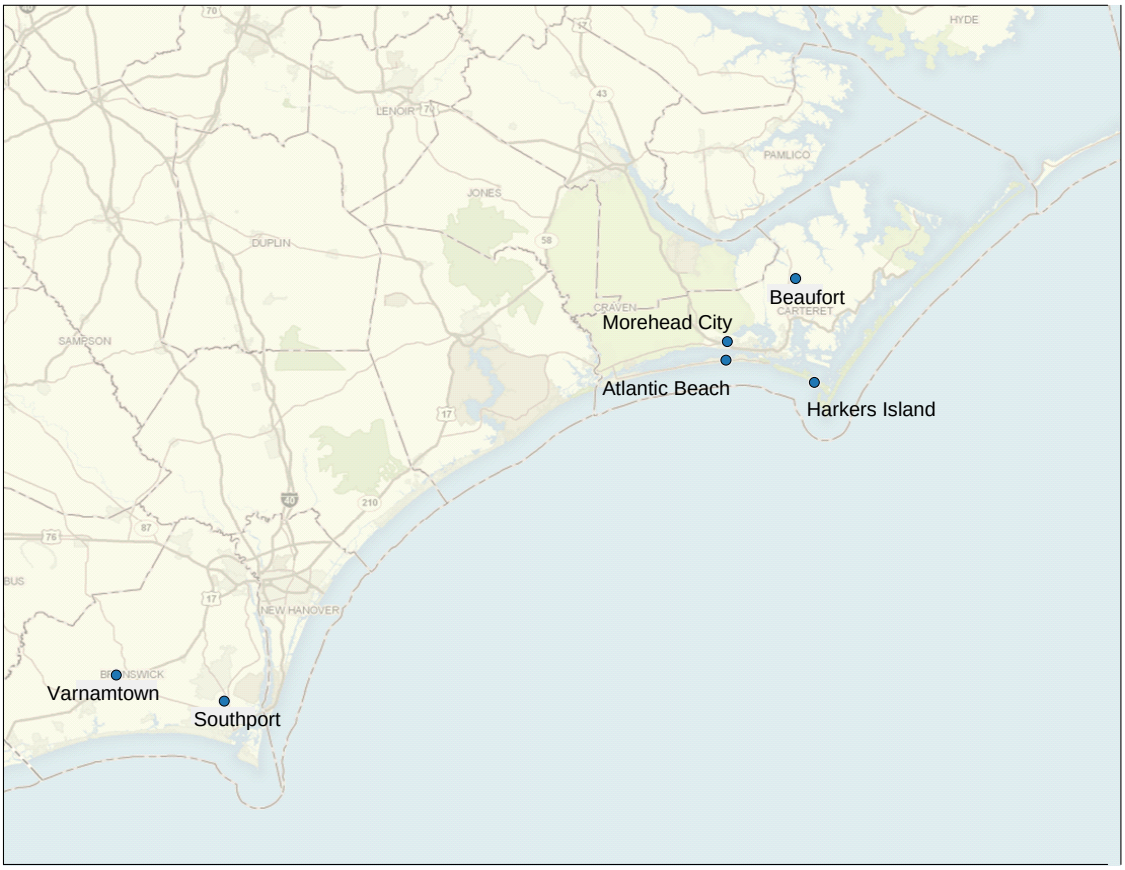


Figure 3-8. North Carolina communities in Counties with Medium to High Red Snapper Landings on Average 2003-2007. (Source: NOAA Fisheries Service, Southeast Fisheries Science Center ACLS)

3.4.2.1.1 Carteret County

Overview

Carteret County had a total population of 59,383 in 2000 that is estimated to have grown to almost 63,000 by 2007. The majority of residents were identified as white (90 percent) and was estimated to have remained there with a very small percentage (2.2 percent) of the population identified as Hispanic. Overall, North Carolina had an estimated 71 percent white population

and Hispanics made up 6.7 percent of its total population. The median age for residents of Carteret County was estimated to have been 43.9 which is slightly higher than in 2000 when it was 42.3. The median age for residents of North Carolina was 35.3 in 2000 and was estimated to have increased to 36.6 by 2007, so Carteret County has a slightly more aged population. An estimated 6.9 percent of the population in the civilian force was unemployed in Carteret County, which was equal to the State's unemployment rate. The percentage of families below the poverty level was estimated at 8.4 percent, which was below the 11 percent for the State as a whole during 2007. Carteret County had a slightly higher owner occupied housing rate than the state with slightly over 75 percent of owner occupied housing to the State's 68 percent estimated for 2007, both of which are slightly lower than in 2000 (U.S. Census Bureau).

Population density for Carteret County was 111 persons per square mile in 2000 which was double the 59 persons per square mile in 1970. It is still lower compared to the state's overall density which was an estimated at 186 persons per square mile in 2007, up slightly from 165 in 2000 (Source: NOAA Spatial Patterns of Socioeconomic Data 1970 to 2000 and the U.S. Census Bureau).

3.4.2.1.2 Communities

There are four communities that have been identified as potential fishing communities in Carteret County: Morehead City, Beaufort, Harker's Island and Atlantic Beach. Of the four communities, Atlantic Beach does not have a long history of commercial fishing and is more recreational in its orientation as are many beachfront communities with histories of tourism. Beaufort was once the site of a menhaden processing plant and homeport for a menhaden fleet. Morehead City and Harker's Island both have residents who have worked in commercial fishing for much of their lives and fishing for snapper-grouper continues to be a primary fishery for the residents of all the communities (McCay et al 2000). There were 33 snapper-grouper dealers in the county in 2003, down to 28 in 2007 and of those only 10 had red snapper landings. Many former commercial dominated fishing communities are seeing a transition toward a more recreational tourism dependent economy. Morehead City, Beaufort and Harker's Island are no exception in that they have seen increases in the number of charter boats along their waterfronts, although most recently there may have been a decline in the number of charter operators. At this same time there has been a decline in the number of commercial vessels and associated fishing infrastructure. This transition is noticeable in the census demographics for Carteret County as it has a slightly older population than the state overall and has a much smaller minority population. The county has a lower poverty rate and a higher owner occupation housing rate than the state. These are all signs of potential gentrification that may be occurring along the coast which may accompany the transition to a more non-water dependent economy that tends to displace both recreational and commercial working waterfronts and their associated businesses (North Carolina Sea Grant 2007). According to a report by Garrity-Blake & Nash (no date) there were between 6-7 fish houses that have closed recently in Carteret County.

3.4.2.1.3 Brunswick County

Overview

Brunswick County had a total population of 73,143 in 2000 that is estimated to have grown to almost 93,887 by 2007. The majority of residents were identified as white (82 percent) in 2000 and that statistic was slightly higher in 2007 (86 percent). In 2000, there was a small percentage (1.7 percent) of the population identified as Hispanic which had grown to 3.6 percent by 2007. Overall, North Carolina had an estimated 71 percent white population and Hispanics made up 6.7 percent of its total population. The median age for residents of Brunswick County was estimated to have been 42.2, just slightly higher than 41.0 in 2000. The median age for residents of North Carolina was 35.3 in 2000 and was estimated to have increased to 36.6 by 2007 so Brunswick County has a slightly more aged population. There was an estimated 7.0 percent of the population in the civilian force that was unemployed in Brunswick County, which was equal to the State's unemployment rate. The percentage of families below the poverty level was estimated at 8.4 percent which was below the 11 percent for the State as a whole during 2007. Brunswick County had a slightly higher owner occupied housing rate than the state with slightly over 75 percent of owner occupied housing to the State's 68 percent estimated for 2007, both of which are slightly lower than their respective occupancy rates in 2000 (U.S. Census Bureau).

Population density for the county was low with 28 persons per square mile in 1970. It had more than doubled to 84 persons per square mile by the year 2000. It is still relatively low compared to the state's overall density, which was an estimated at 186 persons per square mile in 2007, up slightly from 165 in 2000 (NOAA Spatial Patterns of Socioeconomic Data 1970 to 2000 and the U.S. Census Bureau).

Communities

The communities of Southport and Varnamtown were profiled in Jepson et al. (2005) as potential fishing communities. Both are considered rural in character and the county as a whole has a low population density; however, population growth is having its impact (Blount 2006). Southport and Varnamtown residents have historically had an association with commercial fishing but many are now taking part-time jobs and there may be fewer residents who fish full-time as described in Jepson et al. (2005) and Blount (2006). There are some charter operations within these communities; Southport has a number of snapper-grouper unlimited and charter/headboat permits. In 2007, the county had 20 snapper-grouper dealers and only 5 of those had red snapper landings (SEFSC ACLS). There were approximately nine fish houses in the county at one time, that number has declined with the recent closing of two fish houses, one in Varnamtown and the other in Shallotte (Garrity-Blake & Nash, nd). With its rural character and low population Brunswick County does not seem to be experiencing the same rate of gentrification as Carteret County; however, the demographic character of the county makes it a likely candidate as population pressure along the coast increases and according to Blount (2006) the process may well be underway.

3.4.2.2 South Carolina

Commercial Fishing

While pockets of commercial fishing activities remain in the state, many are being displaced by the development forces and associated changes in demographics described elsewhere. The number of unlimited commercial permits increased from 74 in 1999 to 87 in 2004 and then down to 61 in 2008. The number of limited commercial permits decreased by 75 percent from 12 to 4 in 2004 they dropped to 3 in 2008 (SAFMC 2006 & NMFS Permit Database).

Recreational Fishing

Many areas that used to be dedicated to commercial fishing endeavors are now geared towards the private recreational angler and for-hire sector. The number of federal charter/headboat permits held by South Carolina residents increased from 41 in 1999 to 111 in 2004 and to 129 in 2007. The majority of saltwater anglers fish for coastal pelagic species such as king mackerel, Spanish mackerel, tunas, dolphins, and billfish. A lesser number focus primarily on bottom fish such as snapper and groupers and often these species are the specialty of the headboats that run out of Little River, Murrells Inlet, and Charleston. There are 35 coastal marinas in the state and 34 sportfishing tournaments (SAFMC 2006).

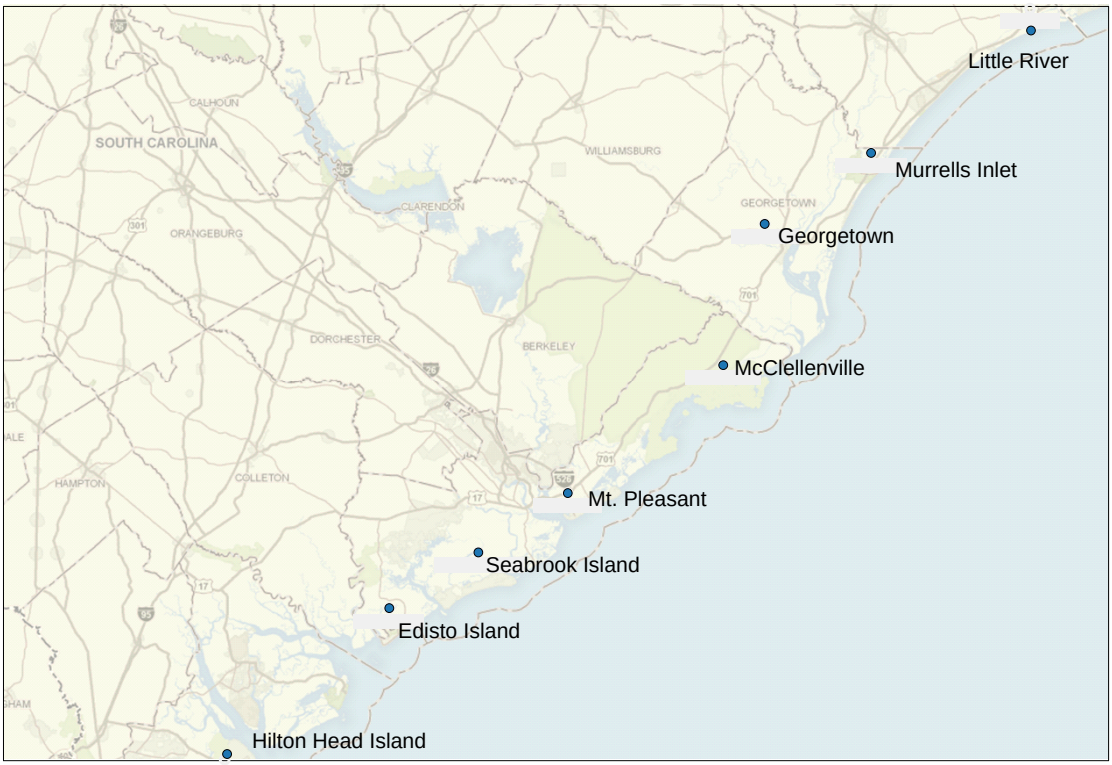


Figure 3-9. South Carolina Communities in Counties with Medium to High Red Snapper Landings on Average. (Source: NOAA Fisheries Service, Southeast Fisheries Science Center ACLS)

3.4.2.2.1 Charleston County

Overview

Charleston County had a total population of 309,969 in 2000 that is estimated to have grown to almost 340,326 by 2007. The majority of residents were identified as white (65 percent) and was estimated to be to have remained there with a very small percentage (3.4 percent) of the population identified as Hispanic. Overall, South Carolina had an estimated 68 percent population and Hispanics made up 3.6 percent of its total population. The median age for residents of Charleston County was estimated to have been 36.2, which is slightly higher than in 2000 when it was 34.5. The median age for resident of South Carolina was 35.4 in 2000 and was estimated to have increased to 37.0 by 2007 so Charleston County's median age is comparable to the state as a whole. There was an estimated 5.6 percent of the population in the civilian force that was estimated to be unemployed in Charleston County, which was well below to the State's unemployment rate of 7.4 percent. The percentage of families below the poverty level was estimated at 11.1 percent which was just below the 11.8 percent for the State as a whole during 2007. Charleston County had a slightly lower owner occupied housing rate than the state with slightly over 62 percent of owner occupied housing to the State's 70 percent estimated for 2007 (U.S. Census Bureau). Population density for the county has remained high with 259 persons per square mile in 1970 to just over 324 persons per square mile in 2000. South Carolina has an estimated overall population density of 146 persons per square mile in 2007, up slightly from 133 in 2000 (NOAA Spatial Patterns of Socioeconomic Data 1970 to 2000 and the U.S. Census Bureau).

Communities

There were five communities that have been identified as potential fishing communities in Charleston County (Jepson et al. 2005): Edisto Beach, Seabrook Island, Mt. Pleasant, Isle of Palms and McClellanville. The three communities on barrier islands, Edisto Beach, Seabrook and Isle of Palms all have very little commercial activity and few charter headboat permits associated with any community. Recreational tourism and non-water dependent activity may be a large part of the economy for these beach communities, although recreational fishing is also part of the mix. McClellanville and Mt. Pleasant have long histories associated with the commercial fishing industry, especially with the shrimp fishery. Charleston County had 6 snapper-grouper dealers permitted in 2007 and all six reported landings of red snapper (SEFSC ACLS). This county is one of the more urban counties in South Carolina with a rather high population density compared to the state. Loss of waterfront property to coastal development has affected the community of Mt. Pleasant, especially the Shem Creek area, with several former fish houses closing, being replaced by condominium and other types of non-fishery related development.

3.4.2.2.2 Georgetown County

Overview

Georgetown County had a total population of 55,797 in 2000 that is estimated to have grown to almost 60,013 by 2007. The majority of residents were identified a white (60 percent) and was estimated to have increased to 64 percent by 2007. The largest minority population was African American which decreased from 38.8 percent in 2000 to 34 percent by 2007. The county had a very small percentage (1.9 percent) of the population identified as Hispanic in 2000 which was

too small to estimate in 2007. Overall, South Carolina had an estimated 68 percent white population and Hispanics made up 3.6 percent of its total population. The median age for residents of Georgetown County was estimated to have been 40.3, which is slightly higher than in 2000 when it was 39.1. The median age for residents of South Carolina was 35.4 in 2000 and was estimated to have increased to 37.0 by 2007, so Georgetown County's median age is slightly older than the state as a whole. There was an estimated 5.7 percent of the population in the civilian force that was unemployed in Georgetown County, which was below the State's unemployment rate of 7.4 percent, but higher than the 3.6 percent found in the County in 2000. The percentage of families below the poverty level was estimated at 13.6 percent which was higher than the 11.8 percent for the state during 2007. Georgetown County had a slightly lower owner occupied housing rate with 68 percent of owner occupied housing compared to the State's 70 percent estimated for 2007 (U.S. Census Bureau).

Population density for the county has remained low with 40 persons per square mile in 1970 to just over 66 persons per square mile in 2000. South Carolina has an estimated overall population density of 146 persons per square mile in 2007, up slightly from 133 in 2000 (NOAA Spatial Patterns of Socioeconomic Data 1970 to 2000 and the U.S. Census Bureau).

Communities

There were two communities identified as potential fishing communities in Georgetown County: Georgetown and Murrell's Inlet (Jepson et al. 2005). Georgetown has always had an association with the commercial fishery, but primarily the shrimp fishery, although the number of shrimp vessels homeporting in Georgetown may be fewer than in the past. Murrell's Inlet has historically been associated with the snapper-grouper fishery with more fish houses and a number of vertical line vessels that homeport there. There were seven snapper-grouper dealers in the county in 2007. Overall landings of red snapper in the county were 15,075 pounds on average over the period from 2003-2007. Murrell's Inlet is likely experiencing impacts from the tourism growth machine just south in Myrtle Beach as the counties population density has grown rapidly over the past two decades.

3.4.2.2.3 Horry County

Overview

Horry County had a total population of 196,629 in 2000 that is estimated to have grown to almost 239,419 by 2007. The majority of residents were identified as white (81 percent) and were estimated to be to have remained there with a very small percentage (3.4 percent) of the population identified as Hispanic. Overall, South Carolina had an estimated 68 percent white population and Hispanics made up 3.6 percent of its total population. The median age for residents of Horry County was estimated to have been 39 which is slightly higher than in 2000 when it was 38. The median age for residents of South Carolina was 35.4 in 2000 and was estimated to have increased to 37.0 by 2007 so Horry County's median age is slightly higher than the State as a whole. There was an estimated 5.5 percent of the population in the civilian force that was estimated to be unemployed in Horry County, which was below to the State's unemployment rate of 7.4 percent but higher than the 2.9 percent in 2000 for the county. The percentage of families below the poverty level was estimated at 11.8 percent which was the same

as the state as a whole during 2007. Those levels are higher than in 2000 when Horry County had 8.4 percent of families below the poverty level while the state overall was at 10.4 percent. Horry County had a slightly lower owner occupied housing rate than the state with slightly over 66 percent of owner occupied housing to the state's 70 percent estimated for 2007 (U.S. Census Bureau).

Population density for the county has more than doubled from 61 persons per square mile in 1970 to just over 172 persons per square mile in 2000. South Carolina has an estimated overall population density of 146 persons per square mile in 2007, up slightly from 133 in 2000 (NOAA Spatial Patterns of Socioeconomic Data 1970 to 2000 and the U.S. Census Bureau).

Communities

There is one community that has been identified as potential fishing communities in Horry County and that is Little River. Overall landings of red snapper in the county were 3,050 pounds on average over the period from 2003-2007. The overall landings of snapper-grouper species for the county were on average 588,000 pounds overall. The number of snapper-grouper unlimited harvest commercial permits held by community residents remained about the same between 1999 and 2004, from 15 permits to 16 permits, and one resident still held a limited harvest commercial license. As observed elsewhere, the number of charter/headboat permits held by community residents increased from 9 in 1999 to 16 in 2004. Three headboats operated out of Little River and this part of the for-hire industry has a long and storied past in the community. Recreational fishing, primarily through headboat effort, came about as a way for commercial fishermen to continue fishing in the summer months. A detailed account of how recreational fishing developed in Little River can be found in Burrell (2000). Most of the private recreational fishing effort in this area occurs out of marinas in North Myrtle Beach, Myrtle Beach, and Murrells Inlet (SAFMC 2006).

3.4.2.3 Georgia

Commercial Fishing

Unlike the pattern observed in many other areas, the number of unlimited commercial permits and limited commercial permits held by Georgia residents did not decrease from 1999 to 2007, with 8 permits and 1 permit, respectively. In 2002, 947 vessels were registered with the state as commercial fishing vessels, 612 full-time state commercial fishing licenses were held by Georgia residents, and 147 residents held part-time state commercial fishing licenses (SAFMC 2006).

Recreational Fishing

As observed in other areas, the number of charter/headboat permits held by Georgia residents increased markedly from five permits in 1999 to 28 in 2008. Recreational vessels are located at Tybee Island close to Savannah, on the barrier islands off Brunswick, and between Savannah and Brunswick.

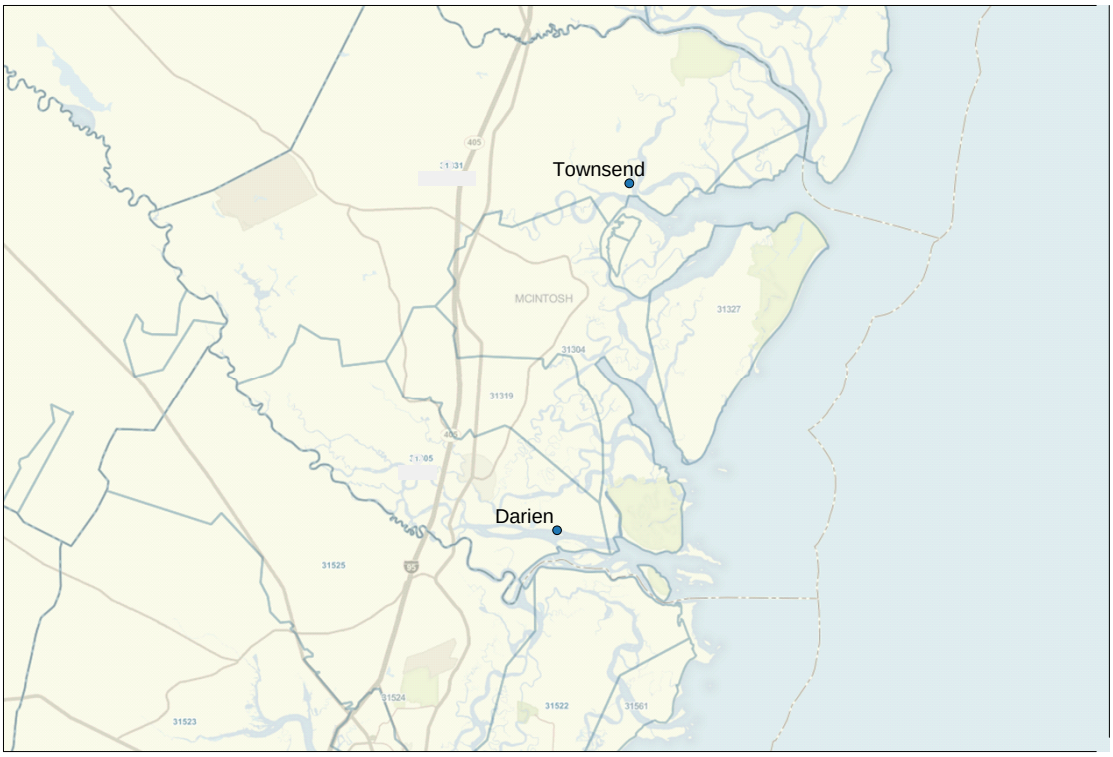


Figure 3-10. Communities in Georgia Counties with Medium to High Red Snapper Landings on Average 2003-2007. (Source: NOAA Fisheries Service, Southeast Fisheries Science Center ACLS)

3.4.2.3.1 McIntosh County

Overview

McIntosh County had a total population of 10,847 in 2000. The majority of residents were identified as white (61 percent) with the largest minority population being African Americans at 37 percent in 2000. The county had a very small percentage (0.9 percent) of the population identified as Hispanic in 2000. Georgia as a state had an estimated 66 percent white population and Hispanics made up 5.3 percent of its total population. The median age for residents of McIntosh County was estimated to have been 37, which is slightly higher than the median age for residents of South Carolina which was 35.4 in 2000. There was an estimated 3.3 percent of the population in the civilian force that was estimated to be unemployed in McIntosh County, which was just slightly below to the State's unemployment rate of 3.6 percent in 2000. The percentage of families below the poverty level was 15.7 percent which was higher than the 9.9 percent for the State as a whole in 2000. McIntosh County had a higher owner occupied housing rate than the state with an 83.6 percent of owner occupied housing to the state's 67.5 percent in 2000 (U.S. Census Bureau)[4].

Population density for the county has remained low with 17 persons per square mile in 1970 to just over 25 persons per square mile in 2000. South Carolina has an estimated overall population

[4] Estimates for 2005-2007 were not available for McIntosh County. Only geographic areas with population of 65,000 or more.

density of 165 persons per square mile in 2007, up slightly from 141 in 2000 (NOAA Spatial Patterns of Socioeconomic Data 1970 to 2000 and the U.S. Census Bureau).

Communities

While there are two communities in McIntosh County that have been profiled as potential fishing communities, Darien and Townsend (Jepson et al. 2005; SAFMC 2006), only one community (Townsend) lands a substantial amount of the snapper-grouper species. Other parts of the state involved in the commercial harvest of seafood are focused on penaeid shrimp, blue crabs, and other finfish such as flounder, shad, croaker, and mullet. Townsend is a small, rural community. In 2005, the fish house in this community was relocating inland. It is not known if this relocation was successful and whether that fish house will be handling domestically harvested fish in the future. For nearly a decade, only one fish house has consistently handled snapper-grouper species (SAFMC 2006).

Offshore recreational anglers do not often target or harvest snapper-grouper species in Georgia and targeted red snapper trips are rare. However, Blount (2006) points out, recreational fishing is important to the county residents as a form of relaxation and inexpensive entertainment. He goes on to describe changes that are beginning to occur in the county that signal the potential beginnings of gentrification that have appeared on the waterfronts as upscale waterfront homes for retirees are beginning to appear along with other new developments in areas where fish houses once were (Blount 2006).

3.4.2.4 Florida

Overview

Florida stands apart from other states in the South Atlantic region in fishing behaviors, history, and demographics. Florida has one of the fastest growing populations in the United States, estimated to increase each day by 750 to 1,000 new immigrants. Twenty-five percent of all vacation homes in the United States are located in Florida's coastal counties (Coastal Ocean Resource Economics 2005).

Along with being heavily populated on land, coastal waters off Florida are also heavily used by recreational users of all kinds.

The natural geography of Florida also sets it apart from other South Atlantic states, particularly in the area from central Florida through the Keys. The weather is amenable to fishing almost year round, though hurricanes in 2004 were particularly devastating and took a toll on all fisheries in the state, both east and west coast. The continental shelf is much narrower in Florida than elsewhere in the region, allowing fishermen to access deep waters quickly and return the same day. Finally, the species of snapper-grouper available to fishermen in southern Florida are different than further north, with yellowtail snapper, gag and black grouper, and other alternative species such as stone crab, spiny lobster, dolphin, king mackerel, and billfish allow a greater variety of both commercial and recreational fishing opportunities.

Commercial Sector

Considering the high population growth rates and emphasis on a tourism economy in Florida, the commercial fishing sector in Florida is still robust in some areas. Although total landings and dollar values of all species landed on the Florida East coast have decreased from 1998 to 2003 (from nearly 30 million pounds worth approximately $44 million to approximately 23 million pounds worth $33 million dollars; SAFMC 2006), there is still a considerable commercial fishing presence in east Florida.

Recreational Sector

While the commercial fishing industry, though still strong, may be in decline, the recreational sector appears to be stable or growing. The number of snapper-grouper for-hire permits has grown from 957 in 2003 to 1140 in 2007.

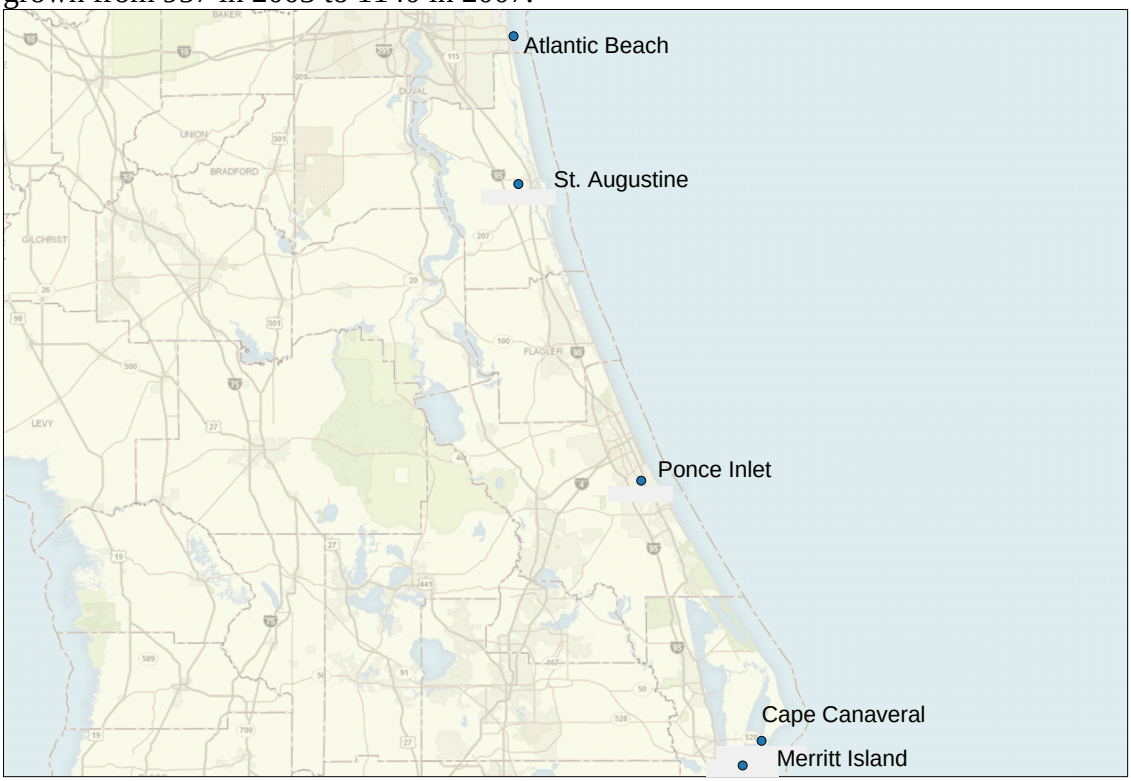


Figure 3-11. Communities in Florida Counties with Medium to High Red Snapper Landings on Average from 2003-2007. (Source: NOAA Fisheries Service, Southeast Fisheries Science Center ACLS)

3.4.2.4.1 Duval County

Overview

Duval County had a total population of 778,879 in 2000 that is estimated to have grown to 841,077 by 2007. The majority of residents was identified white (67.3 percent) and was estimated to have decreased to 64.8 percent by 2007. The largest minority population was African American which increased from 28.8 percent in 2000 to 30 percent by 2007. The county had a small percentage (4.1 percent) of the population identified as Hispanic in 2000 which increased to 5.8 percent in 2007. Overall, Florida had an estimated 77.8 percent white population and Hispanics made up 20 percent of its total population. The median age for residents of Duval County was estimated to have been 35.9 which is slightly higher than in 2000 when it was 34.1. The median age for residents of Florida was 38.7 in 2000 and was estimated to have increased to 39.1 by 2007 so Duval County's median age is slightly younger than the State as a whole. There was an estimated 6.3 percent of the population in the civilian force that was estimated to be unemployed in Duval County, which was slightly higher than the State's unemployment rate of 6 percent. It is also higher than the 5 percent found in the County in 2000 which was lower than the state's unemployment rate 5.6 percent at the time. The percentage of families below the poverty level was estimated at 9.3 percent which was almost equal to the 9 percent for the State as a whole during 2007. Duval County had a slightly lower owner occupied housing rate than the state with slightly over 64.4 percent of owner occupied housing to the State's 70.3 percent estimated for 2007 (U.S. Census Bureau).

Population density for the county has remained high with 672 persons per square mile in 1970 to just over 989 persons per square mile in 2000. Florida has an estimated overall population density of 338 persons per square mile in 2007; up slightly from 296 in 2000 (NOAA Spatial Patterns of Socioeconomic Data 1970 to 2000 and the U.S. Census Bureau).

Communities

Atlantic Beach was the only community in Duval County profiled in Jepson et al. (2005) and there has been relatively little description of the fishing infrastructure since then. Duval County had the highest overall average red snapper landings during the 2003-2007 time period with 10 snapper-grouper dealers in 2007. There are snapper-grouper unlimited and limited permitted vessels located in the community. Many of the snapper-grouper fishermen in this area utilize dive gear rather than vertical line gear (GSAFFI 2008). The County is highly urbanized along the coast and it is unknown whether there is a concentration of fishing infrastructure that caters to the snapper-grouper fishery. This area was also where a large portion of recreational targeted trips were estimated to have originated. The community of Atlantic Beach also has several federal charter snapper-grouper permits located in the community.

3.4.2.4.2 St. Johns County

St. Johns County had a total population of 123,135 in 2000 that is estimated to have grown to 168,125 by 2007. The majority of residents was identified white (91 percent) and was estimated to have decreased to 64.8 percent by 2007. The largest minority population was African American which increased from 28.8 percent in 2000 to 30 percent by 2007. The county had a

small percentage (4.1 percent) of the population identified as Hispanic in 2000 which increased to 5.8 percent in 2007. Overall, Florida had an estimated 77.8 percent white population and Hispanics made up 20 percent of its total population. The median age for residents of St. Johns County was estimated to have been 41, which is slightly higher than in 2000 when it was 40.6. The median age for residents of Florida was 38.7 in 2000 and was estimated to have increased to 39.8 by 2007 so St. Johns County's median age is slightly older than the state as a whole. There was an estimated 4.1 percent of the population in the civilian force that was estimated to be unemployed in St. Johns County, which was lower than the state's unemployment rate of 6.0 percent. The 2007 unemployment is only slightly higher than the 3.3 percent found in the County in 2000 which was still lower than the state's unemployment rate which was 5.6 percent. The percentage of families below the poverty level was estimated at 5.1 percent which was well below the 9 percent for the State as a whole during 2007. St. Johns County had a slightly lower owner occupied housing rate than the state with slightly over 64.4 percent of owner occupied housing to the state's 70.3 percent estimated for 2007 (U.S. Census Bureau).

Population density for the county has climbed from 50 persons per square mile in 1970 to just over 200 persons per square mile in 2000. Florida has an estimated overall population density of 338 persons per square mile in 2007; up slightly from 296 in 2000 (NOAA Spatial Patterns of Socioeconomic Data 1970 to 2000 and the U.S. Census Bureau).

Communities

St. John's County had one community, St. Augustine, profiled as a potential fishing community in Jepson et al. 2005. The community has a long history associated with the shrimp fishery as described in that profile. The community has a number of vessels with snapper-grouper unlimited and limited permits and charter fishing is also important as there are over 15 federally permitted charter boats located in the community. There were 2 dealers with snapper-grouper federal permits in the county in 2007. St. John's County was one of the top 5 counties in terms of red snapper landings averaged over the 2003-2005 time period.

3.4.2.4.3 Volusia County

Volusia County had a total population of 443,343 in 2000 that is estimated to have grown to 494,198 by 2007. The majority of residents was white (87 percent) and was estimated to have decreased to 85.7 percent by 2007. The largest minority population was African American which increased from 9.7 percent in 2000 to 11 percent by 2007. The county had a small percentage (4.1 percent) of the population identified as Hispanic in 2000 which increased to 5.8 percent in 2007. Overall, Florida had an estimated 77.8 percent white population and Hispanics made up 9.7 percent of its total population. The median age for residents of Volusia County was estimated to have been 42.5, which is virtually the same as it was in 2000 when it was 42.4. The median age for residents of Florida was 38.7 in 2000 and was estimated to have increased to 39.8 by 2007 so Volusia County's median age is slightly older than the State as a whole. There was 5.6 percent of the population in the civilian force that was estimated to be unemployed in Volusia County, which was slightly lower than the State's unemployment rate of 6.0 percent. The 2007 unemployment is only slightly lower than the 6.3 percent found in the County in 2000 which was just slightly higher than the state's unemployment rate which was 5.6 percent at the

time. The percentage of families below the poverty level was estimated at 7.9 percent which was below the 9 percent for the state as a whole during 2007. Volusia County had a slightly higher owner occupied housing rate than the state with slightly over 75 percent of owner occupied housing to the state's 70.3 percent estimated for 2007 (U.S. Census Bureau).

Population density for the county has grown significantly with 154 persons per square mile in 1970 to just over 404 persons per square mile in 2000. Florida has an estimated overall population density of 338 persons per square mile in 2007; up slightly from 296 in 2000 (NOAA Spatial Patterns of Socioeconomic Data 1970 to 2000 and the U.S. Census Bureau).

Communities

Ponce Inlet was profiled in Jepson et al. (2005) as a potential fishing community in Volusia County which highlighted the importance of recreational fishing to the community. The community has several snapper-grouper for-hire permits located within. There were 14 unlimited snapper-grouper permits in Volusia County during 2007 a small portion of which were located in Ponce Inlet.

3.4.2.4.4 Brevard County

Brevard County had a total population of 476,230 in 2000 that is estimated to have grown to 531,642 by 2007. The majority of residents was white (88 percent) in 2000 and was estimated to have decreased to 86 percent by 2007. The largest minority population was African American which increased from 9 percent in 2000 to 10 percent by 2007. The county had a small percentage (4.6 percent) of the population identified as Hispanic in 2000 which increased to 6.5 percent in 2007. Overall, Florida had an estimated 77.8 percent white population and Hispanics made up 9.7 percent of its total population. The median age for residents of Brevard County was estimated to have been 43.2, which is slightly higher than it was in 2000 when it was 41.4. The median age for residents of Florida was 38.7 in 2000 and was estimated to have increased to 39.8 by 2007 so Brevard County's median age is slightly older than the state as a whole. There was an estimated 5.4 percent of the population in the civilian force that was estimated to be unemployed in Brevard County, which was lower than the State's unemployment rate of 5.6 percent. The 2007 unemployment is only slightly higher than the 4.9 percent found in the county in 2000 which was lower than the State's unemployment rate which was 5.6 percent at the time. The percentage of families below the poverty level was estimated at 7.9 percent which was below the 9 percent for the State as a whole during 2007. Brevard County had a slightly higher owner occupied housing rate than the state with slightly over 75 percent of owner occupied housing to the State's 70.3 percent estimated for 2007 (U.S. Census Bureau).

Population density for the county has remained relatively high with 219 persons per square mile in 1970 to just over 454 persons per square mile in 2000. Florida has an estimated overall population density of 338 persons per square mile in 2007; up slightly from 296 in 2000 (NOAA Spatial Patterns of Socioeconomic Data 1970 to 2000 and the U.S. Census Bureau).

Communities

Cape Canaveral draws fishermen from Cocoa/Cocoa Beach, Merritt Island, Melbourne, and Titusville. These fishermen target many snapper-grouper species, as well as coastal migratory pelagics such as mackerel, highly migratory species such as sharks and swordfish, and shellfish such as oysters, quahogs, and shrimp. The number of unlimited commercial permits in the County increased from nine in 1999 to 16 in 2004 and grew slightly to 19 in 2008. The number of limited commercial permits fluctuated over this period, but ultimately averaged around 4-5 permits between 1999-2008.

According to a recent amendment, Brevard County supported numerous bait and tackle stores, with five in Cape Canaveral, and 70 marinas with over 3,000 wet slips, indicating the importance of recreational fishing to the area. Fourteen fishing tournaments consistently occur in the area (SAFMC 2006). As in other coastal areas of Florida, there are a number of charter boats, private marinas, and other associated businesses catering to the recreational fishing sector. The number of federally permitted charter/headboat vessels in Cape Canaveral increased from zero to seven from 1999 to 2004. Current estimates from permit files show at least 11 for-hire vessels with snapper-grouper permits homeported in Cape Canaveral (SERO Permit Files).

4 ENVIRONMENTAL CONSEQUENCES

4.1 Alternatives Considered

Alternatives considered in detail include management measures that address the purpose and need of the proposed interim federal action which is an immediate reduction in red snapper harvest in the South Atlantic region for a portion of the 2009 calendar year.

Alternative 1: No action
Implement no changes to current regulations for the harvest of red snapper.

Preferred Alternative 2: No harvest of red snapper in the EEZ off of Florida, Georgia, North Carolina and South Carolina.
Implement interim regulations that would establish a closure of the red snapper fishery for 180 days that applies to both the commercial and recreational sectors; during which no harvest, possession, and/or sale of red snapper would be allowed.

Alternative 3: Four month seasonal closure
Implement interim regulations that would establish a four month closure of the red snapper fishery that applies to both commercial and recreational sectors; during which no harvest, possession, and/or sale of red snapper would be allowed.

For a person on board a vessel for which a federal commercial or charter/headboat permit for the South Atlantic snapper-grouper fishery has been issued, provisions proposed in **Alternatives 2 and 3** would apply regardless of whether the fish are harvested in state or federal waters.

4.1.1 Biological Effects

To determine the environmental effects of **Alternative 1,** no action management alternative, on red snapper, one must first examine current trends in harvest levels, stock biomass levels, and life history characteristics, then predict the direction of future trends under status quo management. The bulk of landings of red snapper come from the recreational fishery, which have exceeded the landings of the commercial fishery by 2-3 times in recent years. Total landings were variable, with a downward trend through the 1990s. The recent SEDAR assessment determined the red snapper stock in the South Atlantic is undergoing overfishing and is overfished (SEDAR 15 2008). The Council is considering two proxies for F_{MSY} in Amendment 17, $F_{30\%SPR}$ and $F_{40\%SPR}$. The ratio of F to the respective proxies for F_{MSY} suggests a generally increasing trend in fishing mortality from the 1950s through the mid-1980s. This indicates that overfishing has been occurring since the early 1970s, with the 2006 estimate of $F/F_{30\%SPR} = 5.39$ and $F/F_{40\%SPR}$ at 7.67 (March 19, 2009 Projection; SEDAR 15 2008). Therefore, regardless of the proxy for F_{MSY} adopted by the Council in Amendment 17, the red snapper stock is experiencing overfishing.

Recruitment, as measured by the number of fish, has declined from the early years (1950s-early 1970s) to a low in the mid-1990s (Figure 4-1). There have been several moderately good year classes in 1998, 1999, and 2000 and then another decline through 2003 with a slight increase through 2007. These moderately good year classes (1998-2000) have grown and entered the fishery over the last couple of years and are likely responsible for the higher catches being reported by recreational and commercial fishermen. However, if these fish are caught and killed, then the age/size composition and biomass will not continue to improve over time.

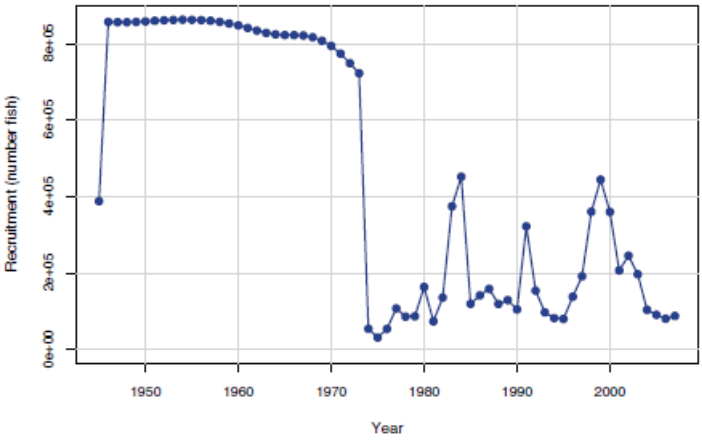


Figure 4-1. Estimated recruitment of age-1 red snapper.
Source: Red Snapper: Estimation of biomass benchmarks and projections, November 2008, Figure 6.2.

McInerny (2007) reports a maximum age of 54 years for red snapper in the South Atlantic. Natural mortality is estimated to be 0.078 using the Hoenig (1983) method with a maximum age of 53 years (SEDAR 15 2008). Because red snapper are very long-lived and have low natural mortality rates, they are very vulnerable to overfishing. The average age of the population is currently fairly stable between 5 and 8 years old with an increase recently. Moderately good recruitment in 1998-2000 appears to be responsible for the recent increase in the mean age and increases in catches. As shown in Figure 4-2, most red snapper are age 10 or younger. This is based on ages from over 7,000 fish. Since red snapper live for at least 54 years, heavy fishing pressure is likely responsible for the truncation in the age structure. SEDAR 15 (2008) indicates most of the older fish were removed in the 1950s and 1960s and the population has not recovered.

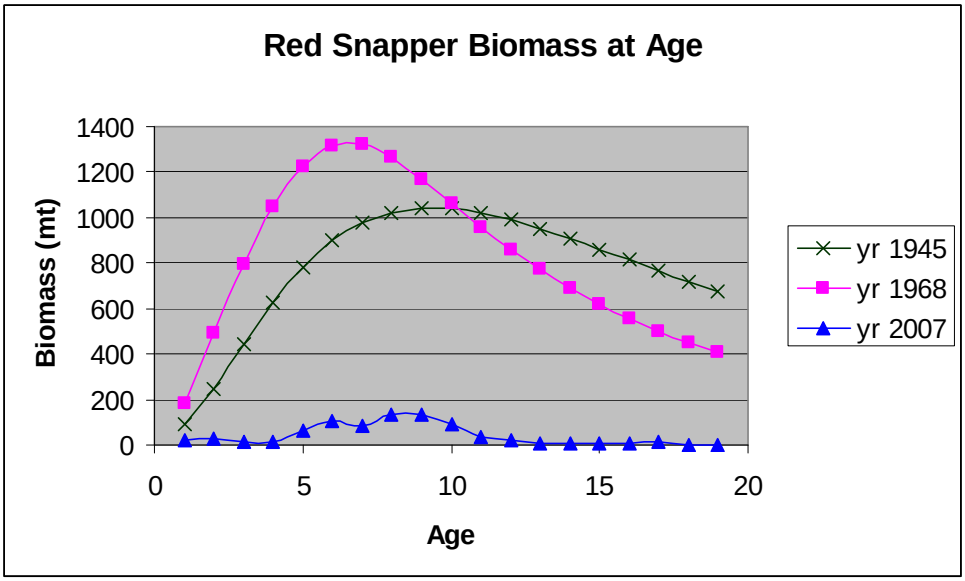


Figure 4-2. Age structure of the red snapper population.
Source: Table 5.2 Red Snapper: Estimation of biomass benchmarks and projections, November 2008.

Examination of Table 5.9 from the November 2008 estimation of biomass benchmarks and projections indicates the mean age of the South Atlantic red snapper population has been less than 10 years since the 1980s. A plot of mean age data since 1966 from Table 5.9 in the November 2008 update on red snapper biomass benchmarks and projections shows a decline in mean age to 6 years in 2000 (Figure 4-3). Mean age increased to almost 8 years of age in 1997 and 2005 following good recruitment in 1988 and 1998-2001. In addition, the biomass of red snapper has changed dramatically over time (Figure 4-3).

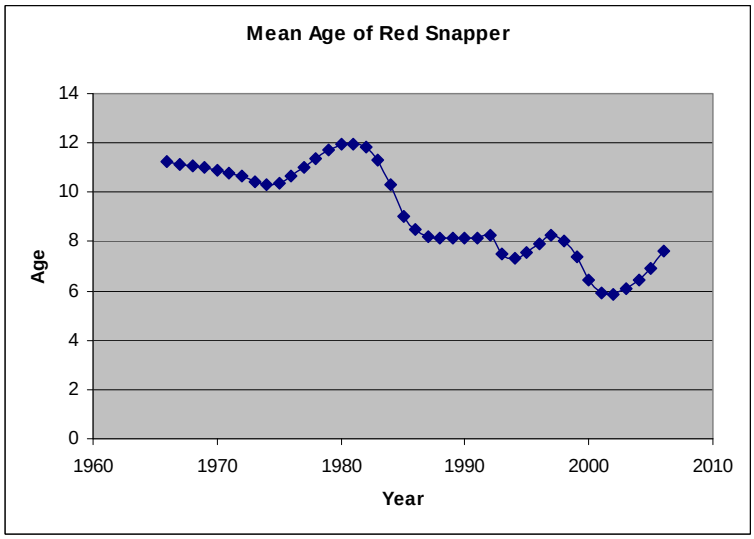


Figure 4-3. Mean age of red snapper.

Source: Plot of data from Table 5.9, Red Snapper: Estimation of biomass benchmarks and projections, November 2008.

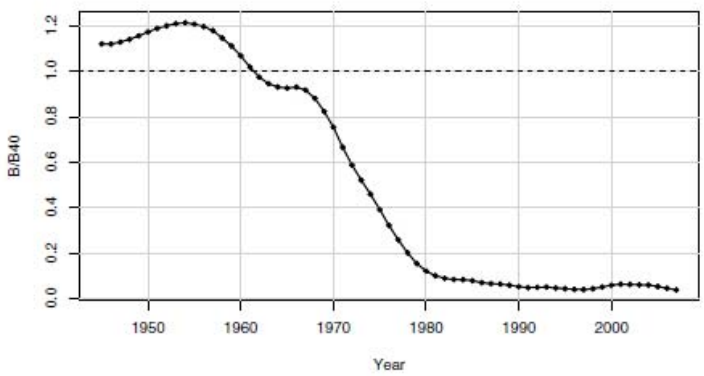


Figure 4-4. Estimated time series of red snapper biomass relative to B_{MSY} proxy.
Source: Red Snapper: Estimation of biomass benchmarks and projections, November 2008, Figure 6.2.

Alternative 1 (no action) would retain the current regulations used to manage catches of red snapper. Regulations include a commercial limited access system, a 20 inch TL commercial and recreational minimum size limit, and a 2 fish recreational bag limit. Minimum size limits are generally used to maximize the yield of each fish recruited to the fishery and to protect a portion of a stock from fishing mortality. The concept behind maximizing yield is to identify the size that best balances the benefits of harvesting fish at larger, more commercially valuable sizes against losses due to natural mortality. Protecting immature and newly mature fish from fishing mortality provides increased opportunities for reproduction and recruitment before becoming vulnerable to fishing gear. If the size limit chosen is larger than the size at first reproduction for the species in question, then a sufficient pool of spawners could be retained even if fishing pressure is heavy.

These types of measures are generally expected to benefit the environment in the short term and long term by limiting the extent to which a stock is targeted. However, the extent to which such benefits are realized depends on the appropriateness of a measure when applied to a specific stock, as well as if and to what extent fishing effort changes or shifts in response to the select management measure.

Discard mortality also can limit the amount by which fishing effort and mortality is reduced by limited access systems, trip limits, and minimum size limits, if fishermen catch and discard red snapper when targeting co-occurring species. The snapper-grouper ecosystem includes many species, which occupy the same habitat at the same time. For example, red snapper co-occur with vermilion snapper, tomtate, scup, red porgy, white grunt, black sea bass, red grouper, scamp, gag, and others. Therefore, red snapper are likely to be caught and suffer some mortality when regulated since they will be incidentally caught when fishermen target other co-occurring species.

In 1983, the Snapper-Grouper Fishery Management Plan established a 12 inch TL for red snapper to maximize the yield per recruit (SAFMC 1983). In 1990, scientists recommended increased minimum size limits for red snapper to achieve reductions necessary to end overfishing. In response, the Council developed Amendment 4 (SAFMC 1991), which imposed new regulations including an increase in the minimum size limit of red snapper taken by recreational and commercial fishermen from 12 inches TL to 20 inches TL and an aggregate bag limit of 10 snapper (excluding vermilion snapper) with no more than 2 red snapper included in the aggregate bag limit. Amendment 4 also established a 15 year rebuilding plan for red snapper. These regulations were determined to be sufficient to end overfishing based on the science available at the time. As a result of this increased size limit, SEDAR 15 (2008) indicates many more red snapper are being released by the recreational sector than are retained (Tables 4-1 and 4-2). Since release mortality rates are estimated to be 40 percent for the recreational sector and 90 percent for the commercial sector, the increased size limit many not have had the intended effect of enhancing stock status. SEDAR 15 (2008) indicates the large number of discards combined with high release mortality rates is one of the major factors contributing to overfishing of red snapper in the South Atlantic. However, the use of dehooking tools, which will be implemented through Amendment 16, may reduce the release mortality of red snapper that are incidentally caught while fishing for other snapper-grouper species.

Table 4-1. MRFFS landings (number A+B1) of red snapper by state, 2003-2007.

State	2003-2007	Avg ww	Percent
FL	145,914	29,183	82.90%
Georgia	11,986	2,397	6.81%
SC	10,183	2,037	5.79%
NC	7,924	1,585	4.50%
Total	176,007		

Table 4-2. MRFSS number of red snapper released alive (B2) among states, 2003-2007.

MRFSS	2003-2007	Avg	percent
FL	1,000,178	124,631	92.67%
GA	64,514	1,176	5.98%
SC	12,307	4,826	1.14%
NC	2,339	8,432	0.22%
Total	1,079,338		

Although a large number of red snapper are caught when fishing for co-occurring species, there is likely some degree of targeting, particularly in the area of greatest abundance for red snapper off northern Florida and southern Georgia. If one assumes that during a closure red snapper would only be caught when targeting major co-occurring species, some trips would not be taken during a seasonal closure for co-occurring species, and fishermen have some ability to avoid red snapper by avoiding locations, then the reduction in total removals provided by closing red snapper year-round in the South Atlantic could be considerably greater. Permanent measures, which are being developed in Amendment 17 to end red snapper overfishing and rebuild the stock, will consider the effects management measures intended for other species would have on reducing fishing mortality of red snapper.

Since the alternatives to status quo management evaluated for red snapper are intended to reduce fishing mortality, they are expected to benefit the biological environment by assisting in restoring stock status and population demographics to more natural conditions. The indirect effects of these alternatives on the ecological environment are less certain. Improving the status of the red snapper stock would likely promote more natural ecological functions. However, competitor, predator, and prey relationships in marine ecosystems are complex and poorly understood.

The snapper-grouper ecosystem includes many species which occupy the same habitat at the same time. For example, red snapper co-occur with vermilion snapper, gag, scamp, greater amberjack, gray triggerfish, black sea bass, red grouper, and others (Tables 4-3 to 4-5). Therefore, snapper-grouper species are likely to be caught when regulated since they will be incidentally caught when fishermen target other co-occurring species. Continued overexploitation of any snapper-grouper species may disrupt the natural community structure of the reef ecosystems that support these species. Predator-exploited species could be expected to decrease in abundance in response to a decline of an exploited species. Alternatively, predators would target other species as prey items. Conversely, the abundance of those prey and competitor species of the overexploited species that are not targeted in fisheries (e.g., scup and tomtate) could increase in response to a decline in the abundance of a targeted species such as red snapper.

Table 4-3. Species taken on commercial trips when at least 1 pound of red snapper was caught. Based on ALS data from 2003-2007.

COMMON	% by trip	% by wt	cum wt
SNAPPER,VERMILION	66.81%	27.59%	27.59%
GROUPER,GAG	61.11%	13.85%	41.44%
SCAMP	64.70%	8.66%	50.10%
AMBERJACK,GREATER	40.66%	7.21%	57.30%
SNAPPER,RED	100.00%	5.72%	63.02%
TRIGGERFISH,GRAY	54.57%	5.48%	68.50%
GROUPER,RED	53.55%	4.77%	73.28%
JACK,ALMACO	34.73%	4.28%	77.56%
GROUPER,BLACK	10.55%	2.42%	79.98%
GROUPER,SNOWY	17.87%	1.68%	81.66%

COMMON	% by trip	% by wt	cum wt
SEA BASSE,ATLANTIC,BLACK,UNC	39.57%	1.66%	83.31%
KING MACKEREL	27.76%	1.43%	84.74%
PORGY,RED,UNC	41.53%	1.42%	86.16%

Table 4-4. Species taken on headboat trips when at least 1 red snapper was caught. Based on data from 2003-2007.

Species	% trip	% number	Cum % number
Vermilion Snapper	69.89%	45.02%	45.02%
Black Sea Bass	77.85%	17.23%	62.25%
Tomtate	22.46%	4.82%	67.08%
Gray Triggerfish	65.96%	4.10%	71.18%
Red Porgy	21.67%	3.34%	74.52%
Banded Rudderfish	13.71%	2.77%	77.29%
White Grunt	12.94%	2.75%	80.04%
Red Snapper	100.00%	2.69%	82.73%
Sharpnose Shark	51.91%	2.08%	84.81%
Scamp	29.02%	1.77%	86.58%
Gray Snapper	39.83%	1.53%	88.11%
Bank Sea Bass	11.81%	0.90%	89.01%
Lane Snapper	32.70%	0.79%	89.81%
Whitebone Porgy	25.80%	0.77%	90.58%
Greater Amberjack	25.11%	0.75%	91.32%
Almaco Jack	13.32%	0.73%	92.05%
Spottail Pinfish	5.02%	0.72%	92.77%

Table 4-5. Species taken on MRFSS trips when at least 1 red snapper was caught. Based on data from 2003-2007.

Species	% trip	% number	Cum % number
vermilion snapper	29.48%	31.28%	31.28%
black sea bass	43.62%	25.09%	56.36%
red snapper	100.00%	6.10%	62.46%
gray triggerfish	20.34%	5.56%	68.02%
tomtate	21.03%	3.24%	71.27%
white grunt	5.17%	2.25%	73.52%
gag	16.81%	1.89%	75.42%
greater amberjack	10.52%	1.74%	77.16%
atlantic sharpnose shark	19.05%	1.73%	78.88%
red porgy	8.88%	1.71%	80.59%
king mackerel	8.36%	1.61%	82.20%
scamp	8.97%	1.36%	83.57%

Species	% trip	% number	Cum % number
round scad	1.90%	1.35%	84.92%
gray snapper	5.26%	1.29%	86.20%
spanish sardine	0.69%	1.04%	87.24%
dolphin	5.26%	0.87%	88.12%
scaled sardine	0.69%	0.87%	88.99%
lane snapper	5.69%	0.76%	89.75%
spottail pinfish	3.53%	0.72%	90.47%
almaco jack	3.45%	0.71%	91.18%
herring family	0.52%	0.67%	91.86%
banded rudderfish	1.64%	0.63%	92.49%
gulf flounder	1.29%	0.55%	93.04%
red grouper	5.52%	0.47%	93.51%

It is anticipated the measures in the interim rule would become effective during summer 2009, which is when landings are high in the commercial and headboat fisheries (Tables 4-6 and 4-7). Recreational landings (MRFSS) are highest during Wave 3 (May-June; Table 4-8). Furthermore, the interim rule would likely take effect during the spawning season for female red snapper off the southeastern United States, which extends from May to October with peak spawning during July through September (White and Palmer 2004).

Table 4-6. Percentage of red snapper (commercial) landed by month in FL, GA, SC, and NC during 2003-2007 (lbs gutted weight) by state and month.

Month	Total	FL &GA	SC	NC
1	8.61%	8.13%	11.02%	6.57%
2	8.10%	8.71%	6.71%	5.84%
3	9.39%	9.86%	7.75%	9.29%
4	9.40%	9.30%	9.56%	9.96%
5	10.78%	10.52%	10.46%	14.40%
6	12.59%	13.55%	9.45%	11.78%
7	8.46%	8.05%	9.32%	10.19%
8	6.13%	5.88%	6.20%	8.66%
9	4.49%	4.84%	3.57%	3.58%
10	6.90%	6.03%	9.44%	8.66%
11	8.12%	7.38%	11.29%	6.49%
12	7.02%	7.76%	5.22%	4.58%

Table 4-7. Average gag headboat landings 2003-2007 (percentage) by state and month.

Month	Total	South FL	GA - NFL	SC	NC
1	3.64%	4.61%	4.76%	0.00%	1.07%
2	5.59%	37.81%	5.53%	0.00%	0.32%
3	8.59%	23.42%	9.36%	4.46%	2.03%
4	11.07%	3.26%	11.49%	14.52%	2.58%

Month	Total	South FL	GA - NFL	SC	NC
5	13.73%	9.77%	12.21%	24.05%	4.59%
6	9.60%	3.27%	9.59%	12.84%	5.22%
7	8.93%	4.05%	8.97%	11.83%	3.98%
8	8.02%	2.21%	6.88%	16.03%	2.30%
9	4.54%	2.26%	4.26%	4.77%	8.18%
10	10.86%	3.60%	11.31%	6.01%	23.68%
11	7.42%	1.23%	8.94%	4.82%	2.61%
12	8.02%	4.50%	6.68%	0.68%	43.43%

Table 4-8. Average red snapper MRFSS landings 2003-2007 (A+B1 Number, percent) by state and month.

Wave	Total	FL	GA	SC	NC
1	9.37%	10.84%	0.00%	0.00%	0.00%
2	18.25%	19.37%	8.09%	15.73%	15.73%
3	26.99%	25.22%	38.98%	37.09%	37.09%
4	12.11%	11.94%	14.93%	10.52%	10.52%
5	16.95%	15.25%	28.55%	26.53%	26.53%
6	16.34%	17.38%	9.45%	10.13%	10.13%

If the interim rule were to go into effect in July 2009, **Preferred Alternative 2** would prohibit recreational and commercial harvest of red snapper during July-December and would include a portion of the June-September peak spawning. Approximately 44 percent of red snapper were landed during July-December in recent years; whereas, 26 percent were landed during July-October (Table 4-9). Therefore, the biological effect of the 180 day red snapper closure for **Preferred Alternative 2** would be greater than **Alternative 3**, which would close fishing for or retention of red snapper for four months. Similar to **Preferred Alternative 2**, **Alternative 3** would prohibit fishing for and retention of red snapper during the period of peak spawning if measures were put into place during summer 2009.

Since red snapper are caught with other species such as vermilion snapper, black sea bass, and gag, some incidental catch could be expected when fishermen target co-occurring species. However, based on SEDAR 15 (2008) release mortality rates, survival of released red snapper is estimated to be 60 percent for the recreational sector, which accounts for two thirds of red snapper landings. Survival of red snapper taken by the commercial sector is considerably less (10 percent) but this sector only takes a third of the landings each year. Furthermore, it is expected fishermen can avoid red snapper to some degree by adjusting fishing behavior or avoiding hot spots where red snapper may be particularly abundant. Therefore, although some increase in discarding could occur, both **Alternatives 2 and 3** would have positive biological effects including protecting individuals in spawning condition, enhancing reproductive success, and increasing the magnitude of recruitment. The biological effect of **Alternative 2** would be greater than **Alternative 3** because **Alternative 2** would close the fishery for a longer time period.

Table 4-9. Average commercial, headboat, and MRFSS landings (lbs gutted weight) during 2003-2007.

Month	comm	HB	MRFSS	Total	%
1	10,125	1,705	11,185	48,957	7.38%
2	9,530	2,621	11,185	50,133	7.55%
3	11,049	4,027	22,741	65,147	9.82%
4	11,055	5,189	22,741	67,302	10.14%
5	12,674	6,438	32,649	71,437	10.76%
6	14,813	4,504	32,649	70,068	10.56%
7	9,946	4,188	16,457	45,187	6.81%
8	7,214	3,761	16,457	42,531	6.41%
9	5,283	2,128	19,550	39,475	5.95%
10	8,122	5,093	19,550	45,150	6.80%
11	9,547	3,481	19,747	61,247	9.23%
12	8,262	3,761	19,747	57,043	8.60%
Total	117,620	46,895	244,661	409,176	
%	28.75%	11.46%	59.79%		

Alternative 1 will perpetuate the existing level of risk for interactions between ESA-listed species and the fishery. **Alternatives 2-3** and are unlikely to have adverse affects on ESA-listed species. Previous ESA consultations determined the snapper-grouper fishery was not likely to adversely affect protected species. These alternatives are unlikely to alter fishing behavior in a way that would cause new adverse affects to protected species. The impacts from **Alternatives 2-3** on sea turtles and smalltooth sawfish are unclear. If they perpetuate the existing amount of fishing effort, but cause effort redistribution, any potential effort shift is unlikely to change the level of interaction between sea turtles and smalltooth sawfish and the fishery as a whole. If these alternatives result in an overall reduction of fishing effort in the snapper-grouper fishery, the risk of interaction between sea turtles and smalltooth sawfish will likely decrease.

4.1.2 Economic Effects

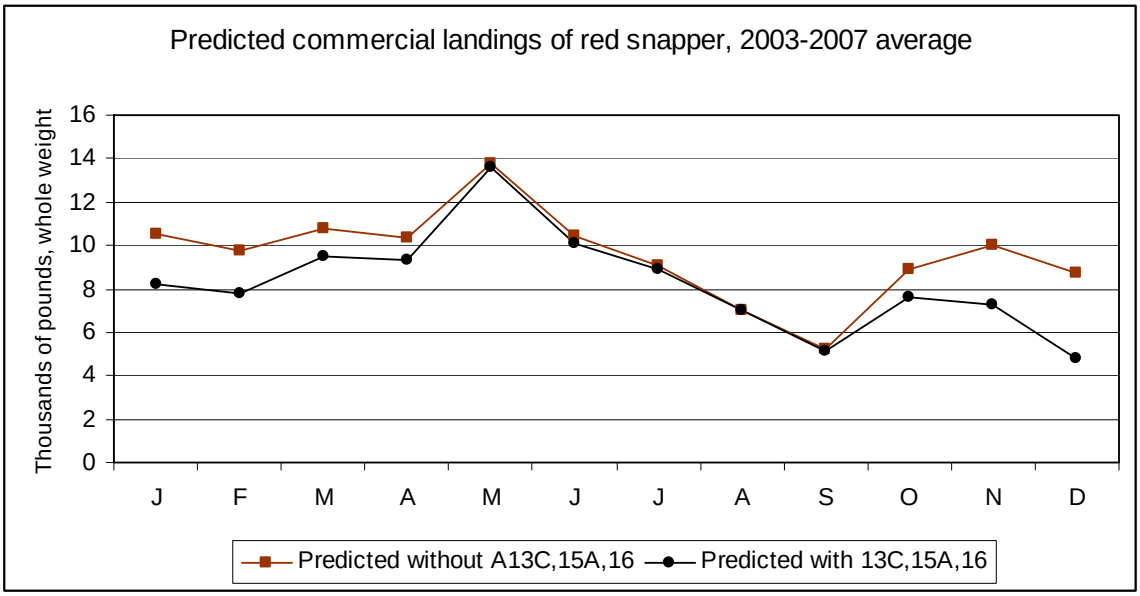
In the following assessment, the expected changes in the economic value of the respective sectors were assessed independently and used two different dollar bases, 2007 dollars for the commercial sector and 2008 dollars for the recreational sector. The assessment of the commercial sector used 2007 dollars to be consistent with the last year of data used in the modeling exercise, which included fishery data from 2003-2007. The assessment of the recreational sector used 2008 dollars to be consistent with the source material from which key parameter estimates were taken (NOAA 2008). Standardization of the resultant estimates into a common base year has not been attempted. The absence of standardization will not adversely affect the use of these results; however, because the effects for each sector will be presented and discussed separately, the results will not be combined, and the different base years does not affect the ranking of the alternatives in terms of the magnitude of economic effect.

Commercial Sector

A description of the historical data on the commercial snapper-grouper and red snapper fisheries is contained in Section 3.4.1.1. However, historical data do not reflect the effects of regulations that were recently implemented or are expected to be implemented by NOAA Fisheries Service. Amendment 13C to the FMP was implemented in October 2006 and Amendment 15A was implemented in March 2008. Both amendments primarily regulated the harvest of deep-water groupers (DWG), tilefish, and black sea bass. Amendment 16, when implemented, will impose limits on the harvest of vermilion snapper, gag, and other shallow-water groupers (SWG). Although Amendments 13C, 15A, and 16 do not specifically restrict the harvest of red snapper, landings of red snapper are expected to decline because they are commonly caught on trips where vermilion snapper, gag, or scamp are the primary revenue species on the trip. As trips for these species are reduced, red snapper harvests are expected to decline.

To establish the appropriate baseline for the current action, a simulation model was used to predict the effects of Amendments 13C, 15A, and 16 on commercial fishing activity. As seen in Figure 4-5, these amendments are predicted to reduce average annual landings of red snapper to less than 100,000 pounds, whole weight, with most of the reductions to occur between October and April. The commercial fishery for gag is already closed in March and April. Amendment 16, when implemented, would prohibit the harvest of all SWG from January through April, which would also be expected to reduce landings of red snapper. In addition, the annual quotas for gag and vermilion snapper are predicted to be filled in the fall, which would close the fisheries for these species and all other SWG and indirectly reduce red snapper landings.

Figure 4-5. Predicted seasonal distribution of red snapper landings, without and with the simulated effects of Snapper-Grouper Amendments 13C, 15A and 16.



The simulation model used logbook trip reports from 2003-2007 to predict the short-term economic effects of alternative prohibitions on the harvest of red snapper. The general method of analysis was to hypothetically impose the proposed regulations on individual fishing trips, as reported to the logbook database, and calculate the effects on trip catches, revenues, and costs. A five-year average of simulated results was used to estimate the expected effects of the proposed regulations to average out any anomalies that data from any one year may have had on fishing success.

The simulated fishing incomes net of trip costs for the proposed alternatives were compared to the status quo no-action alternative (baseline) to estimate the expected economic effects on commercial fishermen. For the purposes of this analysis, the no-action alternative is defined by the predicted landings of red snapper given the harvest regulations specified in Amendments 13C, 15A, and 16.

Net operating revenues (NOR) for trip *j* in year *t* were calculated as trip revenues from all species minus predicted trip costs, which include fuel, oil, bait, ice, and other supplies, and exclude fixed costs and labor costs. Fixed costs were not deducted because data are not available with which to determine the fraction of each boat's fixed costs that should be allocated to red snapper relative to other fishing activities. The NOR represent the return to the fixed factors of production, labor (captain and crew), and the boat owner. The NOR were adjusted to constant 2007 dollars using the consumer price index for all items and all urban consumers.

Red snapper is part of the mid-shelf snapper-grouper complex that includes scamp, gag, vermilion snapper, red porgy, gray triggerfish, and red grouper, among other species. In the simulation model, if the proposed alternative caused trip revenues to fall below the sum of trip costs and the opportunity cost for labor after accounting for the likely effects of the proposed restrictions on trip-level harvests, then the trip was recorded as not taken, and losses were measured as a reduction in net operating revenues, which included the loss in revenues from all species minus the savings of trip costs not incurred. This situation is most likely to occur when red snapper is the primary source of trip revenue. According to logbook trip reports from 2003-2007, red snapper was the primary source of trip revenue on an average of 163 trips per year, and a lesser source of revenue on 1,222 trips per year. Most of the trips on which red snapper was not the primary source of trip revenue are expected to remain profitable even when the harvest of red snapper is prohibited. In this case, losses to fishermen can be approximated as the ex-vessel value of red snapper not harvested due to the prohibitions.

Ten management scenarios were simulated. One scenario simulated the fishery without an interim rule for red snapper, eight scenarios simulated the effects of prohibitions on the harvest of red snapper, with 4 and 6 month closures beginning in either June, July, August, or September, and one scenario simulated the fishery prior to regulations implemented by Amendments 13C, 15A and 16 to serve as a baseline from which to measure the cumulative effects of recent regulations for the snapper-grouper fishery. The estimates of the expected change in NOR and fishing trips relative to the status quo are provided in Table 4-10.

Table 4-10. Average estimated change in vessel net operating revenue (NOR) and number of fishing trips associated with the prohibition of red snapper harvest, 2003-2007.

	4-Month Prohibition		
Period	NOR	%	Trips Lost
June-September	$91,000	1.07%	35
July-October	$85,000	1.00%	29
August-November	$79,000	0.94%	34
September-December	$74,000	0.88%	39
	6-Month Prohibition		
	NOR	%	Trips Lost
June-November	$135,000	1.60%	55
July-December	$120,000	1.42%	55
August-January	$116,000	1.38%	59
September-February	$120,000	1.41%	68

Under **Alternative 1**, the status quo, the red snapper commercial fishery could continue to operate as it currently does, with no short-term reductions in the number of harvested fish, trips taken, or changes in economic value. Because the resource is overfished, however, these conditions would not be expected to persist, nor could they legally be allowed to continue. Biological conditions in the resource would be expected to worsen, requiring more stringent harvest restrictions than those considered here. The absence of action at this time would be expected to adversely affect more permanent regulations. These actions have not yet been developed and the specific resultant economic effects are currently unknown.

Preferred Alternative 2 would prohibit all harvest (retention) and sale of all red snapper from the South Atlantic EEZ as well as red snapper harvested by federally permitted vessels that fish in state waters. This prohibition could stay in effect for 180 days and could be extended for an additional 186 days, thereby remaining in effect for one full year. The target date for implementation is assumed to be July 1. It is expected that the prohibition would remain in effect until replaced by permanent action implemented through plan amendment. A July-December prohibition on the harvest and sale of red snapper would be expected to result in a total reduction in NOR of approximately $120,000, or a reduction in NOR of approximately 1.4 percent, and reduce the number of historic average annual fishing trips during this period by 55 trips. Delayed implementation of the prohibition until August would be expected to affect more trips, 68, but reduce the projected reduction in NOR relative to the status quo to approximately $116,000 (August-January).

If **Preferred Alternative 2** is extended to a full year, the expected reduction of NOR is approximately $289,000 and approximately 142 trips would be expected to be lost. These estimates are higher than might be expected associated with the alternative six-month scenarios because extension of the prohibition to an annual closure would affect more winter and spring months (January through May) when red snapper harvests are historically higher.

Alternative 3 would prohibit all harvest (retention) and sale of all red snapper from the South Atlantic EEZ as well as red snapper harvested by federally permitted vessels that fish in state waters for four months. Assuming a target implementation date of July 1, a July-October prohibition on the harvest of red snapper would be expected to result in a total reduction in NOR of approximately $85,000, or a reduction in NOR of approximately one percent, and reduce the number of historic average annual fishing trips during this period by 29 trips. Delayed implementation of the prohibition until August would be expected to affect more trips, 34, but reduce the projected reduction in NOR relative to the status quo to approximately $79,000 (August-November). **Alternative 3** could not be extended. Continuation of the harvest prohibition would require the development of a new management action, with associated development and implementation costs. The expected economic effects on the fishery, however, would be expected to be as provided in Table 4-10.

Recreational Sector

The methodology employed in this assessment follows the methodology employed in the *Analysis of Expected Economic Effects of the 2008 Gulf of Mexico Recreational Red Snapper Closure* (NOAA 2008). The methodology for that assessment is thoroughly documented in that report and is incorporated herein by reference.

This assessment evaluated the expected change in economic value relative to the status quo to fishermen and for-hire vessels in response to the proposed alternatives. The change in economic value was measured in terms of the consumer surplus (CS) per angler fishing trip and net operating revenues (NOR) to for-hire businesses. Estimates of the CS lost on each fishing trip when the harvest (retention) of red snapper is prohibited and the NOR lost if a for-hire trip is canceled are provided in NOAA (2008). Specifically, starting from a 2-fish bag limit, the loss in CS on each trip when an angler cannot keep any red snapper is estimated to be $53.53 (2008 dollars). The estimated NOR per individual angler charterboat and headboat trip is estimated to be $162 and $78 (2008 dollars), respectively.

Computation of the total expected change in economic value associated with this action involved multiplication of the change in the appropriate economic value (CS or NOR), as described in the previous paragraph, times the appropriate number of individual red snapper angler target trips. The number of red snapper target trips was calculated using the methods described in Holiman (1996). This methodology applies only to the MRFSS data, which includes recreational fishing data for the shore, charterboat, and private/rental boat fishing modes.

Data for the headboat sector does not contain information collected at the angler level, nor does it collect angler target intent information. Therefore, an alternative approach to estimating target effort was required for the headboat sector. Based on examination of landings, this assessment assumed that all headboat trips (angler days) in Georgia and northeast Florida (GA-NEFL; NEFL consisted of Mayport, Florida, south through the Cape Canaveral, Florida, area) targeted red snapper. This assumption is expected to result in an overestimation of the amount of actual red snapper target effort from these areas as some trips may not fish where red snapper are available and many anglers would be expected to not be concerned with targeting any specific species. Although the majority of headboat red snapper harvest comes from the GA-NEFL area, red

snapper are also routinely harvested by South Carolina and North Carolina headboat fishermen. Use of the effort estimates from the GA-NEFL area does not capture this effort. Overall, however, use of the total estimate of headboat effort for GA-NEFL as a proxy of red snapper target effort is expected to fully compensate for the exclusion of trips from other areas and still overestimate actual red snapper target effort by an unknown amount. The resultant estimates of red snapper target trips for all sectors (private angler, charterboat, and headboat) are provided in Table 4-11.

The expected change in CS as a result of the proposed alternatives was computed by multiplying the number of red snapper target trips by the expected change in CS per trip ($53.53; 2008 dollars). Because the effort total used is likely an overestimate of the actual number of red snapper target trips, as discussed in the previous paragraph, the resultant estimate of the total change in CS is also likely an overestimate of the actual change in CS that would be expected to occur. The estimate of the expected change in CS may also differ from the actual value because the value of the expected change in CS per trip used ($53.53) may be incorrect for headboat trips. As described in NOAA (2008), the expected change in CS per trip was derived from data collected from private and charterboat anglers. Headboat anglers may value red snapper differently, on average, than private and charterboat anglers. The direction of difference is unknown, though the higher cost of fishing to charterboat anglers suggests the expected change in CS to headboat anglers would be less than that to charterboat anglers. Nevertheless, overall, the effect of using too high an estimate of target effort is expected to dominate the effects of using an incorrect measure of value per trip, such that the net effect is expected to be an overestimation of the expected change in CS as a result of the proposed alternatives.

Table 4-11. Average red snapper target effort in the South Atlantic, by month, 2003-2007.

	Jul	Aug	Sep	Oct	Nov	Dec		6-mon sum	4-mon sum
Private	4,915	4,915	2,530	2,530	2,467	2,467		19,824	14,890
Charterboat	421	421	118	118	223	223		1,524	1,078
Headboat	8,609	5,295	1,995	2,468	2,133	2,069		22,569	18,367
All	13,945	10,631	4,644	5,117	4,823	4,760		43,917	34,335
	Jan	Feb	Mar	Apr	May	Jun	Avg Annual	6-mon sum	
Private	1,247	1,247	5,435	5,435	3,771	3,771	3,394	20,906	
Charterboat	93	93	165	165	299	299	220	1,114	
Headboat	1,775	2,337	4,919	5,818	5,811	7,528	4,230	28,188	
All	3,115	3,677	10,519	11,418	9,881	11,598	7,844	50,208	

The expected change in NOR was computed by multiplying the average NOR per trip ($162 or $78, 2008 dollars, for charterboat and headboat trips, respectively) times the appropriate number of red snapper target trips. The analysis assumed all red snapper target trips would be cancelled. This assumption is expected to result in overestimation of the actual number of trips lost to the fishery. In reality, most red snapper anglers would be expected to continue to fish, but shift their effort to other species. For example, target effort for grouper, dolphin, and king mackerel was

projected to increase from 13 percent (grouper) to 31 percent (dolphin) in response to the recreational red snapper closure in the Gulf of Mexico (NOAA 2008).

The relatively minor apparent importance of red snapper as a target species in the South Atlantic, as demonstrated by the low incidence of either target or catch effort (see Section 3.4.1.2.2) and ranking within bags or total harvest (see Section 3.4.1.2.1), suggests there is little reason to expect widespread reduction in fishing trips from historic levels, in lieu of continued fishing for other species, in the event of the imposition of a zero bag limit for red snapper. However, it is noted that the likelihood of switching target species would be influenced by resource and management conditions for those other species. Recent implemented or proposed management South Atlantic measures have resulted or are expected to result in increasingly restricted harvest opportunities for other recreational species (see SAFMC 2008b). As a result, the opportunity of species switching has diminished and the likelihood of trip cancellation has increased, and it is possible and reasonable to expect that some trip reductions might occur in response to red snapper harvest prohibitions. Overall, although the assumption that all red snapper target trips would be canceled in response to a red snapper harvest prohibition is expected to be an exaggeration of actual likely effects, this assumption is expected to adequately establish an acceptable upper bound of expected trip reductions.

In summary, this assessment estimated the change in CS associated with red snapper target trips (CS per trip times the total number of target trips), and the change in NOR to for-hire vessels resulting from the reduction of red snapper target trips (NOR per trip times the number of red snapper target trips). If taken alone, the expected change in CS assumes no trip cancellation occurs in response to the harvest prohibition and is assumed to constitute the lower bound of the expected change in economic value relative to the status quo. When the change in NOR is added to the change in CS, the resultant sum is assumed to constitute an upper bound of the expected change in economic value relative to the status quo. The respective estimates of the expected changes in CS and NOR are provided in Table 4-12. These estimates encompass all trips regardless of considerations of whether they would be expected to occur in state waters or the EEZ. As such, these estimates assume compatible regulations by all states. Estimates of target effort by area fished are not available. Approximately 19 percent, on average, of all private/rental boat trips occurred in the EEZ for 2003-2007, whereas approximately 59 percent of all charterboat trips occurred in the EEZ. Across the two sectors combined, approximately 21 percent of all trips occurred in the EEZ. However, approximately 95 percent of the average annual catch of red snapper by the private and charterboat sectors from 2003-2007 were caught in the EEZ, so the vast majority of target trips also likely occurred in these waters. Similar information is not available for the headboat sector. Nevertheless, it is noted that the effects described will be reduced by some unknown amount if states do not adopt compatible regulations.

Table 4-12. Average estimated change in economic value (2008 $), consumer surplus (CS) and vessel net operating revenue (NOR), associated with the loss of red snapper (fish) or red snapper fishing trips, by month, 2003-2007. CB = charterboat; HB = headboat.

	Jul	Aug	Sep	Oct	Nov	Dec		6-mon sum	4-mon sum
CS – Trips	$746,476	$569,067	$248,604	$273,892	$258,159	$254,776		$2,350,974	$1,838,039
NOR – CB	$68,186	$68,186	$19,181	$19,181	$36,077	$36,077		$246,888	$174,734
NOR – HB	$671,502	$412,994	$155,641	$192,488	$166,343	$161,413		$1,760,381	$1,432,625
Sum	$1,486,164	$1,050,247	$423,426	$485,561	$460,579	$452,267		$4,358,244	$3,445,398
	Jan	Feb	Mar	Apr	May	Jun	Avg Annual	6-mon sum	
CS – Trips	$166,757	$196,841	$563,066	$611,200	$528,919	$620,820	$419,881	$2,687,603	
NOR – CB	$15,066	$15,066	$26,795	$26,795	$48,406	$48,406	$35,618	$180,534	
NOR – HB	$138,466	$182,302	$383,666	$453,804	$453,274	$587,184	$329,923	$2,198,696	
Sum	$320,288	$394,208	$973,527	$1,091,799	$1,030,598	$1,256,409	$785,423	$5,066,830	

Under **Alternative 1**, the status quo, the red snapper recreational fishery could continue to operate as it currently does, with no short term reductions in the number of harvested fish, trips taken, or changes in economic value. Because the resource is overfished; however, these conditions would not be expected to persist, nor could they legally be allowed to continue. Biological conditions in the resource would be expected to worsen, requiring more stringent harvest restrictions than those considered here. The absence of action at this time would be expected to adversely affect more permanent regulations. These actions have not yet been developed and the specific resultant economic effects are currently unknown.

Preferred Alternative 2 would prohibit all harvest (retention) of red snapper in the South Atlantic EEZ as well as red snapper harvested by federally permitted for-hire vessels that fish in state waters. This prohibition could stay in effect for 180 days and could be extended for an additional 186 days, thereby remaining in effect for one full year. The target date for implementation is assumed to be June 1. It is expected that the prohibition would remain in effect until replaced by permanent action implemented through plan amendment. Assuming no trip cancellations and the adoption of compatible state regulations, a July-December prohibition on the harvest of red snapper would be expected to result in a total reduction in CS of approximately $2.35 million (2008 dollars) relative to the status quo (Table 4-13). The expected effects of alternative six-month periods generated by implementation delay can be tabulated by addition of the appropriate monthly totals. However, it should be noted that because the July value is the largest, delayed implementation would be expected to reduce the six-month total effect. Extension of the prohibition to a full year would be expected to result in a reduction in CS of approximately $5.04 million. These values are assumed to constitute the lower bound of the expected change in economic value to the recreational fishery as a result of **Preferred Alternative 2**.

Under the assumption that the prohibitions of **Preferred Alternative 2** result in the cancellation of all red snapper target trips during the respective months, in addition to the reduction in CS, a July-December prohibition on the harvest of red snapper would be expected to result in a

reduction in NOR of approximately $247,000 to charterboat vessels, and a reduction in NOR of approximately $1.76 million to headboats, or a total reduction in economic value of approximately $4.36 million, assuming the adoption of compatible state regulations. Extension of the prohibition to a full year would be expected to result in a reduction in economic value of approximately $9.43 million (CS and NOR). There is little expectation that all red snapper target trips would be cancelled under **Preferred Alternative 2**. As discussed above and in Section 3.4.1.2.1, on average, red snapper is only the third most important species in terms of the numbers of fish caught on private and charter trips and the fifteenth most important species in terms of the number of pounds of fish harvested on headboat trips. Thus, most of the historic trips that previously targeted red snapper would be expected to continue to be taken but would target other species. Absent specific data; however, to determine the proportion of red snapper target trips that would be expected to be cancelled, this analysis simply assumes the cancellation of all red snapper target trips constitutes an upper bound of the expected change in economic value to the recreational fishery as a result of **Preferred Alternative 2**. Overall, **Preferred Alternative 2** is expected to result in a reduction in short term economic value of $2.35-$4.36 million if the action is implemented for six months and $5.04-$9.43 million if extended to a full year. As discussed above, these effects may be reduced by an unknown amount if the states do not adopt compatible regulations.

The distribution of effects, in terms of state and mode, would be expected to follow the distribution of target effort. Red snapper target effort primarily occurs off Florida. The headboat sector appears to be the largest target mode, but this may be due only because of the assessment assumptions and, as discussed above, overall, the estimates of headboat effort are believed to exceed actual totals. Nevertheless, the reductions in economic value discussed above would be expected to primarily accrue to Florida anglers in the private/rental and headboat sectors.

Alternative 3 would prohibit all harvest (retention) of red snapper in the South Atlantic EEZ as well as red snapper harvested by federally permitted for-hire vessels that fish in state waters for four months from the time of implementation of the action. Similar to **Preferred Alternative 2**, the target date for implementation is assumed to be July 1. A July-October prohibition on the harvest of red snapper would be expected to result in a total reduction in CS of approximately $1.84 million (2008 dollars) relative to the status quo (Table 4-13). The expected effects of alternative four-month periods generated by implementation delay can be tabulated by addition of the appropriate monthly totals. However, as with the six-month closure, it should be noted that because the July value is the largest, delayed implementation would be expected to reduce the four-month total effect. **Alternative 3** could not be extended. Continuation of the harvest prohibition would require the development of a new management action, with associated development and implementation costs. The expected economic effects on the fishery, however, would be expected to be as provided in Table 4-13. As per the discussion for **Preferred Alternative 2**, these values are assumed to constitute the lower bound of the expected reduction in economic value to the recreational fishery as a result of **Alternative 3**.

Under the assumption that the prohibitions of **Alternative 3** result in the cancellation of all red snapper target trips during the respective months, in addition to the reduction in CS, a July-October prohibition on the harvest of red snapper would be expected to result in a reduction in NOR of approximately $175,000 to charterboat vessels, and a reduction in NOR of

approximately $1.43 million to headboats, or a total reduction in economic value of approximately $3.45 million. As with **Preferred Alternative 2**, there is little expectation that all red snapper target trips during the respective months would be cancelled under **Alternative 3**. Nevertheless, some trip cancellation would be expected among both target and generalist trips and this analysis simply assumes the cancellation of all red snapper target trips during the respective months constitutes an upper bound of the expected change in economic value to the recreational fishery as a result of **Alternative 3**. Overall, **Alternative 3** is expected to result in a reduction in short term economic value of $1.84-$3.45 million. As with **Preferred Alternative 2**, these effects could be reduced by an unknown amount if the states do not adopt compatible regulations.

4.1.3 Social Effects

Under **Alternatives 2 and 3**, fishermen harvesting red snapper would likely suffer reductions in catch and some reduction in revenue. This could have negative effects, but possibly be limited to local areas where more catch occurs. The social effects on fishermen could be greater than anticipated because these actions occur during a time of increasing regulation and economic distress. The impacts would be more severe under **Preferred Alternative 2** rather than the seasonal closure under **Alternative 3**. Due to the rather limited harvest for red snapper, the impacts could be minimal or at least could be localized to those areas where the landings and losses would be greater. Central to Northern Florida and Southern Georgia would likely see greater impacts than other regions as these are where most of the landings and harvest take place. Although, red snapper landings do not constitute a substantial amount of overall commercial landings of snapper-grouper for these areas, there may still be some social and economic disruption. This is true for commercial and recreational fishermen who will need to adjust the closure.

It is assumed that those areas with the most commercial harvest are also the same areas where the most recreational harvest takes place. Because Florida has the most targeted recreational trips and harvest of red snapper, these two alternatives would likely have a greater impact there for both commercial and recreational sectors. One impact would likely be a redirecting of effort to other species to compensate for lost revenue or for lost opportunities for charter/headboat and recreational fishermen. This may place increased pressure on other species and may require further management. However, because landings and targeting behavior are limited, these may be relatively small impacts. It is unlikely these disruptions would cause any type of job loss or temporary shut down of operations; however, the nation is in the midst of a drastic economic downturn and it is not clear how resilient some of the fishing communities or counties may be at this time. Fishing businesses, fish houses, marinas and other fishing related businesses may be experiencing numerous other social and economic impacts that stem from the larger economic recession that are immeasurable at this time. As discussed under community descriptions, some areas are experiencing the effects of gentrification where property values and taxes may be making it difficult for some working waterfronts to remain viable. These regulations under **Alternatives 2 and 3** could exacerbate those impacts if occurring.

There was a common theme among those who have submitted public comment for this action and other upcoming amendments. In those areas where the harvest of red snapper was the highest for both recreational and commercial sectors, comments addressed the current state of the economy and other impending regulations as having deleterious impacts on business operations. Many of those who submitted comments suggested that the stock was not as overfished as indicated by the assessment. This was attributed to increased catches of red snapper, which may reflect recent good year classes coming into the fishery. Unfortunately, the higher catch rates may not last once these good year classes move through the population. This discontinuity often leads to frustration as fishermen on the water see plenty of fish, while stock assessment scientists claim there are problems. However, because red snapper revenues and target harvesting are relatively small when compared to other snapper-grouper species, it is anticipated that there will not be substantial social disruption as a result of this action solely. The anticipated response is that both commercial and recreational fishermen will transfer that effort to other species if necessary. Yet, with other impending actions, such as Amendments 16, 17 and 18 to the Snapper Grouper FMP, this action along with others could have a cumulative impact that is greater than anticipated upon some businesses. The extent of that social and economic disruption is not known or if it may occur. The short term impacts may be such that some businesses cannot recover if other non-fishery disruptions are affecting operations as a result of the larger economic downturn.

Alternative 1, the no action alternative, would have the least impact in the short term. However, it would delay the recovery of red snapper in the long term which may have detrimental impacts if management was extended over a longer period of time and more severe action were required.

4.1.4 Administrative Effects

Alternative 1 would place no new administrative burden on the agency as current management measures would remain in place and no new management measures or enforcement burden would be created. However, if measures to reduce overfishing are not immediately implemented, there is a high likelihood that future management measures would need to be more restrictive to end overfishing of red snapper. If that does occur, the administrative and enforcement burden may grow.

Preferred Alternative 2 and Alternative 3 would have similar administrative burdens as both would require coordination between NOAA Fisheries, NOAA Office of Law Enforcement, and the US Coast Guard, as well as state and local enforcement offices. These alternatives would also require the development of outreach materials such as fishery bulletins, web page content, and other education to ensure compliance with the interim regulations.

Preferred Alternative 2 would have a slightly higher enforcement burden as the closure would extend through the duration of the interim rule period (180 days with a possible extension for another 186 days) while the closure in **Alternative 3** would only be implemented for 4 months.

A seasonal closure restricting the harvest of only one snapper-grouper species would require enforcement officers to either board a vessel at sea or witness fishermen landing prohibited

species dockside. Enforcement of these management measures would put a heavy burden on an already burdened enforcement staff.

4.2 Bycatch Practicability Analysis

The Council is required by Magnuson-Stevens Act §303(a)(11) to establish a standardized bycatch reporting methodology for federal fisheries and to identify and implement conservation and management measures that, to the extent practicable and in the following order, (A) minimize bycatch and (B) minimize the mortality of bycatch that cannot be avoided. The Magnuson-Stevens Act defines bycatch as "fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards. Such term does not include fish released alive under a recreational catch-and-release fishery management program" (Magnuson-Stevens Act §3(2)). Economic discards are fish that are discarded because they are undesirable to the harvester. This category of discards generally includes certain species, sizes, and/or sexes with low or no market value. Regulatory discards are fish that are required by regulation to be discarded, but also include fish that may be retained but not sold.

NMFS outlines at 50 CFR §600.350(d)(3)(i) ten factors that should be considered in determining whether a management measure minimizes bycatch or bycatch mortality to the extent practicable. These are:

1. Population effects for the bycatch species;
2. Ecological effects due to changes in the bycatch of that species (effects on other species in the ecosystem);
3. Changes in the bycatch of other species of fish and the resulting population and ecosystem effects;
4. Effects on marine mammals and birds;
5. Changes in fishing, processing, disposal, and marketing costs;
6. Changes in fishing practices and behavior of fishermen;
7. Changes in research, administration, enforcement costs and management effectiveness;
8. Changes in the economic, social, or cultural value of fishing activities and non-consumptive uses of fishery resources;
9. Changes in the distribution of benefits and costs; and
10. Social effects.

Agency guidance provided at 50 CFR §600.350(d)(3)(ii) suggests the Councils adhere to the precautionary approach found in the Food and Agriculture Organization of the United Nations (FAO) Code of Conduct for Responsible Fisheries (Article 6.5) when faced with uncertainty concerning these ten practicability factors. According to Article 6.5 of the FAO Code of Conduct for Responsible Fisheries, using the absence of adequate scientific information as a reason for postponing or failing to take measures to conserve target species, associated or dependent species, and non-target species and their environment, would not be consistent with a precautionary approach.

4.2.1 Population Effects for the Bycatch Species

4.2.1.1 Background

SEDAR 15 (2008) reported that the bulk of landings of red snapper come from the recreational fishery, which have exceeded the landings of the commercial fishery by 2-3 fold over the assessment period (1984-2006). Total landings were variable, with a downward trend through the 1990s. The base natural mortality (M) in the fishery was 0.078. This was assumed to be a constant over time, but varying with age because younger fish are much more vulnerable (for example, to predation) than larger, older fish. Red snapper do not change sex over their lifetimes, and studies supported a constant 50:50 sex ratio for the population. The mean generation time of 20 years was estimated from data (SEDAR 15 2008). A 20 inch TL limit for red snapper was instituted in 1992 (Amendment 4, SAFMC 1991), which is believed to have caused an increase in discarding. The dive fishery was assumed to generate no discards because of the selectivity of the method. Mortality rates used for discarded fish were 0.4 for the recreational fisheries and 0.9 for the commercial handline fishery. The higher release mortality in the commercial fishery is due to the depth at which the fish are caught, the effect of pressure changes as they are brought to the surface, and the length of time fish may be on deck before being returned to the water.

Management measures, which are currently in place to manage this species, include size limits (20 inch TL), gear restrictions for both commercial and recreational fisheries, a snapper-grouper commercial limited access fishing permit, and a bag limit of 2 red snapper included in the 10 snapper per person retention limit for the recreational fishery.

Management measures proposed in the interim rule would consider alternatives, with the exception of the no action alternative, targeting an immediate reduction in red snapper harvest in the South Atlantic region for the 2009 calendar year. These alternatives are described in detail in Sections 2.0 and 4.0.

4.2.1.2 Commercial Fishery

Detailed information on the commercial fishery can found in Section 3.4.1.1.

During 2001 to 2006, approximately 20 percent of snapper-grouper permitted vessels from the Gulf of Mexico and South Atlantic were randomly selected to fill out supplementary logbooks. A small number of trips that reported discards but did not report numbers or species were not included in analyses. The average number of trips per year during 2001 to 2006 was 15,500 (Table 4-13). Fishermen spent an average of 1.70 days at sea per trip.

Table 4-13. Snapper-grouper fishery effort for the South Atlantic.

YEAR	Trips	Days	Days per Trip
2001	17,283	29,940	1.73
2002	17,231	29,683	1.72

YEAR	Trips	Days	Days per Trip
2003	16,586	27,680	1.67
2004	15,060	24,911	1.65
2005	13,773	22,880	1.66
2006	13,067	22,926	1.75
Mean	15,500	26,337	1.70

Source: NMFS SEFSC Logbook Program.

Since the discard logbook database represents a sample, data were expanded to estimate the number of discard fish in the whole fishery. The method for expansion was to (1) estimate the probability of discarding a species; (2) estimate the number of fish discarded per trip; and (3) estimate the number discarded in the whole fishery (total discarded = total trips * percent trips discarding * discard number). For example in 2001, the total discards 22,627 = 17,283 total trips * 0.0571 trips discarding * 22.9 discards/trip. During 2001-2006, an average of 11,218 red snapper were discarded per year (Table 4-14). Applying a release mortality rate of 90 percent, the average dead discards during 2001-2006 would be 10,096.

Table 4-14. Annual number of trips reporting discards, percentage of trips that discarded red snapper, number of red snapper discarded per trip, and expanded number of discarded red snapper per year in the South Atlantic. Average number of trips during 2001-2006 was 15,500.
Source: NMFS SEFSC Logbook Program.

YEAR	# trips reporting discards	Total trips	% trips discarding	# discards/trip	Expanded # of discards/yr	Dead Discards
2001	67	17,283	5.71	22.9	22,627	20,364
2002	88	17,231	3.25	18.1	10,169	9,152
2003	48	16,586	1.33	20.5	4,540	4,086
2004	42	15,060	1.45	98.8	21,546	19,392
2005	57	13,773	2.26	16.2	5,028	4,525
2006	53	13,067	2.55	10.2	3,397	3,057
Mean	59.17	15,500	2.76	31.13	11,218	10,096

Table 4-15. The 50 most commonly discarded species during 2001-2006 for the South Atlantic. Values represent total for 2001-2006 from NMFS discard logbook.

Species (Table 4-xx)	Number trips reported discarding the species	Number discarded
SEA BASS,ATLANTIC,BLACK,UNC	595	100,992
PORGY,RED,UNC	1,091	81,062
SNAPPER,VERMILION	904	64,885
MENHADEN	162	22,445
SHARK,DOGFISH,SPINY	137	22,193
SNAPPER,YELLOWTAIL	1,934	18,758
SNAPPER,RED	442	12,088
SCAMP	871	10,373

Species (Table 4-xx)	Number trips reported discarding the species	Number discarded
SEA BASS,ROCK	120	9,510
GROUPER,GAG	694	4,657
GRUNTS	190	4,646
GRUNT,WHITE	80	4,575
FINFISHES,UNC,BAIT,ANIMAL FOOD	43	4,351
SHARK,ATLANTIC SHARPNOSE	184	4,232
KING MACKEREL and CERO	582	4,193
SNAPPER,MANGROVE	221	4,112
GROUPERS	85	3,991
GROUPER,RED	724	3,806
SHARK,UNC	457	3,780
SHARK,DOGFISH,UNC	50	3,543
GROUPER,BLACK	505	3,142
GRUNT,TOMTATE	29	2,727
AMBERJACK,GREATER	379	2,599
HIND,SPECKLED	211	2,479
BLUEFISH	67	2,474
SHARK,DOGFISH,SMOOTH	37	2,441
SHARK,BLACKTIP	186	2,409
KING MACKEREL	414	2,393
BLUE RUNNER	279	2,126
SNAPPER,MANGROVE (Duplicate of 3760)	200	2,035
BALLYHOO	44	2,009
TRIGGERFISH,GRAY	129	1,774
TRIGGERFISHES	154	1,628
SHARK,SANDBAR	100	1,550
TUNA,LITTLE (TUNNY)	280	1,538
DOLPHINFISH	240	1,465
BONITO,ATLANTIC	300	1,358
SNAPPERS,UNC	40	1,073
SCUPS OR PORGIES,UNC	101	1,054
SHARK,TIGER	78	1,034
SKATES	42	1,020
FINFISHES,UNC FOR FOOD	126	995
AMBERJACK	218	975
BARRACUDA	197	932
SNAPPER,MUTTON	228	879
SPANISH MACKEREL	91	815
AMBERJACK,LESSER	19	759
PINFISH,SPOTTAIL	41	595
REMORA	233	582
CHUBS	29	526

4.2.1.3 Recreational Fishery

For the recreational fishery, estimates of the number of recreational discards are available from MRFSS and the NMFS headboat survey. The MRFSS system classifies recreational catch into three categories:

- Type A - Fishes that were caught, landed whole, and available for identification and enumeration by the interviewers.
- Type B - Fishes that were caught but were either not kept or not available for identification.
    - Type B1 - Fishes that were caught and filleted, released dead, given away, or disposed of in some way other than Types A or B2.
    - Type B2 - Fishes that were caught and released alive.

A 20 inch TL size limit was implemented for red snapper in 1992 through Amendment 4 (SAFMC 1991). Due to the size limit, a large number of red snapper were released by recreational and headboat fishermen. Approximately 80 percent of the red snapper captured by recreational fishermen and 46 percent of red snapper caught on headboats were released in recent years. It is estimated that 32 percent of the fish caught by recreational fishermen and 18 percent of the fish captured by headboat fishermen will be released and die (Table 4-16). Dead discards were determined by applying a 40 percent release mortality rate to the number of fish released by recreational and headboat fishermen (SEDAR 15 2008).

Table 4-16. Estimated number total catch (A+B1+B2), harvests (A+B1), and released (B2) fish in numbers for the South Atlantic during 2001-2006.
Source: MRFSS Web Site.

Species	Total	A+B1	B2	% B2	Dead Discards	% Dead
Red snapper 2001-2006	1,045,248	213,892	831,356	80%	332,542	32%
Red snapper mean	174,208	35,649	138,559	80%	55,424	32%

Table 4-17. Total red snapper retained and released on sampled headboat trips during 2004-2007.

Species	**Total**	**retained**	**released**	**% released**	**dead discards**	**% dead**
Red snapper 2004-2007	229,373	123,313	106,060	46%	42,424	18%
Red snapper mean	57,343	30,828	26,515	46%	10,606	18%

Source: NMFS Headboat survey.

Dead discards for red snapper have also been estimated by SEDAR 15 (2008) and are similar to estimates provided above (Tables 4-17 and 4-18).

Table 4.18. Estimated time series of dead discards (1000 fish) for commercial handline (D.c.hal), headboat (D.hb), and general recreational (D.rec). Discards were assumed to be zero prior to implementation of regulations in 1984.

Year	D.c.hal	D.hb	D.rec	Total
1984	6.76	3.29	43.28	53.33
1985	3.34	2.77	28.97	35.08
1986	6.35	2.42	25.93	34.7
1987	13.62	8.1	20.22	41.94
1988	6.78	6.57	22.79	36.14
1989	2.51	1.43	9.06	13
1990	26.86	10.38	7.42	44.67
1991	3.69	2.15	7.15	12.99
1992	16.45	1.3	19.85	37.61
1993	16.06	9.8	21.69	47.56
1994	21.99	7.4	24.43	53.82
1995	21.71	11.28	17.88	50.87
1996	28.98	4.34	11.18	44.5
1997	30.32	1.37	8.13	39.82
1998	22.96	8.24	29.2	60.39
1999	20.65	7.31	62.02	89.98
2000	19.62	9.88	86.08	115.58
2001	21.3	18.91	79.67	119.88
2002	19.91	16.13	66.19	102.23
2003	17.03	10.23	63.63	90.89
2004	14.22	17.51	62.61	94.35
2005	13.74	15.85	59.88	89.47
2006	15.22	11.48	52.11	78.81

Source: SEDAR 15 Update, November 2008

4.2.1.4 Finfish Bycatch Mortality

SEDAR 15 (2008) estimates acute release mortality rates of red snapper to be 90 percent and 40 percent for the commercial and recreational fisheries, respectively, in the South Atlantic. A study by Burns et al. (2004) conducted on headboats off Florida in the Atlantic and Gulf of Mexico found a release mortality of 64 percent for red snapper. The majority of acute mortalities in this study (capture depth of 9–42 m) were attributed to hooking (49 percent), whereas barotrauma accounted for 13.5 percent. An earlier study by Burns et al. (2002), also conducted in the Atlantic and Gulf of Mexico, had similar results, as J-hook mortality accounted for 56 percent of the acute mortalities of red snapper on headboats. Using tagging data and cage studies, Burns et al (2002) determined the depth at which 50 percent of the released red snapper would die is 43.7 m (143 feet). SEDAR 15 (2008) indicated red snapper were most often caught at depths of 141 to 190 feet by the recreational sector and 141 to 234 feet by the commercial sector.

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

Red Snapper

Red snapper ranked seventh out of the 10 most commonly discarded species in the commercial fishery in recent years (Table 4-16). A 20 inch TL size limit was implemented for red snapper for both the commercial and recreational sectors in 1992 through Amendment 4 (SAFMC 1991). Due to the size limit, a large number of red snapper were released by recreational and headboat fishermen. Approximately 80 percent of the red snapper captured by recreational fishermen and 46 percent of red snapper caught on headboats were released in recent years. It is estimated that 32 percent of the fish caught by recreational fishermen and 18 percent of the fish captured by headboat fishermen will be released and die (Tables 4-17 and 4-18). Currently, there is also a bag limit of 2 red snapper included in the 10 snapper per person recreational bag limit. Dead discards were determined by a 40 percent release mortality rate to the number of fish released by recreational and headboat fishermen (SEDAR 15 2008).

Higher release mortality has been attributed to the commercial fishery in the South Atlantic than the recreational fishery due to different handling times and depths fished (SEDAR 15 2008). Commercial fishermen have been observed to hold fish on deck until fishing at a site has ceased. After fishing activity has slackened, fishermen measure and release undersized fish, contributing to higher post release mortality.

In this interim rule, two seasonal closures of the commercial and recreational fisheries are being considered to reduce the harvest of red snapper in the South Atlantic. **Preferred Alternative 2** would prohibit the harvest of red snapper in the EEZ of Florida, Georgia, South Carolina and North Carolina for the length of the 180 day interim rule. **Alternative 3** would establish regulations that would implement a four month closure of the red snapper fishery. These alternatives would reduce the fishing pressure on the red snapper stocks in a timely manner, and enable them to start recovering in terms of biomass and increases in age/size.

Amendment 16 includes a management measure that requires the use of dehooking devices, which could reduce discard and bycatch mortality in the snapper-grouper fishery, including red snapper. Dehooking devices can allow fishermen to remove hooks with greater ease and more quickly from snapper-grouper species without removing the fish from the water. If a fish does need to be removed from the water, dehookers could still reduce handling time in removing hooks, thus increasing survival.

A closed season for red snapper could be expected to reduce bycatch if there were some reduction in effort and targeting of the species. It is likely red snapper would still be caught when fishermen target co-occurring species. If there was no reduction in effort and fishermen were unable to avoid red snapper, an increase in bycatch would be expected. However, fishermen may be able to avoid locations where red snapper occur and adjust fishing methods to avoid catching red snapper. Red snapper bycatch mortality could also be reduced through alternatives that would require the use of dehooking devices. Therefore, bycatch could decrease

during a seasonal closure for red snapper. Even if bycatch does increase, an increased number of red snapper would be expected to survive since fish would not be retained by fishermen and a 60 percent survival rate is estimated for red snapper caught by recreational fishermen.

4.2.2 Ecological Effects due to Changes in the Bycatch

The ecological effects of bycatch mortality are the same as fishing mortality from directed fishing efforts. If not properly managed and accounted for, either form of mortality could potentially reduce stock biomass to an unsustainable level. Management alternatives proposed in the interim rule (closures) could reduce bycatch and would likely decrease overall mortality.

Overall fishing effort could decrease in the commercial and recreational sectors in response to more restrictive management measures, thereby reducing the potential for bycatch. Reduced fishing pressure would be expected to result in an increase in the mean size/age of red snapper. In addition, red snapper biomass would be expected to increase. Thus ecological changes could occur in the community structure of reef ecosystems through actions that would end overfishing.

Additional actions in Amendment 16, such as the use of dehooking devices in the snapper-grouper fishery (including red snapper) could reduce bycatch mortality. Amendment 16 also proposes seasonal closures for shallow-water groupers and vermilion snapper, which co-occur with red snapper. Therefore, implementation of Amendment 16 is likely to reduce bycatch of red snapper. Amendment 17, which is under development to establish ACLs and catch limits for species undergoing overfishing may also include actions that could reduce bycatch of red snapper by reducing take of co-occurring species. The Comprehensive ACL Amendment (under development) for species in FMPs not experiencing overfishing could propose additional measures to reduce bycatch in the snapper-grouper fishery with the possible establishment of species units. Species grouping would be based on biological, geographic, economic, taxonomic, technical, social, and ecological factors. It is likely that each group would be represented by an indicator species that has been recently assessed or is scheduled for a SEDAR assessment in the future. Amendment 14, approved in September 2008, established Marine Protected Areas in areas known to be ecologically important to red snapper and could also reduce bycatch of red snapper. Fishery-independent data indicate red snapper occur in MPAs located off South Carolina and northern Florida.

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

Management measures proposed in the interim rule are intended to address overfishing of red snapper. Proposed actions such as seasonal closures could increase the number of discards if fishermen are not able to avoid red snapper and there is no decrease in effort targeting the species. However, fishermen may be able to avoid locations where red snapper occur and adjust fishing methods to avoid catching red snapper. Red snapper bycatch mortality could also be reduced through alternatives that would require the use dehooking devices in Amendment 16,

which should be implemented by the time the interim rule is implemented. Therefore, bycatch could decrease during a seasonal closure for red snapper. Even if bycatch does increase, an increased number of red snapper would be expected to survive since fish would not be retained by fishermen and a 60 percent survival rate is estimated for red snapper caught by recreational fishermen.

The management measures proposed in the interim rule could result in an effort shift to other species and fisheries causing a change in the magnitude of harvest and number of discards in those fisheries. Reduced fishing pressure on red snapper would be expected to result in an increase in the biomass and the mean size and age.

4.2.4 Effects on Marine Mammals and Birds

Under Section 118 of the Marine Mammal Protection Act (MMPA), NOAA Fisheries Service must publish, at least annually, a List of Fisheries (LOF) that places all U.S. commercial fisheries into one of three categories based on the level of incidental serious injury and mortality of marine mammals that occurs in each fishery. The snapper-grouper fishery which uses hook and line gear is listed as a Category III fishery in the LOF. A category III fishery is a fishery that is not expected to cause incidental mortality and serious injury to marine mammals. Gear types used in these fisheries are determined to have occasional incidental mortality and serious injury of marine mammals (72 FR 66048; November 27, 2007). For the snapper-grouper fishery, the best available data on protected species interactions are from the SEFSC Supplementary Discard Data Program (SDDP) initiated in July of 2001 and sub-samples 20 percent of the vessels with an active permit. To date, no interactions with marine mammals have been reported from this program (8/1/2001-7/31/2004) (Poffenberger 2004; K. McCarthy, pers. comm.). The South Atlantic black sea bass pot fishery is listed as a Category II Fishery under the MMPA because of the possibility of entanglement with black sea bass pots. This fishery does not target red snapper but they are occasionally caught as bycatch in the pots. All other components of the fishery are listed as Category III because of the remote likelihood of or no known incidental mortality or serious injury of marine mammals.

NOAA Fisheries Service's biological opinion on the continued operation of the South Atlantic snapper-grouper fishery determined the possible adverse effects resulting from the snapper-grouper fishery are extremely unlikely. Thus, the continued operation of the snapper-grouper fishery in the southeast U.S. Atlantic EEZ is not likely to adversely affect sperm, fin, sei, and blue whales (NMFS 2006).

The endangered Bermuda petrel and threatened roseate tern occur within the action area. Bermuda petrels are occasionally seen in the waters of the Gulf Stream off the coasts of North and South Carolina during the summer. Sightings are considered rare and only occur in low numbers (Alsop 2001). Roseate terns occur widely along the Atlantic coast during the summer but in the southeast region they are found mainly off the Florida Keys (unpublished USFWS data). Interaction with fisheries has not been reported as a concern for either of these species.

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

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

Management alternatives in the interim rule, which are intended to reduce overfishing of red snapper, would be expected to affect the cost of fishing operations and the economic impacts of the alternatives are fully analyzed in Section 4.1.2.

4.2.6 Changes in Fishing Practices and Behavior of Fishermen

Management measures proposed in the interim rule could result in a modification of fishing practices by commercial and recreational fishermen; thereby, affecting the magnitude of discards. There is a potential for increased discards with closures since fishermen might target species which co-occur with red snapper. However, fishermen may be able to modify their behavior by avoiding locations where high concentrations of the restricted species occurs or changing fishing methodology such as hook size and type.

Amendment 16 also requires the use of dehooking tools. Use of this device will require a modification in fishing practices and behavior and have the potential to reduce bycatch mortality if properly used. Gear changes such as the use of dehooking devices is expected to result in a reduction in bycatch mortality. Furthermore, closures could reduce red snapper bycatch if there is some targeting of red snapper and fishermen can avoid locations where red snapper occur or fishing methods that select the species. However, it is difficult to quantify any of the measures in terms of reducing discards until the magnitude of bycatch has been monitored over several years.

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

Research and monitoring is needed to understand the effectiveness of proposed management measure in reducing bycatch. It is likely that a detailed monitoring program for red snapper will be implemented as part of the rebuilding program for the species in Amendment 17. Additional work is needed to determine the effectiveness of measures being implemented in Amendment 16, Amendment 17, and by future actions being proposed by the Council to reduce bycatch. Some observer information has recently been provided by MARFIN and Cooperative Research Programs but more is needed. Approximately 20 percent of commercial fishermen are asked to fill out discard information in logbooks; however, a greater percentage of fishermen could be

selected with emphasis on individuals that dominate landings. Furthermore, the use of electronic logbooks could be enhanced to enable fishery managers to obtain information on species composition, size distribution, geographic range, disposition, and depth of fishes that are released. Amendment 18, which is being developed, identifies additional measures to enhance data collection programs in the South Atlantic. Additional administrative and enforcement efforts will be needed to implement and enforce these regulations.

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

Preferred management measures, including those that are likely to increase discards as well as those that are likely to decrease discards could result in social and/or economic impacts as discussed in Section 4.

4.2.9 Changes in the Distribution of Benefits and Costs

Attempts were made to ensure reductions provided by preferred management measures are equal in the commercial and recreational sectors. The closures considered in the interim rule would apply to both sectors. The extent to which these management measures will increase or decrease the magnitudes of discards is unknown. It is possible that the number of discards may increase. However, this depends on a) if fishermen shift effort to other species, seasons, or fisheries, and b) if effort decreases in response to closures as well as changes in community structure and age/size structures that could result from ending overfishing.

4.2.10 Social Effects

The Social Effects of all the alternatives, including those most likely to reduce bycatch are described in Section 4.

4.2.11 Conclusion

This section evaluates the practicability of taking additional action to minimize bycatch and bycatch mortality in the South Atlantic snapper-grouper fishery using the ten factors provided at 50 CFR 600.350(d)(3)(i). In summary, the alternatives considered affecting both commercial and recreational fisheries for red snapper could help to minimize bycatch of red snapper by causing fishermen to avoid red snapper hotspots or change fishing behavior to avoid catching these species. It is possible that these alternatives could increase the number of discards. However, this depends on if fishermen shift effort to other species, seasons, or fisheries and if effort decreases in response to more restrictive management measures as well as changes in community structure and age/size structures that could result from ending overfishing. Furthermore, overall fishing effort could decrease in the commercial and recreational sectors in

response to more restrictive management measures being implemented in Amendment 16, thereby reducing the potential for bycatch.

Red snapper could continue to be caught when species with fewer regulations are targeted. However, fishermen may be able to avoid areas where a restricted species occurs thereby reducing the potential for bycatch. Reduced fishing pressure on red snapper in the interim rule would be expected to result in an increase in the mean size and age, as well as the population biomass of the species. Overlapping seasonal closures with red porgy, greater amberjack, mutton snapper that are currently in place, as well as seasonal closures for vermilion snapper, gag, and shallow-water groupers to be implemented in Amendment 16, could be expected to reduce bycatch and fishing mortality of many species that co-occur with red snapper. The relative abundance, size structure, and age structure of other species in reef communities could be expected to change in response to reduced fishing pressure on red snapper in the interim rule as well as potential shifts in effort. Thus, ecological changes could occur in the community structure of reef ecosystems through actions that would reduce overfishing. These ecological changes could affect the nature and magnitude of bycatch over time.

Amendment 17 to the Snapper-Grouper FMP and the Comprehensive ACL Amendment could propose additional measures to reduce bycatch in the snapper-grouper fishery. For example, species grouping based on biological, geographic, economic, taxonomic, technical, social, and ecological factors could be proposed in the Comprehensive ACL Amendment. Each group could be represented by an indicator species, which has been recently assessed or is scheduled for a SEDAR assessment in the future.

4.3 Cumulative Effects

The magnitude and significance of environmental consequences of the proposed interim Federal action are analyzed in the context of the cumulative effects of other past, present, and reasonably foreseeable future actions. Verifying the cumulative environmental consequences of the proposed interim federal action requires delineating the relationship between multiple actions and the resources, ecosystems, and human communities of concern. The cumulative effects of the alternatives are analyzed by combining (a) the direct effects of the alternatives and (b) the indirect effects of the alternatives with (c) the effects of exogenous factors, as modified by (b). The cumulative effects on the physical, social and economic environments, habitat, protected species and the resources are described below.

4.3.1 Physical Environment

The immediate impact area of this interim rule is the federal 200-nautical mile limit of the Atlantic off the coasts of North Carolina, South Carolina, Georgia, and east Florida to Key West. Since the boundaries are solely political in nature and do not prohibit immigration and emigration of fish, and fish larvae, the geographic scope of the cumulative effects analysis must be expanded.

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. The cumulative effect analysis cannot establish geographical boundaries in terms of coordinates, but recognizes that the proper geographical boundary to consider effects on the biophysical environment is larger than the entire South Atlantic 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.

Past management of the snapper-grouper fishery, this interim rule, and potential future management of the snapper-grouper fishery is not likely to have negative impacts on the physical environment. The fishery is believed to have minimal impact on bottom habitat and would not result in long term modification of the physical environment. Recent actions taken with regard to the snapper-grouper fishery will likely result in a reduction in fishing effort which could decrease chances for damage to physical habitat.

4.3.2 Habitat and EFH

Reductions in overall fishing effort, as a result of past and current fishery management actions are thought to have had a positive impact on habitat and EFH. This interim rule would result in a decrease in fishing effort for the 2009 fishing year and future management measures proposed in Amendment 16, Amendment 17, and the Comprehensive Ecosystem-Based Amendment are also expected to reduce effort in the snapper-grouper fishery. The Comprehensive Ecosystem-Based Amendment (under development) will establish deepwater Coral Habitat Areas of Particular Concern, which is intended to protect coral habitat from destruction due to bottom tending gear and fishing.

4.3.3 Fishery Resources

Past and future fishery management actions taken through the FMP process are thought to have had a positive effect on the managed resources. It is anticipated that future management actions could result in additional indirect positive effects on the managed species through actions which reduce and monitor bycatch, protect habitat, and protect ecosystem services. This interim action will implement a closure which may coincide with a summer spawning season, which would have positive impacts on the red snapper stocks. Future actions proposed in Amendment 17 (under development) would implement management measures to end overfishing and rebuild the red snapper stock consistent with the guidance of the Magnuson-Stevens Act.

4.3.4 Protected Resources

A description of the protected resources in the action area and the effects determinations can be found in Section 3.3. An ESA consultation conducted in 2006 determined that the snapper-grouper fishery is not likely to adversely affect protected species (NMFS 2006). Past and future fishery management actions taken through the FMP process are thought to have had a positive

effect on the protected species as they tend to reduce fishing effort in the area which would reduce any chance for interaction with fishing gear.

4.3.5 Social and Economic Environment

The snapper-grouper fishery is a highly regulated fishery and continues to be the subject of new management measures from NOAA Fisheries Service. Section 1.7 describes amendments to the snapper-grouper FMP under development, which could impact the social and economic environments of the snapper-grouper fishery and communities. However, the interim rule described in this EA would have the most negative effects on communities which target red snapper exclusively. The negative effects associated with this interim rule as well as previous and subsequent management measures are necessary to address overfishing of snapper-grouper species. Without these measures, long term management of the fishery may become more restrictive to fishermen and burdensome on the agency.

4.3.6 Summary of Cumulative Impacts

The proposed interim federal action is not expected to compound the cumulative effects on the physical, social and economic environments, habitat, protected species or the fishery resource. Therefore, there are no foreseeable significant additive or interactive effects as a result of the proposed interim federal action.

In terms of context and intensity, the proposed interim federal action is not anticipated to have any significant effects on the subject marine ecosystem, marine species or human community involved for the following reasons.

1) The limited nature of the proposed interim federal action. The proposed action is temporary and would impose a closure for four months or, the Council's preferred alternative of a 180 day closure (with the possibility of extension for an additional 186 days).
2) The interim closure may correspond with a spawning season of red snapper, which would allow resource protection from harvest during a particularly important life history stage.
3) Other fishery activities will be available to participants of the snapper-grouper fishery in federal waters during the seasonal closure. While retention of red snapper would be prohibited; harvest and retention of other snapper-grouper species would be allowed.
4) The closure may fall within a period of high fishing activity for the snapper-grouper fishery but this fishery tends not to target red snapper. Red snapper is primarily caught incidentally to other snapper-grouper species and fishermen can adjust fishing methods and locations to avoid red snapper.
5) Impacts of the closure in federal waters would be applied evenly to the recreational and commercial fishery sectors in the South Atlantic region. A sustainable and accessible red snapper resource would provide positive impacts to all snapper-grouper fishery participants in the South Atlantic.

In reference to past federal actions, the proposed action is interim in nature. Following the seasonal closure, the proposed interim federal action would maintain management measures currently under the snapper-grouper FMP, including commercial limited access system, minimum size limits and bag limits. No permanent change to the snapper-grouper FMP would be made by this interim action. However, the Council would develop permanent management measures to end overfishing of red snapper in Amendment 17.

The proposed interim federal action requires no long-term restrictions or operational adjustments to the fishery and, as such, is not anticipated to have any significant impacts that combine with previous impacts. Considering that the proposed interim federal action is temporary, potential economic impacts of the closure are insignificant because of their lack of intensity within the framework of the fishing sector as a whole.

When combined with the past and potential future management efforts, the overall direct and indirect effects of the proposed interim federal action do not produce significant cumulative impacts in the biological, administration and enforcement, economic, social, and cultural environments of the snapper-grouper fishery.

4.4 Unavoidable Adverse Effects

The alternatives explored in this environmental assessment would apply to the commercial and recreational red snapper fishery participants in the South Atlantic region. Under **Preferred Alternative 2 and Alternative 3**, the fishery would be subject to a closure to address overfishing of red snapper. During the closures, fishing for other snapper-grouper species would be permitted which would eliminate some of the adverse economic and social impacts associated with a seasonal closure. The management measures proposed would be temporary (180 days with a possible extension for 186 days) while permanent management measures to end overfishing of red snapper can be developed in Amendment 17.

4.5 Effects of the Fishery on the Environment

The biological impacts of the proposed actions are described in Section 4.0, including impacts on habitat. No actions proposed in this interim rule are anticipated to have any adverse impact on EFH or EFH-HAPCs for red snapper.

4.6 Damage to Ocean and Coastal Habitats

The alternatives and proposed interim rule are not expected to have any adverse effect on the ocean and coastal habitat.

4.7 Relationship of Short-Term Uses and Long-Term Productivity

The relationship between short-term uses and long-term productivity will be affected by this interim rule. The proposed management measures would restrict the harvest of red snapper in the short-term for both the commercial and recreational sectors of the fishery. However, reductions in harvest are expected to benefit the long-term productivity of these species.

4.8 Irreversible and Irretrievable Commitment of Resources

Irreversible commitments are defined as commitments that cannot be reversed, except perhaps in the extreme long-term, whereas irretrievable commitments are lost for a period of time. There are no irreversible commitments for this interim rule. While the proposed management measures would result in irretrievable losses in consumer surplus and angler expenditures, failing to take action would compromise the long-term sustainability of the stocks and would not meet the requirements of the Magnuson Stevens Act.

Since the Snapper-Grouper FMP and its implementing regulations are always subject to future changes, proceeding with the implementation of an interim rule does not represent an irreversible or irretrievable commitment of resources. NOAA Fisheries Service always has discretion to amend its regulations and may do so at any time, subject to the Administrative Procedures Act, the Magnuson-Stevens Act and other applicable laws.

4.9 Monitoring and Mitigation Needs

The proposed actions would adversely affect immediate, short-term net revenues of some commercial and for-hire fishermen in the South Atlantic. The proposed management measures would also adversely affect short-term consumer surplus of some recreational anglers in the South Atlantic and may result in cancelled trips and reduced expenditures to the fishery and associated industries. However, it is anticipated reductions in fishing pressure, which will reduce the likelihood that these stocks will be declared overfished, will assist in restoring the size and age structure to more natural conditions and allow stock biomass to increase to more sustainable and productive levels.

As a result, the amount of fish that can be harvested should increase as the stocks rebuild. The short-term, adverse effects of ending overfishing can be mitigated to some degree by the type of regulations the Council selects to manage reduced catch levels in Amendment 17.

4.10 Unavailable or Incomplete Information

The Council on Environmental Quality, in its implementing regulations for the National Environmental Policy Act, addressed incomplete of unavailable information at 40 CFR 1502.22 (a) and (b). That direction has been considered. There are two tests to be applied: (1) does the

incomplete or unavailable information involve “reasonable foreseeable adverse effects…” and (2) is the information about these effects “essential to a reasoned choice among alternatives…”.

Stock assessments have been conducted on red snapper using the best available data. Status determinations for these species were derived from the SEDAR process, which involves a series of three workshops designed to ensure each stock assessment reflects the best available scientific information. The findings and conclusions of each SEDAR workshop are documented in a series of reports, which are ultimately reviewed and discussed by the Council and their Scientific and Statistical Committee (SSC). SEDAR participants, the Council advisory committees, the Council, and NMFS staff reviewed and considered any concerns about the adequacy of the data. The Council’s SSC and the SEFSC determined the red snapper stock assessment is based on the best available data.

The Council’s Snapper-Grouper Committee and SSC acknowledged, while stock assessment findings are uncertain, there is no reason to assume such uncertainty leads to unrealistically optimistic conclusions about stock status. Rather, the stocks could be in worse shape than indicated by the stock assessment. Uncertainty due to unavailable or incomplete information should not be used as a reason to avoid taking action. Therefore, there are reasonable foreseeable significant adverse effects of not taking action to end overfishing. Failure to take action could result in a worsening of stock status, persistent foregone economic benefits, and more severe corrective actions to end overfishing in the future.

5 Regulatory Impact Review

5.0 Regulatory Impact Review

5.1 Introduction

NOAA Fisheries Service conducts a Regulatory Impact Review (RIR) as required by Executive Order 12866, as amended. The RIR: (1) Provides a comprehensive review of the incidence and level of impacts associated with a proposed or final regulatory action; (2) provides a review of the problems and the policy objectives prompting the regulatory proposals and an evaluation of alternatives that could be used to solve the problem; and (3) ensures that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost-effective way.

The RIR provides the information needed to determine if the proposed regulations constitute a significant regulatory action under Executive Order 12866 and serves as the basis for determining if the action will have a significant economic impact on a substantial number of small entities as per the requirements of the Regulatory Flexibility Act. This RIR analyzes the expected economic effects of the proposed interim prohibition of the harvest (retention) and sale of red snapper in the South Atlantic commercial and recreational fisheries.

5.2 Problems and Objectives

The purpose and need of this action are discussed in Section 1.4 and are incorporated herein by reference. In summary, red snapper in the South Atlantic region are undergoing overfishing and are overfished according the current definition of the minimum stock size threshold. The Magnuson-Stevens Act requires the Council to prepare a plan amendment or proposed regulations to end overfishing within one year of notification that a stock is overfished.

Immediate, short-term, and focused federal action is needed to address overfishing of red snapper in the South Atlantic region while long-term management measures are developed and implemented in Amendment 17, if approved by the Secretary. The objective of this action is to reduce total commercial and recreational fishing mortality on red snapper in the South Atlantic region to immediately address overfishing of red snapper while permanent management measures can be developed to address the issue of overfishing in the long term.

5.3 Description of the Fisheries

A description of the South Atlantic red snapper fisheries is contained in Section 3.4.1 and is incorporated herein by reference.

5.4 Methodology and Framework for Analysis

The methodology and framework for this analysis is described in Section 4.1.2 and is incorporated herein by reference.

5.5 Impacts of the Proposed Action

The proposed action would prohibit the harvest (retention) and sale of red snapper in the South Atlantic commercial and recreational fisheries. This prohibition could stay in effect for 180 days and could be extended for an additional 186 days, thereby remaining in effect for one full year. Detailed discussion of the expected economic effects of this action is contained in Section 3.4.1 and is incorporated herein by reference. In summary, the proposed action, assuming an implementation date of July 1, is expected to result in the reduction in short term net operating revenues (NOR) to commercial snapper grouper fishing vessels of approximately $120,000 (2007 dollars), a reduction in short term NOR to charterboat vessels of approximately $247,000 (2008 dollars), a reduction in short term NOR to headboat vessels of approximately $1.76 million (2008 dollars), and a reduction in short term consumer surplus to recreational anglers of approximately $2.35 million (2008 dollars). Extension of the prohibition to a full year would increase these effects to approximately $289,000, $427,000, $4.0 million, and $5.04 million, respectively. These results would vary by an indeterminate amount if implementation of the proposed action is delayed beyond July 1 (after July 1 but prior to August 1). Estimates of the expected effects of alternative monthly implementation dates (starting on July 1, August 1, etc.) are provided in Section 3.4.1.

Because of the assessment methodology employed, the estimates of the expected change in the NOR for for-hire vessels are considered extreme upper bounds. The results assume 100 percent cancellation of all red snapper target trips by recreational anglers that fish from charterboats or headboats. Further, because target intent is not included in the headboat data (the charterboat data included target intent), all headboat angler days in primary red snapper harvest areas were assumed to be red snapper target trips when, in fact, this is not likely to be true (many anglers want to fish and catch whatever is available and not all trips would be expected to occur where red snapper are a likely harvest species). As a result, the tabulation of red snapper target effort for the headboat sector is expected to overestimate the actual number of target trips. Further, the relatively minor apparent importance of red snapper as a target species in the South Atlantic, as demonstrated by the low incidence of either target or catch effort (see Section 3.4.1.2.2) and ranking within bags or total harvest (see Section 3.4.1.2.1), suggests there is little reason to expect widespread reduction in fishing trips from historic levels, in lieu of continued fishing for other species, in the event of the imposition of a zero bag limit for red snapper. As a result, the assumption that all red snapper target trips would be expected to be cancelled overestimates the actual number of trip cancellations that would be expected to occur. The combination of the overestimation of target effort and the overestimation of trip cancellations likely results in the estimate of the change in NOR for the for-hire sector to be an extreme upper bound. Available data, however, does not support the identification of more reasonable estimates of the appropriate parameters.

5.6 Public and Private Costs of Regulations

The preparation, implementation, enforcement, and monitoring of this or any federal action involves the expenditure of public and private resources which can be expressed as costs associated with the regulations. Costs associated with this action include:

Council costs of document preparation, meetings, public hearings, and information dissemination 0

NMFS administrative costs of document preparation, meetings, and review .....$ 50,000

Law enforcement costs 0

TOTAL .....$ 50,000

Because this is an interim rule, the document preparation, review, and administrative costs are limited to NMFS staff. Although the implementation of a new regulation may result in re-allocation of law enforcement time and priorities, no additional costs have been identified as necessary to enforce the proposed action.

5.7 Determination of Significant Regulatory Action

Pursuant to E.O. 12866, a regulation is considered a "significant regulatory action" if it is likely to result in: (1) An annual effect of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities; (2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; (3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights or obligations of recipients thereof; or (4) raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this executive order. Based on the information provided above, this regulatory action has been determined to not be economically significant for purposes of E.O. 12866.

6 Regulatory Flexibility Act Analysis

6.1 Introduction

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

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

In addition to the information provided in this section, additional information on the expected economic impacts of the proposed action are included in Sections 4.0 and 5.0 and is included herein by reference.

6.2 Statement of Need for, Objectives of, and Legal Basis for the Rule

The purpose and objectives of this proposed interim rule are presented in Section 1.4 and are incorporated herein by reference. In summary, red snapper in the South Atlantic region are undergoing overfishing and are overfished. This proposed interim rule will reduce red snapper overfishing while long-term management measures are developed and implemented. The Magnuson-Stevens Act provides the statutory basis for the proposed rule.

6.3 Identification of All Relevant Federal Rules Which May Duplicate, Overlap or Conflict with the Proposed Rule

No duplicative, overlapping, or conflicting federal rules have been identified.

6.4 Description and Estimate of the Number of Small Entities to Which the Proposed Rule will Apply

This proposed interim rule is expected to directly impact commercial fishers and for-hire operators. The Small Business Administration has established size criteria for all major industry sectors in the U.S. including fish harvesters and for-hire operations. A business involved in fish harvesting is classified as a small business if it is independently owned and operated, is not dominant in its field of operation (including its affiliates), and has combined annual receipts not in excess of $4.0 million (NAICS code 114111, finfish fishing) for all its affiliated operations worldwide. For for-hire vessels, the other qualifiers apply and the annual receipts threshold is $7.0 million (NAICS code 713990, recreational industries).

From 2003-2007, an average of 220 vessels per year were permitted to operate in the commercial snapper-grouper fishery and recorded landings of red snapper, ranging from a high of 236 vessels in 2003 to a low of 206 vessels in 2006. Total dockside revenues from all species on all

recorded trips by these vessels averaged $9.78 million (2007 dollars) over this period, resulting in a per vessel average of approximately $44,500. The highest per vessel average occurred in 2007 at approximately $54,600. An average of 34 vessels per year harvested more than 1,000 pounds of red snapper per year. Based on these average revenue figures, it is determined, for the purpose of this assessment, that all commercial vessels that would be affected by this proposed interim rule are small entities.

Unlike the commercial sector, red snapper harvest activity cannot be associated with individual vessels in the for-hire sector. The harvest of red snapper in the EEZ by for-hire vessels requires a snapper grouper for-hire permit. From 2003-2007, an average of 1,635 vessels per year were permitted to operate in the snapper grouper for-hire fishery, of which 82 are estimated to have operated as headboats. The for-hire fleet is comprised of charterboats, which charge a fee on a vessel basis, and headboats, which charge a fee on an individual angler (head) basis. The annual average gross revenue for charterboats is estimated to range from approximately $80,000-$109,000 (2007 dollars) for Florida vessels, $94,000-$115,000 for North Carolina vessels, $88,000-$107,000 for Georgia vessels, and $41,000-$50,000 for South Carolina vessels. For headboats, the appropriate estimates are $220,000-$468,000 for Florida vessels, and $193,000-$410,000 for vessels in the other states. Based on these average revenue figures, it is determined, for the purpose of this assessment, that all for-hire operations that would be affected by this action are small entities.

Some fleet activity may exist in both the commercial and for-hire snapper grouper sectors, but the extent of such is unknown and all vessels are treated as independent entities in this assessment.

6.5 Description of the Projected Reporting, Record-keeping and Other Compliance Requirements of the Proposed Rule, Including an Estimate of the Classes of Small Entities Which will be Subject to the Requirement and the Type of Professional Skills Necessary for the Preparation of the Report or Records

This proposed interim rule would not establish any new reporting, record-keeping, or other compliance requirements.

6.6 Substantial Number of Small Entities Criterion

This proposed interim rule would be expected to directly affect all vessels that harvest red snapper in the commercial snapper grouper fishery and potentially all vessels that have a federal snapper-grouper for-hire permit. All affected entities have been determined, for the purpose of this analysis, to be small entities. Therefore, it is determined that the proposed interim rule would affect a substantial number of small entities.

6.7 Significant Economic Impact Criterion

The outcome of "significant economic impact" can be ascertained by examining two issues: disproportionality and profitability.

Disproportionality: Do the regulations place a substantial number of small entities at a significant competitive disadvantage to large entities?

All entities that would be expected to be affected by the proposed rule are considered small entities so the issue of disproportionality does not arise in the present case.

Profitability: Do the regulations significantly reduce profit for a substantial number of small entities?

This proposed interim rule to prohibit the harvest and sale of red snapper for 180 days would be expected to result in a short-term reduction in net operating revenues (NOR; trip revenues minus non-labor trip costs) to commercial snapper grouper vessels of approximately $120,000 (2007 dollars). This reduction in NOR would be expected to increase to a cumulative total of $289,000 if the proposed prohibition is extended an additional 186 days, resulting in a prohibition for one full year. An average of 220 commercial vessels per year have recorded landings of red snapper. The proposed interim rule would be expected to result in an average reduction in NOR of approximately $450 per vessel for the proposed 180-day prohibition, and approximately $1,300 per vessel if the prohibition is extended to a full year. The average vessel with recorded red snapper harvests is estimated to receive approximately $44,500 in dock-side revenues per year from all species harvested.

For the headboat sector, the proposed interim rule would be expected to result in a short-term reduction in NOR by a maximum of $1.76 million (2008 dollars). This reduction in NOR would be expected to increase to a cumulative maximum total of $3.96 million if the proposed prohibition is extended an additional 186 days. Although 82 vessels are estimated to operate in the snapper-grouper fishery, red snapper target activity is believed to be concentrated in Georgia and northeast Florida (Mayport south through the Cape Canaveral area) where 16 headboats operate. Approximately 70 percent of all red snapper harvested (pounds) by the headboat sector from 2003-2007 were harvested by anglers fishing on Georgia and northeast Florida headboats. The expected maximum reduction in NOR is based on the assumption that all angler trips on these 16 vessels during the respective period target red snapper and equals the change in NOR if all these trips were lost. This; however, is a worst case scenario. An unknown number of these trips would likely not target red snapper (many anglers fish to catch whatever species is available) and red snapper has historically comprised only three percent of the total number of fish harvested and 11 percent of the total number of pounds of fish harvested by vessels in this area. As a result, it is unlikely that all or necessarily a large portion of these trips would be canceled. Available data; however, does not support the identification of more reasonable estimates of the number of red snapper target trips or the expected rate of trip cancellation and the projected estimates of the expected change in NOR should be considered extreme upper bounds.

The effective average reduction in NOR per headboat vessel is similarly difficult to project. Under the worst case scenario, the cancellation of all angler trips on Georgia and northeast Florida vessels (16) would result in a 100 percent loss of NOR for this period of time (180 days), or approximately 44 percent of annual total NOR ($1.76 million/$3.96 million). However, if the upper bound of effects ($1.76 million) is assumed to also encompass trip cancellation on vessels outside this area, it is unknown how many additional vessels should be included in the analysis. The South Carolina headboat fleet, which contains 14 vessels, accounts the next highest red snapper harvests after the Georgia and northeast Florida fleet. If the maximum expected reduction in NOR is spread over all 30 vessels in these areas, the average expected reduction in

NOR per vessel would be approximately $58,700. This would increase to approximately $132,000 under an annual prohibition. The average annual gross revenue for Florida headboats is estimated to be $220,000-$468,000, and $193,000-$410,000 for vessels in the other states.

For the charterboat sector, the proposed interim rule would be expected to result in a short-term reduction in NOR of approximately $247,000 (2008 dollars) and increase to a cumulative total of approximately $427,000 if the proposed prohibition is extended an additional 186 days. It should be noted that, although target data are available for the charterboat sector, trip cancellation data are not available and the analysis assumes, similar to the analysis of the headboat sector, that all charterboat red snapper target effort will be cancelled. As in the headboat sector, the cancellation of all red snapper target effort in the charterboat sector is unlikely to occur and, as a result, the estimates of the expected change in NOR in the charterboat sector likely overestimate the actual that would occur.

Vessel-level data is unavailable for the charterboat sector. As a result, it is not known how many vessels would be affected by the proposed interim rule. An estimated 1,553 charterboats are permitted to operate in the snapper-grouper fishery, which allows these vessels to harvest red snapper (1,635 total vessels with snapper grouper for-hire permits, of which 82 are estimated to operate as headboats). If the proportion of charterboats that would be expected to be affected by the proposed interim rule is assumed to equal the proportion of headboats constituting the core red snapper vessels (16 vessels out of 82 headboats, or 19.5 percent), then approximately 303 charterboats (19.5 percent of 1,553 vessels) would be expected to be affected. This would result in an average reduction in NOR of approximately $800 per vessel, which would increase to approximately $1,400 under an annual prohibition. The annual average gross revenue per charterboat is estimated to range from approximately $80,000-$109,000 (2007 dollars) for Florida vessels, $94,000-$115,000 for North Carolina vessels, $88,000-$107,000 for Georgia vessels, and $41,000-$50,000 for South Carolina vessels.

6.8 Description of Significant Alternatives

Three alternatives, including the status quo, were considered for this proposed interim rule. The proposed action would prohibit the harvest (retention) and sale of red snapper in the South Atlantic commercial and recreational fisheries for 180 days, with extension potential for another 186 days. The first alternative to the proposed action, the status quo, would not prohibit the harvest and sale of red snapper, would not reduce overfishing of red snapper while long-term management measures are developed and implemented, and would not achieve NMFS's objective.

The second alternative to the proposed prohibition on the harvest and sale of red snapper would only establish a four month seasonal closure. A four month seasonal closure could not be extended and would not be expected to allow sufficient time for the development and implementation of long-term management measures to protect red snapper. As a result, this alternative would not achieve NMFS's objective.

7 List of Preparers

Name	Title	Agency	Division	Location
Rick DeVictor	Environmental Impact Scientist	SAFMC	N/A	SAFMC
Karla Gore	Natural Resource Management Specialist	NMFS	SF	SERO
Stephen Holiman	Economist	NMFS	Socio-Economic	SERO
Mike Jepson	Anthropologist	NMFS	Socio-Economic	SERO
Jack McGovern	Fishery Biologist	NMFS	SF	SERO
Nikhil Mehta	Fishery Management Specialist	NMFS	SF	SERO
Monica Smit-Brunello	Attorney Advisor	NOAA	GC	SERO
Jim Waters	Economist	NMFS	Economics	SEFSC

8 List of Agencies, Organizations, and Persons To Whom Copies of the Statement Are Sent

Responsible Agency
Interim Rule and Environmental Assessment:
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 Consulted
SAFMC Law Enforcement Advisory Panel
SAFMC Snapper-Grouper Advisory Panel
SAFMC Marine Protected Areas Advisory Panel
SAFMC Coral Advisory Panel
SAFMC Habitat and Environmental Protection 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
Gulf of Mexico Fishery Management Council
National Marine Fisheries Service
- Washington Office
- Office of Ecology and Conservation
- Southeast Regional Office
- Southeast Fisheries Science Center

9 REFERENCES

Allen, G.R. 1985. FAO species catalogue. Vol. 6. Snappers of the world. An annotated and illustrated catalogue of lutjanid species known to date. FAO Fish. Synop. 6(125): 208 pp.

Allman, R. J., G. R. Fitzhugh, and W. A. Fable. 2002. Report of Red Snapper Otolith Aging; 2000 Data Summary. NMFS, SFSC, Panama City Laboratory Contribution Series: 02-02. 18 p.

Blount, B. 2006. Factors Affecting Participation in Marine Fisheries: Case Studies in Georgia and North Carolina. Final Report, NOAA Grant Number: NA04NMF4330316. NOAA Fisheries, Southeast Regional Office, St. Petersburg, Florida.

Burns, K.M., C.C. Koenig, and F.C. Coleman. 2002. Evaluation of multiple factors involved in release mortality of undersized red grouper, gag, red snapper, and vermilion snapper. Mote Marine Laboratory Technical Report No. 790.

Burrell, V. G. 2000. The recreational fishery in South Carolina: The Little River Story. Educational Report 19, South Carolina Department of Natural Resources, Marine Resources Research Institute, Charleston, SC.

Cheuvront, B. and M. Neal. 2004. A Social and Economic Analysis of Snapper Grouper Complex Fisheries in North Carolina South of Cape Hatteras. A report for the NC Technical Assistance to the SAFMC, Task 5: NEPA Related Activities, Contract No. SA-03-03-NC. Morehead City, NC.50 pages.

Coastal Ocean Resource Economics 2005 (http://marineeconomics.noaa.gov/NSRE/NSRE2005.html)

Garrity-Blake, Barbara and Barry Nash. (no date) Inventory of Fish Houses in North Carolina. North Carolina Sea Grant. http://www.ncseagrant.org/home/coastal-connections/coastal-business/commercial-fishing

Gentner, B., M. Price, and S. Steinback. 2001. Marine Angler Expenditures in the Southeast Region, 1999. NOAA Technical Memorandum NMFS-F/SPO-48.

GSAFFI. 2008. Catch Characterization and Discards within the Snapper Grouper Vertical Hook-and-Line Fishery of the South Atlantic United States. Final Report, Cooperative Agreement No: NA06NMF4540059 (GSAFFI #99). Gulf and South Atlantic Fisheries Foundation, Inc. Tampa, Florida.

Grimes, C.B. 1987. Reproductive biology of the Lutjanidae: a review. Pages 239-294 In J.J. Polovina and S. Ralston (eds.) Tropical snappers and groupers: biology and fisheries management. Westview Press. Boulder, Colorado.

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

Holiman, S.G. 1996. Estimating Recreational Effort Using the Marine Recreational Fishing Statistics Survey. NOAA Technical Memorandum NMFS-SEFSC-389.

Holland, S. M., A. J. Fedler, and J. W. Milon. 1999. The Operation and Economics of the Charter and Headboat Fleets of the Eastern Gulf of Mexico and South Atlantic Coasts. University of Florida Office of research, Technology, and Graduate Education. Report prepared for the National Marine Fisheries Service. Grant Number NA77FF0553.

Jepson, M., K. Kitner, A. Pitchon, W.W. Perry, and B. Stoffle. 2005. Potential fishing communities in the Carolinas, Georgia, and Florida: An effort in baseline profiling and mapping. NOAA Technical Report No. (TBD).

MacIntyre, I.G. and J.D. Milliman. 1970. Physiographic features on the outer shelf and upper slope, Atlantic continental margin, southeastern United States. Geological Society of America Bulletin 81:2577-2598.

Manooch, C. S., III, and J. C. Potts. 1997. Age and growth of red snapper, Lutjanus campechanus, Lutjanidae, collected along the southeastern United States from North Carolina through the east coast of Florida. J. Elisha Mitchell Sci. Soc. 113: 111-122.

Manooch, C.S., III, J.C. Potts, M.L. Burton, and D.S. Vaughan. 1998. Population assessment of the vermilion snapper, *Rhomboplites aurorubens*, from the southeastern United States. NOAA Technical Memorandum NMFS–SEFSC–411. 59pp.

McCay, B. and M. Cieri. 2000. Fishing Ports of the Mid-Atlantic. Final Report, Mid-Atlantic Fishery Management Council, Dover Delaware. (The reference should probably read McCay and Cieri 2000)

NMFS (National Marine Fisheries Service). 2005. Stock Assessment and Fishery Evaluation Report for the Snapper Grouper Fishery of the South Atlantic. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. Available at http://sero.nmfs.noaa.gov.

NMFS (National Marine Fisheries Service). 2006. Endangered Species Act Section 7 consultation on the Continued Authorization of snapper grouper Fishing under the South Atlantic Snapper Grouper Fishery Management Plan (RFFMP) and Proposed Amendment 13C. Biological Opinion. June 7.

NOAA. 2008. Analysis of the Expected Economic Effects of the August 5 Closure of the 2008 Red Snapper Recreational Fishery in the Federal Waters of the Gulf of Mexico. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Regional Office. 57 pp including appendices.

North Carolina Sea Grant. 2007 Waterfront Access Study Committee Final Report. UNC-SG-07-03.

Poffenberger, J. 2004. A Report on the Discard Data from the Southeast Fisheries Science Center's Coastal Fisheries Logbook Program.

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

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

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

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

SAFMC (South Atlantic Fishery Management Council). 2003. Amendment Number 13A, Final Environmental Assessment, Initial Regulatory Flexibility Analysis/Regulatory Impact Review, and Social Impact Assessment/Fishery Impact Statement for the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South

Atlantic Fishery Management Council, 1 Southpark Cir., Ste 306, Charleston, S.C. 29407-4699. 177 pp.

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

SAFMC (South Atlantic Fishery Management Council). 2008a. Amendment Number 15A, Final Environmental Impact Statement, Initial Regulatory Flexibility Analysis/Regulatory Impact Review, and Social Impact Assessment/Fishery Impact Statement for the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 4055 Faber Place, Ste 201, North Charleston, S.C. 29405. 325 pp.

SAFMC (South Atlantic Fishery Management Council). 2008b. Amendment Number 15B, Final Environmental Impact Statement, Initial Regulatory Flexibility Analysis/Regulatory Impact Review, and Social Impact Assessment/Fishery Impact Statement for the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 4055 Faber Place, Ste 201, North Charleston, S.C. 29405. 325 pp.

SAFMC (South Atlantic Fishery Management Council). 2008c. Amendment Number 16, Final Environmental Impact Statement, Initial Regulatory Flexibility Analysis/Regulatory Impact Review, and Social Impact Assessment/Fishery Impact Statement for the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council, 4055 Faber Place, Ste 201, North Charleston, S.C. 29405.

SEDAR 15 2008 Stock Assessment Report 1 of South Atlantic Red Snapper. Results of a series of workshops February 2008. South Atlantic Fishery Management Council, One Southpark Circle #306, Charleston, SC 29414. Available from the SEDAR website: www.sefsc.noaa.gov/sedar/ 397 pp.

Szedlmayer, S.T. and J.D. Lee. 2004. Diet shifts of juvenile red snapper (*Lutjanus campechanus*) with changes in habitat and fish size. Fish. Bull. 102:366–375 (2004).

Waters, J.R., R.J. Rhodes, W. Waltz, and R. Wiggers. 1997. Executive Summary: An economic survey of commercial reef fish boats along the U.S. South Atlantic Coast. USDC/NOAA/NMFS and SCDNR. November 1997. Unpublished.

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

USDOC. 2009. Fisheries Economics of the United States 2006. Economic and Sociocultural Status and Trend Series. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 157 pp.

Zhao, B. and J.C. McGovern. 1997. Temporal variation in sexual maturity and gear-specific sex ratio of the vermilion snapper, *Rhomboplites aurorubens*, in the South Atlantic Bight. Fish. Bull. 95: 837-848.

Zhao, B., J.C. McGovern, and P.J. Harris. 1997. Age, growth, and temporal change in size-at-age of the vermilion snapper from the South Atlantic Bight. Trans. Am. Fish. Soc. 126:181-193.