Rapid Assessment of the Governance System's Ability to Respond to Climate Change

Version 2.0

Revised through March, 2015

Version 1.0 developed for the March 19-21 2014 East Coast Climate Change and Fishery Governance Workshop

South Atlantic Fishery Management Council

Introduction

Overview

The following rapid assessment approach and compiled document were developed to inform the agenda and discussions at the East Coast Climate Change and Fisheries Governance Workshop, March 19-21, 2014 in Washington, DC. This workshop will be hosted by the Mid-Atlantic Fishery Management Council, and was developed in partnership with the New England Fishery Management Council, South Atlantic Fishery Management Council, Atlantic States Marine Fisheries Commission and NOAA Fisheries, with coordination and facilitation support provided by the Fisheries Leadership & Sustainability Forum (Fisheries Forum).

The purpose of these rapid assessments is to describe the current state of knowledge regarding climate change impacts and concerns for managed fisheries, and in particular to help identify intersections with the workshop focus on management and governance. These initial rapid assessments were completed by council and Commission staff, and represent an investment of their time as well as an effort to share their experience and insight. The assessments are not intended to be comprehensive; rather they are a first pass at gathering information, and will serve as living documents that can be refined and updated over time to incorporate new information and perspectives.

Approach

Fisheries Forum staff, the workshop steering committee and Atlantic States Marine Fisheries Commission (ASMFC) staff collaborated to develop a data collection template. The templates are comprised of a set of questions designed to capture information on a) observed or potential impacts on managed stocks and/or fisheries from climate change; b) management measures and communication/ coordination mechanisms in place; and c) perceptions of the ability of the governance system to address/respond to current or future climate impacts.

The initial data collection template contained two numerical ranking questions to gauge climate vulnerability and the adaptability of management measures. Assigning a numerical value to these questions was valuable to help articulate current thinking on these issues. However, given that the purpose of this assessment was not to compare fisheries, these numerical rankings have been removed and/or characterized qualitatively to better highlight the insights provided by council staff in their discussion of these questions. Several terms found in the rapid assessment, such as “vulnerability” and “adaptation”, have a number of different meanings. These terms have been left undefined in the rapid assessment, and thus responses to the assessment questions may reflect different perspectives on what we mean by these terms and how we measure them.

Current and Future Use

The process of conducting the rapid assessment, and the information contained in the assessments contribute to climate change governance discussions in several ways. First, the responses contained in the rapid assessments have been a valuable input in the development and design of the workshop. The assessments are helpful for framing workshop discussions, and are provided as a reference for workshop participants. Second, the information provided by council and Commission staff in the assessments, along with broader scoping efforts by Fisheries Forum staff, was distilled into a discussion document provided to workshop participants prior to the workshop. The discussion document highlights many of the themes that emerged from looking at the assessments across all council and Commission managed species, and helps to succinctly communicate the value of these assessments in support of the workshop. Finally, these regional rapid assessment documents can be used as a platform to capture additional insights and information, and serve as a "living document" that can be used to support future discussions around climate change and its governance implications.

If you have questions or comments regarding the rapid assessment in regard to the East Coast Climate Change and Governance Workshop, please contact Katie Latanich with the Fisheries Leadership & Sustainability Forum (cal7@duke.edu). If you have questions regarding the specific information contained in the individual assessments, please contact the appropriate member of council and/or Commission staff.

East Coast Climate Change and Fisheries Governance Workshop

March 19-21, 2014 – Washington, DC

Workshop objectives

The purpose of this workshop is to convene managers and staff of the New England Fishery Management Council (NEFMC), Mid-Atlantic Fishery Management Council (MAFMC), South Atlantic Fishery Management Council (SAFMC), Atlantic States Marine Fisheries Commission (ASMFC), and NOAA Fisheries (NMFS) to discuss the potential governance challenges arising from the impacts of climate change on East Coast marine fisheries. Specifically, workshop participants will work collaboratively to:

- Explore the existing and potential impacts of climate change on the management and governance of East Coast marine fisheries, with an emphasis on the policy implications of shifting fishery distributions and changing productivity;
- Evaluate processes for documenting and acknowledging climate-related changes and initiating a management response;
- Identify key management questions, concerns and information needs to guide future research and coordination between management bodies;
- Examine the flexibility of the existing management framework to accommodate climate-related governance challenges; and
- Discuss potential solutions and next steps for adapting and responding to climate change impacts, and opportunities to maintain a dialogue between East Coast fishery management partners.

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Spanish Mackerel

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Inter-state: ASMFC
- Regional: SAFMC and GMFMC
- Federal: NOAA Fisheries

The Gulf of Mexico and South Atlantic Fisheries Management Councils regulate Spanish and king mackerel through the joint Coastal Migratory Pelagics Fisheries Management Plan (FMP).

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Spanish mackerel is vulnerable to climate change. The estuarine dependent life history exposes early life stages to loss or degradation of estuarine habitat. In addition, Spanish would be affected by changes in river flow as they emigrate from the nursery grounds. As adults climate change could affect current, temperature and productivity in the offshore pelagic habitats impacting migration, schooling behavior, prey availability or spawning.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Considering the estuarine dependent nature of some key prey of Spanish mackerel, changes or loss of habitat associated with changing climate would potentially limit availability or production. Year class strength may also be correlated with ocean temperature and increased ocean temperatures could affect survival and distribution of larvae along shelf. As with king mackerel, upwelling event may affect the movement and availability and increased occurrence may have long-term impacts on the population.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

Effort that was once in the mackerel fishery could shift or increase directed effort on species in the snapper grouper complex.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

If populations or availability of prey for this species is reduced significantly, Spanish mackerel could be more vulnerable to changing oceanographic conditions and climate change.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

An increase in episodic upwelling events has been noted by fishermen to affect the movement/migration and availability. An increased occurrence may have long-term impacts on the population.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

If climate impacts productivity, it would directly impacted harvesters, dealers and processors, and secondarily consumers. If climate is contributing to lost productivity and/or availability, the economic impacts have the potential to be significant.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

There is little governance risk to the fishery if climate is impacting the stock because management can adapt quickly.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- After the commercial quota (total ACL x commercial allocation) is met or projected to be met, all harvest, possession, and retention is prohibited; all purchase and sale is prohibited. Payback of commercial overage only if overfished and the Total ACL is exceeded.
- If the recreational sector quota (total ACL x recreational allocation) is exceeded and the Total ACL is exceeded, the RA shall publish a notice to reduce the bag limit by the amount necessary to ensure recreational landings may achieve the recreational annual catch target (ACT), but do not exceed the recreational ACL, in the following fishing year. Recreational landings will be evaluated relative to the ACL based on a moving multi-year average of landings, as described in the FMP. Payback of recreational overage only if overfished and the Total ACL is exceeded.
- Commercial ACL - 3,880,000 lbs
- Recreational ACL - ACL: 6,580,000 lbs; ACT: 6,110,000 lbs
- Fishing Year: March 1- Feb 28
- Commercial Measures: 24" FL but can have 5% catch onboard undersized; complex trip limits in place
- Recreational Measures: 24" FL; 3-fish bag limit Georgia north; 2-fish bag limit Florida
- Spawning Season: April -September

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change? Explain.

Primary management measures can be readily adapted prior to and during the season to match king mackerel availability and fishery demands.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

Spanish mackerel are managed by the SAFMC in cooperation with MAFMC who serve on the Coastal Migratory Pelagic Species Committee and through the South Atlantic Board of ASMFC.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

The current governance system is sufficiently adaptable.

King Mackerel

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

The Gulf of Mexico and South Atlantic Fisheries Management Councils regulate Spanish and king mackerel through the joint Coastal Migratory Pelagics Fisheries Management Plan (FMP).

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

King mackerel is vulnerable to climate change. King life history exposes early life stages to variability of current, temperature and productivity in the offshore pelagic habitats.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Considering the estuarine dependent nature of some key prey of king mackerel, changes or loss of habitat associated with changing climate would potentially limit availability or production. Year class strength may also be correlated with ocean temperature and increased ocean temperatures could affect survival and distribution of larvae along shelf. In addition, upwelling event appear to affect the movement and availability of king mackerel and increased occurrence may have long-term impacts on the population.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

Effort that was once in the mackerel fishery could shift or increase directed effort on species in the snapper grouper complex.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

If populations or availability of prey for this species is reduced significantly, king mackerel could be more vulnerable to changing oceanographic conditions and climate change.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

An increase in episodic upwelling events has been noted by fishermen to affect the movement/migration and availability. An increased occurrence may have long-term impacts on the population.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

If climate is contributing to lost productivity and/or availability, the economic impacts have the potential to be significant.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

There is little governance risk to the fishery if climate is impacting the stock because management can adapt quickly.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- After the commercial quota (total ACL x commercial allocation) is met or projected to be met, all harvest, possession, and retention is prohibited; all purchase and sale is prohibited. Payback of commercial overage only if overfished and the Total ACL is exceeded.
- If the recreational sector quota (total ACL x recreational allocation) is exceeded and the Total ACL is exceeded, the RA shall publish a notice to reduce the bag limit by the amount necessary to ensure recreational landings may achieve the recreational annual catch target (ACT), but do not exceed the recreational ACL, in the following fishing year. Recreational landings will be evaluated relative to the ACL based on a moving multi-year average of

landings, as described in the FMP. Payback of recreational overage only if overfished and the Total ACL is exceeded.

- Commercial ACL - 3,880,000 lbs
- Recreational ACL - ACL: 6,580,000 lbs; ACT: 6,110,000 lbs
- Fishing Year: March 1 - Feb 28
- Commercial Measures: 24" FL but can have 5% catch onboard undersized; complex trip limits in place
- Recreational Measures: 24" FL; 3-fish bag limit Georgia north; 2-fish bag limit Florida
- Spawning Season: April -September

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

Primary management measures can be readily adapted prior to and during the season to match king mackerel availability and fishery demands.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

King mackerel are managed by the SAFMC in cooperation with MAFMC who serve on the Coastal Migratory Pelagic Species Committees.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

The current governance system is sufficiently adaptable.

Atlantic Group Cobia

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Cobia is moderately vulnerable to climate change. The estuarine dependent life history exposes early life stages to loss or degradation of estuarine habitat. As adults climate change could affect current, temperature and productivity in the offshore pelagic habitats impacting migration, schooling behavior, prey availability or spawning.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Considering the estuarine dependent nature of some key prey of cobia, changes or loss of habitat associated with changing climate would potentially limit availability or production. Year class strength may also be correlated with ocean temperature and increased ocean temperatures could affect survival and distribution of larvae along shelf. As with king mackerel, upwelling event may affect the movement and availability and increased occurrence may have long-term impacts on the population.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

Effort that was once in the mackerel fishery could shift or increase directed effort on cobia.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

If populations or availability of prey for this species is reduced significantly cobia could be more vulnerable to changing oceanographic conditions and climate change.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

An increase in episodic upwelling events has been noted by fishermen to affect the movement/migration and availability. An increased occurrence may have long-term impacts on the population.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

No social or economic concerns exist at present; however, if climate induced changes in oceanographic conditions occur, distribution, availability and production levels may change affecting fisheries targeting cobia.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

There is little governance risk to the fishery if climate is impacting the stock because management can adapt quickly.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- Commercial ACL - 125,712 lbs, Commercial Allocation – 8%
- Recreational ACL: 1,445,687 lbs ww; ACT: 1,184,688 lbs ww Recreational Allocation – 92%
- After the commercial quota is met or projected to be met, all harvest, possession, and retention is prohibited; all purchase and sale is prohibited. Payback of commercial overage only if overfished and the Total ACL is exceeded
- If the Total ACL is exceeded, the RA shall publish a notice to reduce the length of the following fishing year by the amount necessary to ensure landings meet the ACT but do not exceed the recreational sector quota for the following fishing year. The RA may also make further adjustments to the fishing year following an ACL overage during the next fishing year. If overfished the ACL and ACT for the

following season will also be reduced. Recreational landings will be evaluated relative to the ACL based on a moving multi-year average of landings, as described in the FMP.

- Commercial Measures - 33" FL; 2-fish possession limit; one day possession limit
- Recreational Measures - 33" FL; 2-fish bag limit; one day possession limit; charter & headboats require a CMP permit
- Commercial payback if total ACL is exceeded
- Recreational payback if total ACL is exceeded and overfished

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

Primary management measures can be readily adapted prior to and during the season to match cobia availability and fishery demands.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

Cobia is managed by the SAFMC in cooperation with MAFMC who serve on the Coastal Migratory Pelagic Species Committees.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

The current governance system is sufficiently adaptable.

Coral, Coral Reefs, and Live/Hard Bottom Coral

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

In combination, the benthic species are or will be impacted by changing oceanographic conditions associated with a changing climate. Changes in overall ocean currents, temperature, acidification, and increased episodic events including upwelling, tropical and winter storms will, in combination, affect the survival, growth, spawning and subsequent distribution of coral and live bottom species and subsequently species which depend on this habitat.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

N/A.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

These species are managed as habitat and changes in their survival or distribution will reduce the function as essential habitat for many pelagic and reef/live bottom obligated species managed by the Council.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

If climate change results in a shifts to fisheries which increase habitat/gear related impacts, that could potentially exacerbate climate related impacts on reef/live bottom habitats.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Concerns include changes in overall ocean currents, temperature, acidification, and increased episodic events including upwelling, tropical and winter storms, which, in combination, affect the survival, growth, spawning and subsequent distribution of coral and live bottom species.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

Many South Atlantic fisheries depend on coral and live/hard bottom habitat. Subsequently, climate related impacts on these habitats could translate to reduction in availability of managed or prey populations, which could result in significant social and economic impacts to recreational and commercial fisheries.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

Considering the importance of the species/habitat to a large number of managed species, the inability to adjust management to address climate related impacts could have significant long-term impacts on those species and associated recreational and commercial fisheries.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- Managed as habitat with an Optimum Yield of 0 for Coral, Coral Reefs and Live/Hard Bottom Habitat. The harvest of all species is prohibited.
- Deepwater Coral HAPCs area established and prohibits the use of damaging gear including bottom longlines, traps, mid-water trawls, bottom trawls, anchoring and the use of grapples and chains.
- The Oculina Bank Coral HAPC was established and prohibits the use of damaging gear including bottom longlines, traps, bottom trawls, anchoring and the use of grapples and chains.

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The present management system should be able to adapt.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

Coral, Coral Reefs and Live/Hard bottom habitat is managed by the SAFMC with oversight by the Habitat and Environmental Protection and Ecosystem Based Management Committees.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

None.

Dolphin

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Dolphin likely has low vulnerability to climate change. They are dependent on ocean currents and temperature and subsequently affected directly by changes associated with climate change.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Changes in the distribution or availability of pelagic Sargassum habitat could also affect dolphin or species dependent on them as prey.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

Reduction in dolphin availability or population could affect species which rely on dolphin as prey including but not limited to dolphin, billfish, wahoo and other pelagic species.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

Unknown.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Concerns include changes in overall ocean currents, temperature, acidification, and increased episodic events including upwelling, tropical and winter storms, which, in combination, affect the survival, growth, spawning and subsequent distribution of coral and live bottom species.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

Significant reduction in dolphin availability or population resulting from climate change may have a significant impact on the primarily recreational fishery.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

N/A.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- Total ACL- 14,596,216 lbs ww
- Commercial ACL- 1,065,524 lbs ww (7.3%)
- Recreational ACL- 13,530,692 lbs ww (92.7%)
- After the commercial ACL is met or projected to be met, all purchase and sale of dolphin is prohibited and harvest and/or possession are limited to the bag limit.
- ACT=11,595,803 lbs ww. If annual landings exceed ACL, the following year's landings would be monitored in-season for persistence in increased landings. The Regional Administrator will publish a notice to reduce the length of the fishing season as necessary
- Recreational- 20" off FL, GA & SC; N of 39o Lat. vessels without commercial DW permit limited to 200 lbs dolphin and wahoo combined
- Commercial- 20" off FL, GA & SC; 10-fish bag limit not to exceed 60-fish vessel whichever is less; 10/paying passenger on headboats. Sale of recreationally caught fish prohibited.

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The existing system and measures facilitate timely management.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The Atlantic Dolphin fishery is managed by SAFMC in cooperation with MAFMC and NEFMC who provide input through membership on the Dolphin Wahoo Committee.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

N/A

Wahoo

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Wahoo likely has low vulnerability to climate change. They are dependent on ocean currents and temperature and subsequently affected directly by changes associated with climate change.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Changes in the ocean currents, temperature or distribution or availability of pelagic Sargassum habitat could also affect wahoo.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

Unknown.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

Unknown.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Concerns include changes in overall ocean currents, temperature, acidification, and increased episodic events including upwelling, tropical

and winter storms, which, in combination, affect the survival, growth, spawning and subsequent distribution of coral and live bottom species.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

Limited risk.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- Recreational ACL – 1,427,638 lbs. Recreational Allocation – 96.7%
- Commercial - ACL 64,147 lbs. Commercial Allocation – 4.3%
- After the commercial ACL is met or projected to be met, all wahoo sales are prohibited and harvest and/or possession are limited to bag limits.
- ACT=1,164,953 lbs. ww. If annual landings exceed ACL, the following year's landings would be monitored in-season for persistence in increased landings. The Regional Administrator will publish a notice to reduce the length of the fishing season as necessary.
- Commercial Measures - Trip limit-500 lbs. for vessels with DW permit; N of 39o Lat. vessels without commercial DW permit limited to 200 lbs. dolphin and wahoo
- Recreational Measures - 2-fish bag limit. Sale of recreationally caught fish prohibited

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The existing system and measures facilitate timely management.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The Atlantic Wahoo fishery is managed by SAFMC in cooperation with MAFMC and NEFMC who provide input through membership on the dolphin wahoo Committee.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

Management authorities - *Who has the authority or obligation to manage the species?*

- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Golden Crab being a deepwater species, would generally have low or minimal vulnerability to impacts of climate change. However, detailed life history is lacking for the species and true vulnerability may depend on the magnitude of change in bottom temperature or deepwater currents that would eventually impact spawning, feeding and movement.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Golden crabs are a deepwater species using deepwater coral ecosystems extensively. Therefore, if deepwater coral species are affected by changes in ocean water ph, the essential habitat for this species would effectively be reduced, prey associated with that habitat would be reduced which in combination could lead to impacts at the populations level.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

There are no direct impacts to other fisheries considering participants primarily participate in the fishery almost exclusively.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

Unless new entrants are allowed into the fishery other fisheries shouldn't affect this fishery.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Changes in deepwater currents or increased of episodic events like upwelling have been raised as a potential concern.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

Considerations would only arise if changes are great enough to reach the deepwater ecosystems.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

Given the timescales being discussed as to impacting deepwater habitats the existing Council management system has a long-term working relationship with the fishermen and should be able to respond the management needs associated with such change especially with regard to spatial management.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- 2 million lbs- Commercial only (Comp ACL Am)
- After the ACL is met or projected to be met, all harvest, purchase, and the sale of golden crab is prohibited. If the ACL is exceeded, the RA shall publish a notice to reduce the ACL in the following season by the amount of the overage only if the species is overfished. (Comp ACL Am)
- Designated zones and Golden Crab Allowable Catch Areas in two Deepwater Coral CHAPCs; female crabs must be < 0.5% of onboard catch

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The Council has developed a long-term working relationship with the fishermen and the existing cooperative management system should be able to respond the management needs associated with such change especially with regard to spatial management.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The SAFMC manages the Golden Crab Fishery with Council's staff coordinating Golden Crab Committee deliberations related to developing conservation and management actions to be considered by the Council.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Pelagic Sargassum may not be as vulnerable to change as other species. However, being dependent on ocean current for dispersal and propagation, significant changes in current patterns associated with climate change could alter the distribution and production of Sargassum.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Changes in ocean currents that result in less Sargassum moving along and into shelf waters could affect transport of larval and early life histories of many pelagic and benthic fish. In addition direct loss to the system would result in loss of prey available at critical early and other life stages of fish species. Other components of the ecosystem potentially affected include species endemic to pelagic Sargassum, threatened and endangered sea turtles which use Sargassum in transit offshore and for shelter and feeding and highly migratory species.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

Loss in production or availability of pelagic Sargassum could affect availability or production of dolphin or other species, which utilize it at various life stages. Sargassum provides shelter and a transport vehicle for early life stages of a wide variety of managed

and prey species. In addition, turtles also rely on Sargassum for shelter, feeding and transport offshore.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

None known.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Concerns include changes in overall ocean currents, temperature, acidification, and increased episodic events including upwelling, tropical and winter storms which, in combination, could affect even this pelagic habitat.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- Prohibition of harvest south of the NC/SC state boundary
- Prohibition of harvest within 100 miles of shore off NC
- A total allowable catch (TAC) of 5,000 pounds wet weight per year
- Harvest is limited to November through June to protect turtles
- Requirement for observers onboard any vessel harvesting Sargassum
- Harvesting gear specifications

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The SAFMC manages Pelagic Sargassum Habitat with Council's staff coordinating the Habitat and Environmental Protection Committee

deliberations related to developing conservation and management actions to be considered by the Council.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

Panaeid Shrimp: White, Brown, and Pink Shrimp

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

White shrimp are the very vulnerable to environmental change with significant die offs of the population occurring when temperatures are sustained at a very low level for an extended time period. These events facilitate the closure of first state (SC and or GA) then federal waters off that state. Recent amendments to the shrimp plan has expedited the ability of states to directly request the NOAA Fisheries Regional Administrator close adjacent state waters in the event of a cold water kill event. Changing climate could result in increased extreme episodic events such as winter dies offs however the existing management structure would be able to address such a change.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Changes in pelagic and benthic estuarine habitat resulting from change in climate would potentially reduce the essential habitat and subsequently productive capacity of penaeid shrimp populations.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

Penaeid shrimp are prey to a wide variety of species and variety of life stages in estuarine and near-shore and offshore habitats.

Significant reduction in availability or population may impact food available of other managed species.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

The commercial shrimp fishery is one of the most economically important commercial fisheries in the southeast. While not overfished, the white shrimp resource in the South Atlantic region is periodically decimated by severe winter cold kills, especially offshore of Georgia and South Carolina. Significant economic impact to the commercial shrimp and potentially the inshore recreational fishery may result if climate change results in increased episodic events which reduce water temperatures to the level where winter kills of overwintering white shrimp occur more frequently.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- Required the use of certified bycatch reduction devices (BRDs) in all penaeid (pink, white and brown) shrimp trawls in the South Atlantic EEZ and established a framework for BRD certification
- Allows a state, after determining that the concurrent closure criteria have been met (a state must demonstrate either at least an 80-percent reduction in the population of overwintering white shrimp, or that state water temperatures were 9 °C (48 °F) or less, for at least 7 consecutive days), to submit a letter directly to the NMFS Regional Administrator (RA) with the request and supporting data for a concurrent closure of penaeid shrimp harvest in the EEZ adjacent to the closed state waters.

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

Recent adjustment of the winter kill closure provision allows the states to directly request closure of federal waters adjacent to closed federal waters. Therefore, the system can adapt with increased episodic events.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The SAFMC manages the Penaeid Shrimp Fisheries with Council's staff coordinating Shrimp Committee deliberations related to developing conservation and management actions to be considered by the Council.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

Deepwater Shrimp Fishery: Rock and Royal Red Shrimp

Management authorities - *Who has the authority or obligation to manage the species?*

- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Deepwater species would generally have low or minimal vulnerability to impacts of climate change. However, detailed life history, movement and migration patterns are lacking for the species and true vulnerability may depend on the magnitude of change in bottom temperature or deepwater and oceanic currents that would eventually impact spawning, feeding and movement.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

If climate change affects the deepwater fishery, effort could shift to other managed shrimp species and potentially in other regions.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

Climate change impacts on near-shore shelf pelagic and benthic habitats impacting penaeid shrimp could result in some vessels increasing effort on the deepwater shrimp fishery. A significant increase in fishing effort on the deepwater shrimp fishery could also result in increased bycatch in depths where mortality is high.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List*

any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?

Changes in deepwater currents, bottom ocean temperatures or increased episodic events like upwelling have been raised as a potential concerns affecting habitat essential to managed species.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

Vessels' dependence on landings from the South Atlantic rock shrimp fishery is relatively low on average, with most dependent on revenue from the Gulf shrimp fishery, the South Atlantic penaeid shrimp fishery and non-shrimp landings. If climate change results in increased cold weather events resulting kills of overwintering white shrimp, vessels may a shift effort into other penaeid or deepwater shrimp fisheries.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

Given the timescales being discussed as to impacting deepwater habitats, the existing Council management system has a long-term working relationship with the fishermen and should be able to respond the management needs associated with such change.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- Require a commercial rock shrimp permit and endorsement
- Requires all South Atlantic shrimp permit holders to provide economic data if selected
- The use of trawl gear is prohibited in Deepwater Coral Habitat Areas of Particular Concern and the Oculina Bank Habitat Area of Particular Concern through regulations in the Coral FMP.

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

Yes.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The SAFMC manages the Deepwater Shrimp Fishery with Council's staff coordinating Shrimp Committee deliberations related to developing conservation and management actions to be considered by the Council. The Council addresses impacts of fishing gear on benthic habitats closely associated with the deepwater fisheries through deliberations of the Habitat and Environmental and Ecosystem Based Management Committees.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

Gag Grouper

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Gag Grouper is very vulnerable to the impacts of climate change. Gag life history exposes life stages utilizing a wide range of estuarine, nearshore, and offshore benthic and pelagic habitats.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Considering the estuarine dependent nature of Gag, changes or loss of seagrass in NC and FL and oyster reef habitat in SC and GA would potentially limit availability of juvenile habitat for settlement and early development. Year class strength has been positively correlated with ocean temperature and increased ocean temperatures could affect survival and distribution of larvae along shelf and into estuaries.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

Effort that was once in the gag fishery could shift to other species in the snapper grouper complex.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

Climate change impacting shelf habitat could reduce availability and possibly fishery production of a number of snapper grouper species including gag.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Gag life history includes life stages dependent on inshore estuarine, near-shore shelf and shelf edge benthic habitats and offshore pelagic habitats expose making the species susceptible to impacts associated with climate change. Increased episodic events associated with a changing climate including upwelling, may impact the resource, habitat and fishery.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

If climate impacts to inshore estuarine, near-shore shelf and shelf edge benthic habitats and offshore pelagic habitats which gag depend on, result in reduced availability or production and the economic loss associated with that change.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

There is little governance risk to the fishery if climate is impacting the stock because management can adapt quickly.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- Commercial ACL – 326,722 lbs gw Commercial Allocation – 49%
- Recreational Allocation - 340,060 lbs gw Recreational Allocation – 51%
- After the commercial quota is projected to be met, all harvest, possession, and retention is prohibited; all purchase and sale is prohibited. Prohibit commercial harvest of shallow water groupers when the quota is projected to be met. If gag commercial landings, as estimated by the SRD, reach or are projected to reach the ACL, the AA will file a notification with the Office of the Federal Register to close the commercial fishery for gag for the remainder of the fishing year. Reduce the unadjusted gag commercial ACL

from 353,940 lbs gw to 326,722 lbs gw to account for projected gag discard mortality from commercial trips that target co-occurring species (i.e., red grouper and scamp) following a projected gag closure.

- If recreational landings, as estimated by the SRD, reach or are projected to reach the recreational ACL and species is overfished, based on the most recent Status of U.S. Fisheries Report to Congress, the AA will file a notification with the Office of the Federal Register to close the gag recreational sector for the remainder of the fishing year. Without regard to overfished status, if gag recreational landings exceed the ACL, the AA will file a notification with the Office of the Federal Register, at or near the beginning of the following fishing year, to reduce the ACL for that fishing year by the amount of the overage. Compare the recreational ACL with recreational landings over a range of years. For 2012 and subsequent fishing years, the most recent 3-year running average recreational landings will be compared to the ACL. If overfished and recreational sector is projected to be met, prohibit harvest and retention. If the ACL is exceeded, independent of stock status, reduce the sector ACL in the following season by the amount of the overage.
- Commercial Measures - Trip limit 1,000 lbs (gw); 24" TL
- Recreational Measures - 24" TL; Part of Aggregate Grouper Bag Limit of 3/person/day of: gag, black, snowy, misty, red grouper, scamp, yellowedge, yellowfin, yellowmouth, blueline tile, golden tile, sand tile, coney, graysby, red hind and rock hind, with a limit of 1 black or gag (but not both) per person per day. Sale of recreationally caught fish prohibited.
- The use of non-stainless steel circle hooks (offset or non-offset) is required for all species in the snapper grouper complex when using hook-and-line gear with natural baits in waters North of 28 degrees N. latitude.
- All species must be landed with head and fins intact.
- Recreational and commercial fishermen are required to use dehooking tools when fishing for snapper grouper species.
- Spawning closure Jan 1-Apr 30

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The existing management system can adapt to address potential climate related changes.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

> The SAFMC manages the Gag Fishery with Council's staff coordinating Snapper Grouper Committee deliberations related to developing conservation and management actions to be considered by the Council.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

Atlantic Spadefish

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

> Atlantic Spadefish are very vulnerable. Spadefish are estuarine dependent species with life stages utilizing a wide range of estuarine, nearshore, and offshore pelagic habitats.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

> Considering the estuarine dependent nature of Spadefish, changes or loss of estuarine habitat would potentially limit availability of juvenile habitat for settlement and early development. Year class strength has been positively correlated with ocean temperature and increased ocean temperatures could affect survival and distribution of larvae along shelf and into estuaries.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

> ***If climate change affects the fishery for this species, what are the potential impacts to other fisheries?***
>
> ***Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.***

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

There is little governance risk to the fishery if climate is impacting the stock because management can adapt quickly.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- Recreational ACL- 154,352 lbs ww (ACT=96,470 lbs ww) - Recreational Allocation - 81.47%
- Commercial ACL- 35,108 lbs ww Commercial Allocation - 18.53%
- If an ACL (i.e., individual or complex) is met or is projected to be met, all subsequent purchase and sale is prohibited and harvest and/or possession is limited to the bag limit for the species covered by that ACL. If an ACL (i.e., individual or complex) is exceeded, the RA shall publish a notice to reduce the ACL in the following season by the amount of the overage only if the species is overfished.
- Recreational Measures- Part of S. Atlantic snapper-grouper 20-fish bag limit. Sale of recreationally caught fish prohibited.
- The use of non-stainless steel circle hooks (offset or non-offset) is required for all species in the snapper grouper complex when using hook-and-line gear with natural baits in waters North of 28 degrees N. latitude.
- All species must be landed with head and fins intact.
- Recreational and commercial fishermen are required to use dehooking tools when fishing for snapper grouper species.

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

Primary management measures can be readily adapted.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The SAFMC manages the fishery for Atlantic Spadefish with Council's staff coordinating Snapper Grouper Committee deliberations related to developing conservation and management actions to be considered by

the Council.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

The current governance system is sufficiently adaptable, with the ability to change measures as needed.

Bar Jack

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Bar jack would generally have low to medium vulnerability to impacts of climate change. However, detailed life history and movement patterns are lacking for the species and true vulnerability may depend on the magnitude of change in shelf ocean temperature and oceanic currents that would eventually impact spawning, feeding, schooling and movement associated with structural shelf habitats.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Bar jack use shelf ecosystems extensively and if pelagic and benthic habitats are affected by changes in ocean currents, water temperature, or ph, the essential habitat for the species would effectively be reduced, which could lead to impacts at the populations level.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

Effort shifts associated with impacts in shelf waters, could result in increased effort on other managed snapper grouper species or even the deepwater complex.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

If climate change affects other managed species including coastal

migratory pelagic and fisheries for other snapper grouper species, effort could shift to bar jack.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Changes in ocean temperature, ocean currents or increased of episodic events like upwelling have been raised as a potential concern affecting habitat essential to bar jack.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

Considerations would arise if pelagic changes are great enough to result in shifts among shelf fisheries.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

The existing Council management system should be able to respond the management needs associated with such change.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- Commercial ACL - 5,265 lbs ww Commercial Allocation – 21.25%
- Recreational ACL - 19,515 lbs ww (ACT=9,758 lbs ww) Recreational Allocation – 78.75%
- If an ACL (i.e., individual or complex) is met or is projected to be met, all subsequent purchase and sale is prohibited and harvest and/or possession is limited to the bag limit for the species covered by that ACL. If an ACL (i.e., individual or complex) is exceeded, the RA shall publish a notice to reduce the ACL in the following season by the amount of the overage only if the species is overfished.
- If annual landings exceed ACL, the following year's landings would be monitored in-season for persistence in increased landings. The Regional Administrator will publish a notice to reduce the length of the fishing season as necessary.
- Recreational Measures - part of S Atl snapper-grouper 20-fish bag limit. Sale of recreationally caught fish prohibited.
- The use of non-stainless steel circle hooks (offset or non-offset) is

required for all species in the snapper grouper complex when using hook-and-line gear with natural baits in waters North of 28 degrees N. latitude.

- All species must be landed with head and fins intact.
- Recreational and commercial fishermen are required to use dehooking tools when fishing for snapper grouper species.

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The existing management system can adapt to address potential climate related changes.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The SAFMC manages the Fishery for Bar Jack with Council's staff coordinating Snapper Grouper Committee deliberations related to developing conservation and management actions to be considered by the Council.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

Deepwater Complex

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Deepwater species would generally have low or minimal vulnerability to impacts of climate change. However, detailed life history, movement and migration patterns are lacking for the species and true vulnerability may depend on the magnitude of change in bottom temperature or deepwater and oceanic currents that would eventually impact spawning, feeding and movement.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Deepwater species using shelf edge to deepwater ecosystems extensively. Therefore, if deepwater habitat including coral and live bottom species are affected by changes in ocean water ph, the essential habitat for species in the deepwater complex would effectively be reduced, prey associated with that habitat would be reduced which in combination could lead to impacts at the populations level.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

If climate change affects the deepwater fishery effort could shift to other managed species including coastal migratory pelagics and shallower water snapper grouper species.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

If climate change impacts near-shore, shelf pelagic and benthic habitats, there could be an increase in fishing effort on the deepwater complex. A significant increase in fishing effort on the deepwater complex could also result in increased bycatch in depths where mortality is high.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Changes in deepwater currents, bottom ocean temperatures or increased of episodic events like upwelling have been raised as a potential concern affecting habitat essential to the managed species.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

Considerations would only arise if changes are great enough to reach the deepwater ecosystems.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

Given the timescales being discussed as to impacting deepwater habitats, the existing Council management system has a long-term working relationship with the fishermen and should be able to respond to management needs associated with such change.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- ACLs and Allocations
- If an ACL (i.e., individual or complex) is met or is projected to be met, all subsequent purchase and sale is prohibited and harvest and/or possession is limited to the bag limit for the species covered by that ACL. If an ACL (i.e., individual or complex) is exceeded, the RA shall publish a notice to reduce the ACL in the following season by the amount of the overage only if the species is overfished.
- Recreational Measures- 12" TL for silk, queen, black and blackfin; Groupers and tilefish are part of the Aggregate Grouper Bag Limit of 3/person/day of: gag, black, snowy, misty, red grouper, scamp, yellowedge, yellowfin, yellowmouth, blueline tile, golden tile, sand

tile, coney, graysby, red hind and rock hind. Bag limit= 0 for captain and crew for yellowedge, blueline, misty, and sand tilefish. The snappers are part of Aggregate Snapper Bag Limit of 10/person/day of: lane, yellowtail, grey, mutton, black, queen, schoolmaster, blackfin, mahogoney, cubera under 30", dog, and silk snapper. Sale of recreationally caught fish prohibited.

- Commercial Measures- 12" TL for silk, queen and blackfin snapper
- The use of non-stainless steel circle hooks (offset or non-offset) is required for all species in the snapper grouper complex when using hook-and-line gear with natural baits in waters North of 28 degrees N. latitude.
- All species must be landed with head and fins intact.
- Recreational and commercial fishermen are required to use dehooking tools when fishing for snapper grouper species.

Species	Commercial ACL	Recreational ACL	Total ACL	Comm. Allocation	Rec. Allocation
Deepwater Complex	376,469 lbs ww	334,556 lbs ww (ACT=197,100 lbs ww)	711,025 lbs ww		
Yellowedge Grouper	27,431	2,790 (ACT=1,395 lbs ww)	30,221	90.77%	9.23%
Blueline Tilefish	316,098	315,243 (ACT=187,443 lbs ww)	631,341	50.07%	49.93%
Silk Snapper	18,564	6,541 (ACL=3,270 lbs ww)	25,104	73.95%	26.05%
Misty Grouper	2,388	475 (ACT=237 lbs ww)	2,863	83.42%	16.58%
Sand Tilefish	1,770	6,213 (ACT=3,107 lbs ww)	7,983	22.17%	77.83%
Queen Snapper	8,756	710 (ACT=355 lbs ww)	9,466	92.50%	7.50%
Black Snapper	366	16 (ACT=8 lbs ww)	382	95.92%	4.08%
Blackfin Snapper	1,096	2,569 (ACT=1,284 lbs ww)	3,665	29.91%	70.09%

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The existing management system can adapt to address potential climate related changes.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The SAFMC manages the Snapper Grouper Deepwater Complex with Council's staff coordinating Snapper Grouper Committee deliberations related to developing conservation and management actions to be considered by the Council.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

Shallow Water Complex

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Shallow water species, would generally have medium vulnerability to impacts of climate change. However, detailed life history and movement patterns are lacking for the complex and true vulnerability may depend on the magnitude of change in shelf ocean temperature and oceanic currents that would eventually impact spawning, feeding and movement associated with benthic shelf habitats.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Shallow water complex species use shelf ecosystems extensively and if pelagic and benthic habitats including coral and live bottom are affected by changes in ocean currents, water temperature, ph, the essential habitat for species in the shallow water complex would effectively be reduced, prey associated with that habitat would be reduced which in combination could lead to impacts at the populations level.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

If climate change affects other managed species including coastal migratory pelagic and fisheries for other snapper grouper species, effort could shift to the shallow water complex.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

Effort shifts associated with impacts in shelf waters, could result in increased effort on other managed snapper grouper species or even the deepwater complex.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Changes in ocean currents or increased of episodic events like upwelling have been raised as a potential concern affecting habitat essential to the managed species.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

Considerations would only arise if changes are great enough to result in shift among shelf or movement to deepwater ecosystems.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

The existing Council management system should be able to respond the management needs associated with such change.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- If an ACL (i.e., individual or complex) is met or is projected to be met, all subsequent purchase and sale is prohibited and harvest and/or possession is limited to the bag limit for the species covered by that ACL. If an ACL (i.e., individual or complex) is exceeded, the RA shall publish a notice to reduce the ACL in the following season by the amount of the overage only if the species is overfished.
- Recreational Measures- 12" TL for silk, queen, black and blackfin; Groupers and tilefish are part of the Aggregate Grouper Bag Limit of 3/person/day of: gag, black, snowy, misty, red grouper, scamp, yellowedge, yellowfin, yellowmouth, blueline tile, golden tile, sand tile, coney, graysby, red hind and rock hind. Bag limit= 0 for captain and crew for yellowedge, blueline, misty, and sand tilefish. The snappers are part of Aggregate Snapper Bag Limit of 10/person/day of: lane, yellowtail, grey, mutton, black, queen, schoolmaster, blackfin, mahogoney, cubera under 30", dog, and silk

snapper. Sale of recreationally caught fish prohibited.

- Commercial Measures- 12" TL for silk, queen and blackfin snapper
- The use of non-stainless steel circle hooks (offset or non-offset) is required for all species in the snapper grouper complex when using hook-and-line gear with natural baits in waters North of 28 degrees N. latitude.
- All species must be landed with head and fins intact.
- Recreational and commercial fishermen are required to use dehooking tools when fishing for snapper grouper species.

Species	Commercial ACL	Recreational ACL	Total ACL	Comm. Allocation	Rec. Allocation
Shallow-Water Complex	49,776 lbs ww	46,656 lbs ww (ACT=23,595 lbs ww)	96,432 lbs ww		
Red Hind	18,303	6,564 (ACT=3,282 lbs ww)	24,867	73.60%	26.40%
Rock Hind	23,115	14,838 (ACT=7,419 lbs ww)	37,953	60.90%	39.10%
Yellowmouth Grouper	44	3,995 (ACT=1,998 lbs ww)	4,040	1.10%	98.90%
Yellowfin Grouper	4,879	4,379 (ACT=2,190 lbs ww)	9,258	52.70%	47.30%
Coney	665	2,053 (ACT=1,026 lbs ww)	2,718	24.45%	75.55%
Graysby	2,771	14,827 (ACT=7,680 lbs ww)	17,597	15.74%	84.26%

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The existing management system can adapt to address potential climate related changes.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The SAFMC manages the Snapper Grouper Shallow Water Complex with Council's staff coordinating Snapper Grouper Committee deliberations related to developing conservation and management actions to be considered by the Council.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

Snappers Complex

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Species in the snapper complex would generally have medium vulnerability to impacts of climate change. However, detailed life history and movement patterns are lacking for the complex and true vulnerability may depend on the magnitude of change in shelf ocean temperature and oceanic currents that would eventually impact spawning, feeding and movement associated with benthic shelf habitats.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Snapper complex species use shelf ecosystems extensively and if pelagic and benthic habitats including coral and live bottom are affected by changes in ocean currents, water temperature, ph, the essential habitat for species in the shallow water complex would effectively be reduced, prey associated with that habitat would be reduced which in combination could lead to impacts at the populations level.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

If climate change affects other managed species including coastal migratory pelagic and fisheries for other snapper grouper species, effort could shift to the snapper complex.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

Effort shifts associated with impacts in shelf waters, could result in increased effort on other managed snapper grouper species or even the deepwater complex.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Changes in ocean currents or increased episodic events like upwelling have been raised as a potential concern, affecting habitat essential to the managed species.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

Considerations would only arise if changes are great enough to result in shift among shelf or movement to deepwater ecosystems.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

The existing Council management system should be able to respond to management needs associated with such change.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- ACLs and Allocations
- If an ACL (i.e., individual or complex) is met or is projected to be met, all subsequent purchase and sale is prohibited and harvest and/or possession is limited to the bag limit for the species covered by that ACL. If an ACL (i.e., individual or complex) is exceeded, the RA shall publish a notice to reduce the ACL in the following season by the amount of the overage only if the species is overfished.
- Recreational Measures- Part of Aggregate Snapper Bag Limit of 10/person/day of: lane, yellowtail, grey, mutton, black, queen, schoolmaster, blackfin, mahogany, cubera under 30", dog, and silk snapper. Sale of recreationally caught fish prohibited. Size Limits (Gray 12" TL, lane 8" TL, cubera 12" TL; 2/person for fish > 30"TL off East FL, dog 12" TL, mahogany 12" TL)
- Commercial Measures- Size Limits (Gray 12" TL, lane 8" TL, cubera 12"

TL; 2/person for fish > 30"TL off East FL, dog 12" TL, mahogany 12" TL)

- The use of non-stainless steel circle hooks (offset or non-offset) is required for all species in the snapper grouper complex when using hook-and-line gear with natural baits in waters North of 28 degrees N. latitude.
- All species must be landed with head and fins intact.
- Recreational and commercial fishermen are required to use dehooking tools when fishing for snapper grouper species.

Species	Commercial ACL	Recreational ACL	Total ACL	Comm.	Rec.
Snappers Complex	215,662 lbs ww	728,577 lbs ww (ACT=624,197 lbs ww)	944,239 lbs ww		
Gray Snapper	192,830	602,913(ACT=534,422 lbs ww)	795,743	24.23%	75.77%
Lane Snapper	17,695	102,289 (ACT=78,087 lbs ww)	119,984	14.75%	85.25%
Cubera Snapper	4,829	19,851 (ACT=9,925 lbs ww)	24,680	19.57%	80.43%
Dog Snapper	273	3,012 (ACT=1,506 lbs ww)	3,285	8.31%	91.69%
Mahogany Snapper	36	512 (ACT=256 lbs ww)	548	6.49%	93.51%

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The existing management system can adapt to address potential climate related changes.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The SAFMC manages the Snappers Complex with Council's staff coordinating Snapper Grouper Committee deliberations related to developing conservation and management actions to be considered by the Council.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

Jacks Complex

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

The Jack Complex would generally have medium vulnerability to impacts of climate change. However, detailed life history and movement patterns are lacking for the complex and true vulnerability may depend on the magnitude of change in shelf ocean temperature and oceanic currents that would eventually impact spawning, feeding and movement associated with benthic shelf habitats.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Species in the Jacks complex use shelf ecosystems extensively and if pelagic and benthic habitats including coral and live bottom are affected by changes in ocean currents, water temperature, ph, the essential habitat for species in the shallow water complex would effectively be reduced, prey associated with that habitat would be reduced which in combination could lead to impacts at the populations level.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

If climate change affects other managed species including coastal migratory pelagic and fisheries for other snapper grouper species, effort could shift to the jacks complex.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

Effort shifts associated with impacts in shelf waters, could result in increased effort on other managed snapper grouper species or even the deepwater complex.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Changes in ocean currents or increased of episodic events like upwelling have been raised as a potential concern affecting habitat essential to the managed species.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

Considerations would only arise if changes are great enough to result in shift among shelf or movement to deepwater ecosystems.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

The existing Council management system should be able to respond the management needs associated with such change.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- ACLs and Allocations
- If an ACL (i.e., individual or complex) is met or is projected to be met, all subsequent purchase and sale is prohibited and harvest and/or possession is limited to the bag limit for the species covered by that ACL. If an ACL (i.e., individual or complex) is exceeded, the RA shall publish a notice to reduce the ACL in the following season by the amount of the overage only if the species is overfished.
- The use of non-stainless steel circle hooks (offset or non-offset) is required for all species in the snapper grouper complex when using hook-and-line gear with natural baits in waters North of 28 degrees N. latitude.
- All species must be landed with head and fins intact.
- Recreational and commercial fishermen are required to use dehooking tools when fishing for snapper grouper species.

Species	Commercial ACL	Recreational ACL	Total ACL	Comm. Allocation	Rec. Allocation
Jacks Complex	189,422 lbs ww	267,799 lbs ww (ACT=165,590 lbs ww)	457,221 lbs ww		
Almaco Jack	147,322	155,195 (ACT=109,288 lbs ww)	302,517	48.70%	51.30%
Banded Rudderfish	37,829	107,605 (ACT=53,802 lbs ww)	145,434	26.01%	73.99%
Lesser Amberjack	4,270	5,000 (ACT=2,500 lbs ww)	9,270	46.07%	53.93%

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The existing management system can adapt to address potential climate related changes.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The SAFMC manages the Jacks Complex with Council's staff coordinating Snapper Grouper Committee deliberations related to developing conservation and management actions to be considered by the Council.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

Porgy Complex

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Species in the Porgy Complex would generally have medium vulnerability to impacts of climate change. However, detailed life history and movement patterns are lacking for the complex and true vulnerability may depend on the magnitude of change in shelf ocean temperature and oceanic currents that would eventually impact spawning, feeding and movement associated with benthic shelf habitats.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Porgy complex species use shelf ecosystems extensively and if pelagic and benthic habitats including coral and live bottom are affected by changes in ocean currents, water temperature, ph, the essential habitat for species in the shallow water complex would effectively be reduced, prey associated with that habitat would be reduced which in combination could lead to impacts at the populations level.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

If climate change affects other managed species including coastal migratory pelagic and fisheries for other snapper grouper species, effort could shift to the porgy complex.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

Effort shifts associated with impacts in shelf waters could result in increased effort on other managed snapper grouper species or even the deepwater complex.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Changes in ocean currents or increased of episodic events like upwelling have been raised as a potential concern affecting habitat essential to the managed species.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

Considerations would only arise if changes are great enough to result in shift among shelf or movement to deepwater ecosystems.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

The existing Council management system should be able to respond the management needs associated with such change.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- ACLs and Allocations
- If a commercial ACL (i.e., individual or complex) is met or is projected to be met, all subsequent purchase and sale is prohibited and harvest and/or possession is limited to the bag limit for the species covered by that ACL. If an ACL (i.e., individual or complex) is exceeded, the RA shall publish a notice to reduce the ACL in the following season by the amount of the overage only if the species is overfished.
- If annual recreational landings exceed ACL, the following year's landings would be monitored in-season for persistence in increased landings. The Regional Administrator will publish a notice to reduce the length of the fishing season as necessary.
- The use of non-stainless steel circle hooks (offset or non-offset) is required for all species in the snapper grouper complex when using hook-and-line gear with natural baits in waters North of 28 degrees

N. latitude.

- Sale of recreationally caught fish prohibited. Included in the Other Snapper Grouper Complex Species: 20 Fish Aggregate Bag Limit
- All species must be landed with head and fins intact.
- Recreational and commercial fishermen are required to use dehooking tools when fishing for snapper grouper species.

Species	Commercial ACL	Recreational ACL	Total ACL	Comm. Allocation	Rec. Allocation
Porgy Complex	36,348 lbs ww	106,914 lbs ww (ACT=59,319 lbs ww)	143,263 lbs ww		
Jolthead Porgy	1,571	36,315 (ACT=22,537 lbs ww)	37,885	4.15%	95.85%
Knobbed Porgy	34,515	32,926 (ACT=16,509 lbs ww)	67,441	51.18%	48.82%
Saucereye Porgy	0	3,606 (ACT=1,803 lbs ww)	3,606	0.01%	99.99%
Scup	0	9,306 (ACT=4,653 lbs ww)	9,306	0.00%	100.00%
Whitebone Porgy	262	24,762 (ACT=13,817 lbs ww)	25,024	1.05%	98.95%

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The existing management system can adapt to address potential climate related changes.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The SAFMC manages the Porgy Complex with Council's staff coordinating Snapper Grouper Committee deliberations related to developing conservation and management actions to be considered by the Council.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

Grunt Complex

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

The grunt complex would generally have medium vulnerability to impacts of climate change. However, detailed life history and movement patterns are lacking for the complex and true vulnerability may depend on the magnitude of change in shelf ocean temperature and oceanic currents that would eventually impact spawning, feeding and movement associated with benthic shelf habitats.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

The Grunt Complex species use shelf ecosystems extensively and if pelagic and benthic habitats including coral and live bottom are affected by changes in ocean currents, water temperature, ph, the essential habitat for species in the shallow water complex would effectively be reduced, prey associated with that habitat would be reduced which in combination could lead to impacts at the populations level.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

If climate change affects other managed species including coastal migratory pelagic and fisheries for other snapper grouper species, effort could shift to the grunt complex.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

Effort shifts associated with impacts in shelf waters, could result in increased effort on other managed snapper grouper species or even the deepwater complex.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Changes in ocean currents or increased of episodic events like upwelling have been raised as a potential concern affecting habitat essential to the managed species.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

Considerations would only arise if changes are great enough to result in shift among shelf or movement to deepwater ecosystems.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

The existing Council management system should be able to respond the management needs associated with such change.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- ACLs and Allocations
- If an ACL (i.e., individual or complex) is met or is projected to be met, all subsequent purchase and sale is prohibited and harvest and/or possession is limited to the bag limit for the species covered by that ACL. If an ACL (i.e., individual or complex) is exceeded, the RA shall publish a notice to reduce the ACL in the following season by the amount of the overage only if the species is overfished.
- The use of non-stainless steel circle hooks (offset or non-offset) is required for all species in the snapper grouper complex when using hook-and-line gear with natural baits in waters North of 28 degrees N. latitude.
- All species must be landed with head and fins intact.
- Recreational and commercial fishermen are required to use dehooking tools when fishing for snapper grouper species.

Species	Commercial ACL	Recreational ACL	Total ACL	Comm. Allocation	Rec. Allocation
Grunts Complex	218,539 lbs ww	588,113 lbs ww (ACT=442,970 lbs ww)	806,652 lbs ww		
White Grunt	212,896	461,136 (ACT=363,283 lbs ww)	674,033	31.59%	68.41%
Sailor's Choice	0	22,674 (ACT=11,663 lbs ww)	22,674	0.00%	100.00%
Tomtate	0	80,056 (ACT=54,887 lbs ww)	80,056	0.00%	100.00%
Margate	5,643	24,246 (ACT=13,137 lb ww)	29,889	18.88%	81.12%

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The existing management system can adapt to address potential climate related changes.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The SAFMC manages the Grunt Complex with Council's staff coordinating Snapper Grouper Committee deliberations related to developing conservation and management actions to be considered by the Council.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

Black Grouper

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Black grouper would generally have medium vulnerability to impacts of climate change. However, detailed life history and movement patterns are lacking for the complex and true vulnerability may depend on the magnitude of change in shelf ocean temperature and oceanic currents that would eventually impact spawning, feeding and movement associated with benthic shelf habitats.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Black grouper use shelf ecosystems extensively and if pelagic and benthic habitats including coral and live bottom are affected by changes in ocean currents, water temperature, ph, the essential habitat for species in the shallow water complex would effectively be reduced, prey associated with that habitat would be reduced which in combination could lead to impacts at the populations level.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

If climate change affects other managed species including coastal migratory pelagic and fisheries for other snapper grouper species, effort could shift to black grouper.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

Effort shifts associated with impacts in shelf waters, could result in increased effort on other managed snapper grouper species in the complex. Increased effort associated with a shift could increase the vulnerability of the species if coupled with reduced habitat or productive capacity also associated with climate change.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Changes in ocean currents, increases in ocean temperature and the increase of episodic events like upwelling have been raised as a potential concern affecting habitat essential to the managed species.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

Considerations would only arise if changes are great enough to result in shift in targeted shelf species or shift to targeting species in deepwater ecosystems.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

The existing Council management system should be able to respond the management needs associated with such change.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- Commercial ACL - 94,571 lbs ww 2013, 96,844 lbs ww 2014
  Commercial Allocation 36.88%
- Recreational ACL - 161,859 lbs ww 2013 165,750 lbs ww 2014+
  Recreational Allocation 62.12%
- After the commercial ACL is met or projected to be met, all purchase and sale of black grouper is prohibited and harvest and/or possession is limited to the bag limit. If the commercial sector ACL is exceeded, the RA shall publish a notice to reduce the commercial sector ACL in the following season by the amount of the overage only if overfished.
- ACT (2013)=98,734 lbs ww. ACT (2014)=101,108 lbs ww. If the annual landings exceed the ACL in a given year, the following year's

landings would be monitored in-season for persistence in increased landings. The RA will publish a notice to reduce the length of the fishing season as necessary. If the ACL is exceeded, the RA shall publish a notice to reduce the ACL in the following season by the amount of the overage if the species is overfished.

- Commercial Measures - 24" TL
- Recreational Measures - 24" TL; Part of Aggregate Grouper Bag Limit of 3/person/day with a limit of 1 black or gag (but not both) per person per day. Sale of recreationally caught fish prohibited.
- Spawning closure Jan 1-Apr 30
- The use of non-stainless steel circle hooks (offset or non-offset) is required for all species in the snapper grouper complex when using hook-and-line gear with natural baits in waters North of 28 degrees N. latitude.
- All species must be landed with head and fins intact.
- Recreational and commercial fishermen are required to use dehooking tools when fishing for snapper grouper species.

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The existing management system can adapt to address potential climate related changes.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The SAFMC manages the Black Grouper with Council's staff coordinating Snapper Grouper Committee deliberations related to developing conservation and management actions to be considered by the Council.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

The current governance system is sufficiently adaptable, with the ability to change measures as needed.

Black Sea Bass

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Black sea bass would generally have vulnerability to impacts of climate change. However, detailed life history and movement patterns are lacking for the complex and true vulnerability may depend on the magnitude of change in shelf ocean temperature and oceanic currents that would eventually impact spawning, feeding and movement associated with benthic shelf habitats.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Black sea bass use nearshore and shelf ecosystems extensively and if pelagic and benthic habitats including coral and live bottom are affected by changes in ocean currents, water temperature, ph, the essential habitat for species in the shallow water complex would effectively be reduced, prey associated with that habitat would be reduced which in combination could lead to impacts at the populations level.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

If climate change affects the black sea bass fishery, effort may shift to other managed species including coastal migratory pelagic and fisheries for other species in the snapper grouper complex.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

Effort shifts associated with impacts in nearshore and shelf waters could result in increased effort on other managed snapper grouper species. Increased effort associated with a shift could increase the vulnerability of the species if coupled with reduced habitat or productive capacity also associated with climate change.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Changes in ocean currents, increases in ocean temperature and the increase of episodic events like upwelling have been raised as a potential concern affecting habitat essential to the managed species.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

Considerations would only arise if changes are great enough to result in shift in targeted shelf species or shift to targeting species in deepwater ecosystems.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

The existing Council management system should be able to respond the management needs associated with such change.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- Commercial ACL - 780,020 lbs (Reg 19), Commercial Allocation: 43%
- Recreational ACL - 1,033,980 lbs ww for 2013–2014, 2014–2015, and 2015–2016 fishing years, ACT=903,905 lbs ww ; ACL = 1,001,177 lbs ww for the 2016–2017 fishing year
- Recreational Allocation 57%
- If the commercial sector black sea bass ACL is met or is projected to be met, independent of stock status, all subsequent purchase and sale of black sea bass is prohibited and harvest and/or possession is limited to the black sea bass bag limit. If the commercial sector black sea bass ACL is exceeded, independent of stock status, the Regional Administrator shall publish a notice to reduce the commercial sector black sea bass ACL in the following season by

the amount of the overage.

- If the recreational sector black sea bass ACL is met or is projected to be met, independent of stock status, prohibit the harvest and retention of black sea bass. If the recreational sector black sea bass ACL is exceeded, independent of stock status, the Regional Administrator shall publish a notice to reduce the recreational sector ACL in the following season by the amount of the overage.
- Commercial Measures - Trip limit 1,000 lbs gw (1,180 lbs ww); 11" TL. (Am18A); Pot closure Nov 1- Apr 30
- Recreational Measures - 13" TL (Am 18A); 5-fish bag limit (Reg Am 9). Sale of recreationally caught fish prohibited.
- The use of non-stainless steel circle hooks (offset or non-offset) is required for all species in the snapper grouper complex when using hook-and-line gear with natural baits in waters North of 28 degrees N. latitude.
- All species must be landed with head and fins intact.
- Recreational and commercial fishermen are required to use dehooking tools when fishing for snapper grouper species.

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The existing management system can adapt to address potential climate related changes.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

The current governance system is sufficiently adaptable, with the ability to change measures as needed.

Golden Tilefish

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Golden tilefish would generally have low or minimal vulnerability to impacts of climate change. However, detailed life history, movement and migration patterns are lacking for the species and true vulnerability may depend on the magnitude of change in bottom temperature or deepwater and oceanic currents that would eventually impact spawning, feeding and movement.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Golden tilefish use distinct and limited deepwater soft sediment habitat at all life stages. Therefore, if the limited deepwater habitat is affected by changes in ocean currents, ocean temperature of ocean water ph, the essential habitat for golden tilefish would effectively be reduced, prey associated with that habitat would be reduced which in combination could lead to impacts at the populations level.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

If efforts shifts to deepwater associated with impacts in shelf waters, could result in increased effort on the deepwater species including golden tilefish.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

If climate change affects other managed species including coastal migratory pelagic and shallower water snapper grouper species, effort could shift to the deepwater species including golden tilefish.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Changes in ocean temperature, deepwater currents or increased of episodic events like upwelling have been raised as a potential concern affecting habitat essential to the managed species.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

Considerations would only arise if changes are great enough to reach the deepwater ecosystems.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

The existing Council management system should be able to respond the management needs associated with a change associated with shifting fisheries. However, if changes result in significant change in the ability of the habitat to support various life stages of this deepwater species, even Council management may not be able to ensure long-term sustainability.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- Commercial Allocation - 97% (25% Hook and line, 75% longline)
- Recreational ACL –3,019 fish (19,195 lbs); Recreational Allocation: 3%
- After the commercial quota is projected to be met, prohibit harvest, possession, and retention. All purchase and sale is prohibited when the quota is projected to be met.
  (i) Hook-and-line component. If commercial landings, as estimated by the SRD, reach or are projected to reach the commercial ACL (commercial quota) specified in § 622.190(a)(2)(ii), the AA will file a notification with the Office of the Federal Register to close the hook-and-line component of the commercial sector for the remainder of the fishing year.

- (ii) Longline component. If commercial landings, as estimated by the SRD, reach or are projected to reach the commercial ACL (commercial quota) specified in § 622.190(a)(2)(iii), the AA will file a notification with the Office of the Federal Register to close the longline component of the commercial sector for the remainder of the fishing year. After the commercial ACL for the longline component is reached or projected to be reached, golden tilefish may not be fished for or possessed by a vessel with a golden tilefish longline endorsement.
- If the annual recreational landings exceed the ACL in a given year, the Regional Administrator (RA) shall publish a notice to close the recreational sector when the ACL is projected to be met. Monitor following year and shorten season as necessary. If the ACL is exceeded, the following year's recreational landings would be monitored in-season for persistence in increased landings. The Regional Administrator (RA) will publish a notice to reduce the length of the recreational fishing season as necessary.
- Commercial Measures - Longline trip limit 4,000 lbs; H&L trip limit 500 lbs
- Recreational Measures - Part of Aggregate Grouper Bag Limit of 3/person/day of: gag, black, snowy, misty, red grouper, scamp, yellowedge, yellowfin, yellowmouth, blueline tile, golden tile, sand tile, coney, graysby, red hind and rock hind, with a limit of 1 golden tile per person per day. Sale of recreationally caught fish prohibited.
- All species must be landed with head and fins intact.

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The existing management system can adapt to address potential climate related changes.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The SAFMC manages Golden Tilefish with Council staff coordinating Snapper Grouper Committee deliberations related to developing conservation and management actions to be considered by the Council.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

Gray Triggerfish

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Gray triggerfish would generally have medium vulnerability to impacts of climate change. However, detailed life history and movement patterns are lacking for the complex and true vulnerability may depend on the magnitude of change in shelf ocean temperature and oceanic currents that would eventually impact spawning, feeding and movement associated with benthic shelf habitats.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Gray triggerfish use shelf ecosystems extensively and if pelagic and benthic habitats including coral and live bottom are affected by changes in ocean currents, water temperature, ph, the essential habitat for species in the shallow water complex would effectively be reduced, prey associated with that habitat would be reduced which in combination could lead to impacts at the populations level.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

If climate change affects the gray triggerfish fishery, effort may shift to other managed species including coastal migratory pelagic and fisheries for other species in the snapper grouper complex.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

Effort shifts associated with impacts in shelf waters, could result in increased effort on other managed snapper grouper species in the complex. Increased effort associated with a shift could increase the vulnerability of the species if coupled with reduced habitat or productive capacity also associated with climate change.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Changes in ocean currents, increases in ocean temperature and the increase of episodic events like upwelling have been raised as a potential concern affecting habitat essential to the managed species.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

Considerations would only arise if changes are great enough to result in shift in targeted shelf species or shift to targeting species in deepwater ecosystems.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

The existing Council management system should be able to respond the management needs associated with such change.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- Commercial ACL - 272,880 lbs ww; Commercial Allocation – 43.56%
- Recreational ACL - 353,638 lbs ww (ACT=284,325 lbs ww)
  Recreational Allocation - 56.44%
- If an ACL (i.e., individual or complex) is met or is projected to be met, all subsequent purchase and sale is prohibited and harvest and/or possession is limited to the bag limit for the species covered by that ACL. If an ACL (i.e., individual or complex) is exceeded, the RA shall publish a notice to reduce the ACL in the following season by the amount of the overage only if the species is overfished.
- Commercial Measures - 12" TL off Florida
- Recreational Measures - 12" TL off Florida; part of S Atl snapper-

grouper 20-fish bag limit. Sale of recreationally caught fish prohibited.

- The use of non-stainless steel circle hooks (offset or non-offset) is required for all species in the snapper grouper complex when using hook-and-line gear with natural baits in waters North of 28 degrees N. latitude.
- All species must be landed with head and fins intact.
- Recreational and commercial fishermen are required to use dehooking tools when fishing for snapper grouper species.

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The existing management system can adapt to address potential climate related changes.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The SAFMC manages the Gray Triggerfish with Council's staff coordinating Snapper Grouper Committee deliberations related to developing conservation and management actions to be considered by the Council.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

Greater Amberjack

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Greater Amberjack would generally have medium vulnerability to impacts of climate change. However, detailed life history and movement patterns are lacking for the complex and true vulnerability may depend on the magnitude of change in shelf ocean temperature and oceanic currents that would eventually impact spawning, feeding, schooling and movement associated with structural shelf habitats.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Greater amberjack use shelf ecosystems extensively and if pelagic and benthic habitats including coral and live bottom are affected by changes in ocean currents, water temperature, ph, the essential habitat for species in the shallow water complex would effectively be reduced, prey associated with that habitat would be reduced which in combination could lead to impacts at the populations level.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

If climate change affects other managed species including coastal migratory pelagic and fisheries for other snapper grouper species, effort could shift to greater amberjack.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

Effort shifts associated with impacts in shelf waters, could result in increased effort on other managed snapper grouper species or even the deepwater complex.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Changes in ocean temperature, ocean currents or increased of episodic events like upwelling have been raised as a potential concern affecting habitat essential to the managed species.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

Considerations would only arise if changes are great enough to result in shift among shelf or movement to deepwater ecosystems.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

The existing Council management system should be able to respond the management needs associated with such change.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- Commercial ACL - 769,388 lbs gw (800,163 lbs ww) Commercial Allocation – 40.66%
- Recreational Allocation - 1,167,837 lbs; Recreational Allocation – 59.34%
- If commercial ACL (i.e., individual or complex) is met or is projected to be met, all subsequent purchase and sale is prohibited and harvest and/or possession is limited to the bag limit for the species covered by that ACL. If an ACL (i.e., individual or complex) is exceeded, the RA shall publish a notice to reduce the ACL in the following season by the amount of the overage only if the species is overfished. (Comp ACL Am)
- If annual landings exceed recreational ACL, the following year's landings would be monitored in-season for persistence in increased landings. The Regional Administrator will publish a notice to reduce the length of the fishing season as necessary.

- Commercial Measures - Trip limit 1,200 lbs (gw); 36" FL no coring. Commercial sector closed in April. Sale is prohibited, retention limited to the bag limit. Commercial sector closed in April.
- Recreational Measures - 28" FL; 1-fish per person per day bag limit; In April, for-hire/charter vessels limited to 1 per person per day or 1 per person per trip. Sale of recreationally caught fish prohibited.
- The use of non-stainless steel circle hooks (offset or non-offset) is required for all species in the snapper grouper complex when using hook-and-line gear with natural baits in waters North of 28 degrees N. latitude.
- All species must be landed with head and fins intact.
- Recreational and commercial fishermen are required to use dehooking tools when fishing for snapper grouper species.

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The existing management system can adapt to address potential climate related changes.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The SAFMC manages Greater Amberjack with Council's staff coordinating Snapper Grouper Committee deliberations related to developing conservation and management actions to be considered by the Council.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

Hogfish

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Hogfish would generally have low to medium vulnerability to impacts of climate change. However, detailed life history and movement patterns are lacking for the complex and true vulnerability may depend on the magnitude of change in shelf ocean temperature and oceanic currents that would eventually impact spawning, feeding and movement associated with benthic shelf habitats.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Hogfish use nearshore (off Florida) and shelf ecosystems extensively and if pelagic and benthic habitats including coral and live bottom are affected by changes in ocean currents, water temperature, ph, the essential habitat for species in the shallow water complex would effectively be reduced, prey associated with that habitat would be reduced which in combination could lead to impacts at the populations level.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

If climate change affects other managed species including coastal migratory pelagic and fisheries for other snapper grouper species, effort could shift to target hogfish.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

Effort shifts associated with impacts in near-shore waters, could result in increased effort on the shelf for other managed snapper grouper species or even the deepwater complex.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Changes in ocean currents or increased of episodic events like upwelling have been raised as a potential concern affecting habitat essential to the managed species.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

Considerations would only arise if changes are great enough to result in shift among shelf or movement to deepwater ecosystems.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

The existing Council management system should be able to respond the management needs associated with such change.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- Commercial ACL - 49,469 lbs; Commercial Allocations – 36.69%
- Recreational ACL - 85,355 lbs; (ACT=59,390 lbs ww); Recreational Allocation - 63.31%
- If a commercial ACL (i.e., individual or complex) is met or is projected to be met, all subsequent purchase and sale is prohibited and harvest and/or possession is limited to the bag limit for the species covered by that ACL. If an ACL (i.e., individual or complex) is exceeded, the RA shall publish a notice to reduce the ACL in the following season by the amount of the overage only if the species is overfished.
- Specify Recreational ACT (see under ACL). If annual recreational landings exceed ACL, the following year's landings would be monitored in-season for persistence in increased landings. The

Regional Administrator will publish a notice to reduce the length of the fishing season as necessary.

- Recreational Measures - 12" TL; 5-fish bag limit off FL only, included in the 20-fish bag limit in GA, SC, and NC. Sale of recreationally caught fish prohibited.
- Commercial Measures - 12" TL
- The use of non-stainless steel circle hooks (offset or non-offset) is required for all species in the snapper grouper complex when using hook-and-line gear with natural baits in waters North of 28 degrees N. latitude.
- All species must be landed with head and fins intact.
- Recreational and commercial fishermen are required to use dehooking tools when fishing for snapper grouper species.

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The existing management system can adapt to address potential climate related changes.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The SAFMC manages the fishery for Hogfish with Council's staff coordinating Snapper Grouper Committee deliberations related to developing conservation and management actions to be considered by the Council.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

Mutton Snapper

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Mutton snapper would generally have medium vulnerability to impacts of climate change. However, detailed life history and movement patterns are lacking for the complex and true vulnerability may depend on the magnitude of change in shelf ocean temperature and oceanic currents that would eventually impact spawning, feeding and movement associated with benthic shelf habitats.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Mutton snapper use shelf ecosystems extensively and if pelagic and benthic habitats including coral and live bottom are affected by changes in ocean currents, water temperature, ph, the essential habitat for species in the shallow water complex would effectively be reduced, prey associated with that habitat would be reduced which in combination could lead to impacts at the populations level.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

Effort shifts associated with impacts in shelf waters, could result in increased effort on other managed snapper grouper species or even the deepwater complex.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

If climate change affects other managed species including coastal migratory pelagic and fisheries for other snapper grouper species, effort could shift to target other species in the complex including mutton snapper.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Changes in ocean currents or increased of episodic events like upwelling have been raised as a potential concern affecting habitat essential to the managed species.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

Considerations would only arise if changes are great enough to result in shift among shelf or movement to deepwater ecosystems.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

The existing Council management system should be able to respond the management needs associated with such change.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- ACLs and Allocations
- If an ACL (i.e., individual or complex) is met or is projected to be met, all subsequent purchase and sale is prohibited and harvest and/or possession is limited to the bag limit for the species covered by that ACL. If an ACL (i.e., individual or complex) is exceeded, the RA shall publish a notice to reduce the ACL in the following season by the amount of the overage only if the species is overfished.
- Recreational Measures- Part of Aggregate Snapper Bag Limit of 10/person/day of: lane, yellowtail, grey, mutton, black, queen, schoolmaster, blackfin, mahogoney, cubera under 30", dog, and silk snapper. Sale of recreationally caught fish prohibited. Size Limits (Gray 12" TL, lane 8" TL, cubera 12" TL; 2/person for fish > 30"TL off East FL, dog 12" TL, mohogoney 12" TL)
- Commercial Measures- Size Limits (Gray 12" TL, lane 8" TL, cubera 12"

TL; 2/person for fish > 30"TL off East FL, dog 12" TL, mohogoney 12" TL)

- The use of non-stainless steel circle hooks (offset or non-offset) is required for all species in the snapper grouper complex when using hook-and-line gear with natural baits in waters North of 28 degrees N. latitude.
- All species must be landed with head and fins intact.
- Recreational and commercial fishermen are required to use dehooking tools when fishing for snapper grouper species.

Species	Commercial ACL	Recreational ACL	Total ACL	Comm.	Rec.
Snappers Complex	215,662 lbs ww	728,577 lbs ww (ACT=624,197 lbs ww)	944,239 lbs ww		
Gray Snapper	192,830	602,913(ACT=534,422 lbs ww)	795,743	24.23%	75.77%
Lane Snapper	17,695	102,289 (ACT=78,087 lbs ww)	119,984	14.75%	85.25%
Cubera Snapper	4,829	19,851 (ACT=9,925 lbs ww)	24,680	19.57%	80.43%
Dog Snapper	273	3,012 (ACT=1,506 lbs ww)	3,285	8.31%	91.69%
Mahogany Snapper	36	512 (ACT=256 lbs ww)	548	6.49%	93.51%

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The existing management system can adapt to address potential climate related changes.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The SAFMC manages the Mutton Snapper fishery with Council's staff coordinating Snapper Grouper Committee deliberations related to developing conservation and management actions to be considered by the Council.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

Red Grouper

Management authorities - *Who has the authority or obligation to manage the species?*

- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Red grouper would generally have medium vulnerability to impacts of climate change. However, detailed life history and movement patterns are lacking for the complex and true vulnerability may depend on the magnitude of change in shelf ocean temperature and oceanic currents that would eventually impact spawning, feeding and movement associated with benthic shelf habitats.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Red grouper use shelf and shelf edge ecosystems extensively and if pelagic and benthic habitats including coral and live bottom are affected by changes in ocean currents, water temperature, ph, the essential habitat for species in the shallow water complex would effectively be reduced, prey associated with that habitat would be reduced which in combination could lead to impacts at the populations level.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

Effort shifts associated with impacts in shelf waters and the fishery for red grouper could result in increased effort on other managed snapper grouper species or even the deepwater complex. The availability of red grouper competes with and may affect the demand for wreckfish and climate related availability could affect the demand for the deepwater species.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

If climate change affects other managed species including coastal migratory pelagic and fisheries for other snapper grouper species, effort could shift to red grouper.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Changes in ocean currents or increased of episodic events like upwelling have been raised as a potential concern affecting habitat essential to the managed species.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

Considerations would only arise if changes are great enough to result in shift among shelf or movement to deepwater ecosystems.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

The existing Council management system should be able to respond the management needs associated with such change.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- Commercial ACL – 315,920 lbs ww (2013); 343,200 lbs ww (2014+) Commercial Allocation – 44%
- Recreational ACL - 402,080 lbs ww ACT=301,560 lbs ww (2013)
- 436,800 lbs ww; ACT=327,600 lbs; (2014+) Recreational Allocation: 56%
- If the commercial ACL is met or is projected to be met, all subsequent purchase and sale of red grouper is prohibited and harvest and/or possession is limited to the bag limit. (Am24) If the commercial ACL is exceeded, the Regional Administrator shall publish a notice to reduce the commercial ACL in the following season by the amount of the overage.
- If the current year recreational landings exceed the recreational ACL in a given year, the Regional Administrator shall publish a notice to

close the recreational sector when the recreational ACL is projected to be met. If the recreational ACL is exceeded, the Regional Administrator shall publish a notice to reduce the recreational ACL in the following season by the amount of the overage.

- Commercial Measures - 20" TL
- Recreational Measures - 20" TL; aggregate grouper bag limit of 3/person/day. Sale of recreationally caught fish prohibited.
- Spawning closure Jan 1-Apr 30
- The use of non-stainless steel circle hooks (offset or non-offset) is required for all species in the snapper grouper complex when using hook-and-line gear with natural baits in waters North of 28 degrees N. latitude.
- All species must be landed with head and fins intact.
- Recreational and commercial fishermen are required to use dehooking tools when fishing for snapper grouper species.

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The existing management system can adapt to address potential climate related changes.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The SAFMC manages the Red Grouper Fishery with Council's staff coordinating Snapper Grouper Committee deliberations related to developing conservation and management actions to be considered by the Council.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

Red Porgy

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Red porgy would generally have medium vulnerability to impacts of climate change. However, detailed life history and movement patterns are lacking for the complex and true vulnerability may depend on the magnitude of change in shelf ocean temperature and oceanic currents that would eventually impact spawning, feeding and movement associated with benthic shelf habitats.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Red porgy species use shelf ecosystems extensively and if pelagic and benthic habitats including coral and live bottom are affected by changes in ocean currents, water temperature, ph, the essential habitat for species in the shallow water complex would effectively be reduced, prey associated with that habitat would be reduced which in combination could lead to impacts at the populations level.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

Effort shifts associated with impacts in shelf waters could result in increased effort on other managed snapper grouper species or even the deepwater complex.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

If climate change affects other managed species including coastal migratory pelagic and fisheries for other snapper grouper species, effort could shift to the shallow water complex.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Changes in ocean temperature, ocean currents or increase in episodic events like upwelling have been raised as a potential concern affecting habitat essential to the managed species.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

Considerations would only arise if changes are great enough to result in shift among shelf or movement to deepwater ecosystems.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

The existing Council management system should be able to respond the management needs associated with such change.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- Commercial ACL – 153,000 lbs ww (2013); 154,500 lbs ww for 2014; 164,000 lbs ww for 2015+
- Recreational ACL - 153,000 lbs ww (ACT = 109,670) (2013); 154,500 lbs ww for 2014;
- 164,000 lbs ww for 2015+
- Commercial Allocation – 50% Recreational Allocation – 50%
- If commercial landings exceed the applicable commercial ACL, and red porgy are overfished, the AA will file a notification with the Office of the Federal Register, at or near the beginning of the fishing year to reduce the ACL for that following year by the amount of the overage in the prior fishing year.
- If annual recreational landings exceed ACL, the following year's landings would be monitored in-season for persistence in increased landings. The Regional Administrator will publish a notice to reduce the length of the fishing season as necessary.

- The use of non-stainless steel circle hooks (offset or non-offset) is required for all species in the snapper grouper complex when using hook-and-line gear with natural baits in waters North of 28 degrees N. latitude.
- All species must be landed with head and fins intact.
- Recreational and commercial fishermen are required to use dehooking tools when fishing for snapper grouper species.

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The existing management system can adapt to address potential climate related changes.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The SAFMC manages the Red Porgy Fishery with Council's staff coordinating Snapper Grouper Committee deliberations related to developing conservation and management actions to be considered by the Council.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

Red Snapper

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Red snapper would generally have medium vulnerability to impacts of climate change. However, detailed life history and movement patterns are lacking for the complex and true vulnerability may depend on the magnitude of change in shelf ocean temperature and oceanic currents that would eventually impact spawning, feeding and movement associated with benthic shelf habitats.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Red snapper use shelf ecosystems extensively and if pelagic and benthic habitats including coral and live bottom are affected by changes in ocean currents, water temperature, ph, the essential habitat for species in the shallow water complex would effectively be reduced, prey associated with that habitat would be reduced which in combination could lead to impacts at the populations level.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

Effort shifts associated with impacts in shelf waters, could result in increased effort on other managed snapper grouper species or even the deepwater complex. However, red snapper is overfished and evaluated annually to determine if any harvest can be allowed. The recent resulting fisheries are short commercial and recreational times that would unlikely be impacted in the short term by

population or habitat effects of climate change.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

If climate change affects other managed species effort could shift to target other snapper grouper species. However, given the red snapper harvest is limited if allowed at all and controlled to ensure long-term rebuilding is not compromised, the species isn't as vulnerable to effects of climate change.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Changes in ocean temperature, ocean currents or increased of episodic events like upwelling have been raised as a potential concern affecting habitat essential to the managed species.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

Considerations would only arise if changes are great enough to result in shift among shelf or movement to deepwater ecosystems. If change results in conditions which compromise the ability of the stock to rebuild, increased access and economic value of a rebuilt fishery would not be realized.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

The existing Council management system should be able to respond the management needs associated with such change.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- Commercial ACL – 21,447 lbs gw (2013 only); Commercial Allocation - 28.07%
- Recreational ACL - 9,585 fish (2013 only); Recreational Allocation – 71.93%
- Commercial Measures - No minimum size limit; trip limit 75 lbs gw

- Recreational Measures - No minimum size limit; bag limit 1 fish/person/day. Sale of recreationally caught fish prohibited.
- The use of non-stainless steel circle hooks (offset or non-offset) is required for all species in the snapper grouper complex when using hook-and-line gear with natural baits in waters North of 28 degrees N. latitude.
- All species must be landed with head and fins intact.
- Recreational and commercial fishermen are required to use dehooking tools when fishing for snapper grouper species.

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The existing management system can adapt to address potential climate related changes.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The SAFMC manages the Red Snapper Fishery with Council's staff coordinating Snapper Grouper Committee deliberations related to developing conservation and management actions to be considered by the Council.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

Scamp

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Scamp would generally have medium vulnerability to impacts of climate change. However, detailed life history and movement patterns are lacking for the complex and true vulnerability may depend on the magnitude of change in shelf ocean temperature and oceanic currents that would eventually impact spawning, feeding and movement associated with benthic shelf habitats.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Scamp use shelf ecosystems extensively and if pelagic and benthic habitats including coral and live bottom are affected by changes in ocean currents, water temperature, ph, the essential habitat for species in the shallow water complex would effectively be reduced, prey associated with that habitat would be reduced which in combination could lead to impacts at the populations level.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

Effort shifts associated with impacts in shelf waters, could result in increased effort on other managed snapper grouper species or even the deepwater complex.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

If climate change affects other managed species including coastal migratory pelagic and fisheries for other snapper grouper species, effort could shift to scamp.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Changes in ocean currents or increased of episodic events like upwelling have been raised as a potential concern affecting habitat essential to the managed species.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

Considerations would only arise if changes are great enough to result in shift among shelf or movement to deepwater ecosystems.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

The existing Council management system should be able to respond the management needs associated with such change.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- Commercial ACL - 333,100 lbs ww; Commercial Allocation - 65.34%
- Recreational ACL - 176,688 lbs ww (ACT=94,316 lbs ww) Recreational Allocation – 34.66%
- If the commercial ACL (i.e., individual or complex) is met or is projected to be met, all subsequent purchase and sale is prohibited and harvest and/or possession is limited to the bag limit for the species covered by that ACL. If an ACL (i.e., individual or complex) is exceeded, the RA shall publish a notice to reduce the ACL in the following season by the amount of the overage only if the species is overfished.
- If recreational annual landings exceed ACL, the following year's landings would be monitored in-season for persistence in increased landings. The Regional Administrator will publish a notice to reduce the length of the fishing season as necessary.
- Commercial Measures - 20" TL

- Recreational Measures - 20" TL; Part of Aggregate Grouper Bag Limit of 3/person/day of: gag, black, snowy, misty, red grouper, scamp, yellowedge, yellowfin, yellowmouth, blueline tile, golden tile, sand tile, coney, graysby, red hind and rock hind. Sale of recreationally caught fish prohibited.
- The use of non-stainless steel circle hooks (offset or non-offset) is required for all species in the snapper grouper complex when using hook-and-line gear with natural baits in waters North of 28 degrees N. latitude.
- All species must be landed with head and fins intact.
- Recreational and commercial fishermen are required to use dehooking tools when fishing for snapper grouper species.

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The existing management system can adapt to address potential climate related changes.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The SAFMC manages the Scamp Fishery with Council's staff coordinating Snapper Grouper Committee deliberations related to developing conservation and management actions to be considered by the Council.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

Snowy Grouper

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Snowy grouper would generally have low or minimal vulnerability to impacts of climate change. However, detailed life history, movement and migration patterns are lacking for the species and true vulnerability may depend on the magnitude of change in bottom temperature or deepwater and oceanic currents that would eventually impact spawning, feeding and movement.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Snowy grouper using shelf edge to deepwater ecosystems extensively. Therefore, if deepwater habitat including coral and live bottom species are affected by changes in ocean water ph, the essential habitat for snowy grouper would effectively be reduced, prey associated with that habitat would be reduced which in combination could lead to impacts at the populations level.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

If effort shifts to deepwater associated with impacts in shelf waters, increased effort on snowy grouper may occur.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

If climate change affects other managed fisheries including coastal migratory pelagic and shallower water snapper grouper species, effort could shift to the deepwater putting more stress on the snowy grouper fishery possibly making it more vulnerable to impacts associated with climate change.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Changes in deepwater currents, ocean temperature or increased of episodic events like upwelling have been raised as a potential concern affecting habitat essential to the managed species.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

Considerations would only arise if changes are great enough to reach the deepwater ecosystems.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

Given the timescales being discussed as to impacting deepwater habitats, the existing Council management system should be able to respond the management needs associated with such change.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- Commercial ACL - 82,900 lbs gw (97,822 lbs ww); Commercial Allocation – 95%
- Recreational Allocation - 523 fish (5,192 lbs gw); Recreational Allocation - 5%
- Prohibit harvest, possession, and retention when the commercial quota is projected to be met.
- If the recreational ACL is exceeded, the Regional Administrator shall publish a notice to reduce the length of the following fishing season by the amount necessary to ensure landings do not exceed the recreational ACL for the following fishing season. Compare the recreational ACL with projected recreational landings over a range of years. For 2012 and subsequent fishing years, the most recent 3-

year running average recreational landings will be compared to the ACL.

- Commercial Measures - Trip limit 100 lbs
- Recreational Measures - Part of Aggregate Grouper Bag Limit of 3/person/day of: gag, black, snowy, misty, red grouper, scamp, yellowedge, yellowfin, yellowmouth, blueline tile, golden tile, sand tile, coney, graysby, red hind and rock hind with a limit of 1 snowy per vessel per day. Sale of recreationally caught fish prohibited.
- The use of non-stainless steel circle hooks (offset or non-offset) is required for all species in the snapper grouper complex when using hook-and-line gear with natural baits in waters North of 28 degrees N. latitude.
- All species must be landed with head and fins intact.
- Recreational and commercial fishermen are required to use dehooking tools when fishing for snapper grouper species.

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The existing management system can adapt to address potential climate related changes.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The SAFMC manages the Snowy Grouper Fishery with Council's staff coordinating Snapper Grouper Committee deliberations related to developing conservation and management actions to be considered by the Council.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

Vermillion Snapper

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Vermilion snapper would generally have medium vulnerability to impacts of climate change. However, detailed life history and movement patterns are lacking for the complex and true vulnerability may depend on the magnitude of change in shelf ocean temperature and oceanic currents that would eventually impact spawning, feeding and movement associated with benthic shelf habitats.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Vermilion snapper use shelf ecosystems extensively and if pelagic and benthic habitats including coral and live bottom are affected by changes in ocean currents, water temperature, ph, the essential habitat for species in the shallow water complex would effectively be reduced, prey associated with that habitat would be reduced which in combination could lead to impacts at the populations level.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

Effort shifts associated with impacts in shelf waters could result in an effort shift to other managed snapper grouper species including the deepwater complex.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

If climate change affects coastal migratory pelagic or fisheries for other snapper grouper species, effort could shift to vermilion snapper.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Changes in ocean temperature, ocean currents or increased of episodic events like upwelling have been raised as a potential concern affecting habitat essential to the managed species.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

If shelf habitat is affected by climate change economic impacts would arise from possible reduction in availability or production.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

The existing Council management system should be able to respond the management needs associated with such change.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- Commercial ACL – Jan- June: 466,480 lbs (2013); 446,080 lbs for 2014; 438,260 lbs for 2015; 431,460 lbs for 2016+
- July- Dec: 466,480 lbs (2013 only); 446,080 lbs for 2014; 438,260 lbs for 2015; 431,460 lbs for 2016; Commercial Allocation: 68%
- Recreational ACL – 439,040 lbs (2013); 419,840 lbs for 2014; 412,480 lbs for 2015; 406,080 lbs for 2016+; Recreational Allocation - 32%
- After the commercial quota is projected to be met, all harvest, possession, and retention is prohibited; all purchase and sale is prohibited.
- If recreational landings, as estimated by the SRD, reach or are projected to reach the recreational ACL and species is overfished, based on the most recent Status of U.S. Fisheries Report to Congress, the AA will file a notification with the Office of the Federal Register to close the recreational sector for the remainder of the fishing year. Without regard to overfished status, if recreational landings exceed

the ACL, the AA will file a notification with the Office of the Federal Register, at or near the beginning of the following fishing year, to reduce the ACL for that fishing year by the amount of the overage. Compare the recreational ACL with recreational landings over a range of years. For 2012 and subsequent fishing years, the most recent 3-year running average recreational landings will be compared to the ACL. If overfished and recreational sector is projected to be met, prohibit harvest and retention. If the ACL is exceeded, independent of stock status, reduce the sector ACL in the following season by the amount of the overage.

- Commercial Measures - 12" TL; trip limit 1,000 lbs gw with a step-down to 500 lbs gw when 75% of the ACL is met
- Recreational Measures - 12"TL; 5-fish bag limit; Sale of recreationally caught fish prohibited.
- The use of non-stainless steel circle hooks (offset or non-offset) is required for all species in the snapper grouper complex when using hook-and-line gear with natural baits in waters North of 28 degrees N. latitude.
- All species must be landed with head and fins intact.
- Recreational and commercial fishermen are required to use dehooking tools when fishing for snapper grouper species.

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The existing management system can adapt to address potential climate related changes.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The SAFMC manages the Vermilion Snapper Fishery with Council's staff coordinating Snapper Grouper Committee deliberations related to developing conservation and management actions to be considered by the Council.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

Wreckfish

Management authorities - *Who has the authority or obligation to manage the species?*

- Regional: SAFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Wreckfish as a deepwater species would generally have low or minimal vulnerability to impacts of climate change. However, detailed life history, movement and migration patterns are lacking for the species and true vulnerability may depend on the magnitude of change in bottom temperature or deepwater and oceanic currents that would eventually impact spawning, feeding and movement.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Wreckfish are a deepwater species using deepwater coral ecosystems extensively. Therefore, if deepwater coral species are affected by changes in ocean water ph, the essential habitat for this species would effectively be reduced, prey associated with that habitat would be reduced which in combination could lead to impacts at the populations level.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

There are no direct impacts to other fisheries considering participants primarily participate in the fishery almost exclusively.

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

Unless new entrants are allowed into the fishery other fisheries

shouldn't affect this fishery.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

Changes in deepwater currents or increased of episodic events like upwelling have been raised as a potential concern affecting habitat essential to the managed species.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

Considerations would only arise if changes are great enough to reach the deepwater ecosystems.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

Given the timescales being discussed as to impacting deepwater habitats, the existing Council management system has a long-term working relationship with the fishermen and should be able to respond the management needs associated with such change.

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- Commercial ACL- 223,250 lbs ww Commercial Allocation 95%
- Recreational ACL- 11,750 lbs ww Recreational Allocation 5%
- Commercial Measures - ITQ program
- Recreational Measures- Open Jul 1- Aug 31; 1/person/day. Sale of recreationally caught fish prohibited
- Seasonal Closure- Jan 15- Apr 15
- If an ACL (i.e., individual or complex) is met or is projected to be met, all subsequent purchase and sale is prohibited and harvest and/or possession is limited to the bag limit for the species covered by that ACL. If an ACL (i.e., individual or complex) is exceeded, the RA shall publish a notice to reduce the ACL in the following season by the amount of the overage only if the species is overfished.
- The use of non-stainless steel circle hooks (offset or non-offset) is required for all species in the snapper grouper complex when using hook-and-line gear with natural baits in waters North of 28 degrees

N. latitude.

- All species must be landed with head and fins intact.
- Recreational and commercial fishermen are required to use dehooking tools when fishing for snapper grouper species.

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The existing management system can adapt to address potential climate related changes.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

The SAFMC manages the Wreckfish Fishery with Council's staff coordinating Snapper Grouper Committee deliberations related to developing conservation and management actions to be considered by the Council.

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*

Management authorities - *Who has the authority or obligation to manage the species?*

- States: NC, SC, GA, FL
- Regional: SAFMC, GMFMC
- Federal: NOAA Fisheries

Climate vulnerability of species - *Climate change can influence the biology of a species (i.e. growth, maturity, reproduction, productivity, etc.). How vulnerable is the species to climate change, based on its biology? Please explain.*

Spiny Lobster are moderately susceptible to climate change.

Ecosystem considerations - *Climate change can influence entire ecosystems. Do ecosystem considerations or changes make this species more or less vulnerable to climate change? (i.e. predator-prey interactions, competition between species, habitat, etc.). If yes, please explain.*

Spiny Lobster live in a presently changing benthic environment. As the coral reef and live/hard bottom habitat distribution and quality change or are impacted, so will the species essential habitat potentially affecting their movement, spawning, growth to maturity and possibly even level of production.

Linkages to other fisheries - *Climate change can influence human behavior, such as changes in fisheries – direct fisheries, incidental fisheries, or other fisheries (i.e. changes in effort, bait supply, etc.).*

If climate change affects the fishery for this species, what are the potential impacts to other fisheries?

Could changes in other fisheries influence the vulnerability of this species to climate change? If yes, please explain.

Known climate-related concerns – *Have any climate related concerns been raised in the management process (i.e. scientists, fisherman, managers, other stakeholders, etc.)? List any specific issues (i.e. productivity, distribution, acidification). Are they short-term, intermediate, or long-term concerns?*

As the coral reef and live/hard bottom habitat distribution and quality change or are impacted, so will the species essential habitat potentially affecting their movement, spawning, growth to maturity and possibly

even level of production.

Social and economic concerns - *Are there any social or economic considerations that are relevant to climate change? If yes, please explain.*

The directed fisheries for spiny Lobster are off Florida primarily in the Florida Keys. Changes or loss of the tropical corals in the reef systems resulting from a changing climate could significantly reduce the present level of production in the population.

What's at risk? *Can you describe potential consequences of a governance system that is not capable of responding effectively to climate change impacts or within relevant timescales?*

Existing management measures - *What management measures are primarily used in the management of this species? Please list.*

- Aug 6- Mar 31 (fishing season)
- Commercial: 3" carapace; 5" tail for tailing permits; no berried lobster; NC, SC, GA: possession limit 2 lobster. FL: Trap certificate program; 250 per vessel dive limit
- Recreational: 3" carapace; no berried lobster; NC, SC, GA: 2-lobster bag limit; FL: 6/person/day
- ACL- 7.32 million lbs (rec and commercial combined)
- If ACT (6.59 million lbs) is met, landings will be reviewed

Do these measures allow for timely adaptation that might be necessary given the species vulnerability to climate change?

The present cooperative management of spiny lobster is effective and climate related change such as a population variability or range expansion associated with climate change could be addressed.

Communication and coordination - *How do management authorities communicate with one another about the management of the species? (i.e. Joint FMPs, designated seats, MOUs, staff coordination, etc.)*

Anything else? *Are there other categories or considerations that would shed light on the ability of the governance system to respond to climate change?*