APPENDIX A. ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

SNAPPER GROUPER ALTERNATIVES

SSC Control Rule for Species without assessments.

Discussion:

The South Atlantic Fishery Management Council (Council) received the proposed data-poor acceptable biological catch (ABC) control rule in June 2010. Some aspects of the proposed ABC control rule and its criteria were considered inappropriate because the ABC control did not follow the NS1 Guidelines. The Council ultimately rejected the data poor ABC control rule as put forth by the scientific and statistical committee (SSC) and requested that the SSC consider the following in revising the rule:

MOTION: COUNCIL DIRECTS THE SSC TO CONSIDER THE FOLLOWING GUIDANCE WHEN CONSIDERING AN ALTERNATIVE CONTROL RULE FOR UN-ASSESSED STOCKS:

(1) DETERMINATION OF SPECIES AS ECOSYSTEM COMPONENTS AND INCREASING BUFFERS ABOUT OFL FOR SUCH CIRCUMSTANCES IS BEYOND THE SCOPE OF ASSESSMENT UNCERTAINTY AND SHOULD THEREFORE NOT BE PART OF AN ABC CONTROL RULE.

(2) THE COUNCIL BELIEVES THAT STOCK STATUS IS AN OUTCOME AND NOT AN ASSESSMENT UNCERTAINTY APPROPRIATE TO CONSIDER IN AN ABC CONTROL RULE.

(3) THE COUNCIL RECOMMENDS THAT THE SSC CONFIGURE THE DATA POOR CONTROL RULE TO PROVIDE A REDUCTION DOWNWARD FROM OFL, AS DESCRIBED IN THE GUIDELINES, AND DOES NOT BELIEVE IT IS APPROPRIATE TO START AT AN ASSUMPTION THAT ABC=0.

(4) THE COUNCIL RECOMMENDS THAT THE SSC CONSIDER A TIERED APPROACH THAT DIFFERENTIATES BETWEEN LEVELS OF DATA DEFICIENCY, AND TAKES INTO CONSIDERATION SOURCES OF INFORMATION BEYOND LANDINGS STREAMS THAT MAY INCLUDE BUT ARE NOT LIMITED TO, PRIOR ASSESSMENTS, EFFORT TRENDS, SURVEY AND MONITORING TRENDS.

MOREOVER, THE COUNCIL RECOMMENDS THAT THE SSC REVIEW, COMPARE AND CONTRAST AND COMMENT ON THE UTILITY OF:

(1) THE ANALYTICAL APPROACHES FOR DEVELOPING ABCS IN DATA POOR SITUATIONS AND FOR UN-ASSESSED STOCKS THAT WERE PROVIDED FOR CONSIDERATION AT THE APRIL 2010 MEETING (E.G., DCAC AND COOPER APPROACHES);

(2) THE ALTERNATIVE ABC CONTROL RULES DEVELOPED BY THE COUNCIL AND INCLUDED IN CURRENT DRAFT AMENDMENTS; AND

(3) THE PROPOSED DATA POOR CONTROL RULE DEVELOPED AT THE APRIL 2010 MEETING.

THE SSC SHOULD COMMENT ON WHICH OF THESE APPROACHES IS MOST ROBUST TO UNKNOWN INFORMATION AND MOST APPROPRIATE FOR USE IN DERIVING

ABC FROM OFL. [INTENT THAT THIS APPLIES TO ALL SPECIES; USE ANY ASSESSMENT, NOT JUST PEER REVIEWED ASSESSMENTS].

The Council passed a motion establishing a data poor (later the term 'unassessed stocks' was indicated as preferred) ABC control rule of ABC=75% of OFL for snapper grouper stocks, excluding wreckfish. This was intended as a way to move the process ahead while giving the SSC additional time to develop the unassessed stocks control rule, and is an alternative referenced in (2) of the second clause of the motion listed above.

Council Motion:
ESTABLISH AN ABC CONTROL RULE FOR DATA POOR (NO P* ANALYSIS) SNAPPER GROUPER SPECIES WHERE ABC = 75% OF OFL (ALTERNATIVE 3B) EXCEPT FOR WRECKFISH.

The SSC further developed their ABC control rule in accordance with the NS1 Guidelines, which has been incorporated into the Comprehensive ACL Amendment. The SSC determined OFL was unknown for many data poor species and further revised its ABC control to include a broad range of data levels from data rich to data poor.

Action 3: Establish Species Groupings for Snapper Grouper Species
Alternative 2. Establish three species groups based on results from Shertzer and Williams (2008). For snapper-grouper species in Table 11 not covered by the assemblages, ACLs, ACTs, and AMs would be specified on an individual basis.

1. Deepwater assemblage: Blueline tilefish, snowy grouper, speckled hind, and yellowedge grouper.
2. Southern assemblage: Blue runner, gray snapper, lane snapper, mutton snapper, and yellowtail snapper.
3. Northern assemblage: Bank sea bass, black sea bass, knobbed porgy, gag, gray triggerfish, greater amberjack, red porgy, red snapper, scamp, tomtate, vermilion snapper, white grunt, and whitebone porgy.

Alternative 3. Use spatial and temporal patterns from Shertzer et al. (2009) to establish three species groups. For snapper-grouper species in Table 11 not covered by the assemblages, ACLs, ACTs, and AMs would be specified on an individual basis.

1. North Carolina and South Carolina.
2. Georgia and N. Florida (north of Cape Canaveral).
3. South Florida (south of Cape Canaveral, including the Keys).

Alternative 4. Use information from Shertzer et al. (2009), to establish two species groups for snapper-grouper species, north and south of the Cape Canaveral zoogeographic boundary (Table 9).

> *<u>Discussion:</u> Using the approach in these studies would have been problematic. Firstly, it would have resulted in a north and a south assemblage so groups would have been separated by geographical range. Secondly, the groupings approach proposed by Dr. Nick Farmer (used to develop the other alternatives) already makes use of the information contained in these studies.*

Action 4: Establish an Acceptable Biological Catch (ABC) Control Rule for Species That Have Not Been Assessed

Alternative 4. Establish an ABC Control Rule where ABC equals a percentage of the yield at MFMT.

Subalternative 4a. ABC=yield at 65%MFMT

Subalternative 4b. ABC=yield at 75%MFMT

Subalternative 4c. ABC=yield at 85%MFMT

Discussion: This alternative was not applicable to unassessed species as the MFMT is obtained from a stock assessment.

Alternative 6. Establish ABC based on the SSC's ABC Control Rule where ABC is a percentage of OFL. The percentage is based on the level or risk of overfishing (P*).

Alternative 6a. ABC=X% of OFL. The X% is based upon P* equals .20.

Alternative 6b. ABC=X% of OFL. The X% is based upon P* equals .30.

Alternative 6c. ABC=X% of OFL. The X% is based upon P* equals .40.

Alternative 6d. ABC=X% of OFL. The X% is based upon P* equals .50.

Discussion: This alternative refers to a P approach but the SSC's ABC control rule does not apply the P* approach to species that have not been assessed. For assessed species, this alternative is redundant as this approach is contained within Tier 1 of the SSC's Control Rule.*

Action 6: Establish Annual Catch Limits (ACLs) and Optimum Yield (OY) for the Snapper Grouper Fishery

Alternatives 2, 3 and 4. Establish ACLs for species…

Subalternative a. Establish a single ACL (commercial and recreational) based on the current TAC.

Subalternative b. Establish commercial and recreational ACLs based on preferred allocation alternative.

Discussion: The subalternatives were redundant as allocations were selected under a previous action. The same action was taken for similar actions in the amendment (i.e. wreckfish, black grouper, dolphin and wahoo).

WRECKFISH ALTERNATIVES

Action 10: Maximum Sustainable Yield (MSY) for Wreckfish.

Action 11: Specify Optimum Yield (OY) for Wreckfish.

Action 12: Specify the Overfishing Limits for Wreckfish.

Action 13: Specify the Overfished Threshold for Wreckfish.

Discussion: The Council chose to wait for any specification for MSY to come from the Council's SSC or wait until a new assessment is complete for wreckfish in 2012. The Council chose to re-specify optimum yield so that it coincides with the ACL. Overfishing levels need to be recommended by the SSC.

ABC Control Rule

Action 14. Establish an Acceptable Biological Catch (ABC) for wreckfish.

Discussion: The Council chose to replace this action with a discussion of the ABC recommendations from the SSC and their rationale for that recommendation. Note that the same rationale was given for actions that would set the ABC for golden crab and Sargassum.

Alternative 5. ABC = Amount equal to that calculated with the use of the ABC control rule developed by the SSC.

Discussion: This alternative was the same as Alternative 2 in Action 14.

Action 10: Establish an Annual Catch Limit (ACL) for Wreckfish

Alternative 2 (Preferred). ACL = OY = ABC.

Subalternative 2a. Establish a single ACL (commercial and recreational) based on the current TAC.

Subalternative 2b. Establish commercial and recreational ACLs based on preferred allocation alternative.

Alternative 3. ACL = OY = 90% of the ABC.

Subalternative 3a. Establish a single ACL (commercial and recreational) based on the current TAC.

Subalternative 3b. Establish commercial and recreational ACLs based on preferred allocation alternative.

Alternative 4. ACL = OY = 80% of the ABC.

Subalternative 4a. Establish a single ACL (commercial and recreational) based on the current TAC.

Subalternative 4b. Establish commercial and recreational ACLs based on preferred allocation alternative.

Discussion: The Council voted to remove the subalternatives under each one of the alternatives in Action 10 since ACLs are addressed in a separate action. Note that the Council took the same action for black grouper, dolphin and wahoo due to the same reasoning.

Action 17: Specify Annual Catch Target for the Wreckfish Fishery.

Discussion: This action was moved to the Considered But Rejected Appendix because all of the current landings are under an IFQ Program, which is a built-in accountability mechanism.

Action 18: Specify Accountability Measures for the Wreckfish Fishery.

Alternative 2. Specify Annual Catch Targets (ACT) for the recreational sector, apply the ACT to recreational AM Alternatives 3 and 4.

Subalternative 2c. The recreational sector ACT equals sector ACL [(1-PSE) or 0.5, whichever is greater].

Discussion: Subalternative 2c was removed from consideration because there is not recreational fishery for wreckfish and consequently no PSEs.

Alternative 2. After the commercial ACL is met, all purchase and sale of wreckfish is prohibited and harvest and/or possession is limited to the bag limit.
Alternative 3. If the commercial sector ACL is exceeded, the Regional Administrator shall publish a notice to reduce the commercial sector ACL in the following season by the amount of the overage.

> *Discussion: The commercial fishery already contains accountability measures; that is, the IFQ Program itself. The program already prevents fishermen from going over the ACL. The Council felt that the IFQ Program itself is the accountability mechanism.*

Alternative 5. The Regional Administrator shall publish a notice to close the recreational fishery when the ACL is projected to be met.

> *Discussion: There would be no basis to be able to project when the ACL is expected to be met because there has never been a recreational fishery. All that could be done is to have the accountability measure be a post-season retrospective. An in-season measure is not practical at this point. The Council may revisit the approach in the future when there are some baseline data for the recreational fishery.*

Management Measures for the Wreckfish Fishery (Recreational Sector)
Alternative 6. Implement a 5 wreckfish per angler per day bag limit for the recreational fishery.
Alternative 7. Implement a 10 wreckfish per vessel per day bag limit for the recreational fishery.
Alternative 8. Implement a 10 wreckfish per angler per day bag limit for the recreational fishery.
Alternative 9. Implement a 20 wreckfish per vessel per day bag limit for the recreational fishery.
Alternative 10. Implement a 20 wreckfish per angler per day bag limit for the recreational fishery.

> *Discussion: The Council reasoned that Alternatives 6 through 10 would create a recreational fishery for this species. When the Council considered management measures for other deep-water species and the landings were unknown for some sectors, they decided on a one-per- person, considering going to a one per boat in those fisheries. To be consistent and to take care of creating a bycatch fishery in this sector, the Council thought it prudent to eliminate the potential for developing a recreational fishery with a bag limit of ten and twenty fish.*

Alternative 2. Eliminate the January 15-April 15 spawning season closure in the:

> **Subalternative 2a:** Commercial sector.
> **Subalternative 2b:** Recreational sector.
> *Discussion: This action was suggested by some members of the IPT for Council consideration since many catch share programs eliminate seasonal closures upon implementation of a catch share program. However, this is not a seasonal closure but a spawning season closure, which has important biological benefits to the stock. Members of the industry support a spawning season closure.*

DOLPHIN ALTERNATIVES

MSY Alternatives

Previously, the Councils (South Atlantic, Mid-Atlantic and New England Councils) were considering the following alternatives:

A. Maximum Sustainable Yield (MSY)

Option 1. No action. Maximum Sustainable Yield (MSY) for dolphin in the Atlantic, U.S. Caribbean, and Gulf of Mexico is between 18.8 and 46.5 million pounds.

Option 2. MSY = 26,986,790 pounds (12,241 mt). This figure is from a production model by Prager (2000) and would apply for dolphin in the Atlantic, U.S. Caribbean, and Gulf of Mexico.

Option 3. MSY = 15,882,100 – 17,833,190 pounds. This range is based on average landings from a 10 year and 5 year period respectively (Prager 2000) and would apply for dolphin in the Atlantic, U.S. Caribbean, and Gulf of Mexico.

Option 4. Specify MSY separately for the Atlantic at _____ million pounds.

Option 5. Recommended MSY from the Scientific and Statistical Committee (SSC).

Option 6. Specify MSY as 46.5 million pounds for the Atlantic, U.S. Caribbean, and Gulf of Mexico.

> *Discussion: One AP member supported Option 1. No Action. There was no support for Options 2, 3, & 4. Nine AP members supported Option 5. The AP recommended adding Option 6, which is the top end of the current MSY range. The Council concluded this is not an action item and does not need to be addressed in the Comprehensive ACL Amendment because they felt an updated estimate of MSY should come from a stock assessment. The current MSY will remain until a SEDAR assessment is completed.*

OFL Alternatives

Previously, the Councils (South Atlantic, Mid-Atlantic and New England Councils) were considering the following alternatives:

Option 1. No action. A maximum fishing mortality threshold (MFMT) - In the Atlantic, U.S. Caribbean, and Gulf of Mexico overfishing for dolphin is defined as a fishing mortality rate (F) in excess of F_{MSY} ($F_{30\%Static\ SPR}$).

A minimum stock size threshold (MSST) – In the Atlantic, U.S. Caribbean, and Gulf of Mexico the minimum stock size threshold for dolphin is defined as a ratio of current biomass ($B_{current}$) to biomass at MSY or (1-M)*B_{MSY}, where 1-M should never be less than 0.5. Using the best available estimates of natural mortality (M = 0.68-0.80) in the formula results in a MSST of 50% B_{MSY}. The stock would be overfished if current biomass ($B_{current}$) was less than MSST and would be recovered when current biomass was equal or greater than the biomass at MSY.

Option 2. OFL = F_{MSY} = 0.49 based on a production model (Prager 2000; Table 4).

Option 3. Specify OFL separately for the Atlantic at _____.

Option 4. Value recommended by the SSC.

Discussion: The AP supported Option 4. The Council's SSC indicated that OFL cannot be determined for dolphin.

ABC Control Rule and ABC Alternatives

Option 4. Establish ABC based on the SSC's Data Poor ABC control rule.

Discussion: The Council determined that this alternative is not needed as the SSCs ABC control rule was updated to encompass tiers, which include different levels of data availability.

Alternative 4. Establish an ABC Control Rule where ABC equals a percentage of the yield at MFMT.

Subalternative 4a. ABC = yield at 65%MFMT = 11,122,393 lbs whole weight.
Subalternative 4b. ABC = yield at 75%MFMT= 11,538,294 lbs whole weight.
Subalternative 4c. ABC = yield at 85%MFMT = 11,752,186 lbs whole weight

Discussion: This alternative is not appropriate since dolphin have not been assessed and a stock assessment is needed to estimate MFMT.

Allocation Alternatives

Alternative 6. Split the allocations for dolphin equally among the two sectors. The allocation would be 50% commercial and 50% recreational. Beginning in 2011, the commercial allocation would be _____ lbs gutted weight and the recreational allocation would be _____ fish (_____ lbs gutted weight). The commercial and recreational allocation specified for 2011 would remain in effect beyond 2011 until modified.

Discussion: The Council reasoned that this alternative was no longer necessary because allocations are being established based on catch history. Catches of dolphin have been overwhelmingly dominated by the recreational sector. Based on catch history, there is no basis to allocate catch equally to the commercial and recreational sectors.

Alternative 3. Define allocations for dolphin based upon landings from the ALS, MRFSS, and headboat databases. The allocation would be based on landings from the years 2006-2008. The allocation would be 8% commercial and 92% recreational. Beginning in 2011, the commercial allocation would be 712,974 lbs gutted weight and the recreational allocation would be _____ fish (8,199,200 lbs gutted weight). The commercial and recreational allocation specified for 2011 would remain in effect beyond 2011 until modified.

Discussion: Alternative 3 was not needed as the allocation percentages were identical for both Alternatives 3 and 4.

ACL Alternatives

Option 2. ACL = 17,541,414 pounds based on 65% of MSY Option 2 and would apply for dolphin in the Atlantic, U.S. Caribbean, and Gulf of Mexico.

Option 3. ACL = 20,240,093 pounds based on 75% of MSY Option 2 and would apply for dolphin in the Atlantic, U.S. Caribbean, and Gulf of Mexico.

Option 4. ACL = 22,938,772 pounds based on 85% of MSY Option 2 and would apply for dolphin in the Atlantic, U.S. Caribbean, and Gulf of Mexico.

Discussion: These alternatives were removed because a value for OFL was being considered and the ACL values exceeded the OFL level in the preferred alternative. The ACL must be set equal to or below the OFL. The Comprehensive ACL Amendment currently contains alternatives for ACLs that are defined as a portion of ABC where ABC was defined by the preferred alternative for the ABC control rule.

AM Alternatives

Option 2. The commercial AM for this stock is to prohibit harvest, possession, and retention when the quota is met. All purchase and sale is prohibited when the quota is met. Do not implement AMs for the recreational sector.

Option 4. Pay back for commercial?

Option 5. Pay back for recreational?

Discussion: The Council did not feel there was a need to consider a payback for dolphin because the stock is not overfished or undergoing overfishing. The Council has indicated that it will monitor landings with respect to the ACLs and recreational ACTs as a performance measure. If the ACLs and recreational ACTs were routinely exceeded, the Council would take action through a framework measure to modify management measures, AMs, etc.

Management Measure Alternatives

Option 4. Establish minimum size limits in NEFMC and MAFMC.

Discussion: The Mid-Atlantic and New England Councils did not indicate an interest in establishing a minimum size limit for dolphin.

OPTION 7. Examine harvest by powerheads and evaluate whether it should continue to be allowed.

Discussion: Harvest with powerheads represents a very low level of landings and the Council did not feel that it should be evaluated in this comprehensive amendment. The Council will consider this action in a future amendment.

WAHOO ALTERNATIVES

Previously, the Councils (South Atlantic, Mid-Atlantic and New England Councils) were considering the following alternatives:

Maximum Sustainable Yield (MSY)

Option 1. No action. The MSY proxy in the Atlantic, U.S. Caribbean, and Gulf of Mexico is between 1.41 and 1.63 million pounds (NMFS SEFSC based on 5-10 year catch history; letter dated 1/8/01).

Option 2. MSY = x.xx – y.yy million pounds. These figures could be based on updated 5-10 year time periods using more recent data and would apply for wahoo in the Atlantic, U.S. Caribbean, and Gulf of Mexico.

Option 3. Specify MSY separately for the Atlantic at _____ million pounds.

Option 4. The recommendation from the Scientific and Statistical Committee (SSC).

Discussion
The MSY options were structured the same way they were for dolphin. The Council chose to not make MSY an action item for dolphin and wanted to remain consistent for wahoo. The Council concluded this is not an action item and does not need to be addressed in the Comprehensive ACL Amendment because they felt an updated estimate of MSY should come from a stock assessment.

OFL Alternatives

Previously, the Councils (South Atlantic, Mid-Atlantic and New England Councils) were considering the following alternatives:

Option 1. No action. A maximum fishing mortality threshold (MFMT) - In the Atlantic, U.S. Caribbean, and Gulf of Mexico overfishing for wahoo is defined as a fishing mortality rate (F) in excess of F_{MSY} ($F_{30\%Static\ SPR}$).

A minimum stock size threshold (MSST) – In the Atlantic, U.S. Caribbean, and Gulf of Mexico the minimum stock size threshold for wahoo is defined as a ratio of current biomass ($B_{current}$) to biomass at MSY or (1-M)*B_{MSY}, where 1-M should never be less than 0.5. The stock would be overfished if current biomass ($B_{current}$) was less than MSST and would be recovered when current biomass was equal or greater than the biomass at MSY.

Option 2. Specify OFL and MSST separately for the Atlantic at _____ and _____ pounds.

Option 3. The values recommended by the SSC.

Discussion: The AP supported Option 3. The Council's SSC indicated that OFL cannot be determined for wahoo.

ABC Control Rule and ABC Alternatives

Option 4. Establish ABC based on the SSC's Data Poor ABC control rule.

Discussion: The Council determined that alternative is not needed as the SSCs ABC control rule was updated to encompass tiers, which include different levels of data availability.

Action 27: Acceptable Biological Catch (ABC) Control Rule and ABC (for wahoo).

Alternative 7. Establish an ABC Control Rule where ABC is a percentage of OFL. The percentage is based upon the level of risk of overfishing (P*).

Alternative 7a. ABC=X% of OFL. The X% is based upon P* equals .20.
Alternative 7b. ABC=X% of OFL. The X% is based upon P* equals .30.
Alternative 7c. ABC=X% of OFL. The X% is based upon P* equals .40.
Alternative 7d. ABC=X% of OFL. The X% is based upon P* equals .50.
Discussion: The use of P cannot be applied to unassessed species.*

Alternative 4. Establish an ABC Control Rule where ABC equals a percentage of the yield at MFMT.

Subalternative 4a. ABC=yield at 65%MFMT = 10,296,000 lbs whole weight.
Subalternative 4b. ABC=yield at 75%MFMT = 10,681,000 lbs whole weight.
Subalternative 4c. ABC=yield at 85%MFMT = 10,780,000 lbs whole weight.
Discussion: This alternative is not appropriate since wahoo have not been assessed and a stock assessment is needed to obtain MFMT.

Allocation Alternatives

Alternative 6. Split the allocations for wahoo equally between the two sectors. The allocation would be 50% commercial and 50% recreational. Beginning in 2011, the commercial allocation would be _____ lbs gutted weight and the recreational allocation would be _____ fish (_____ lbs gutted weight). The commercial and recreational allocation specified for 2011 would remain in effect beyond 2011 until modified.

Discussion: The Council reasoned that this alternative was no longer necessary because allocations are being established based on catch history. Catches of wahoo have been dominated by the recreational sector. Based on catch history, there is no basis to allocate catch equally to the commercial and recreational sectors.

Alternative 2. Define allocations for wahoo based upon landings from the ALS, MRFSS, and headboat databases. The allocation would be based on landings from the years 1999-2008. The allocation would be 5% commercial and 95% recreational. Beginning in 2011, the commercial allocation would be 41,250 lbs gutted weight and the recreational allocation would be _____fish (783,750 lbs gutted weight). The commercial and recreational allocation specified for 2011 would remain in effect beyond 2011 until modified.

Discussion: Alternative 2 resulted in same percentage as Alternative 4 so it was not needed.

ACL Alternatives

Option 2. ACL = c.cc million pounds based on 65% of MSY Option 1 or 2 and apply to wahoo in the Atlantic, U.S. Caribbean, and Gulf of Mexico.

Option 3. ACL = d.dd million pounds based on 75% of MSY Option 1 or 2 and apply to wahoo in the Atlantic, U.S. Caribbean, and Gulf of Mexico.

Option 4. ACL = e.ee million pounds based on 85% of MSY Option 1 or 2 and apply to wahoo in the Atlantic, U.S. Caribbean, and Gulf of Mexico.

Discussion: Values ACLs were defined as a portion of ABC where ABC was defined by the preferred alternative for the ABC control rule. The Council felt an updated value of MSY should come from a stock assessment.

AM Alternatives

Option 2. The commercial AM for this stock is to prohibit harvest, possession, and retention when the quota is met. All purchase and sale is prohibited when the quota is met. Do not implement AMs for the recreational sector.
Option 4. Payback for commercial?
Option 5. Payback for recreational?

Discussion: These alternatives were removed to track the changes the Council made for dolphin. The Council did feel there was a need to consider a payback for wahoo because the stock is not overfished or undergoing overfishing. The Council has indicated that it will monitor landings with respect to the ACLs and recreational ACTs as a performance measure. If the ACLs and recreational ACTs were routinely exceeded, the Council would take action through a framework measure to modify management measures, AMs, etc.

Action 28. Modify the Dolphin Wahoo Framework Procedure

Discussion: Due to statutory deadlines associated with the Comprehensive ACL Amendment, the Council decided to address changes to all framework procedures in a future comprehensive framework amendment so as to expedite development of this amendment.

***SARGASSUM* ACTIONS**

Action 37: Annual Catch Limits.

Alternative 4. ACL equals 85% of the ABC.
Alternative 5. ACL equals 75% of the ABC.
Alternative 6. ACL equals 65% of the ABC.

Discussion: This range of alternatives was not needed given the SSC's ABC recommendation (12,800 pounds) and the current allowable harvest of 5,000 pounds. An alternative (Alternative 3) was added to set the ACL equal to the current allowable harvest.

Action 27. Designate Sargassum as Ecosystem Component Species and Withdraw the Sargassum FMP

Discussion: An FMP cannot have a single species that is designated as an ecosystem component. A withdrawal of the FMP would be necessary to designate Sargassum as an ecosystem component species. However, such an action would delay development of this comprehensive amendment substantially. Since there is a statutory deadline associated with the Comprehensive ACL Amendment, the Council decided to address this action in a future amendment.

GOLDEN CRAB ALTERNATIVES

Action 43: Acceptable Biological Catch Control Rule and ABC.

Discussion: At their June 2010 meeting the South Atlantic Council rejected the SSC's control rule and removed the ABC recommendations based on that control rule. The South Atlantic Council agreed with the SSC comments from April 2010 that there was likely additional information that could be compiled for golden crab to better support fishing level recommendations. One of the concerns was that there was a wide range of prior estimates of productivity and acceptable yield. At their August 2010 meeting, the SSC considered additional information on golden crab. These data included additional landings, catch per unit effort, mean sizes, and history and background of past MSY values. The SSC recommended that ABC be set at 2 million pounds with a precautionary

note that more data are needed. The Council felt the SSC's recommended ABC could be specified in the body of the text without alternatives.

Action 41: Maximum Sustainable Yield.

Discussion: The specification of MSY should come from the Council's SSC; therefore, no action is needed to establish MSY.

Action 31: Modify the Golden Crab Framework Procedure

Discussion: Due to statutory deadlines associated with this amendment, the Council decided to address changes to all framework procedures in a future comprehensive framework amendment so as to expedite development of this amendment.

Action 45: Specify Annual Catch Target

Discussion: the golden crab fishery is strictly commercial so an annual catch target is not necessary.

Action 42: Overfishing Level.

Discussion: The specification of OFL should come from the Council's SSC; therefore, no action is needed to establish OFL.

Appendix B. Glossary

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

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

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

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

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

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

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

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

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

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

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

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

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

Discards: Fish captured, but released at sea.

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

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

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

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

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

F: Fishing mortality.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Moving to Ecosystem-Based Management

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

The Fishery Ecosystem Plan for the South Atlantic Region encompasses the following volume structure:
FEP Volume I - Introduction and Overview of FEP for the South Atlantic Region
FEP Volume II - South Atlantic Habitats and Species
FEP Volume III - South Atlantic Human and Institutional Environment
FEP Volume IV - Threats to South Atlantic Ecosystem and Recommendations

FEP Volume V - South Atlantic Research Programs and Data Needs
FEP Volume VI - References and Appendices

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

Ecosystem Approach to Deepwater Ecosystem Management

The South Atlantic Council manages coral, coral reefs and live/hard bottom habitat, including deepwater corals, through the Fishery Management Plan for Coral, Coral Reefs and Live/Hard Bottom Habitat of the South Atlantic Region (Coral FMP). Mechanisms exist in the FMP, as amended, to further protect deepwater coral and live/hard bottom habitats. The SAFMC's Habitat and Environmental Protection Advisory Panel and Coral Advisory Panel have supported proactive efforts to identify and protect deepwater coral ecosystems in the South Atlantic region. Management actions in Comprehensive Ecosystem-Based Amendment (CE-BA 1) (SAFMC 2009b)established deepwater coral HAPCs (C-HAPCs) to protect what is thought to be the largest continuous distribution (>23,000 square miles) of pristine deepwater coral ecosystems in the world. In addition, CE-BA 1 established areas within the CHAPC which provide for traditional fishing in limited areas which do not impact deepwater coral habitat. CE-BA 1, supported by the FEP, also addresses non-regulatory updates for existing EFH and EFH- HAPC information and addresses the spatial requirements of the Final EFH Rule (i.e., GIS presented for all EFH and EFH-HAPCs).

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

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

These efforts include participation as a member and on the Board of the Southeast Coastal Regional Ocean Observing Association (SECOORA) to guide and direct priority needs for observation and modeling to support fisheries oceanography and integration into stock assessment process through SEDAR. Cooperation through SECOORA is envisioned to facilitate the following:

- Refining current or water column designations of EFH and EFH-HAPCs (e.g., Gulf Stream and Florida Current)
- Providing oceanographic models linking benthic, pelagic habitats and food webs
- Providing oceanographic input parameters for ecosystem models
- Integration of OOS information into Fish Stock Assessment process in the SA region
- Facilitating OOS system collection of fish and fishery data and other research necessary to support the Council's use of area-based management tools in the SA Region including but not limited to EFH, EFH-HAPCs, Marine Protected Areas, Deepwater Coral Habitat Areas of Particular Concern, Special Management Zones and Allowable Gear Areas.
- Integration of OOS program capabilities and research Needs into the South Atlantic Fishery Ecosystem Plan

- Collaboration with SECOORA to integrate OOS products on the Council's Habitat and Ecosystem Internet Mapping System to facilitate model and tool development
- Expanding IMS and Arc Services will provide permissioned researchers access to data or products including those collected/developed by SA OOS partners

In addition, the Council serves on the National Habitat Board and, as a member of the Southeast Aquatic Resource Partnership (SARP), has highlighted the collaboration by including the Southeast Aquatic Habitat Plan and associated watershed conservation restoration targets into the FEP. Many of the habitat, water quality, and water quantity conservation needs identified in the threats and recommendations Volume of the FEP are directly addressed by on-the-ground projects supported by SARP. This cooperation results in funding fish habitat restoration and conservation intended to increase the viability of fish populations and fishing opportunity which also meets the needs to conserve and manage Essential Fish Habitat for Council managed species or habitat important to their prey.

Initially discussed as a South Atlantic Eco-regional Compact, the Council has also cooperated with South Atlantic States in the formation of a Governor's South Atlantic Alliance (SAA). This will also provide regional guidance and resources that will address State and Council broader habitat and ecosystem conservation goals. The SAA was initiated in 2006. An Executive Planning Team (EPT), by the end of 2007, had created a framework for the Governors South Atlantic Alliance. The formal agreement between the four states (NC, SC, GA, and FL) was executed in May 2009. The Agreement specifies that the Alliance will prepare a "Governors South Atlantic Alliance Action Plan" which will be reviewed annually for progress and updated every five years for relevance of content. Alliance mission and purpose is to promote collaboration among the four states, and with the support and interaction of federal agencies, academe, regional organizations, non-governmental organizations, and the private sector, to sustain and enhance the region's coastal and marine resources. The Alliance proposes to regionally implement science-based actions and policies that balance coastal and marine ecosystems capacities to support both human and natural systems. An Action Plan was approved by the Governors and an Implementation Plan is under development.

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

Building Tools to support EBM in the South Atlantic Region

The Council has developed a Habitat and Ecosystem Section of the website http://www.safmc.net/ecosystem/Home/EcosystemHome/tabid/435/Default.aspx and, in cooperation with the Florida Wildlife Research Institute (FWRI), developed a Habitat and Ecosystem Internet Map Server (IMS) http://www.safmc.net/EcosystemManagement/EcosystemBoundaries/MappingandGISData/tabid/62/Default.aspx. The IMS was developed to support Council and regional partners' efforts in the transition to EBM. Other regional partners include NMFS Habitat Conservation, South Atlantic States,

local management authorities, other Federal partners, universities, conservation organizations, and recreational and commercial fishermen. As technology and spatial information needs evolve, the distribution and use of GIS demands greater capabilities. The Council has continued its collaboration with FWRI in the now evolution to Web Services initially for for Essential Fish Habitat (http://ocean.floridamarine.org/SAFMC_EFH/) and Fishery Regulations (http://ocean.floridamarine.org/SAFMC_Regulations/) and is refining permissioned services for Fishery Independent and Habitat Research and developing one for Ocean Energy activities in the region (e.g., wind, wave and current).

Ecosystem Based Action, Future Challenges and Needs

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

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

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

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

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

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

South Atlantic Bight Ecopath Model

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

Essential Fish Habitat and Essential Fish Habitat Areas of Particular Concern

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

Snapper Grouper FMP

Essential fish habitat for snapper-grouper species includes coral reefs, live/hard bottom, submerged aquatic vegetation, artificial reefs and medium to high profile outcroppings on and around the shelf break zone from shore to at least 600 feet (but to at least 2000 feet for wreckfish) where the annual water temperature range is sufficiently warm to maintain adult populations of members of this largely tropical complex. EFH includes the spawning area in the water column above the adult habitat and the additional pelagic environment, including *Sargassum*, required for

larval survival and growth up to and including settlement. In addition the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse snapper grouper larvae.

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

Areas which meet the criteria for EFH-HAPCs for species in the snapper-grouper management unit include medium to high profile offshore hard bottoms where spawning normally occurs; localities of known or likely periodic spawning aggregations; nearshore hard bottom areas; The Point, The Ten Fathom Ledge, and Big Rock (North Carolina); The Charleston Bump (South Carolina); mangrove habitat; seagrass habitat; oyster/shell habitat; all coastal inlets; all state-designated nursery habitats of particular importance to snapper grouper (e.g., Primary and Secondary Nursery Areas designated in North Carolina); pelagic and benthic *Sargassum*; Hoyt Hills for wreckfish; the *Oculina* Bank Habitat Area of Particular Concern; all hermatypic coral habitats and reefs; manganese outcroppings on the Blake Plateau; and Council-designated Artificial Reef Special Management Zones (SMZs). In addition, the Council through CEBA 2 (SAFMC 2011) is proposing the deepwater snapper grouper MPAs and golden tilefish and blueline tilefish habitat as EFH-HAPCs under the Snapper Grouper FMP as follows:

EFH-HAPCs for golden tilefish to include irregular bottom comprised of troughs and terraces inter-mingled with sand, mud, or shell hash bottom. Mud-clay bottoms in depths of 150-300 meters are HAPC. Golden tilefish are generally found in 80-540 meters, but most commonly found in 200-meter depths.

EFH-HAPC for blueline tilefish to include irregular bottom habitats along the shelf edge in 45-65 meters depth; shelf break; or upper slope along the 100-fathom contour (150-225 meters); hardbottom habitats characterized as rock overhangs, rock outcrops, manganese-phosphorite rock slab formations, or rocky reefs in the South Atlantic Bight; and the Georgetown Hole (Charleston Lumps) off Georgetown, SC.

EFH-HAPCs for the snapper grouper complex to include the following deepwater Marine Protected Areas (MPAs) as designated in Snapper Grouper Amendment 14; Snowy Grouper Wreck MPA, Northern South Carolina MPA, Edisto MPA, Charleston Deep Artificial Reef MPA, Georgia MPA, North Florida MPA, St. Lucie Hump MPA and East Hump MPA.

Shrimp FMP

For penaeid shrimp, Essential Fish Habitat includes inshore estuarine nursery areas, offshore marine habitats used for spawning and growth to maturity, and all interconnecting water bodies as described in the Habitat Plan. Inshore nursery areas include tidal freshwater (palustrine), estuarine, and marine emergent wetlands (e.g., intertidal marshes); tidal palustrine forested areas; mangroves; tidal freshwater,

estuarine, and marine submerged aquatic vegetation (e.g., seagrass); and subtidal and intertidal non-vegetated flats. This applies from North Carolina through the Florida Keys.

For rock shrimp, essential fish habitat consists of offshore terrigenous and biogenic sand bottom habitats from 18 to 182 meters in depth with highest concentrations occurring between 34 and 55 meters. This applies for all areas from North Carolina through the Florida Keys. Essential fish habitat includes the shelf current systems near Cape Canaveral, Florida which provide major transport mechanisms affecting planktonic larval rock shrimp. These currents keep larvae on the Florida Shelf and may transport them inshore in spring. In addition the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse rock shrimp larvae.

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

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

Coastal Migratory Pelagics FMP

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

For Cobia essential fish habitat also includes high salinity bays, estuaries, and seagrass habitat. In addition, the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse coastal migratory pelagic larvae.
For king and Spanish mackerel and cobia essential fish habitat occurs in the South Atlantic and Mid-Atlantic Bights.

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

North Carolina (Adults May-September salinity >30 ppt); and New River, North Carolina (Adults May-October salinity >30 ppt). For Cobia they include Broad River, South Carolina; and Broad River, South Carolina (Adults & juveniles May-July salinity >25ppt).

Golden Crab FMP

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

Spiny Lobster FMP

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

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

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

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

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

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

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

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

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

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

Dolphin and Wahoo FMP

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

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

Pelagic *Sargassum* Habitat FMP

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

Actions Implemented That Protect EFH and EFH-HAPCs

Snapper Grouper FMP

- Prohibited the use of the following gears to protect habitat: bottom longlines in the EEZ inside of 50 fathoms or anywhere south of St. Lucie Inlet Florida, fish traps, bottom tending (roller-rig) trawls on live bottom habitat, and entanglement gear.

- Established the *Oculina* Experimental Closed Area where the harvest or possession of all species in the snapper grouper complex is prohibited

Shrimp FMP

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

Pelagic Sargassum Habitat FMP

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

Coastal Migratory Pelagics FMP

- Prohibited of the use of drift gill nets in the coastal migratory pelagic fishery;

Golden Crab FMP

- In the northern zone golden crab traps can only be deployed in waters deeper than 900 feet; in the middle and southern zones traps can only be deployed in waters deeper than 700 feet.
  Northern zone - north of the 28°N. latitude to the North Carolina/Virginia border;
  Middle zone - 28°N. latitude to 25°N. latitude; and
  Southern zone - south of 25°N. latitude to the border between the South Atlantic and Gulf of Mexico Fishery Management Councils.

Coral, Coral Reefs and Live/Hard Bottom FMP

- Established an optimum yield of zero and prohibiting all harvest or possession of these resources which serve as essential fish habitat to many managed species.
- Designated of the *Oculina* Bank Habitat Area of Particular Concern
- Expanded the *Oculina* Bank Habitat Area of Particular Concern (HAPC) to an area bounded to the west by 80°W. longitude, to the north by 28°30' N. latitude, to the south by 27°30' N. latitude, and to the east by the 100 fathom (600 feet) depth contour.
- Established the following two Satellite *Oculina* HAPCs: (1) Satellite *Oculina*

HAPC #1 is bounded on the north by 28°30'N. latitude, on the south by 28°29'N. latitude, on the east by 80°W. longitude, and on the west by 80°3'W. longitude, and (2) Satellite *Oculina* HAPC #2 is bounded on the north by 28°17'N. latitude, on the south by 28°16'N. latitude, on the east by 80°W. longitude, and on the west by 80°3'W. longitude.

- Prohibited the use of all bottom tending fishing gear and fishing vessels from anchoring or using grapples in the *Oculina* Bank HAPC.
- Established a framework procedure to modify or establish Coral HAPCs.
- Established the following six deepwater CHAPCs: Cape Lookout Lophelia Banks, Cape Fear Lophelia Banks, Stetson Reefs, Savannah and East Florida Lithoherms, and Miami Terrace (Stetson-Miami Terrace), Pourtales Terrace, and Blake Ridge Diapir Methane Seep.
- Within the deepwater CHAPCs, the possession of coral species and the use of all bottom damaging gear is prohibited including bottom longline, trawl (bottom and mid-water), dredge, pot or trap, or the use of an anchor, anchor and chain, or grapple and chain by all fishing vessels.

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

SAFMC Habitat and Environmental Protection Policy

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

SAFMC EFH Policy Statements

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

Protection and Restoration of EFH from Marine Aquaculture
http://www.safmc.net/Portals/0/HabitatPolicies/SAFMCAquaPolicyFinalJune07.pdf
Protection and Enhancement of Marine Submerged Aquatic Vegetation
http://www.safmc.net/Portals/0/HabitatPolicies/SAFMCSAVPol.pdf
Protection and Restoration of EFH from Beach Dredging and Filling

http://www.safmc.net/Portals/0/HabitatPolicies/BeachPolicy.pdf
Protection and Restoration of EFH from Energy Exploration, Development, Transportation and Hydropower Re-Licensing
http://www.safmc.net/Portals/0/HabitatPolicies/SAFMCEnergyPolicyFinal05.pdf
Protection and Restoration of EFH from Alterations to Riverine, Estuarine and Nearshore Flows
http://www.safmc.net/Portals/0/HabitatPolicies/FlowsPolicy.pdf
Policies for the Protection of South Atlantic Estuarine Ecosystems from Non-Native and Invasive Species
http://www.safmc.net/LinkClick.aspx?fileticket=Qn%2baT%2blNjZM%3d&tabid=245
Policies for the Protection of South Atlantic Marine Ecosystems from No-Native and Invasive Species
http://www.safmc.net/LinkClick.aspx?fileticket=bNFKO%2fIcvHQ%3d&tabid=245

Appendix D. History of Management

History of Management of the South Atlantic Snapper Grouper Fishery

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

Table D-1. History of Management for the Snapper Grouper Fishery of the South Atlantic Region.

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

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

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

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

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

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
Amendment #9 (1998b)	2/24/99	PR: 63 FR 63276 FR: 64 FR 3624	-Red porgy: 14" length (recreational and commercial); 5 fish rec. bag limit; no harvest or possession > bag limit, and no purchase or sale, in March and April. -Black sea bass: 10" length (recreational and commercial); 20 fish rec. bag limit; required escape vents and escape panels with degradable fasteners in bsb pots -Greater amberjack: 1 fish rec. bag limit; no harvest or possession > bag limit, and no purchase or sale, during April; quota = 1,169,931 lbs; began fishing year May 1; prohibited coring. -Vermilion snapper: 11" length (recreational) Gag: 24" length (recreational); no commercial harvest or possession > bag limit, and no purchase or sale, during March and April -Black grouper: 24" length (recreational and commercial); no harvest or possession > bag limit, and no purchase or sale, during March and April. -Gag and Black grouper: within 5 fish aggregate grouper bag limit, no more than 2 fish may be gag or black grouper (individually or in combination) -All SG without a bag limit: aggregate recreational bag limit 20 fish/person/day, excluding tomtate and blue runners -Vessels with longline gear aboard may only possess snowy, warsaw, yellowedge, and misty grouper, and golden, blueline and sand tilefish.
Amendment #9 (1998b) resubmitted	10/13/00	PR: 63 FR 63276 FR: 65 FR 55203	-Commercial trip limit for greater amberjack
Regulatory Amendment #8 (2000a)	11/15/00	PR: 65 FR 41041 FR: 65 FR 61114	-Established 12 SMZs at artificial reefs off Georgia; revised boundaries of 7 existing SMZs off Georgia to meet CG permit specs; restricted fishing in new and revised SMZs
Emergency Interim Rule	09/08/99, expired 08/28/00	64 FR 48324 and 65 FR 10040	-Prohibited harvest or possession of red porgy.
Emergency Action	9/3/99	64 FR 48326	-Reopened the Amendment 8 permit application process
Amendment #10 (1998d)	07/14/00	PR: 64 FR 37082 and 64 FR 59152 FR: 65 FR 37292	-Identified EFH and established HAPCs for species in the SG FMU.

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
Amendment #11 (1998e)	12/02/99	PR: 64 FR 27952 FR: 64 FR 59126	-MSY proxy: goliath and Nassau grouper = 40% static SPR; all other species = 30% static SPR -OY: hermaphroditic groupers = 45% static SPR; goliath and Nassau grouper = 50% static SPR; all other species = 40% static SPR -Overfished/overfishing evaluations: BSB: overfished (MSST=3.72 mp, 1995 biomass=1.33 mp); undergoing overfishing (MFMT=0.72, F1991-1995=0.95) Vermilion snapper: overfished (static SPR = 21-27%). Red porgy: overfished (static SPR = 14-19%). Red snapper: overfished (static SPR = 24-32%) Gag: overfished (static SPR = 27%) Scamp: no longer overfished (static SPR = 35%) Speckled hind: overfished (static SPR = 8-13%) Warsaw grouper: overfished (static SPR = 6-14%) Snowy grouper: overfished (static SPR = 5=15%) White grunt: no longer overfished (static SPR = 29-39%) Golden tilefish: overfished (couldn't estimate static SPR) Nassau grouper: overfished (couldn't estimate static SPR) Goliath grouper: overfished (couldn't estimate static SPR) -overfishing level: goliath and Nassau grouper = F>F40% static SPR; all other species: = F>F30% static SPR Approved definitions for overfished and overfishing. MSST = [(1-M) or 0.5 whichever is greater]*B_{MSY}. MFMT = F_{MSY}
Amendment #12 (2000c)	09/22/00	PR: 65 FR 35877 FR: 65 FR 51248	-Red porgy: MSY=4.38 mp; OY=45% static SPR; MFMT=0.43; MSST=7.34 mp; rebuilding timeframe=18 years (1999=year 1); no sale during Jan-April; 1 fish bag limit; 50 lb. bycatch comm. trip limit May-December; modified management options and list of possible framework actions.
Amendment #13A (2003b)	04/26/04	PR: 68 FR 66069 FR: 69 FR 15731	-Extended for an indefinite period the regulation prohibiting fishing for and possessing snapper grouper spp. within the *Oculina* Experimental Closed Area.
Notice of Control Date	10/14/05	70 FR 60058	-The Council is considering management measures to further limit participation or effort in the commercial fishery for snapper grouper species (excluding Wreckfish).
Amendment #13C (2006)	10/23/06	PR: 71 FR 28841 FR: 71 FR 55096	- End overfishing of snowy grouper, vermilion snapper, black sea bass, and golden tilefish. Increase allowable catch of red porgy. Year 1 = 2006. 1. Snowy Grouper Commercial: Quota (gutted weight) = 151,000 lbs gw in year 1, 118,000 lbs gw in year 2, and 84,000 lbs gw in year 3 onwards. Trip limit = 275 lbs gw in year 1, 175 lbs gw in year 2, and 100 lbs gw

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
			in year 3 onwards. Recreational: Limit possession to one snowy grouper in 5 grouper per person/day aggregate bag limit. 2. Golden Tilefish Commercial: Quota of 295,000 lbs gw, 4,000 lbs gw trip limit until 75% of the quota is taken when the trip limit is reduced to 300 lbs gw. Do not adjust the trip limit downwards unless 75% is captured on or before September 1. Recreational: Limit possession to 1 golden tilefish in 5 grouper per person/day aggregate bag limit. 3. Vermilion Snapper Commercial: Quota of 1,100,000 lbs gw. Recreational: 12" size limit. 4. Black Sea Bass Commercial: Commercial quota (gutted weight) of 477,000 lbs gw in year 1, 423,000 lbs gw in year 2, and 309,000 lbs gw in year 3 onwards. Require use of at least 2" mesh for the entire back panel of black sea bass pots effective 6 months after publication of the final rule. Require black sea bass pots be removed from the water when the quota is met. Change fishing year from calendar year to June 1 – May 31. Recreational: Recreational allocation of 633,000 lbs gw in year 1, 560,000 lbs gw in year 2, and 409,000 lbs gw in year 3 onwards. Increase minimum size limit from 10" to 11" in year 1 and to 12" in year 2. Reduce recreational bag limit from 20 to 15 per person per day. Change fishing year from the calendar year to June 1 through May 31. 5. Red Porgy Commercial and recreational 1. Retain 14" TL size limit and seasonal closure (retention limited to the bag limit); 2. Specify a commercial quota of 127,000 lbs gw and prohibit sale/purchase and prohibit harvest and/or possession beyond the bag limit when quota is taken and/or during January through April; 3. Increase commercial trip limit from 50 lbs ww to 120 red porgy (210 lbs gw) during May through December; 4. Increase recreational bag limit from one to three red porgy per person per day.
Notice of Control Date	3/8/07	72 FR 60794	-The Council may consider measures to limit participation in the snapper grouper for-hire fishery
Amendment #14 (2007) Sent to NMFS 7/18/07	2/12/09	PR: 73 FR 32281 FR: 74 FR 1621	-Establish eight deepwater Type II marine protected areas (MPAs) to protect a portion of the population and habitat of long-lived deepwater snapper grouper species.
Amendment #15A (2008a)	3/14/08	73 FR 14942	- Establish rebuilding plans and SFA parameters for snowy grouper, black sea bass, and red porgy.
Amendment #15B (2008b)	2/15/10	PR: 74 FR 30569 FR: 74 FR 58902	- Prohibit the sale of bag-limit caught snapper grouper species.

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
			-Reduce the effects of incidental hooking on sea turtles and smalltooth sawfish. - Adjust commercial renewal periods and transferability requirements. - Implement plan to monitor and assess bycatch, - Establish reference points for golden tilefish. - Establish allocations for snowy grouper (95% com & 5% rec) and red porgy (50% com & 50% rec).
Amendment #16 (SAFMC 2009a)	7/29/09	PR: 74 FR 6297 FR: 74 FR 30964	-Specify SFA parameters for gag and vermilion snapper -For gag grouper: Specify interim allocations 51%com & 49%rec; rec & com spawning closure January through April; directed com quota=348,440 pounds gutted weight; reduce 5-grouper aggregate to 3-grouper and 2 gag/black to 1 gag/black and exclude captain & crew from possessing bag limit. -For vermilion snapper: Specify interim allocations 68%com & 32%rec; directed com quota split Jan-June=168,501 pounds gutted weight and 155,501 pounds July-Dec; reduce bag limit from 10 to 4 and a rec closed season October through May 15. In addition, the NMFS RA will set new regulations based on new stock assessment. -Require dehooking tools.
Amendment #17A (SAFMC 2010a)	12/3/10 red snapper closure; circle hooks March 3, 2011	PR: 75 FR 49447 FR: 75 FR 76874	-Specify an ACL and an AM for red snapper with management measures to reduce the probability that catches will exceed the stocks' ACL -Specify a rebuilding plan for red snapper -Specify status determination criteria for red snapper -Specify a monitoring program for red snapper
Emergency Rule	12/3/10	75 FR 76890	- Delay the effective date of the area closure for snapper grouper species implemented through Amendment 17A
Amendment #17B (SAFMC 2010b)	January 31, 2011	PR: 75 FR 62488 FR: 75 FR 82280	-Specify ACLs, ACTs, and AMs, where necessary, for 9 species undergoing overfishing. -Modify management measures as needed to limit harvest to the ACL or ACT. -Update the framework procedure for specification of total allowable catch.
Notice of Control Date	12/4/08	74 FR 7849	Establishes a control date for the golden tilefish fishery of the South Atlantic

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
Notice of Control Date	12/4/08	74 FR 7849	- Establishes control date for black sea bass pot fishery of the South Atlantic
Amendment #19 (Comprehensive Ecosystem-based Amendment 1) (SAFMC 2010c)	7/22/10	PR: 75 FR 14548 FR: 75 FR 35330	-Provide presentation of spatial information for Essential Fish Habitat (EFH) and EFH-Habitat Areas of Particular Concern (EFH-HAPC) designations under the Snapper Grouper FMP - Designation of deepwater coral HAPCs
Regulatory Amendment 10 (2011a)	5/31/11	PR: 76 FR 9530 FR: 76 FR 23728	Eliminate closed area for snapper grouper species approved in Amendment 17A.
Regulatory Amendment 9 (2011b)	Bag limit: 6/22/11 Trip limits: 7/15/11	PR: 76 FR 23930 FR: 76 FR 34892	- Establish trip limit for vermilion snapper and gag, increase trip limit for greater amberjack, and reduce bag limit for black sea bass
Regulatory Amendment 11	TBD	TBD	- Eliminate 240 ft closure for six deepwater species.
Amendment #18A (TBD)	TBD	TBD	- Limit participation and effort in the black sea bass fishery - Modifications to management of the black sea bass pot fishery - Improve the accuracy, timing, and quantity of fisheries statistics

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
Amendment 18B (TBD)	TBD	TBD	-Limit participation and effort in the golden tilefish fishery -Change the golden tilefish fishing year -Modify trip limits - update SFA parameters based on assessment
Amendment #20A	TBD	TBD	-Redistribute latent share for the wreckfish ITQ program.
Amendment #20B	TBD	TBD	-Update wreckfish ITQ according to reauthorized Magnuson-Stevens Act
Amendment #23 (Comprehensive Ecosystem-based Amendment 2)	TBD	TBD	- Designate the Deepwater MPAs as EFH-HAPCs - Limit harvest of snapper grouper species in SC Special Management Zones to the bag limit - Modify sea turtle release gear
Comprehensive ACL Amendment	TBD	TBD	-Establish ABC control rules, establish ABCs, ACLs, and AMs for species not undergoing overfishing -Remove some species from South Atlantic FMU -Specify allocations among the commercial, recreational, and for-hire sectors for species not undergoing overfishing -Limit the total mortality for federally managed species in the South Atlantic to the ACLs
Amendment #24	TBD	TBD	-Specify MSY, rebuilding plan (including ACLs, AMs, and OY), and allocations for red grouper

History of Management for the Dolphin and Wahoo Fishery off the Atlantic States
The Fishery Management Plan for the Dolphin and Wahoo Fishery off the Atlantic States (SAFMC 2003a) was partially approved on December 23, 2003. The FMP represents a proactive approach to maintaining healthy stocks of dolphin and wahoo, with action intended to cap participation, effort, and landings in the fishery. Approved actions provide equitable harvesting restrictions to the recreational and commercial sectors, and maintain the historical participation by both user groups. The intended effects of the FMP are to conserve and manage dolphin and wahoo off the Atlantic states (Maine through the east coast of Florida), and to ensure that no new fisheries for dolphin and wahoo develop.

The following regulations were effective on June 28, 2004: (1) a 20-inch fork length minimum size limit for dolphin off the coasts of Georgia and Florida with no size restrictions elsewhere; (2) prohibition of longline fishing for dolphin and wahoo in areas closed to the use of such gear for highly migratory pelagic species; and (3) allowable gear to be used in the fishery (hook-and-line gear including manual, electric, and hydraulic rods and reels; bandit gear; handlines; longlines; and spearfishing (including powerheads) gear. In addition, other approved portions of the FMP were also effective on this date, including (1) the management unit and designations of stock status criteria for the unit; (2) a fishing year of January 1 through December 31; (3) a 1.5 million pound (or 13% of the total harvest) cap on commercial landings; (4) establishment of a framework procedure by which the SAFMC may modify its management measures; and (5) designations of Essential Fish Habitat and Essential Fish habitat-Habitat Areas of Particular Concern.

The following regulations were effective on September 24, 2004: (1) owners of commercial vessels and/or charter vessels/headboats must have vessel permits and, if selected, submit reports; (2) dealers must have permits and, if selected, submit reports; (3) longline vessels must comply with sea turtle protection measures; (4) a recreational bag limit of 10 dolphin and 2 wahoo per person per day, with a limit of 60 dolphin per boat per day (headboats are excluded from the boat limit); (5) prohibition on recreational sale of dolphin and wahoo caught under a bag limit unless the seller holds the necessary commercial permits; and (6) a commercial trip limit of 500 pounds for wahoo.

The following regulations were effective on November 23, 2004: (1) operators of commercial vessels, charter vessels and headboats that are required to have a federal vessel permit for dolphin and wahoo must display operator permits.

Amendment 1 to the Dolphin Wahoo FMP was included in the Comprehensive Ecosystem-Based Amendment 1 (SAFMC 2010c). The amendment provided presentation of spatial information for Essential Fish Habitat (EFH) and EFH-Habitat Areas of Particular Concern (EFH-HAPC) designations under the FMP. Regulations became effective on July 22, 2010.

History of Management for the Golden Crab Fishery off the South Atlantic Region
The golden crab resource and fishery in the South Atlantic Region was unprotected prior to implementation of the FMP. The Council approved a control date that was published in the Federal Register on April 7, 1995. The Council completed the Golden Crab FMP (SAFMC 1995) and submitted the plan for formal Secretarial Review on December 15, 1995. Regulations implementing the FMP were published in the Federal Register on August 27, 1996 [61 FR 43952]; various regulations became effective August 27, September 26, and October 28, 1996 and September 7, 1997.

The Golden Crab FMP relies on a system of traditional fishery management plus controlled access. Traditional fisheries management includes measures to provide biological protection to the resource (escape gaps in traps and no retention of female crabs); gear regulation (define allowable gear, degradable panel, tending requirements, gear identification, and maximum trap size by zone); provide for law enforcement (depth limitations and prohibit possession of whole fish or fillets of snapper grouper species); determine the number of participants (vessel and dealer/processor permits); collect the necessary data (vessel/fishermen and dealer/processor reporting); and a framework procedure to adjust the management program (framework adjustments and adjustments to activities authorized by the Secretary of Commerce). Use of these traditional management techniques in other fishery management plans has not solved all fisheries management problems. At best, the fishery resource, in this case golden crab, is biologically protected. Ignored, or even exacerbated, are underlying social and economic problems resulting from gear conflicts, high regulatory costs, and low marketing incentives. To solve these social and economic problems, managers have increasingly turned to various forms of controlled access or effort limitation. The Council chose to limit the number of vessels in the golden crab fishery. Combining the more traditional fisheries management measures with controlled access best allowed the Council to solve problems in the golden crab fishery.

Framework Seasonal Adjustment #1 (SAFMC 1997) revised the vessel size limitations applicable when a vessel permit is transferred to another vessel and extended through December 31, 2000, the authorization to use wire cable for a mainline attached to a golden crab trap. The framework document was sent to NMFS on September 26, 1997 and the proposed rule was published on June 26, 1998. The final rule was published in the Federal Register on October 28, 1998 with regulations effective upon publication.

Amendment 1 (SAFMC 1998d) was a part of the Council‘s Comprehensive Amendment addressing Essential Fish Habitat in FMPs of the South Atlantic Region. Essential fish habitat for golden crab includes the U.S. Continental Shelf from Chesapeake Bay south through the Florida Straits (and into the Gulf of Mexico). In addition, the Gulf Stream, which occurs within the EEZ, is an essential fish habitat because it provides a mechanism to disperse golden crab larvae. The detailed description of seven essential fish habitat types (a flat foraminferan ooze habitat; distinct mounds, primarily of dead coral; ripple habitat; dunes; black pebble habitat; low outcrop; and soft-bioturbated habitat) for golden crab is provided in Wenner et al. (1987). Refer to Volume II of the FEP (SAFMC 2009b) and the Habitat Plan (SAFMC 1998c) for a more detailed description of habitat utilized by the managed species. There is insufficient knowledge of the biology of golden crabs to identify spawning and nursery areas and to identify HAPCs. As information becomes available, the Council would evaluate such data and identify HAPCs as

appropriate through the framework. In addition, Amendment 1 established a framework procedure to address habitat issues; this framework was added to the framework of all approved FMPs including the Golden Crab FMP. Amendment 1 was submitted to the NMFS on October 9, 1998. The Notice of Availability was published in the Federal Register on March 5, 1999, and the Comprehensive Habitat Amendment was approved on June 3, 1999. The proposed rule was published on July 9, 1999 and a supplement to the proposed rule was published on November 2, 1999. The final rule was published in the Federal Register on June 14, 2000 with regulations becoming effective July 14, 2000.

Amendment 2 (SAFMC 1998d) was a part of the Council's Comprehensive Amendment addressing Sustainable Fishery Act definitions and other required provisions in FMPs of the South Atlantic Region. The amendment was partially approved on May 19, 1999. The final rule was published in the Federal Register on November 2, 1999 with regulations becoming effective December 2, 1999. The description of fisheries and communities was approved and bycatch reporting was approved. The remaining items for golden crab were disapproved because the stock status determination criteria are incomplete and, thus, do not totally fulfill the new requirements of the Magnuson-Stevens Act and the national standard guidelines.

Amendment 3 (SAFMC 2000b) extended the authorization to use wire cable for mainlines attached to golden crab traps to December, 31, 2002; modified escape panel sizes for traps; addressed permit renewal requirements including removal of the 5,000-pound harvest requirement for renewing biannual permits and addressed the minimum harvest requirement for permit holders in the Southern Zone; allowed up to a 20% increase in vessel size from the vessel size of the original permit; created a sub-zone within the Southern Zone with specified conditions; allowed two new vessels to be permitted to fish only in the Northern Zone using an earlier list of those wanting to enter the fishery; specified status determination criteria; and modified the FMP framework to allow modifications to the sub-zone.

Amendment 4 (SAFMC 2010c) was included the Comprehensive Ecosystem-Based Amendment 1. The amendment created Allowable Golden Crab Fishing Areas‖ within the proposed Coral Habitat Areas of Particular Concern (CHAPCs); considered vessel monitoring for the golden crab fishery; and provide presentation of spatial information for Essential Fish Habitat (EFH) and EFH-Habitat Areas of Particular Concern (EFH-HAPC) designations under the Golden Crab FMPs. Regulations in Amendment 4 became effective on July 22, 2010.

Amendment 5 is contained within this Comprehensive ACL Amendment and establishes ABC, ACL and AMs for the golden crab fishery.

Amendment 6 (under development) proposes to establish a catch share program for the golden crab fishery.

The current effort at managing the golden crab fishery is distinguished by the practice of co-management, which has been defined by McGoodwin (1990) as a shift away from autocratic and paternalistic modes of management to modes that rely on the joint efforts of traditional fisheries specialists and fishing peoples. The options for managing the fishery that are put forth in this document have been developed by the golden crab fishermen and refined in consultation with the

Council. It is hoped that such efforts would increase the legitimacy of the future regulations and make the rationale for such regulations more understandable to all involved.

History of Management of Pelagic *Sargassum* Habitat

The Fishery Management Plan for Pelagic *Sargassum* Habitat (SAFMC 2002) was approved in 2003 and established the following restrictions to protect Pelagic *Sargassum* Habitat in the South Atlantic:

(1) Harvest and possession of *Sargassum* is prohibited south of the latitude line representing the North Carolina/South Carolina border, (2) all harvest is prohibited within 100 miles of shore between the 34 degrees North latitude line and the line representing the North Carolina/Virginia border, (3) harvest is limited to the months of November through June, (4) official observers are required on any harvesting trip, (5) an annual quota of 5,000 pounds landed wet weight, and (6) nets used to harvest Sargassum must be constructed of 4 ft stretch mesh or larger fitted to a frame no larger than 4 x 6 feet.

Other provisions of the plan include: Establishing the management unit for pelagic *Sargassum* throughout the South Atlantic exclusive economic zone (EEZ) and state waters. The management unit is the population of pelagic Sargassum occurring within the South Atlantic Council's area of jurisdiction along the U.S. Atlantic coast from the east coast of Florida, including the Atlantic side of the Florida Keys, to the North Carolina/Virginia Border and within state waters of North Carolina, South Carolina, Georgia, and the Florida East Coast. In addition, the following were established for pelagic *Sargassum*; a maximum sustainable yield, an optimum yield for pelagic *Sargassum* as 5,000 pounds wet weight per year and an overfishing level to meet Magnuson-Stevens Act mandate for pelagic *Sargassum*.

APPENDIX E: FISHERY IMPACT STATEMENT (FIS)

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

Actions Contained in the Comprehensive Annual Catch Limit (ACL) Amendment

This amendment will bring the Snapper Grouper, Dolphin Wahoo, Golden Crab and *Sargassum* FMPs into compliance with Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requirements for Annual Catch Limits (ACLs) and Accountability Measures (AMs) and modify management measures for wreckfish and dolphin. Specifically, this amendment would:

- Remove some snapper grouper species from the Fishery Management Unit and designate others as Ecosystem Component species
- Establish species groupings for the Snapper Grouper FMP
- Establish an Acceptable Biological Catch (ABC) Control Rule
- Establish sector allocations for snapper grouper species, dolphin and wahoo
- Establish ACLs, ACTs and AMs for snapper grouper species, dolphin, wahoo, and golden crab, as appropriate
- Establish jurisdictional allocations for black grouper, yellowtail snapper and mutton snapper
- Modify management measures for wreckfish and dolphin

Assessment of Biological Effects

Removal of 13 snapper grouper species from the Snapper Grouper FMP is expected to have little impact on the biological environment. Landings data indicate the vast majority of the landings for these 13 species occur in state waters. The potential effects on bycatch are expected to be minimal in most cases because the species proposed for removal are not generally targeted or desired. State agencies, such as Florida's Fish and Wildlife Commission, will continue to manage these species within their area of jurisdiction and may, in some cases, extend management into Federal waters. Moreover, removal of species from the FMU does not mean the species cannot be added back into the FMU. The Council intends to evaluate landings and other available information on species removed from the FMU every five years. Ongoing monitoring and data collection will continue for all species that are sold to dealers or caught recreationally, regardless of whether or not they are in the FMU. If the Council determines that a removed species is in need of management, the species would be added back into the FMU. Further, six species met criteria to be designated as Ecosystem Component species thus negating the need to remove them from the FMU and the requirement to specify ACLs and AMs. Most of these species are generally not retained because of their small size and availability of a higher quality co-occurring species.

The structuring of the species in the Snapper Grouper FMU into groupings or "complexes" is an administrative action that promotes attaining OY for assessed stocks while providing a mechanism to prevent overfishing of the less productive or more vulnerable, unassessed stocks. Grouping less productive, vulnerable, and/or data-poor stocks into complexes helps mitigate uncertainty in individual landings histories, mitigates issues with species identification, and provides buffers against the unnecessary implementation of AMs. The biological effects of this action, if any, are therefore expected to be positive.

Specification of jurisdictional allocations for some species, sector allocations, ACLs, ACTs and AMs are intended to meet the mandates of the Reauthorized MSA to have measures in place by 2011 for managed species that are not overfished or undergoing overfishing. In general, the biological effects of these actions are positive in that overfishing will be prevented while attaining OY and sustainably managing the resource. The establishment of AMs would provide beneficial effects by establishing a mechanism to maintain harvest levels at or below the ACLs. Overall, the South Atlantic Council believes the implementation of this system is necessary to manage the resources sustainably.

Assessment of Economic Effects

The economic effects of the actions in this Amendment can be aggregated by fishery (snapper grouper, dolphin-wahoo, and golden crab) and by sector (commercial and recreational). Because the commercial sector of the wreckfish fishery is managed under an IFQ program, the economic effects for wreckfish are considered separately from the other species in the snapper grouper fishery. All direct economic effects are due to the jurisdictional allocation, ACL, sector allocation, and management measure (dolphin only) actions. All other actions only result in indirect economic effects.

For the snapper grouper fishery (excluding wreckfish), the actions in this Amendment are expected to result in an increase of approximately $1.52 million in gross revenue to the commercial sector and an increase of approximately $22.43 million in consumer surplus to the recreational sector. Changes in producer surplus to the for-hire sector cannot be estimated with currently available information, but are expected to be positive given the large increase in consumer surplus. Thus, the actions in this Amendment are expected to result in significant net economic benefits to the snapper grouper fishery.

For the wreckfish component of the snapper grouper fishery, the actions in this Amendment may potentially result in a decrease of approximately $4.36 million in gross revenue to the commercial sector and an increase of approximately $31,000 in consumer surplus to the recreational sector. However, the potential loss in commercial gross revenue significantly overstates the expected actual loss in gross revenue. Losses in gross revenue overstate losses in profits. Further, the potential loss in gross revenue is based on a reduction in the wreckfish commercial quota from 2 million pounds to 237,500 pounds. In addition, the commercial sector only harvested approximately 165,000 pounds on average between 2005 and 2009, which is below the proposed commercial quota. On the other hand, because each wreckfish shareholder's annual allocation will be proportionally reduced as a result of the reduction in the commercial quota, it is possible that some vessels' allocation of wreckfish will be reduced below their recent

harvest levels, which would reduce their gross revenue and likely their profits. On average, only 5 vessels have been harvesting wreckfish in recent years. Thus, the actions in this Amendment may result in some net economic losses to a small number of commercial vessels in the wreckfish fishery.

For the dolphin-wahoo fishery, the actions in this Amendment are expected to result in a decrease of approximately $91,000 in gross revenue to the commercial sector and an increase of approximately $124.5 million in consumer surplus to the recreational sector. The reduction in commercial gross revenue is entirely due to the expected reduction in the commercial harvest of dolphin as no reduction in the commercial harvest of wahoo is expected. A decrease in revenue to the for-hire sector of approximately $71,000 is expected as a result of the action to prohibit bag limit sales of dolphin from for-hire vessels. However, revenue losses overstate losses in producer surplus in the for-hire sector. Further, changes in producer surplus to the for-hire sector cannot be estimated with currently available information, but are expected to be positive given the large increase in consumer surplus. Thus, the actions in this Amendment are expected to result in significant net economic benefits to the dolphin-wahoo fishery, though these benefits accrue solely to the recreational sector.

For the golden crab fishery, the actions in this Amendment result in an increase of approximately $94,000 in gross revenue to the commercial sector. Gross revenue effects overstate effects on profits. No recreational sector exists in the golden crab fishery. Thus, the actions in this Amendment will likely result in modest net economic benefits to the golden crab fishery.

Assessment of the Social Effects

The combined impacts of the Comprehensive ACL amendment for the South Atlantic would primarily be contingent upon the alternatives affecting harvest levels, sector allocation and any reductions in harvest as a result of the proposed accountability measures. The effects are described below in summary fashion for all alternatives.

Removing species from the management unit will likely have positive social effects as it would streamline management. Requiring federal agencies to maintain annual catch limits and accountability measures on species that pose some difficulty in monitoring because landings data are sparse or non-existent could impose further regulatory burdens on fishermen if harvest levels are reduced unnecessarily because of excessively restrictive catch levels. By establishing some species as Ecosystem Component species and removing others, that may be avoided, therefore avoiding negative social effects in the short term.

Overfishing limits and other biological thresholds are determined through stock assessment and deliberation of the SSC in setting the ABC from which ACLs and ACTs are derived. With actions in this amendment establishing both single ACLs and complex ACLs, it is anticipated that fewer negative social effects should accrue as compared to single ACLs on all species, which could be cumbersome for management. In some cases, where ACLs are set close to current harvest levels, short-term negative social effects could occur if thresholds are exceeded in the future. With the setting of ACTs and AMs it is anticipated that management will be able to

constrain harvest within sustainable levels. However, there may be negative social effects in the short term as fishermen adjust to the possibility of closures and reductions in harvest. It is unknown whether the flexibility remains for either commercial or recreational fishermen to switch targeting behaviors to accommodate closures and any reductions in harvest levels as new thresholds are established for all species in the FMU. In some cases new sector allocations are being established which should assist with sector accountability, yet new allocations may change fishing behaviors that could impose other social effects if other thresholds are exceeded and management measures are imposed.

The overall intent of the amendment is to establish sustainable fisheries through establishment of harvest thresholds and accountability measures. However, this new management regime may create new burdens on management, as monitoring for many different species can be cumbersome. In addition, as mentioned previously, these new harvesting thresholds might encourage different fishing patterns for both recreational and commercial fishermen, which could initiate a continuing struggle over allocation.

Assessment of Effects on Safety at Sea

The actions contained in the Comprehensive ACL Amendment are not expected to change the manner in which fisheries are prosecuted in the Snapper Grouper, Dolphin Wahoo, Golden crab, and *Sargassum* FMPs. Therefore, the actions proposed in this amendment are not expected to affect safety at sea.

APPENDIX F

1.0 REGULATORY IMPACT REVIEW

1.1 Introduction

The National Marine Fisheries Service requires a Regulatory Impact Review (RIR) for all regulatory actions that are of public interest. The RIR does three things: 1) provides a comprehensive review of the level and incidence of impacts associated with a proposed or final regulatory action; 2) provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problem; and, 3) ensures that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost-effective way. The RIR also serves as the basis for determining whether the proposed regulations are a "significant regulatory action" under the criteria provided in Executive Order (E.O.) 12866 and provides some information that may be used in conducting an analysis of impacts on small business entities pursuant to the Regulatory Flexibility Act (RFA). This RIR analyzes the impacts that the proposed management alternatives in this interim rule would be expected to have on the grouper fishery.

1.2 Problems and Objectives

The problems and objectives addressed by this action are discussed in Section 1.2 of this document and are incorporated herein by reference. In summary, management measures considered in this regulatory action are intended to prevent overfishing and achieve optimum yield (OY) while minimizing, to the extent practicable, adverse social and economic effects.

1.3 Description of Fisheries

A description of the South Atlantic snapper grouper, dolphin-wahoo, and golden crab fisheries are provided in Section 3 of this document and is incorporated herein by reference.

1.4 Impacts of Management Measures

1.4.1 Action 1: Remove Species from Snapper Grouper Fishery Management Unit (FMU)

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.1.1.2 and is incorporated herein by reference. The number of species to be removed under **Alternative 2 (Preferred), Alternative 5 (Preferred),** and **Alternative 9**

(Preferred) are 10, 3, and 2 respectively. Because two species would be removed under both **Alternative 2 (Preferred)** and **Alternative 5 (Preferred),** the total number of species removed under all preferred alternatives is 13 rather than 15. However, a better measure of the reduction in federal oversight of snapper grouper species is total landings of snapper grouper species removed under each alternative. The total landings in millions of pounds (whole weight) of snapper grouper species being removed from federal management under **Alternative 2 (Preferred), Alternative 5 (Preferred), Alternative 6, Alternative 7, Alternative 8** and **Alternative 9 (Preferred)** are: 2.944, 0.025, and 0, respectively. Given the overlap of species between **Alternative 2 (Preferred)** and **Alternative 5 (Preferred),** the total landings of snapper grouper species removed from federal oversight these alternatives cannot be determined simply by adding the landings under those alternatives. Thus, for example, the total landings of snapper grouper species removed from federal management across all preferred alternatives is 2.948 million pounds (whole weight) rather than 2.969 million pounds (whole weight). Although a fair degree of overlap exists across alternatives in terms of the number of species removed, the overlap in terms of landings is relatively small.

More importantly, nearly 100% of the combined landings under all preferred alternatives come from species removed under **Alternative 2 (Preferred)**. Further, most of the landings (93%) removed under **Alternative 2 (Preferred),** and thus under all preferred alternatives, are of sheepshead and crevalle jack. Current federal regulations are likely not restricting the harvest of the species being removed under **Alternatives 2 (Preferred), 5 (Preferred), and 9 (Preferred)**. Most importantly, 95% or more of the sheepshead and crevalle jack landings come from state waters, and thus the effective landings of those species being removed from federal management is approximately 124,000 pounds (whole weight) as opposed to 2.754 million pounds. Further, The effective landings of the 13 snapper grouper species being removed from federal management across all preferred alternatives (**Preferred Alternatives 2, 5,** and **9)** is considerably less than 2.948 million pounds and, most likely, around 225,000 pounds.

the economic benefits associated with retaining management of the 13 snapper grouper species' effective landings would be relatively small. The impact of removing these landings from federal management under the preferred alternatives (**Preferred Alternatives 2, 5**, and **9**) would be reduced by other factors, such as the fact that individual states can still manage species directly if landings occur at ports within their respective jurisdictions.

Further, removing species effectively managed by the states from the snapper grouper FMP is expected to result in more efficient management of all snapper grouper species. Specifically, the states will obtain management authority over snapper grouper species which they have more direct control over and federal authorities (SAFMC and NOAA Fisheries Service) will retain management over snapper grouper species which, to some or a large extent, fall within their jurisdiction and are harvested in relatively significant numbers based on landings. In turn, federal resources (labor and capital) could be used to more effectively manage the remaining snapper grouper species in the FMU. In general, the allocation of management authority over all snapper grouper species and thus the

associated costs will more closely mirror the distribution of the resource. The administrative costs associated with management of these species is not presently known given currently available information. By removing 13 of the 73 (approximately 18%) species currently in the FMU, the administrative costs of federally-managing snapper grouper species could be reduced under all preferred alternatives (**Preferred Alternatives 2, 5,** and **9)**, and potentially in a proportional manner (i.e., federal administrative costs might be reduced by 18%).

Therefore, in general, the net economic effects of removing species from the snapper grouper FMU are expected to result in net economic benefits rather than losses. Given that only 13 species are being removed from federal management, net economic benefits are expected to be considerably less under the combination of all preferred alternatives (**Preferred Alternatives 2, 5,** and **9)** relative to other combinations of alternatives where more species would be removed (e.g., **Alternatives 4, 5, 7,** and **8,** which would remove 39 species**),** but still greater than under **Alternative 1 (No Action)** under which no species would be removed. Since the removal of species from the snapper grouper FMU is an administrative action, and thus does not directly affect participants in the snapper grouper fishery, these net economic benefits are the result of indirect rather than direct economic effects.

1.4.2 Action 2: Designate Ecosystem Component Species in the Snapper Grouper Fishery Management Unit (FMU)

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.1.1.2 and is incorporated herein by reference. **Alternative 6 (Preferred)** would designate 6 species as ecosystem component species. The NS 1 criteria noted in section 4.1.2.1 serve as the sole basis for determining which species qualify as EC species under **Alternative 6 (Preferred)**. However, two species (tiger grouper and smallmouth grunt) are taken out of consideration due to their removal from the FMU under **Alternative 9 (Preferred)** for **Action 1**. Thus, the effective number of species determined to be EC species is 6 under **Alternative 6 (Preferred)**.

Based on 2005-09 average landings, the total landings of the species designated as EC species is 24,655 pounds. Designating species as EC could result in positive economic effects for commercial and recreational fishermen if catches of these species increase in the short-term. However, consistent with the NS 1 criteria indicating that these are not target species and are rarely if ever retained for sale or personal use, it is unlikely that landings of these species will increase much if at all in the short-term. In theory, **Alternative 6 (Preferred)** has the potential to result in the greatest negative economic effects compared to **Alternative 1 (No Action)** if fishermen significantly alter their fishing behavior by targeting and landing these species in the long-term. However, such changes are not expected as a result of the management actions being taken in this Amendment or any other currently known factors, and thus the likelihood such changes will occur are remote.

The primary economic effects of designating species as EC species are nearly identical in nature to the effects of removing species from the FMU (**Action 1**). If species which are not removed under **Action 1** are also not designated as EC species, as would be the case under **Alternative 1 (No Action)**, annual catch limits (ACLs), accountability measures (AMs), and annual catch targets (ACTs) would need to be implemented and enforced for these species, including those currently subject to little or no management, on a regular basis. The administrative costs associated with management of these species is not presently known given currently available information. By designating 6 species currently in the FMU as EC species, the administrative costs of federally-managing snapper grouper species are expected to be reduced, and potentially in a proportional manner according to the number of species receiving that designation. These reductions in administrative costs are expected to be the greatest under **Alternative 6 (Preferred)** relative to **Alternative 1 (No Action)**.

Therefore, in general, the net economic effects of designating species as EC species in the snapper grouper FMU are expected to result in net economic benefits rather than losses. More specifically, net economic benefits are expected to be maximized under **Alternative 6 (Preferred**. Since the designation of species as EC species in the snapper grouper FMU is an administrative action, and thus does not directly affect participants in the snapper grouper fishery, these net economic benefits are the result of indirect rather than direct economic effects.

1.4.3 Action 3: Establish Species Groupings for Snapper Grouper Species

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.1.3.2 and is incorporated herein by reference. **Action 3** would only apply to the 54 snapper grouper species remaining in the FMU that are also not designated as EC species. By grouping species according to a particular methodology, **Alternative 4 (Preferred)** increases the likelihood of overfishing for species not covered by an individual ACL.

Alternative 4 (Preferred) would be likely to prevent overfishing of species within the snapper grouper FMU as it would establish 29 ACLs: 6 complex ACLs and 23 individual ACLs All 14 assessed species, 3 prohibited species and 6 unassessed species would have an individual ACL. As under **Alternative 1 (No Action)**, the probability of overfishing and associated risk would be minimized for these 23 species. The probability of overfishing and associated risk for the 26 unassessed species covered by complex ACLs would be higher than under **Alternative 1 (No Action)**. Six of these 26 unassessed species are considered most vulnerable species according to the PSA analysis.

With respect to expected long-term economic benefits derived from protecting snapper grouper species in the FMU from overfishing, **Alternative 1 (No Action)** is expected to generate the greatest long-term economic benefits, while **Alternative 4 (Preferred)**, is expected to generate somewhat lower long-term economic benefits. Since the grouping of species in the snapper grouper FMU is an administrative action, and thus does not

directly affect participants in the snapper grouper fishery, these expected economic benefits are the result of indirect rather than direct economic effects.

However, these expected economic benefits must be evaluated relative to the expected economic costs in order to estimate the net economic benefits associated with each of these alternatives. In general, the expected economic costs are a function of expected administrative costs associated with implementing, monitoring, and enforcing ACLs, AMs, and ACTs as well as the probability of triggering AM actions in the future (e.g., fishery closures reductions in ACLs, reductions in fishing seasons, etc.).

Administrative costs arise from fishery management and the required scientific research to support management. Administrative costs would be much greater under **Alternative 1 (No Action)** relative to **Alternative 4 (Preferred)**. Relative to **Alternative 1 (No Action)**, the reduction in ACLs and thus expected administrative costs is 46% under **Alternative 4 (Preferred)**. On the other hand, the probability of triggering an AM action in the future is inversely related to the number of ACLs, all else being equal. Thus, the probability of triggering an AM action in the future would be much greater under **Alternative 1 (No Action)** relative to **Alternative 4 (Preferred)**. AM actions in the future are expected to generate adverse indirect economic effects on fishery participants. Although quantitative estimates of the expected net economic benefits cannot be generated, a qualitative assessment based on the available information suggests that expected net economic benefits would be greatest under **Alternative 4 (Preferred)**. However, this conclusion must be cautioned by the fact that it is unknown how fishing behavior will be altered under the different species grouping methodologies and potential AMs in the future.

1.4.4 Action 4: Establish an Acceptable Biological Catch (ABC) Control Rule for Snapper Grouper Species

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.1.4.2 and is incorporated herein by reference. Establishing the biological parameters for harvest thresholds only generate indirect economic effects because the direct economic effects will result from establishing the ACLs and the triggering of subsequent corrective actions as per the accountability measures. Thus, the economic effects under **Alternative 7 (Preferred)** for **Action 4** are indirect.

In general, the more conservative the ABC control rule, the greater the short-term adverse economic effects and the greater the potential long-term positive economic effects. In most cases, **Alternative 1 (No Action)** is expected to cause the least disruption to operations in the snapper grouper fishery. Specifically, **Alternative 1 (No Action)** would allow current harvest levels to continue and thus the greater landings and ex-vessel revenue to the commercial sector and greater consumer and producer surplus to the recreational sector relative to **Alternative 7 (Preferred)**. In turn, **Alternative 1 (No Action)** is expected to generate the least short-term adverse economic effects and the smallest potential long-term positive economic effects. However, legally, **Alternative 1 (No Action)** is not a feasible alternative. Because **Alternative 7 (Preferred)** uses a

relatively conservative ABC control rule, it is expected to generate greater short-term adverse economic effects but also greater potential long-term positive economic effects relative to **Alternative 1 (No Action)**. The cumulative economic effects of reduced harvests from all snapper grouper species covered by this action are difficult to determine. If the ACL is restrictive as a result of the selected ABC and the harvest of all species is subsequently reduced, the effects on fishing behavior will differ across vessels depending on their physical and operational characteristics. Such behavioral changes cannot be predicted using the currently available science.

1.4.5 Action 5: Specify Allocations for Snapper Grouper Species That Do not Currently have Allocations

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.1.5.2 and is incorporated herein by reference. **Alternative 1 (No Action)** would maintain the allocations that are currently in place for certain species but would not specify commercial or recreational allocations for the remaining species or species groups in the snapper grouper FMP. **Alternative 2 (Preferred)** would divide allocations between the recreational and commercial sectors based on historical landings information from 1986-2008 and 2006-2008. The actual allocation differs by species under **Alternative 2 (Preferred)**.

Table 4-31a shows the maximum changes in anticipated landings and gross revenue to the commercial sector and consumer surplus to the recreational sector under **Alternative 2 (Preferred)** relative to **Alternative 1 (No Action)**. These annual figures assume that the fleets are willing and able to harvest the entire ACL. The statistics offered in **Table 4-31a** should be considered upper bounds on the potential economic effects since it is uncertain how fishing practices would change following the adoption of multiple allocations. In addition, the resulting net benefits will depend on the regulatory framework in place (e.g., individual transferable quota, limited entry, trip limits in the commercial sector or bag limits, size limits, or seasonal closures in the recreational sector) and compliance with ACLs, which is also unknown. Regardless, the economic effects to the commercial sector are estimated to be a loss of approximately $754,000 in gross revenue. For the recreational sector, the economic effects are estimated to be a gain of approximately $3.192 million in consumer surplus. The loss in profits to the commercial sector must be less than the loss in gross revenue. Further, although the effects on producer surplus in the recreational sector cannot be estimated with available information, those effects are likely positive. As such, **Alternative 2 (Preferred)** is expected to result in net economic benefits to the fishery.

1.4.6 Action 6: Establish Annual Catch Limits (ACLs) and Optimum Yield (OY) for the Snapper Grouper Fishery

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.1.6.2 and is incorporated herein by reference. The establishment of ACLs is intended to reduce the risk of overfishing for those snapper grouper species that do not

currently have them. For those stocks requiring biological protection, ACLs constrain existing catch levels to increase the long-run abundance of these stocks.

Alternative 2 (Preferred) would establish ACLs for those snapper grouper species that do not currently have an ACL. **Table 4-35** shows the anticipated effects on gross revenue to the commercial fleet and consumer surplus to the recreational fleet relative to **Alternative 1 (No Action)**. These annual figures presume that the commercial and recreational fleets can harvest the entire ACL. These statistics should be considered upper bounds on the potential economic effects since it is uncertain how fishing practices would change following the adoption of multiple snapper grouper ACLs, particularly those for overfished and/or less productive species. Thus, the resulting benefits will be a function of the actual behavioral response, which is presently unknown. Similarly, the recreational consumer surplus estimates offered in **Table 4-35** should be considered upper bounds because it is unlikely that, as the number of pounds caught decreases, recreational participation and consumer surplus would decrease at the same rate. Again, the resulting benefits will be a function of the actual behavioral response, which is presently unknown. Regardless, the economic effects to the commercial sector are estimated to be a gain of approximately $2.135 million in gross revenue. For the recreational sector, the economic effects are estimated to be a gain of approximately $16.723 million in consumer surplus. The effect on profits to the commercial sector is unknown though likely positive. Further, although the effects on producer surplus in the recreational sector cannot be estimated with available information, those effects are likely positive. As such, **Alternative 2 (Preferred)** is expected to result in net economic benefits to the fishery.

1.4.7 Action 7: Specify Accountability Measures (AMs)/Annual Catch Targets (ACTs) for the Commercial Sector for species in the Snapper Grouper FMU

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.1.7.2 and is incorporated herein by reference. **Action 7** considers alternatives that would establish accountability measures (AMs) for the snapper grouper species harvested by the commercial sector that currently lack such measures. AMs are designed to prevent ACLs from being exceeded, and if exceeded, correct or mitigate any overages (50 CFR 600.310(g)). The NS 1 guidelines identify two types of AMs: in-season and post-season, the latter of which is invoked when an ACL is exceeded. These two types of AMs are not mutually exclusive and may be used simultaneously when appropriate.

Establishing AMs for the commercial sector is an administrative action, and thus has no direct effects on the economic environment. However, establishing AMs may result in management actions that could increase the snapper grouper stocks from their present levels, which would in turn allow these stocks to support higher catch levels without becoming overfished. As such, AMs would potentially result in indirect economic effects on fishing participants. Direct economic effects on fishing participants would only occur in the future if and when the AMs are triggered.

Subalternative 2a (Preferred) sets no ACT. Thus, it creates no buffer between the ACT and the ACL and would not generate any economic effects. **Alternative 3 (Preferred)** may generate lower short-run gross revenue in the commercial sector, but will still be bound by the estimated gross revenue changes under **Action 6**. **Alternative 4 (Preferred)** calls for reducing the commercial sector ACL in the following season by the amount of the overage if the species is overfished. This alternative will likely generate adverse short-run economic effects (i.e., lower short-run gross revenue) but potentially long-run positive economic effects relative to **Alternative 1 (No Action)** as it would help stabilize stock abundance and reduce the risk overfishing. The extent of these adverse short-run economic effects is unknown at this time since the probability the ACL for each species will be exceeded is unknown.

1.4.8 Action 8: Specify Accountability Measures (AMs)/Annual Catch Targets (ACTs) for the Recreational Sector for species in the Snapper Grouper FMU

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.1.8.2 and is incorporated herein by reference. **Action 8** considers alternatives that would establish AMs for the snapper grouper species harvested by the recreational sector that currently lack such measures. Accountability measures are designed to prevent ACLs from being exceeded, and if exceeded, correct or mitigate any overages (50 CFR 600.310(g)). The NS 1 guidelines identify two types of AMs: in-season and post-season, the latter of which is invoked when an ACL is exceeded. These two types of AMs are not mutually exclusive and may be used simultaneously when appropriate.

Establishing AMs for the recreational sector is an administrative action, and thus has no direct effects on the economic environment. However, establishing AMs may result in management actions that could increase the snapper grouper stocks from their present levels, which would in turn allow these stocks to support higher catch levels without becoming overfished. As such, AMs would potentially result in indirect economic effects on fishing participants. Direct economic effects on fishing participants would only occur in the future if and when the AMs are triggered.

Alternative 2 considers alternatives for establishing an ACT**. Subalternative 2d (Preferred)** sets the ACT at 50% of the ACL or at (1-PSE) of the ACL, whichever is greater. **Subalternative 2d (Preferred)** is relatively conservative and thus generates the highest potential short-term losses in landings and consumer surplus for most species, though it is not always the most conservative and thus does not always generate the highest potential short-term losses in landings and consumer surplus. **Alternative 3** considers alternatives for establishing an AM trigger. An ACL is most likely to be exceeded for the applicable snapper grouper species under **Subalternative 3b (Preferred)**. **Alternative 4** considers alternatives for establishing an in-season AM. **Subalternative 4a (Preferred)** would not establish an in-season AM and thus would not generate any indirect economic effects. **Alternative 5** considers alternatives for establishing a post-season AM. Under **Subalternative 5f (Preferred)**, a post-season AM (i.e., reducing the length of the fishing season) must be implemented in the following

year if the ACL is exceeded in just one year**.** Because the probability that a post-season AM will be required is relatively high under **Subalternative 5f (Preferred)**, the expected adverse indirect economic effects resulting from **Subalternative 5f (Preferred)** in the short term are also relatively high.

1.4.9 Action 9: Specify Allocations for Wreckfish Fishery

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.2.1.2 and is incorporated herein by reference. Under **Action 10**, the TAC/ACL for wreckfish is being reduced from 2 million pounds (ww) to 250,000 pounds (ww). **Alternative 1 (No Action)** allows some opportunities for participation by the recreational sector if recreational fishermen own wreckfish shares, a wreckfish permit, and fish under the bag limit. **Alternative 3 (Preferred)** provides a 5% allocation to the recreational sector and a 95% allocation to the commercial sector.

The estimated changes in landings, gross revenue, and consumer surplus assume that both the commercial and recreational sectors are able to harvest their assigned allocation, which is a reasonable assumption since the commercial allocation is being reduced by 87.5% and the recreational allocation is very small. The commercial sector would lose 12,500 pounds while the recreational sector would gain 12,500 pounds. The estimated commercial loss in gross revenue is $28,875 while the estimated gain in consumer surplus to the recreational sector is $30,625.

1.4.10 Action 10: Establish an Annual Catch Limit (ACL) and Optimum Yield (OY) for wreckfish

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.2.2.2 and is incorporated herein by reference. **Alternative 2 (Preferred)** would set the ACL equal to the ABC, which would reduce the TAC/ACL from 2 million pounds to 250,000 pounds. The TAC has previously been assigned exclusively to the commercial sector, but **Action 9** would assign only 95% (237,500 pounds) of the new ACL to the commercial sector. Although the commercial sector has not been harvesting the entire TAC for many years, the potential harvest to the commercial sector is being reduced by 1,762,500 pounds. As such, the potential loss in commercial gross revenue is estimated to be approximately $4.071 million.

1.4.11 Action 11: Specify Accountability Measures (AM) for the Wreckfish Fishery

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.1.3.2 and is incorporated herein by reference. **Action 10** considers alternatives that would establish accountability measures (AMs) for the recreational sector of the wreckfish fishery. AMs are designed to prevent ACLs from being exceeded, and if exceeded, correct or mitigate any overages (50 CFR 600.310(g)). The NS-1 guidelines identify two types of AMs: in-season and post-season, the latter of which is invoked when an ACL is exceeded. These two types of AMs are not mutually exclusive and may be used simultaneously when appropriate.

Establishing AMs for the recreational sector of the wreckfish fishery is an administrative action, and thus has no direct effects on the economic environment. However, establishing AMs may result in management actions that could increase the wreckfish stock from its present level, which would in turn allow the stock to support higher catch levels without becoming overfished. As such, AMs would potentially result in indirect economic effects on recreational fishing participants. Direct economic effects on recreational fishing participants would only occur in the future if and when the AMs are triggered.

Alternative 2 considers alternatives for establishing an AM trigger. The ACL is most likely to be exceeded under **Subalternative 2b (Preferred)**. Thus, **Subalternative 2b (Preferred)** is the most conservative alternative and in turn has the highest likelihood of triggering an in-season AM. **Alternative 3** considers alternatives for establishing a post-season AM. It is highly likely that **Subalternatives 3d (Preferred)** will generate some adverse indirect economic effects in the short term because the recreational ACL for wreckfish is so small.

1.4.12 Action 12: Establish Management Measures for Wreckfish

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.2.4.2 and is incorporated herein by reference. **Action 11** considers seven alternatives for managing recreational harvest of wreckfish in addition to **Alternative 1 (No action)**. In general, the direct and indirect economic effects of **Alternative 3 (Preferred)** are expected to be minimal given that a recreational sector does not currently exist and the recreational ACL is only 12,500 pounds under **Alternative 3 (Preferred)** for **Action 8**. However, there may be some indirect economic benefits under **Alternative 6 (Preferred)** as it may be safer to fish in July and August than other times of the year.

1.4.13 Action 13: Specify Jurisdictional Allocations for Black Grouper

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.3.1.2 and is incorporated herein by reference. The analysis of economic effects for **Alternative 2b (Preferred)** under **Action 13** assume the allocation of black grouper between the commercial and recreational sectors under **Alternative 2 (Preferred)** for **Action 5**, which are 36.88% commercial and 63.12% recreational, respectively. Relative to **Alternative 1 (No Action)**, commercial gross revenue and consumer surplus in the recreational sector for black grouper in the South Atlantic are expected to increase by $44,302 and $291,634, respectively, under **Alternative 2b (Preferred)**. Thus, net economic benefits to the snapper grouper fishery are expected to increase under **Alternative 2b (Preferred)**.

1.4.14 Action 14: Specify Sector Allocations for Black Grouper

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.3.2.2 and is incorporated herein by reference. **Action 14** considers different allocations of the black grouper harvest that separate allocations for the commercial and recreational sectors. **Alternative 2e (Preferred)** favors the recreational sector relative to the commercial sector because it relies on a relatively short and more recent time series of data during which time an increase in recreational participation occurred. Annual commercial gross revenue is expected to decrease by $123,880, $129,345, and $132,454 in 2012 through 2014 respectively while annual consumer surplus in the recreational sector is expected to increase by $467,693, $488,326, and $500,065 during that same time period. The loss in profits to the commercial sector must be less than the loss in gross revenue. Further, although the effects on producer surplus in the recreational sector cannot be estimated with available information, those effects are likely positive. As such, **Alternative 2 (Preferred)** is expected to result in net economic benefits to the snapper grouper fishery.

1.4.15 Action 15: Establish Annual Catch Limits (ACL) and Optimum Yield (OY) for Black Grouper

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.3.3.2 and is incorporated herein by reference. **Alternative 1 (No Action)** would retain the aggregate ACL for red grouper, gag, and black grouper, which contains an implicit black grouper ACL of 140,124 pounds whole weight. **Alternative 2 (Preferred)** explicitly establishes an ACL specifically for black grouper and sets the black grouper ACL equal to the ABC. In general, the short-run economic benefits tend be higher when there is no or little buffer between the ACL and the ABC, as is the case under **Alternative 2 (Preferred**). Long-term economic benefits may be maximized under **Alternative 2 (Preferred**) as long as there is very little uncertainty regarding whether the ACL will be exceeded or not. Using a discount rate of 3%, gross revenue in the commercial sector and consumer surplus in the recreational sector are expected to increase by $537,718 and $1,760,921, respectively, during the 2012-2014 time period. Using a discount rate of 5%, gross revenue in the commercial sector and consumer surplus in the recreational sector are expected to increase by $487,445 and $1,672,030, respectively, during the 2012-2014 time period.

1.4.16 Action 16: Establish Accountability Measures/Management Measures for the Commercial Sector for Black Grouper

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.3.4.2 and is incorporated herein by reference. **Action 16** considers alternatives that would potentially augment the current black grouper AMs established under Amendment 17B (SAFMC 2010b) for the commercial sector. AMs are designed to prevent ACLs from being exceeded, and if exceeded, correct or mitigate any overages (50 CFR 600.310(g)). The NS-1 guidelines identify two types of AMs: in-season and

post-season, the latter of which is invoked when an ACL is exceeded. These two types of AMs are not mutually exclusive and may be used simultaneously when appropriate. As discussed above, establishing AMs is an administrative action, and thus has no direct effects on the economic environment. However, establishing AMs may result in management actions that could rebuild the black grouper stock from its present level, which would in turn allow the stock to support higher catch levels without becoming overfished. As such, changes to the current AMs would potentially result in indirect economic effects on commercial fishing participants. Direct economic effects on commercial fishing participants would only occur in the future if and when the AMs are triggered.

Subalternative 2a (Preferred) does not establish an ACT. **Alternative 3 (Preferred)** will likely generate marginally lower economic benefits in the short-run but still be bound by the gross revenue effects estimated under **Action 15**. **Alternative 4 (Preferred)** calls for reducing the commercial sector ACL in the following season by the amount of the overage if black grouper is overfished. This alternative will likely generate adverse short-run economic effects (i.e., lower short-run gross revenue) but potentially long-run positive economic effects relative to **Alternative 1 (No Action)** as it would help stabilize stock abundance and reduce the risk overfishing. The extent of these adverse short-run economic effects is unknown at this time since the probability the ACL for each species will be exceeded is unknown.

1.4.17 Action 17: Establish Accountability Measures/Management Measures for the Recreational Sector for Black Grouper

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.3.5.2 and is incorporated herein by reference. **Action 17** considers alternatives that would potentially augment the current black grouper AMs established under Amendment 17B (SAFMC 2010b) for the recreational sector. AMs are designed to prevent ACLs from being exceeded, and if exceeded, correct or mitigate any overages (50 CFR 600.310(g)). The NS1 guidelines identify two types of AMs: in-season and post-season, the latter of which is invoked when an ACL is exceeded. These two types of AMs are not mutually exclusive and may be used simultaneously when appropriate.

Establishing AMs is an administrative action, and thus has no direct effects on the economic environment. However, establishing AMs may result in management actions that could rebuild the black grouper stock from its present level, which would in turn allow the stock to support higher catch levels without becoming overfished. As such, changes to the current AMs would potentially result in indirect economic effects on recreational fishing participants. Direct economic effects on recreational fishing participants would only occur in the future if and when the AMs are triggered.

Alternative 2 considers alternatives for establishing an ACT. **Subalternative 2d (Preferred)** sets the ACT at 50% of the ACL or at (1-PSE) of the ACL, whichever is greater. **Subalternative 2d (Preferred)** is relatively conservative and thus generates the highest potential short-term losses in landings and consumer surplus for most species,

though it is not always the most conservative and thus does not always generate the highest potential short-term losses in landings and consumer surplus. **Alternative 3** considers alternatives for establishing an AM trigger. An ACL is most likely to be exceeded for the applicable snapper grouper species under **Subalternative 3b (Preferred). Alternative 4** considers alternatives for establishing an in-season AM. **Subalternative 4a (Preferred)** would not establish an in-season AM and thus would not generate any indirect economic effects. **Alternative 5** considers alternatives for establishing a post-season AM. Under **Subalternative 5f (Preferred)**, a post-season AM (i.e., reducing the length of the fishing season) must be implemented in the following year if the ACL is exceeded in just one year. Because the probability that a post-season AM will be required is relatively high under **Subalternative 5f (Preferred)**, the expected adverse indirect economic effects resulting from **Subalternative 5f (Preferred)** in the short term are also relatively high.

1.4.18 Action 18: Establish Jurisdictional Allocations for Yellowtail Snapper

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.3.6.2 and is incorporated herein by reference. The analysis of economic effects for **Action 18** assume the allocation of yellowtail snapper between the commercial and recreational sectors under **Alternative 2 (Preferred)** for **Action 5**, which are 52.56% commercial and 47.44% recreational, respectively. Relative to **Alternative 1 (No Action)**, commercial gross revenue and consumer surplus in the recreational sector for yellowtail snapper in the South Atlantic are expected to increase by $158,439 and $601,171, respectively, under **Alternative 4 (Preferred)**. Thus, net economic benefits to the snapper grouper fishery are expected to increase under **Alternative 4 (Preferred)**.

1.4.19 Action 19: Establish Jurisdictional Allocations for Mutton Snapper

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.3.7.2 and is incorporated herein by reference. The analysis of economic effects for **Action 19** assumes that the allocation of mutton snapper between the commercial and recreational sectors under **Alternative 2 (Preferred)** for **Action 5**, which are 17.02% commercial and 82.98% recreational, respectively.. Also, under **Alternative 1 (No Action)**, the distribution of mutton snapper landings between the South Atlantic and Gulf Councils' jurisdictions is assumed to remain the same as it has been on average from 2005-2009. Relative to **Alternative 1 (No Action)**, commercial gross revenue and consumer surplus in the recreational sector for mutton snapper in the South Atlantic are expected to decrease by $18,023 and $397,516, respectively, under **Alternative 2 (Preferred)**. Thus, net economic benefits to the snapper grouper fishery are expected to decrease under **Alternative 2 (Preferred)**.

1.4.20 Action 20: Establish an Acceptable Biological Catch (ABC) Control Rule and ABC for dolphin

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.4.1.1.2 and is incorporated herein by reference. Establishing the biological

parameters for harvest thresholds only generate indirect economic effects because the direct economic effects will result from establishing the ACLs and the triggering of subsequent corrective actions as per the accountability measures. Thus, the economic effects under **Action 20** are indirect. **Alternative 4 (Preferred)** would specify an ABC for dolphin based on the South Atlantic Council's SSC's ABC control rule. In general, the more conservative the ABC control rule, the greater the short-term adverse economic effects and the greater the potential long-term positive economic effects.

1.4.21 Action 21: Specify Allocations for Dolphin

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.4.1.1.7 and is incorporated herein by reference. Under **Alternative 1 (No Action)**, assuming the sector allocation remains the same as defined in the Dolphin Wahoo FMP, ex-vessel gross revenue derived from commercial landings of dolphin are predicted to total $1,582,000. This figure assumes the preferred ACL for dolphin of 14,596,216 lbs ww in **Action 22**. The commercial allocation would be reduced from 13% to 7.3% under **Alternative 3 (Preferred)**. The predicted loss in gross revenue due to this 43.8% reduction in allocation is $78,000. For the recreational sector, the estimate of consumer surplus value for recreational dolphin trips under **Alternative 1 (No Action)** is $198,735,000 using willingness-to-pay estimates from the nested logit (NL) model and $71,621,000 using willingness-to-pay estimates from the mixed logit (ML) model. The predicted potential gain in consumer surplus to the recreational sector due to a 6.6% increase (i.e. 87% to 92.7%) in allocation is $13,021,000 for the NL model and $4,692,000 for the ML model. The loss in profits to the commercial sector must be less than the loss in gross revenue. Further, although the effects on producer surplus in the recreational sector cannot be estimated with available information, those effects are likely positive. As such, **Alternative 3 (Preferred)** is expected to result in net economic benefits to the dolphin-wahoo fishery.

1.4.22 Action 22: Establish Annual Catch Limits (ACL) and Optimum Yield (OY) for Dolphin

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.4.1.1.12 and is incorporated herein by reference. Under **Alternative 1 (No Action)**, gross revenue derived from dolphin landings is predicted to total $1,582,000. This alternative is expected to generate the least dislocation in the short term, but will also likely generate smaller long-term economic benefits relative to **Alternative 2 (Preferred)**. **Alternative 2 (Preferred)** sets the ACL equal to the ABC, which leads to a short-term reduction in landings and gross revenue relative to **Alternative 1 (No Action)**. The annual short-term loss to the commercial sector is estimated at $78,000. However, this result assumes the allocation between the commercial and recreational sectors under **Alternative 3 (Preferred)** for **Action 21** and thus this reduction is already accounted for in the analysis for that action. Thus, no additional economic effects on the commercial sector are expected. Under **Alternative 1 (No Action)**, the estimate of consumer surplus value for recreational dolphin trips is $141,741,000 using willingness-to-pay estimates from the nested logit (NL) model and $51,081,000 using willingness-to-pay estimates

from the mixed logit (ML) model. **Alternative 2 (Preferred)** sets the ACL equal to the ABC, which leads to a potential increase in recreational landings and economic value to the recreational sector relative to **Alternative 1 (No Action)**. The potential annual short-term gain to the recreational sector is estimated at $70,014,000 for the NL model and $25,232,000 for the ML model. The loss in profits to the commercial sector must be less than the loss in gross revenue. Further, although the effects on producer surplus in the recreational sector cannot be estimated with available information, those effects are likely positive. As such, **Alternative 2 (Preferred)** is expected to result in net economic benefits to the dolphin-wahoo fishery.

1.4.23 Action 23: Establish Accountability Measures for the Commercial Sector for Dolphin

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.4.1.1.17 and is incorporated herein by reference. Under **Alternative 1 (No Action)** and **Subalternative 2a (Preferred)**, ex-vessel gross revenue derived from commercial landings of dolphin are predicted to total $1,504,000. Thus, no economic effects are expected under **Subalternative 2a (Preferred)**. **Alternative 3 (Preferred)** will likely generate marginally lower economic benefits in the short-run, but still be bound by the gross revenue estimates under **Action 22**.

1.4.24 Action 24: Establish Accountability Measures for the Recreational Sector for Dolphin

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.4.1.1.22 and is incorporated herein by reference. Under **Alternative 1 (No Action)**, the estimate of consumer surplus for recreational dolphin trips is $211,755,000 using willingness-to-pay estimates from the nested logit (NL) model and $76,313,000 using willingness-to-pay estimates from the mixed logit (ML) model. **Alternative 2** considers alternatives for establishing an ACT. **Subalternative 2d (Preferred)** sets the ACT at 50% of the ACL or at (1-PSE) of the ACL, whichever is greater. **Subalternative 2d (Preferred)** is relatively conservative and thus generates the highest potential short-term losses in landings and consumer surplus. **Subalternative 2d (Preferred)** could result in a potential annual short-term loss in consumer surplus to the recreational sector of $57,502,000 for the NL model and $20,723,000 for the ML model. These losses would only accrue in the future if and when the Council uses the ACT for management purposes. **Alternative 3** considers alternatives for establishing an AM trigger. The ACL is most likely to be exceeded under **Subalternative 3b (Preferred). Alternative 4** considers alternatives for establishing an in-season AM. **Subalternative 4a (Preferred)** would not establish an in-season AM and thus would not generate any indirect economic effects. **Alternative 5** considers alternatives for establishing a post-season AM. Under **Subalternative 5f (Preferred)**, a post-season AM (i.e., reducing the length of the fishing season) must be implemented in the following year if the ACL is exceeded in just one year. Because the probability that a post-season AM will be required is relatively high under **Subalternative 5f (Preferred)**, the expected adverse

indirect economic effects resulting from **Subalternative 5f (Preferred)** in the short term are also relatively high.

1.4.25 Action 25: Establish Management Measures for Dolphin

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.4.1.1.27 and is incorporated herein by reference. Under **Alternative 1 (No Action),** regarding minimum size limits, ex-vessel gross revenue derived from commercial landings of dolphin are predicted to total $1,517,000 (**Table 4-82**). Under **Alternative 2 (Preferred)**, charter vessels will not be able to sell dolphin fish harvested under the bag limit, even with the appropriate permits. This will result in a loss of producer surplus relative to **Alternative 1 (No Action)**. Information is not available on the relevant costs of selling fish for charter vessels that is necessary to measure the loss in producer surplus associated with this alternative. Therefore, the loss in terms of foregone revenue from the sale of fish is estimated. Losses in revenue overstate losses in producer surplus. Revenue losses are estimated to be approximately $70,901. **Alternative 3 (Preferred)** proposes increasing the minimum size limit of commercial and recreational landings of dolphin in South Carolina. **Alternative 3 (Preferred)** would result in a predicted gross revenue of $1,504,000 in the commercial sector, or a $13,000 loss in gross revenue for the commercial sector due to the minimum size limit. For the recreational sector, the loss in consumer surplus is approximately $44,000, and the loss in producer surplus to the for-hire sector is approximately $15,000.

1.4.26 Action 26: Establish an Acceptable Biological Catch (ABC) Control Rule and ABC for Wahoo

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.4.2.1.2 and is incorporated herein by reference. Establishing the biological parameters for harvest thresholds only generate indirect economic effects because the direct economic effects will result from establishing the ACLs and the triggering of subsequent corrective actions as per the accountability measures. Thus, the economic effects under all alternatives for **Action 26** are indirect. In general, the more conservative the ABC control rule, the greater the short-term adverse economic effects and the greater the potential long-term positive economic effects.

1.4.27 Action 27: Specify Allocations for Wahoo

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.4.2.1.7 and is incorporated herein by reference. Under **Alternative 1 (No Action)**, ex-vessel gross revenue is predicted to total $118,000, which is the largest amount that the industry can earn based on historical data. Under **Alternative 1 (No Action),** the baseline estimate of consumer surplus value for recreational wahoo trips is $2,261,000 using willingness-to-pay estimates from the conditional logit (CL) model and $4,584,000 using willingness-to-pay estimates from the nested logit (NL) model. These

figures assume the preferred ACL for wahoo of 1,491,785 lbs ww in **Action 28**. **Alternative 3 (Preferred)** would provide for an allocation of 4.3% to the commercial sector, which would not change commercial gross revenue in the short-term if historical fishing patterns continue in the near future. The potential gain in consumer surplus to the recreational sector due to **Alternative 3 (Preferred)** is $894,000 for the CL model and $1,812,000 for the NL model.

1.4.28 Action 28: Establish Annual Catch Limits (ACL) and Optimum Yield (OY) for Wahoo

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.4.2.1.12 and is incorporated herein by reference. Under **Alternative 1 (No Action)**, ex-vessel gross revenue derived from landings of wahoo are predicted to total $118,000 and the baseline estimate of consumer surplus value for recreational wahoo trips is $2,261,000 using willingness-to-pay estimates from the conditional logit (CL) model and $4,584,000 using willingness-to-pay estimates from the nested logit (NL) model. **Alternative 2 (Preferred)** sets the ACL equal to ABC and thus results in no short-term losses in gross revenues to commercial fishers landing wahoo. The potential annual short-term gain in consumer surplus to the recreational sector was estimated at $894,000 for the CL model and $1,812,000 for the NL model. However, this result assumes the allocation between the commercial and recreational sectors under **Alternative 3 (Preferred)** for **Action 27** and thus this reduction is already accounted for in the analysis for that action. Thus, no additional effects on the recreational sector are expected.

1.4.29 Action 29: Establish Accountability Measures for the Commercial Sector for Wahoo

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.4.2.1.17 and is incorporated herein by reference. Under **Alternative 1 (No Action)** and **Subalternative 2a (Preferred)**, ex-vessel gross revenue derived from landings of wahoo are predicted to total $118,000. Thus, no economic effects are expected under **Subalternative 2a (Preferred)**. **Alternative 3 (Preferred)** will likely generate marginally lower economic benefits in the short-run, but still be bound by the gross revenue estimates under **Action 28**.

1.4.30 Action 30: Establish Accountability Measures for the Recreational Sector for Wahoo

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.4.2.1.22 and is incorporated herein by reference. Under **Alternative 1 (No Action)**, the estimate of consumer surplus for recreational wahoo trips is $3,155,000 using willingness-to-pay estimates from the nested logit (NL) model and $6,396,000 using willingness-to-pay estimates from the mixed logit (ML) model. **Alternative 2** considers alternatives for establishing an ACT. **Subalternative 2d (Preferred)** sets the ACT at 50% of the ACL or at (1-PSE) of the ACL, whichever is greater.

Subalternative 2d (Preferred) is relatively conservative and thus generates the highest potential short-term losses in landings and consumer surplus for most species, though it is not always the most conservative and thus does not always generate the highest potential short-term losses in landings and consumer surplus. **Subalternative 2d (Preferred)** could result in a potential annual short-term loss in consumer surplus to the recreational sector of $580,000 for the NL model and $1,177,000 for the ML model. These losses would only accrue in the future if and when the Council uses the ACT for management purposes. **Alternative 3** considers alternatives for establishing an AM trigger. An ACL is most likely to be exceeded under **Subalternative 3b (Preferred). Alternative 4** considers alternatives for establishing an in-season AM. **Subalternative 4a (Preferred)** would not establish an in-season AM and thus would not generate any indirect economic effects. **Alternative 5** considers alternatives for establishing a post-season AM. Under **Subalternative 5f (Preferred)**, a post-season AM (i.e., reducing the length of the fishing season) must be implemented in the following year if the ACL is exceeded in just one year. Because the probability that a post-season AM will be required is relatively high under **Subalternative 5f (Preferred)**, the expected adverse indirect economic effects resulting from **Subalternative 5f (Preferred)** in the short term are also relatively high.

1.4.31 Action 31: Establish Management Measures for Wahoo

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.4.2.1.22 and is incorporated herein by reference. **Alternative 1 (No Action) (Preferred)** would retain current management measures for wahoo. Thus, no economic effects would occur.

1.4.32 Action 32: Establish Annual Catch Limits (ACL) and Optimum Yield (OY) for Golden Crab

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.6.6.2 and is incorporated herein by reference. Under **Alternative 1 (No Action),** there is no upper limit placed on how much golden crab can be landed by the 11 permitted vessels in the fishery. Although current landings are moderate (around 570,000 pounds), rising demand and the adoption of new technologies such as re-circulating seawater systems are likely to increase production, potentially increasing the risk of overfishing. Assuming a growth rate in production between 5% and 15%, **Alternative 2 (Preferred)** would establish an ACL of 2 million pounds, which would result in gross revenue gains between approximately $47,000 and $141,000.

1.4.33 Action 33: Establish Accountability Measures for Golden Crab

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.6.6.2 and is incorporated herein by reference. Failure to implement an AM for the golden crab fishery under **Alternative 1 (No Action)** could result in overages and the smallest long-term economic benefits relative to the other alternatives since the risk of overfishing is the greatest. **Alternative 2 (Preferred)** and **Alternative 3 (Preferred)** would likely generate greater adverse economic effects in the short-term but greater long-

term economic benefits relative to **Alternative 1 (No Action)** since they provide a hedge against overfishing. **Alternative 2 (Preferred)** would be precautionary but would not likely generate the greatest long-term economic benefits since it does not provide a mechanism for addressing overages, if these occur. While **Alternative 2 (Preferred)** would have less adverse short-term economic effects, **Alternative 3 (Preferred)** may have greater long-term positive economic effects, but could adversely affect market and financial stability in the short term if an overage occurs. Since **Action 32** is administrative in nature, and thus does not directly affect participants in the golden crab fishery, the effects under **Alternative 2 (Preferred)** and **Alternative 3 (Preferred)** are indirect.

1.4.34 Summary of Economic Effects and Economic Impacts

The economic effects of the actions in this Amendment can be aggregated by fishery or FMP (snapper grouper, dolphin-wahoo, and golden crab) and by sector (commercial and recreational). For current purposes, because the commercial sector is managed under an IFQ program, wreckfish is broken out separately from the other species in the snapper grouper fishery/FMP. Also, all direct economic effects are due to the jurisdictional allocation, ACL, sector allocation, and management measures (dolphin only) actions. All other actions only result in indirect economic effects.

For the snapper grouper fishery (excluding wreckfish), the actions in this Amendment result in an increase of approximately $1.52 million in gross revenue to the commercial sector and an increase of approximately $22.77 million in consumer surplus to the recreational sector. Changes in producer surplus to the for-hire sector cannot be estimated with currently available information, but are expected to be positive given the large increase in consumer surplus. Thus, the actions in this Amendment result in significant net economic benefits to the snapper grouper fishery.

For the wreckfish fishery, the actions in this Amendment may potentially result in a decrease of approximately $4.36 million in gross revenue to the commercial sector and an increase of approximately $31,000 in consumer surplus to the recreational sector. However, the potential loss in commercial gross revenue significantly overstates the expected actual loss in gross revenue. Losses in gross revenue overstate losses in profits. Further, the potential loss in gross revenue is based on a reduction in the wreckfish commercial quota from 2 million pounds to 237,500 pounds. In addition, the commercial sector only harvested approximately 165,000 pounds on average between 2005 and 2009, which is below the proposed commercial quota. On the other hand, because each wreckfish shareholder's annual allocation will be proportionally reduced as a result of the reduction in the commercial quota, it is possible that some vessels' allocation of wreckfish will be reduced below their recent harvest levels, which would reduce their gross revenue and likely their profits. On average, only 5 vessels have been harvesting wreckfish in recent years. Thus, the actions in this Amendment may result in some net economic losses to a small number of commercial vessels in the wreckfish fishery.

For the dolphin-wahoo fishery, the actions in this Amendment result in a decrease of approximately $91,000 in gross revenue to the commercial sector, all of which is due to a reduction in gross revenue associated with the harvest of dolphin, and an increase of approximately $124.5 million in consumer surplus to the recreational sector. A decrease in revenue to the for-hire sector of approximately $71,000 is estimated as a result the action to prohibit bag limit sales of dolphin by charter vessels. However, revenue losses overstate losses of producer surplus in the for-hire sector. Further, with the exception of the action to increase the minimum size limit of dolphin, changes in producer surplus to the for-hire sector cannot be estimated with currently available information, but are expected to be positive given the large increase in consumer surplus. For the action to increase the minimum size limit of dolphin, the loss in producer surplus to the for-hire sector is approximately $15,000. Thus, the actions in this Amendment result in significant net economic benefits to the dolphin-wahoo fishery, though these benefits accrue solely to the recreational sector.

For the golden crab fishery, the actions in this Amendment result in an increase of approximately $94,000 in gross revenue to the commercial sector. Gross revenue effects overstate effects on profits. No recreational sector exists in the golden crab fishery. Thus, the actions in this Amendment likely result in modest net economic benefits to the golden crab fishery.

The economic effects noted above will result in economic impacts. Because changes in the number of trips and thus producer surplus cannot be estimated using currently available information, the economic impacts resulting from the economic effects on the recreational sector also cannot be estimated. Further, because of the unique nature of the commercial sector of the wreckfish fishery (e.g., a very small number of participants, landings data is confidential for some recent years, and those landings are significantly below the current commercial quota), the current model used to estimate economic impacts from the commercial sector does not generate scientifically reasonable results. In addition, results for black grouper, yellowtail snapper, and mutton snapper are separated from the other snapper grouper species due the jurisdictional allocation actions and the related fact that the harvest of these species is geographically specialized in the Florida Keys. The estimated economic impacts are presented in Table F-1 below. Numbers in parentheses indicate negative values.

Table F-1. Summary of Commercial Economic Impacts

	Black Grouper	Yellowtail Snapper	Mutton Snapper	Other Snapper Grouper	Dolphin	Golden Crab
Change in gross revenue	$407,825	$65,915	$111,243	$934,623	($91,000)	$94,000
Harvesters						
Employment impacts (FTE jobs)	10	2	3	23	(2)	2
Income Impacts (000 of dollars)	336	54	92	771	(74)	80

Output Impacts (000 of dollars)	874	141	238	2,003	(194)	204
Primary dealers/processors						
Employment impacts (FTE jobs)	6	1	2	14	(1)	1
Income Impacts (000 of dollars)	283	46	77	648	(63)	65
Output Impacts (000 of dollars)	880	142	240	2,017	(196)	203
Secondary wholesalers/distributors						
Employment impacts (FTE jobs)	5	1	1	12	(1)	1
Income Impacts (000 of dollars)	277	45	75	634	(62)	64
Output Impacts (000 of dollars)	649	105	177	1,487	(145)	150
Grocers						
Employment impacts (FTE jobs)	3	0	1	7	(1)	1
Income Impacts (000 of dollars)	115	19	31	264	(26)	27
Output Impacts (000 of dollars)	251	40	68	574	(56)	58
Restaurants						
Employment impacts (FTE jobs)	52	8	14	120	(12)	12
Income Impacts (000 of dollars)	1,277	206	348	2,928	(285)	294
Output Impacts (000 of dollars)	2,716	439	741	6,225	(606)	626
Harvesters and seafood industry						
Employment impacts (FTE jobs)	77	12	21	176	(17)	18
Income Impacts (000 of dollars)	2,288	370	624	5,245	(509)	530
Output Impacts (000 of dollars)	5,370	868	1,465	12,306	(1,197)	1,240

1.5 Public and Private Costs of Regulations

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

Council costs of document preparation, meetings, public hearings, and information dissemination……..$350,000

NMFS administrative costs of document preparation, meetings, and review…….....$200,000

TOTAL……...$550,000

The Council and Federal costs of document preparation are based on staff time, travel, printing, and any other relevant items where funds were expended directly for this specific action. There are no permit requirements proposed in this interim rule. Under a fixed budget, any additional enforcement activity due to the adoption of this interim rule would mean a redirection of resources to enforce the new measures.

1.6 Determination of Significant Regulatory Action

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

APPENDIX G

1.0 REGULATORY FLEXIBILITY ACT ANALYSIS

1.1 Introduction

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

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

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

A discussion of the reasons why action by the agency is being considered is provided in Section 1.2 of this document. In summary, the purposes of this proposed rule are to implement measures expected to prevent overfishing and achieve optimum yield (OY) while minimizing, to the extent practicable, adverse social and economic effects and specify overfishing limits (OFLs), ACLs, and AMs where needed in order to comply with Magnuson-Stevens Act requirements.

7.3 Description and estimate of the number of small entities to which the proposed action would apply

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

In 2010, 598 vessels possessed snapper grouper unlimited permits and 136 vessels possessed limited snapper grouper permits. Thus, 732 vessels possessed limited access permits to harvest snapper grouper species in the South Atlantic. Between 2005 and 2009, the average gross revenue from landings of South Atlantic snapper grouper was approximately $13.82 million, resulting in an average of $18,875 in gross revenue per permitted vessel. These vessels are expected to be directly affected by the proposed actions to specify jurisdictional allocations for black grouper, yellowtail snapper, and mutton snapper, the action to establish ACLs for snapper grouper species retained in the FMU that currently do not have an ACL, and the action to establish sector allocations for snapper grouper species currently without such allocations.

The commercial sector of the wreckfish fishery is managed under an IFQ program. In the 2009/2010 fishing season, there were 25 IFQ shareholders. However, between 2005 and 2009, only 5 vessels harvested wreckfish per year on average. All vessels harvesting wreckfish must possess a snapper grouper permit. Between 2005 and 2009, the average annual gross revenue from wreckfish landings was approximately $440,000, resulting in an average of $84,600 in annual gross revenue per vessel. These shareholders and vessels are expected to be directly affected by the actions to establish an ACL and sector allocation for wreckfish.

In 2010, 2,144 vessels possessed an open access dolphin-wahoo commercial permit. However, landings data indicates that, on average, only 602 and 224 vessels harvested dolphin and wahoo, respectively, between 2005 and 2009. Annual gross revenue from dolphin and wahoo landings were approximately $1.58 million and $118,000, respectively, during this time period. Thus, annual gross revenue per vessel was approximately $2,628 and $527 on average for dolphin and wahoo, respectively. These vessels are expected to be directly affected by the actions to establish ACLs and sector allocations for dolphin and wahoo. The action to establish a commercial minimum size limit for dolphin would only affect vessels that harvest dolphin.

For the golden crab fishery, 11 vessels possessed a limited access permit in 2010. However, between 2005 and 2009, only 5 vessels harvested golden crab per year on average. Between 2005 and 2009, the average annual gross revenue from golden crab landings was approximately $1.09 million, resulting in an average of $226,400 in annual gross revenue per vessel. These vessels are expected to be directly affected by the action to establish an ACL for golden crab.

Between 2005 and 2009, approximately 2,018 vessels possessed for-hire snapper grouper permits. These vessels are expected to be directly affected by the proposed actions to specify jurisdictional allocations for black grouper, yellowtail snapper, and mutton snapper, the action to establish ACLs for snapper grouper species retained in the FMU that currently do not have an ACL, the action to establish sector allocations for snapper grouper species currently without such allocations, the actions to establish an ACL and sector allocation for wreckfish, and the actions to establish a daily vessel limit for the recreational possession of wreckfish and a closed season for the wreckfish recreational sector. Also between 2005 and 2009, 2,012 vessels possessed for-hire dolphin-wahoo permits on average. These vessels are expected to be directly affected by the actions to establish ACLs and sector allocations for dolphin and wahoo, and the action to prohibit sales of dolphin under the bag limit by charter vessels. For-hire permits do not distinguish charterboats from headboats and thus the specific number of charterboats with for-hire dolphin-wahoo permits cannot be estimated. The number of for-hire vessels that landed snapper grouper or dolphin-wahoo during this time period also cannot be estimated based on currently available data.

A study on the for-hire sector in the Southeastern U.S. presented two sets of average gross revenue estimates for the charter and headboat sectors in the South Atlantic (Holland *et al*., 1999). The first set of estimates was as follows: $51,000 for charterboats on the Atlantic coast of Florida; $60,135 for charterboats in North Carolina; $26,304 for charterboats in South Carolina; $56,551 for charterboats in Georgia; $140,714 for headboats in Florida; and $123,000 for headboats in the other South Atlantic states. The second set of estimates was as follows: $69,268 for charterboats and $299,551 for headboats. Since the second set of estimates were considerably higher than the first set, a new approach was employed that generated the following estimates of average gross revenue: $73,365 for charterboats in North Carolina, $32,091 for charterboats in South Carolina; $68,992 for charterboats in Georgia; and $261,990 for headboats in the other South Atlantic states.

Based on the figures above, all commercial fishing vessels expected to be directly affected by this proposed rule are determined for the purpose of this analysis to be small business entities. Similarly, and regardless of which estimates are used, based on these figures, all for-hire fishing vessels expected to be directly affected by this proposed rule are determined for the purpose of this analysis to be small business entities.

7.4 Description of the projected reporting, record-keeping and other compliance requirements of the proposed rule, including an estimate of the classes of small

entities which will be subject to the requirement and the type of professional skills necessary for the preparation of the report or records

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

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

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

7.6 Significance of economic impacts on small entities

Substantial number criterion

This proposed rule, if implemented, would be expected to directly affect all federally permitted commercial fishing entities and for-hire fishing entities in the South Atlantic snapper grouper, dolphin-wahoo, and golden crab fisheries. All affected entities have been determined, for the purpose of this analysis, to be small entities. Therefore, it is determined that the proposed rule will affect a substantial number of small entities.

Significant economic impacts

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

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

All entities expected to be directly affected by the measures in this proposed rule are determined for the purpose of this analysis to be small business entities, so the issue of disproportionality does not arise in the present case.

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

For the action to establish sector allocations in the snapper grouper fishery, the economic effects to the commercial sector are estimated to be a loss of approximately $754,000 in gross revenue, representing a loss of approximately $1,030 in gross revenue per vessel. For the for-hire sector, effects on producer surplus cannot be estimated given available data. However, an increase of approximately $3.192 million in consumer surplus for the recreational sector suggests that producer surplus will also increase for vessels in the for-hire sector.

For the action to establish ACLs in the snapper grouper fishery, the economic effects to the commercial sector are estimated to be a gain of approximately $2,134,725 in gross

revenue, representing a gain of about $2,916 in gross revenue per vessel. For the for-hire sector, effects on producer surplus cannot be estimated given available data. However, a gain of approximately $16.72 million in consumer surplus for the recreational sector suggests that producer surplus for for-hire vessels will likewise increase, with the increase potentially being substantial.

For the action to establish a sector allocation for wreckfish, the economic effects to the commercial sector are estimated to be a loss of approximately $29,000 in gross revenue, representing a loss of about $5,800 per vessel. For the for-hire sector, effects on producer surplus cannot be estimated given available data. However, a gain of approximately $31,000 in consumer surplus for the recreational sector suggests that producer surplus may also increase for for-hire vessels.

For the action to establish an ACL for wreckfish, the economic effects to the commercial sector are estimated to be a potential loss of approximately $4.07 million in gross revenue. However, losses in gross revenue overstate losses in profits. Moreover, the potential loss in commercial gross revenue significantly overstates the expected actual loss in gross revenue. The potential loss in gross revenue is based on a reduction in the wreckfish commercial quota from 2 million pounds to 237,500 pounds. The commercial sector only harvested approximately 165,000 pounds on average between 2005 and 2009, which is below the proposed commercial quota. In addition, only 5 vessels have been harvesting wreckfish in recent years on average. It is highly unlikely these 5 vessels could generate landings of 2 million pounds. It is much more likely their landings will be close to the proposed ACL, in which case the losses in gross revenue and profits may be minimal and possibly zero. However, because each wreckfish shareholder's annual allocation would be proportionally reduced as a result of the reduction in the commercial quota, it is possible that a few of these vessels' allocation of wreckfish will be reduced below their recent harvest levels, which would reduce their gross revenue and likely their profits. For the for-hire sector, effects on producer surplus cannot be estimated given available data. However, a gain of approximately $31,000 in consumer surplus for the recreational sector suggests that producer surplus for for-hire vessels may also increase.

For the actions to establish a daily vessel limit for the recreational possession of wreckfish and a closed season for the wreckfish recreational sector, the direct economic effects are expected to be minimal given that a recreational sector does not currently exist and a recreational ACL of only 12,500 pounds is being established under a separate action.

For the action to establish a jurisdictional allocation for black grouper, commercial gross revenue is expected to increase by approximately $44,300, or by approximately $61 per vessel. For the for-hire sector, effects on producer surplus cannot be estimated given available data. However, a gain of approximately $291,600 in consumer surplus for the recreational sector suggests that producer surplus for for-hire vessels will also increase.

For the action to establish a sector allocation for black grouper, the economic effects to the commercial sector are estimated to be a gain of approximately $124,000 in gross

revenue for 2012, representing a gain of about $170 in gross revenue per vessel. For the for-hire sector, effects on producer surplus cannot be estimated given available data. However, a gain of approximately $468,000 in consumer surplus for the recreational sector in 2012 suggests that producer surplus will also increase for for-hire vessels.

For the action to establish an ACL for black grouper, the economic effects to the commercial sector are estimated to be a gain of approximately $538,000 in gross revenue, indicating a gain of about $735 in gross revenue per vessel. For the for-hire sector, effects on producer surplus cannot be estimated given available data. However, a gain of approximately $1.76 million in consumer surplus for the recreational sector suggests that producer surplus for for-hire vessels will likewise increase.

For the action to establish a jurisdictional allocation for yellowtail snapper, commercial gross revenue is expected to increase by approximately $158,400, or by approximately $216 per vessel. For the for-hire sector, effects on producer surplus cannot be estimated given available data. However, a gain of approximately $601,200 in consumer surplus for the recreational sector suggests that producer surplus for for-hire vessels will also increase.

For the action to establish a jurisdictional allocation for mutton snapper, the economic effects to the commercial sector are estimated to be a loss of approximately $18,000 in gross revenue for 2012, representing a loss of about $25 in gross revenue per vessel. For the for-hire sector, effects on producer surplus cannot be estimated given available data. However, a loss of approximately $397,600 in consumer surplus for the recreational sector in 2012 suggests that producer surplus may also decrease for for-hire vessels.

Thus, an increase in gross revenue of approximately $1.52 million, or approximately $2,080 per vessel, is expected as a result of all actions affecting commercial snapper grouper vessels. Further, under all actions affecting for-hire snapper grouper vessels, the expected increase in consumer surplus is approximately $22.77 million. Although the effects on producer surplus cannot be estimated given available data, producer surplus is expected to increase, likely substantially, for for-hire vessels.

For the action to establish a sector allocation for dolphin, the economic effects to the commercial sector are estimated to be a loss of approximately $78,000 in gross revenue, representing a loss of about $130 in gross revenue per vessel. For the for-hire sector, effects on producer surplus cannot be estimated given available data. However, a gain of at least $4.7 million in consumer surplus for the recreational sector suggests that producer surplus will also increase, possibly substantially, for for-hire vessels.

For the action to establish an ACL for dolphin, the economic effects to the commercial sector are estimated to be a loss of approximately $78,000 in gross revenue. However, this loss is directly attributable to the to the proposed sector allocation, and thus no additional losses in gross revenue are expected as a result of this action. For the for-hire sector, effects on producer surplus cannot be estimated given available data. However, a

gain of at least $25.2 million in consumer surplus for the recreational sector suggests that producer surplus will also increase, likely substantially, for for-hire vessels.

For the action to establish management measures for dolphin, a loss of $13,000 in gross revenue is expected as a result of the proposed commercial minimum size limit, representing a loss in gross revenue of approximately $22 per vessel. The prohibition on bag limit sales by charter vessels is expected to result in a loss of approximately $71,000 in revenue, or by approximately $70 per charter vessel. Losses in revenue overstate losses in producer surplus and thus the expected loss in producer surplus per vessel would be less. A loss in producer surplus to the for-hire sector of approximately $15,000 is expected as a result of the proposed recreational minimum size limit for dolphin. Because this action would only affect the 134 vessels with for-hire dolphin-wahoo permits in South Carolina, the loss in producer surplus per for-hire vessel is approximately $112.

For the action to establish a sector allocation for wahoo, no economic effects on the commercial sector are expected. For the for-hire sector, effects on producer surplus cannot be estimated given available data. However, a gain of at least $894,000 in consumer surplus for the recreational sector suggests that producer surplus may also increase for for-hire vessels.

For the action to establish an ACL for wahoo, no economic effects on the commercial sector are expected. For the for-hire sector, effects on producer surplus cannot be estimated given available data. A gain of at least $894,000 in consumer surplus was estimated for the recreational sector. However, this gain is directly attributable to the proposed sector allocation, and thus no gains in producer surplus are expected as a result of this action.

For the action to establish an ACL for golden crab, the economic effects to the commercial sector are estimated to be a gain of approximately $94,000 in gross revenue, representing a gain of approximately $18,800 in gross revenue per vessel.

As a result of the information above, a reduction in profits for a substantial number of small entities would not be expected.

7.7 Description of significant alternatives to the proposed action and discussion of how the alternatives attempt to minimize economic impacts on small entities

This proposed action, if implemented, would not be expected to have a significant direct adverse economic effect on the profits of a substantial number of small entities. As a result, the issue of significant alternatives is not relevant.

Appendix H.

1 Bycatch Practicability Analysis

1.1 Population Effects for the Bycatch Species

Background

The Comprehensive Annual Catch Limit (ACL) Amendment includes actions which could: remove some species from South Atlantic Snapper Grouper Fishery Management Unit (FMU); consider multi-species groupings for specifying ACLs, annual catch targets (ACT)s, and accountability measures (AM)s; designate some snapper grouper species as ecosystem component species; establish acceptable biological catch (ABC) control rules, ABCs, ACLs, ACTs, and AMs for species not undergoing overfishing in the Fishery Management Plan (FMP) for the Dolphin Wahoo Fishery of the Atlantic, the FMP for pelagic *Sargassum* habitat of the South Atlantic Region, FMP for the Golden Crab Fisheries of the South Atlantic Region, and FMP for the Snapper Grouper Fishery of the South Atlantic Region; specify allocations among the commercial, recreational, and for-hire sectors for species not undergoing overfishing; and modify management measures to limit total mortality to the ACL.

The majority of species in the snapper grouper FMU are taken with hook and line gear (Table 1). Black sea bass are predominantly taken with pots; whereas, longline gear has been the predominant gear type used to capture golden tilefish. In dolphin wahoo FMU, most dolphin and wahoo are taken with hook and line gear. Golden crab are harvested with traps. There have been no landings of *Sargassum* since 1997. *Sargassum* is a free floating seaweed that is harvested with nets.

Table 1. Percentage of commercial catch by gear based on data from 2005-2009. H&L = hook and line; L = longline; O = other; S = spear; and T = black sea bass pots.

Taxon	H&L	L	O	S	T
Amberjack	100%	0%	0%	0%	0%
Greater amberjack	93%	0%	0%	7%	0%
Lesser amberjack	96%	2%	0%	2%	0%
Banded rudderfish	100%	0%	0%	0%	0%
Blue runner	54%	0%	45%	1%	0%
Crevalle jack	92%	0%	8%	0%	0%
Graysby	100%	0%	0%	0%	0%
Black grouper	89%	0%	0%	11%	0%
Gag	80%	0%	0%	20%	0%
Misty grouper	99%	1%	0%	1%	0%
Red grouper	98%	0%	0%	2%	0%
Snowy grouper	81%	19%	0%	0%	0%
Warsaw grouper	14%	86%	0%	0%	0%
Yellowedge grouper	69%	30%	0%	1%	0%
Yellowfin grouper	99%	1%	0%	0%	0%
Yellowmouth grouper	100%	0%	0%	0%	0%

Taxon	H&L	L	O	S	T
Groupers	100%	0%	0%	0%	0%
Bluestriped grunt	97%	0%	0%	0%	2%
French grunt	94%	0%	0%	0%	6%
Sailors Cchoice	0%	0%	0%	0%	100%
Tomtate	100%	0%	0%	0%	0%
White grunt	30%	0%	0%	0%	70%
Grunts	89%	0%	1%	0%	11%
Red hind	100%	0%	0%	0%	0%
Rock hind	99%	0%	0%	0%	0%
Speckled hind	98%	0%	0%	0%	1%
Hogfish	54%	0%	3%	43%	1%
Yellow jack	60%	0%	1%	39%	0%
Almaco jack	96%	0%	0%	4%	0%
Bar jack	80%	0%	2%	18%	0%
Jacks Unc	16%	0%	84%	0%	0%
Margate	94%	0%	0%	1%	5%
Black margate	91%	0%	0%	1%	7%
Grass porgy	100%	0%	0%	0%	0%
Jolthead porgy	98%	0%	1%	0%	0%
Knobbed porgy	98%	0%	0%	0%	2%
Longspine porgy	100%	0%	0%	0%	0%
Red porgy	99%	0%	0%	0%	1%
Whitebone porgy	90%	0%	1%	0%	9%
Porkfish	94%	0%	0%	6%	0%
Scamp	95%	0%	0%	5%	0%
Scups or Porgies, Unc	49%	0%	4%	1%	46%
Bank sea bass	1%	0%	0%	0%	99%
Rock sea bass	7%	0%	0%	0%	93%
Black sea bass	11%	0%	0%	0%	89%
Sheepshead	34%	0%	34%	32%	0%
Black snapper	100%	0%	0%	0%	0%
Blackfin snapper	29%	70%	1%	0%	0%
Cubera snapper	74%	6%	0%	19%	0%
Dog snapper	82%	0%	0%	18%	0%
Gray snapper	100%	0%	0%	0%	0%
Lane snapper	99%	0%	0%	0%	0%
Mahogony snapper	53%	0%	0%	47%	0%
Mangrove snapper	92%	0%	0%	8%	0%
Mutton snapper	93%	0%	2%	4%	0%
Queen snapper	65%	34%	0%	1%	0%
Red snapper	94%	0%	0%	5%	0%
Schoolmaster snapper	87%	0%	0%	13%	0%

Taxon	H&L	L	O	S	T
Silk snapper	61%	39%	0%	0%	0%
Vermilion snapper	100%	0%	0%	0%	0%
Yellowtail snapper	100%	0%	0%	0%	0%
Snapper, Unc	86%	14%	0%	0%	0%
Atlantic spadefish	11%	0%	23%	66%	0%
Tilefish	9%	91%	0%	0%	0%
Blueline tilefish	46%	52%	0%	0%	1%
Sand tilefish	100%	0%	0%	0%	0%
Tilefish, Unc	100%	0%	0%	0%	0%
Gray triggerfish	96%	1%	0%	1%	2%
Ocean triggerfish	99%	0%	0%	0%	1%
Queen triggerfish	82%	17%	0%	1%	0%
Triggerfishes	89%	0%	0%	1%	10%
Wreckfish	100%	0%	0%	0%	0%
Dolphin	56%	44%	0%	0%	0%
Wahoo	86%	1%	10%	0%	3%

Source: NMFS SEFSC Logbook Program.

Landings during 2005-2009 among species in the snapper grouper and dolphin wahoo sectors were generally dominated by the for-hire and private recreational sectors (Table 2). Catches of deepwater species such as snowy grouper and golden tilefish were dominated by commercial fishermen. Golden crab are taken entirely by the commercial sector and there are no landings of *Sargassum*.

Table 2. Percentage of landings among the commercial, for-hire, private recreational sectors during 2005-2009. Landings provided by the Southeast Fisheries Science Center.

Taxon	Commercial	For Hire	Recreational
Almaco jack	57%	29%	15%
Atlantic spadefish	12%	42%	46%
Banded rudderfish	30%	56%	14%
Bank sea bass	6%	76%	18%
Bar jack	42%	44%	14%
Black grouper	52%	10%	38%
Black margate	0%	52%	48%
Black sea bass	42%	20%	38%
Black snapper	100%	0%	0%
Blackfin snapper	39%	16%	45%
Blue runner	17%	53%	30%
Blueline tilefish	50%	34%	16%
Bluestriped grunt	0%	46%	54%
Coney	0%	12%	88%
Cottonwick	0%	100%	0%

Taxon	Commercial	For Hire	Recreational
Crevalle jack	27%	53%	20%
Cubera snapper	26%	36%	39%
Dog snapper	8%	9%	83%
French grunt	0%	5%	95%
Gag	54%	14%	32%
Goliath grouper	0%	2%	98%
Grass porgy	0%	17%	83%
Gray snapper	15%	35%	50%
Gray triggerfish	*43%	24%	33%
Graysby	4%	54%	42%
Greater amberjack and Unc jacks	41%	34%	25%
Hogfish	27%	3%	70%
Jolthead porgy	6%	47%	48%
Knobbed porgy	54%	33%	12%
Lane snapper	6%	32%	61%
Lesser amberjack	50%	36%	14%
Longspine porgy	3%	97%	0%
Mahogany snapper	2%	27%	72%
Margate	16%	55%	29%
Misty grouper	100%	0%	0%
Mutton snapper	15%	28%	57%
Nassau grouper	0	0	0
Ocean triggerfish	0%	17%	83%
Porkfish	0%	23%	77%
Puddingwife	0%	1%	99%
Queen snapper	100%	0%	0%
Queen triggerfish	0%	56%	44%
Red grouper	46%	9%	46%
Red hind	74%	8%	18%
Red porgy	51%	36%	13%
Red snapper	25%	29%	46%
Rock hind	66%	21%	13%
Rock sea bass	26%	26%	48%
Sailors choice	0%	48%	52%
Sand tilefish	20%	22%	58%
Saucereye porgy	0%	44%	56%
Scamp	69%	18%	13%
Schoolmaster	3%	12%	84%

Taxon	Commercial	For Hire	Recreational
Scup	0%	95%	5%
Sheepshead	13%	18%	70%
Silk snapper	75%	24%	1%
Snowy grouper	65%	23%	12%
Spanish grunt	0%	0%	100%
Speckled hind	51%	47%	2%
Tilefish	83%	11%	5%
Tomtate	0%	54%	46%
Vermilion snapper	63%	30%	7%
Warsaw grouper	6%	26%	68%
White grunt and Unc grunts	32%	41%	26%
Whitebone porgy	0%	35%	65%
Yellow jack	0%	60%	40%
Yellowedge grouper	97%	3%	0%
Yellowfin grouper	43%	5%	51%
Yellowmouth grouper	0%	43%	57%
Yellowtail snapper	69%	12%	19%
Dolphin	8%	37%	54%
Wahoo	4%	23%	73%

*Commercial represents unclassified triggerfish. Commercial triggerfish landings are not identified to species; however, most triggerfish in landings are likely gray triggerfish.

Commercial Fishery

During 2005 to 2009, approximately 20% of snapper grouper permitted vessels from the Gulf of Mexico and South Atlantic were randomly selected to fill out supplementary logbooks. The average number of trips per year during 2005 to 2009 was 13,973 (Table 3). Fishermen spent an average of 1.69 days at sea per trip.

Table 3. Snapper grouper fishery effort for South Atlantic.

YEAR	Trips	Days	Days per Trip
2005	13,771	22,855	1.66
2006	13,264	23,324	1.76
2007	14,885	24,509	1.65
2008	14,781	25,023	1.69
2009	15,345	25,487	1.66
Mean	13,973	23,563	1.69

Source: NMFS SEFSC Logbook Program.

For species in Snapper Grouper Fishery FMU, the number of commercial trips that reported discards was greatest for yellowtail snapper, red porgy, vermilion snapper, scamp, and black sea bass (Table 4). Table 4 indicates many other species not included in the Snapper Grouper FMU

including mackerel species, sharks, dolphin, and others are discarded by fishermen with federal commercial snapper grouper permits.

Table 4. The 70 most commonly discarded species during 2005-2009 for the South Atlantic. Snapper grouper species are highlighted. Note: Represents total of unexpanded data during 2005-2009.

Species	Number of trips reported discarding the species	Number discarded
Red porgy, Unc	1,449	128,197
Vermilion snapper	1,272	89,156
Black sea bass, Unc	896	69,027
Knobbed porgy	503	27,924
Yellowtail snapper	2,058	21,420
Rough skin dogfish	85	14,807
Red snapper	634	11,340
Scamp	969	8,703
King mackerel	1,415	7,917
Mangrove snapper	416	7,230
Spottail pinfish	113	7,194
Smooth dogfish	43	5,456
Atlantic sharpnose	204	5,055
Menhaden	50	4,880
Little tunny	140	4,189
Greater amberjack	361	4,163
Gag	618	4,045
Grunts	181	3,517
Dogfish shark	54	3,435
Bluefish	77	3,092
Red grouper	559	3,045
White grunt	168	2,695
Gray triggerfish	233	2,508
Scups or Porgies, Unc	73	2,495
Blue runner	303	2,332
Triggerfish	168	2,274
Blacktip shark	161	2,098
Amberjack	262	1,818
Sandbar shark	129	1,810
Black grouper	381	1,723
Tomtate	22	1,703
Tiger shark	115	1,506
Mutton snapper	296	1,347
Dolphin	214	1,270

Species	Number of trips reported discarding the species	Number discarded
Unc, finfish for food	86	1,167
Atlantic bonito	218	1,049
Speckled hind	122	817
Remora	270	815
Snappers, Unc	36	681
Barracuda	75	668
Spanish mackerel	106	651
Ballyhoo	18	600
Lane snapper	73	582
Groupers	67	396
Chubs	8	364
Caribbean sharpnose	13	361
Stingrays	29	335
Hake	35	333
Rays, Unc	46	324
Snowy grouper	59	319
Margate	17	313
Cobia	182	304
Needlefish	72	299
Cero	98	288
Lesser amberjack	12	282
Sand tilefish	35	264
Spinner shark	33	245
Hammerhead shark	69	218
Almaco jack	20	203
Sheepshead	21	201
Sea catfish	69	188
Rudderfish	33	181
Black margate	3	161
Yellowfin tuna	36	161
Banded rudderfish	14	159
Mahogany snapper	13	133
Rock sea bass	11	131
Squirrelfish	18	131
Silky shark	13	114
Atlantic spadefish	21	107

Some dolphin are taken with pelagic longline. Observer data and vessel logbooks indicate that pelagic longline fishing for Atlantic swordfish and tunas results in catch of non-target finfish species such as bluefin tuna, billfish, and undersized swordfish, and of protected species,

including threatened and endangered sea turtles. Also, this fishing gear incidentally hooks marine mammals and sea birds during tuna and swordfish operations. Actions have been taken to reduce bycatch and incidental catch of overfished and protected species by pelagic longline fishermen who target highly migratory pelagic species (HMS). Appendix C of the Dolphin Wahoo FMP contains data which indicate that pelagic longlines targeting dolphin do in fact result in a bycatch of HMS species.

Recreational Fishery

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

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

For species in the Comprehensive ACL Amendment, the number of released fish was greatest for black sea bass, followed by crevalle jack (Table 5).

Table 5. Estimated number of fish released (B2) fish in numbers for the South Atlantic during 2005-2009. Species in Comprehensive ACL Amendment are highlighted. Species highlighted in green are currently selected for removal from the Snapper Grouper FMP, in preferred alternatives under Action 1.

Species	Year: 2005		Year: 2006		Year: 2007		Year: 2008		Year: 2009	
	TYPE B2	PSE	TYPE B2	PSE	TYPE B2	PSE	TYPE B2	PSE	TYPE B2	PSE
Barracudas										
Barracudas	126,721	10.8	180,157	8.7	268,282	9.5	239,534	9.6	204,545	9.8
-- Species Group Subtotal --	126,721	10.8	180,157	8.7	268,282	9.5	239,534	9.6	204,545	9.8
Bluefish										
Bluefish	3,004,781	6.1	3,707,415	5.7	4,539,620	6	3,440,594	5	2,337,256	5.4
-- Species Group Subtotal --	3,004,781	6.1	3,707,415	5.7	4,539,620	6	3,440,594	5	2,337,256	5.4
Cartilaginous fishes										
Dogfish sharks	151,502	28.1	91,248	17.4	132,366	42.2	129,161	22.3	92,811	24.9
Other sharks	2,888,895	5.1	2,770,853	6.8	3,128,079	4.5	2,925,490	4.4	2,638,748	5.5
Skates/Rays	1,387,330	6.9	1,059,210	6.7	1,183,040	5.3	1,070,743	6.2	1,431,617	10.8
-- Species Group Subtotal --	4,427,727	4.1	3,921,311	5.1	4,443,485	3.7	4,125,394	3.6	4,163,176	5.1
Catfishes										
Freshwater catfishes	64,895	28.1	40,805	30.2	20,552	25.6	45,502	28	12,530	35.4
Saltwater catfishes	1,775,623	6.2	1,362,776	5.8	2,473,885	7.1	1,912,040	6.5	1,016,001	6.6
-- Species Group Subtotal --	1,840,518	6	1,403,581	5.7	2,494,437	7	1,957,542	6.3	1,028,531	6.6
Cods and Hakes										
Other Cods/Hakes	34,531	40.3	5,889	37	9,605	31	7,405	69.3	32,350	39.9
-- Species Group Subtotal --	34,531	40.3	5,889	37	9,605	31	7,405	69.3	32,350	39.9
Dolphins										
Dolphins	218,931	16.1	231,853	10.8	254,568	17.1	200,879	11.8	75,493	14
-- Species Group Subtotal --	218,931	16.1	231,853	10.8	254,568	17.1	200,879	11.8	75,493	14
Drums										
Atlantic croaker	2,153,037	6.6	3,439,549	6.4	2,540,696	7	2,372,758	5.9	3,113,213	5.5
Black drum	190,110	11.4	312,415	9.7	820,032	10.2	640,413	7.7	293,214	8.8
Kingfishes	2,226,960	6.8	3,582,622	7.7	3,309,945	5.9	2,902,539	6.1	2,710,822	6.8
Other drum	581,461	11	834,383	8.8	1,049,974	10.9	1,173,266	9.5	900,754	12.3
Red drum	2,412,470	5.8	2,111,089	5.6	2,070,575	5.6	2,333,096	6.1	1,979,705	5.6
Sand seatrout	0	0	9,401	72	11,324	45.8	27,367	42.5	110,534	48.4
Silver perch	480,503	13.2	726,915	11.5	584,828	12.1	491,659	15.6	595,518	15.6
Spot	1,728,002	9.9	3,851,795	9.6	1,732,440	9.9	1,713,571	7.6	1,798,841	8.8
Spotted seatrout	5,336,913	5.3	4,988,541	4.7	6,114,718	5	4,715,679	5.5	3,782,693	5.4

Species	Year: 2005		Year: 2006		Year: 2007		Year: 2008		Year: 2009	
	TYPE B2	PSE	TYPE B2	PSE	TYPE B2	PSE	TYPE B2	PSE	TYPE B2	PSE
Weakfish	438,519	11	538,799	11.4	346,898	14	265,383	14.1	189,614	21.8
-- Species Group Subtotal --	15,547,975	2.8	20,395,509	2.9	18,581,430	2.6	16,635,731	2.5	15,474,908	2.7
Eels										
Eels	51,553	26.3	62,029	25.8	43,847	16.3	41,653	19	27,700	17.3
-- Species Group Subtotal --	51,553	26.3	62,029	25.8	43,847	16.3	41,653	19	27,700	17.3
Flounders										
Gulf flounder	4,932	64	10,047	58.5	32,472	49.1	6,181	51.8	964	100
Other flounders	1,214,700	6.3	1,201,665	5.6	1,689,592	5.8	1,900,658	5.9	1,577,521	6.8
Southern flounder	131,274	17.9	257,712	13.7	190,340	13	125,290	14.8	104,871	23.9
Summer flounder	83,320	22.4	139,805	20.5	10,815	38.6	5,715	38	35,632	27.3
-- Species Group Subtotal --	1,434,226	5.7	1,609,229	5	1,923,219	5.4	2,037,844	5.6	1,718,988	6.4
Grunts										
Other grunts	905,462	8.2	790,470	8.4	1,561,407	8.3	903,581	7.7	1,219,001	8.5
Pigfish	743,829	7.8	553,384	9.6	868,092	10.3	821,930	8.4	841,230	10.1
White grunt	195,770	14.8	274,926	15	241,875	11.3	434,040	14.5	148,501	24.3
-- Species Group Subtotal --	1,845,061	5.3	1,618,780	5.8	2,671,374	6	2,159,551	5.4	2,208,732	6.3
Herrings										
Herrings	1,243,180	17.4	2,640,817	12.5	1,203,718	16.9	512,502	31.7	1,698,306	15.3
-- Species Group Subtotal --	1,243,180	17.4	2,640,817	12.5	1,203,718	16.9	512,502	31.7	1,698,306	15.3
Jacks										
Blue runner	661,888	9.6	822,370	9.2	1,159,991	11.7	796,058	11.1	705,910	24.5
Crevalle jack	1,362,086	6.7	1,264,018	6.5	1,634,661	6	1,097,877	7	1,139,832	7.9
Florida pompano	693,755	12.5	1,007,541	20.1	605,621	12	696,269	10.7	345,791	21.5
Greater amberjack	16,687	25.1	19,234	19.6	30,752	20.8	80,931	19.8	71,802	16.1
Other jacks	332,217	17.4	180,298	14	326,798	15.8	433,050	12.2	352,874	16
-- Species Group Subtotal --	3,066,633	5	3,293,461	7.1	3,757,823	5.1	3,104,185	4.8	2,616,209	8.3
Mullets										
Mullets	1,384,536	13.7	1,801,720	11.3	2,263,848	9.4	1,091,237	10.7	1,367,241	11.1
-- Species Group Subtotal --	1,384,536	13.7	1,801,720	11.3	2,263,848	9.4	1,091,237	10.7	1,367,241	11.1
Other fishes										
Other fishes	2,965,704	4.8	2,882,611	4.7	4,518,284	3.7	2,828,534	4.2	2,751,240	5.7
-- Species Group Subtotal --	2,965,704	4.8	2,882,611	4.7	4,518,284	3.7	2,828,534	4.2	2,751,240	5.7
Porgies										

Species	Year: 2005		Year: 2006		Year: 2007		Year: 2008		Year: 2009	
	TYPE B2	PSE	TYPE B2	PSE	TYPE B2	PSE	TYPE B2	PSE	TYPE B2	PSE
Other porgies	72,379	20.1	150,357	20.4	139,040	21.4	116,266	19.5	65,856	19.2
Pinfishes	3,917,568	5.8	5,056,606	6.2	4,960,818	5.1	5,040,941	6	3,588,516	5.8
Red porgy	27,514	19.2	16,636	15.8	30,085	19	44,154	30	18,089	55.8
Scup	1,620	46.5	7,721	44	5,729	30.6	9,755	36	3,293	25.3
Sheepshead	436,207	9.6	437,836	9.3	603,767	10.7	773,720	8	520,600	9.1
-- Species Group Subtotal --	4,455,288	5.2	5,669,156	5.6	5,739,439	4.5	5,984,836	5.2	4,196,354	5.1
Puffers										
Puffers	425,264	7.7	635,341	8.5	1,152,418	6.6	1,341,422	6.7	912,983	7.6
-- Species Group Subtotal --	425,264	7.7	635,341	8.5	1,152,418	6.6	1,341,422	6.7	912,983	7.6
Sea basses										
Black sea bass	2,483,947	5.5	2,967,099	5.6	3,764,105	7.3	2,940,795	6.2	2,716,240	6.2
Epinephelus groupers	254,936	9.1	165,261	9.1	107,240	17.6	97,808	11.9	128,065	11.9
Mycteroperca groupers	145,222	11	152,123	10.7	302,398	11.2	252,309	8.9	142,865	10.6
Other sea basses	324,893	11.5	797,375	11.3	910,942	8.7	801,710	9.1	499,275	10.4
-- Species Group Subtotal --	3,208,998	4.5	4,081,858	4.6	5,084,685	5.7	4,092,622	4.8	3,486,445	5.1
Searobins										
Searobins	158,366	12.1	300,921	21.5	432,617	11.1	333,166	14.5	123,415	10.5
-- Species Group Subtotal --	158,366	12.1	300,921	21.5	432,617	11.1	333,166	14.5	123,415	10.5
Snappers										
Gray snapper	1,228,211	7.8	1,457,251	5.9	2,936,755	6	1,839,406	6.5	1,725,889	7.4
Lane snapper	111,276	22.7	137,572	16.8	330,770	14.1	227,775	18.4	157,594	16.6
Other snappers	242,324	10.6	280,948	10.1	426,284	10.4	557,020	10	314,681	10.1
Red snapper	125,739	13.3	134,692	18.5	455,405	12.8	403,244	10.5	210,279	12.4
Vermilion snapper	140,356	13.2	102,219	34.3	293,433	12.9	246,103	14.2	226,125	11.6
Yellowtail snapper	258,606	17.7	344,982	11.7	402,201	12.5	319,239	11.1	221,836	22.6
-- Species Group Subtotal --	2,106,512	5.5	2,457,664	4.5	4,844,848	4.3	3,592,787	4.3	2,856,404	5.2
Temperate basses										
Striped bass	136,536	16.3	85,438	19.4	50,735	18.2	86,858	19.6	93,353	21
White perch	0	0	46,904	38.1	7,339	56.8	1,397	58.5	0	0
-- Species Group Subtotal --	136,536	16.3	132,342	18.4	58,074	17.5	88,255	19.4	93,353	21
Toadfishes										
Toadfishes	477,955	8.3	479,125	9.4	435,924	7.7	691,142	8	405,848	8.2
-- Species Group Subtotal --	477,955	8.3	479,125	9.4	435,924	7.7	691,142	8	405,848	8.2

Species	Year: 2005		Year: 2006		Year: 2007		Year: 2008		Year: 2009	
	TYPE B2	PSE	TYPE B2	PSE	TYPE B2	PSE	TYPE B2	PSE	TYPE B2	PSE
Triggerfishes/Filefishes										
Triggerfishes/Filefishes	239,995	10.7	210,123	14.6	228,262	10.1	199,476	10.7	181,503	14
-- Species Group Subtotal --	239,995	10.7	210,123	14.6	228,262	10.1	199,476	10.7	181,503	14
Tunas and Mackerels										
Atlantic mackerel	67,658	81.9								
King mackerel	207,618	13.7	195,618	9.8	303,008	9.4	166,716	9.7	127,316	13.4
Little tunny/Atlantic bonito	288,459	8.5	476,296	7	780,193	8.4	511,878	7.6	585,015	8.3
Other tunas/Mackerels	66,422	24.6	43,933	13.7	58,912	16.3	121,352	17.4	93,887	17
Spanish mackerel	704,569	12.9	321,860	11.9	586,722	9.4	994,693	10.4	466,681	9.4
-- Species Group Subtotal --	1,334,726	8.5	1,037,707	5.3	1,728,835	5.3	1,794,639	6.3	1,272,899	5.4
Wrasses										
Other wrasses	2,966	53.3	2,079	50.4	10,386	41.8	13,203	51.5	2,977	42.4
Tautog	2,885	100	5,185	52	2,905	60.9	1,755	58.9	1,922	62.6
-- Species Group Subtotal --	5,851	56.2	7,264	39.8	13,291	35.3	14,958	46	4,899	35.6
-- Grand Total --	49,741,568	1.4	58,765,863	1.6	66,691,933	1.3	56,515,888	1.3	49,238,778	1.5

Source: MRFSS Web Site http://www.st.nmfs.noaa.gov/st1/recreational/overview/overview.html.

For species in the Comprehensive ACL Amendment, black sea bass, vermilion snapper, tomtate, and red snapper were most often discarded by headboat fishermen during 2005-2009 (Table 6).

Table 6. Most commonly discarded species from headboats in South Atlantic. Total fish reported released alive or dead on sampled headboat trips during 2005-2009. Data are not expanded to all trips. Species in Comprehensive ACL Amendment are highlighted. Species highlighted in green are currently selected for removal from the Snapper Grouper FMP, in preferred alternatives under Action 1.

Species	# trips reporting discards	released	sum
Black sea bass	17,087	rel_dead	18,316
		rel_live	721,640
Vermilion snapper	11,601	rel_dead	19,013
		rel_live	413,854
Tomtate	7,801	rel_dead	34,943
		rel_live	243,869
Red snapper	9,198	rel_dead	3,214
		rel_live	212,572
Red porgy	3,848	rel_dead	2,400
		rel_live	110,940
Yellowtail snapper	11,797	rel_dead	3,005
		rel_live	103,625
White grunt	12,917	rel_dead	3,154
		rel_live	91,647
Pinfish	3,000	rel_dead	2,850
		rel_live	81,423
Sharpnose shark	10,928	rel_dead	477
		rel_live	82,816
Spottail pinfish	3,450	rel_dead	199
		rel_live	35,381
Red grouper	7,885	rel_dead	317
		rel_live	27,527
Gag	9,520	rel_dead	339
		rel_live	20,393
Gray triggerfish	14,291	rel_dead	380
		rel_live	18,599
Lane snapper	7,506	rel_dead	591
		rel_live	17,561
Scamp	4,809	rel_dead	275
		rel_live	16,123
Bank sea bass	2,903	rel_dead	763
		rel_live	13,725
Gray snapper	10,376	rel_dead	137

Species	# trips reporting discards	released	sum
		rel_live	13,744
		rel_dead	513
Mutton snapper	8,907	rel_live	13,030
		rel_dead	155
Squirrelfish	3,012	rel_live	9,688
		rel_dead	298
Bluerunner	3,958	rel_live	8,439
		rel_dead	865
Scup	1,187	rel_live	7,402
		rel_dead	104
Greater amberjack	4,438	rel_live	8,155
		rel_dead	31
Smooth dogfish	865	rel_live	6,830
		rel_dead	219
Little tunny	4,019	rel_live	6,620
		rel_dead	232
King mackerel	10,764	rel_live	5,913
		rel_dead	31
Banded rudderfish	2,333	rel_live	5,426
		rel_dead	53
Inshore lizardfish	1,126	rel_live	4,804
		rel_dead	154
Spanish mackerel	2,117	rel_live	4,380
		rel_dead	65
Remora	1,408	rel_live	4,139
		rel_dead	412
Bluefish	1,420	rel_live	3,728
		rel_dead	173
Bluestriped grunt	2,283	rel_live	3,650
		rel_dead	18
Blacktip shark	1,001	rel_live	3,729
		rel_dead	67
Porkfish	1,645	rel_live	3,429
		rel_dead	49
Black grouper	2,530	rel_live	3,026
		rel_dead	64
Nurse shark	1,730	rel_live	2,964
		rel_dead	213
Graysby	2,736	rel_live	2,699
		rel_dead	17
Cobia	3,925	rel_live	2,771

Species	# trips reporting discards	released	sum
Sand perch	1,017	rel_dead	195
		rel_live	2,279
Rock hind	1,998	rel_dead	290
		rel_live	1,663
Doctorfish	873	rel_dead	60
		rel_live	1,790
Almaco jack	2,652	rel_dead	24
		rel_live	1,768
Sandbar shark	393	rel_dead	1
		rel_live	1,694
Margate	744	rel_dead	75
		rel_live	1,540
Dolphin	3,087	rel_dead	45
		rel_live	1,370
Bigeye	2,098	rel_dead	39
		rel_live	1,231
Whitebone porgy	4,480	rel_dead	32
		rel_live	1,204
Spiny dogfish	58	rel_dead	0
		rel_live	1,201
Jolthead porgy	3,667	rel_dead	80
		rel_live	1,054
Great barracuda	2,085	rel_dead	47
		rel_live	1,079
Pigfish	1,072	rel_dead	11
		rel_live	996
Rainbow runner	669	rel_dead	55
		rel_live	811
Sand tilefish	872	rel_dead	40
		rel_live	823
Atlantic croaker	39	rel_dead	0
		rel_live	843
Knobbed porgy	3,890	rel_dead	26
		rel_live	554
Crevalle jack	265	rel_dead	0
		rel_live	564

Source: NMFS Headboat survey.

Finfish Bycatch Mortality

Release mortality rates are unknown for most snapper grouper species. Recent SEDAR assessments include estimates of release mortality rates based on published studies. Stock assessment reports can be found at http://www.sefsc.noaa.gov/sedar/.

SEDAR 17 (2008) recommended a release mortality rate for vermilion snapper of 38% for both the commercial and recreational fisheries. SEDAR 10 (2006) estimated release mortality rates of 40% and 25% for gag taken by commercial and recreational fishermen, respectively. SEDAR 24 (2010) used release mortality rates of 48% commercial; 41% for-hire, and 39% private recreational for red snapper. Release mortality rates were estimated as 20% for black grouper and red grouper in SEDAR 19 (2010). SEDAR 15 (2008) estimated a 20% release mortality rate for greater amberjack. In the Gulf of Mexico, SEDAR 9 (2006) assumes a 0% release mortality rate for gray triggerfish. Snowy grouper are primarily caught in water deeper than 300 feet and golden tilefish are taken at depths greater than 540 feet; therefore, release mortality of the species are probably near 100% (SEDAR 4 2004). Release mortality of black sea bass is considered to be low (15%) (SEDAR 2-SAR 3 2005) indicating minimum size limits are probably an effective management tool for black sea bass. Collins et al. (1999) reported venting of the swim bladder yielded reductions in release mortality of black sea bass, and the benefits of venting increased with capture depth. The same study was analyzed by Wilde (2009) to suggest that venting increased the survival of black sea bass, although this was an exception to the general findings of Wilde's (2009) study.

Estimates of bycatch mortality for dolphin and wahoo are unknown. It is likely that most mortality is a function of hooking and handling of the fish when the hook is being removed. Release mortality of golden crab is presumed to be very low. Regulations do not allow for the retention of females, and it is assumed they survive the trauma of capture.

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

Tables 2-6 list the species that are most commonly discarded by commercial and recreational fishermen. The Comprehensive ACL Amendment includes alternatives for annual catch limits (ACLS) and annual catch targets for snapper grouper species as well as dolphin wahoo that are below current catch levels. Accountability measures (AM) are also being considered for these species that could shorten fishing seasons and reduce bag limits (i.e. dolphin) if an ACL is exceeded.

Discards of dolphin and wahoo are small in comparison to snapper grouper species and bycatch is believed to be minimal in the recreational, charter, and headboat sectors. Action was taken in the Dolphin Wahoo FMP to reduce bycatch by prohibiting the use of surface and pelagic longline gear for dolphin and wahoo within any "time or area closure" in the South Atlantic Council's area of jurisdiction (Atlantic Coast) which is closed to the use of pelagic gear for highly migratory pelagic species. The Comprehensive ACL Amendment would also establish ACLs for the commercial dolphin fishery, which could establish a ceiling on the commercial catch slightly below the current levels and thereby reduce interaction of longline gear with

protected species. Actions have been taken to reduce bycatch and incidental catch of overfished and protected species by pelagic longline fishermen who target highly migratory pelagic species (HMS). Appendix C of the Dolphin Wahoo FMP contains data which indicate that pelagic longlines targeting dolphin do in fact result in a bycatch of HMS species.

For species in the Snapper Grouper FMP, commercial AMs would close species or species groups in season when the ACL is projected to be met. Regulatory discards could increase after a catch limit has been met since fishermen might target co-occurring species. However, the Comprehensive ACL Amendment is establishing species complexes for many species that are often caught together. Therefore reduced catch limits for multiple species or closing co-occurring species at the same time could have the effect of reducing effort, which in turn could reduce bycatch.

If recreational ACLs for many co-occurring species are met, the AM would be to shorten the following fishing season. Extended closures for co-occurring species could reduce bycatch and enhance the reproductive potential of fish stocks, particularly if closures occurred during spawning seasons. Seasonal and/or longer closures of both commercial and recreational fisheries specified in Snapper Grouper Amendment 16 could also reduce bycatch mortality of species included in the Comprehensive ACL Amendment. A longer spawning seasonal closure could enhance the reproductive potential of the stock. For example Amendment 16 established a January - April spawning season closure for gag, red grouper, black grouper, scamp, rock hind, red hind, coney, graysby, yellowfin grouper, yellowmouth grouper, and tiger grouper. These species are in spawning condition from December through April each year and many form spawning aggregations when they are extremely vulnerable to fishing pressure. Groupers change sex from female to male and there is evidence that males can be selectively removed from spawning aggregations, which could affect reproductive success. Furthermore, the largest most fecund females could also be selectively removed by fishing gear. Therefore, a spawning season closure for all shallow water grouper species implemented through Snapper Grouper Amendment 16 would be expected to protect grouper species when they are most vulnerable to capture, reduce bycatch of co-occurring grouper species, increase the percentage of males in grouper populations, enhance reproductive success, and increase the magnitude of recruitment.

Snapper Grouper Amendment 16 required the use of dehooking devices, which could help reduce bycatch of vermilion snapper, black sea bass, gag, red grouper, black grouper, and red snapper. Dehooking devices can allow fishermen to remove hooks with greater ease and more quickly from snapper grouper species without removing the fish from the water. If a fish does need to be removed from the water, dehookers could still reduce handling time in removing hooks, thus increasing survival (Cooke et al. 2001). Furthermore, Snapper Grouper Amendment 17A required circle hooks for snapper-grouper species north of 28 degrees latitude, which is expected to reduce bycatch mortality of snapper grouper species.

Actions were taken in the Golden Crab FMP to reduce bycatch including a requirement for at least two escape gaps, degradable escape panels in traps, and a requirement that traps be tended. It is presumed that crabs survive the trauma of capture and regulations specify that females be released. Only 0.5% of the catch can include females.

1.2 Ecological Effects Due to Changes in the Bycatch

The ecological effects of bycatch mortality are the same as fishing mortality from directed fishing efforts. If not properly managed and accounted for, either form of mortality could potentially reduce stock biomass to an unsustainable level.

Overall fishing effort could decrease in the commercial and recreational sectors in response to more restrictive ACLs; thereby, reducing the potential for bycatch. Many of the species in the snapper grouper fishery management unit have spatial and temporal coincidence and the benefits could be shared among them.

Data from North Carolina presented to the Council indicated fishermen with snapper grouper permits also fish in the nearshore gillnet fisheries. Fishermen with snapper grouper permits in other areas also participate in various state fisheries. It is expected that if efforts shift to these fisheries, there could be impacts to protected species. Current monitoring programs will allow NOAA Fisheries Service to track and evaluate any increased risk to protected species. If necessary, an Endangered Species Act (ESA) consultation can be re-initiated to address any increased levels of risk to ESA-listed species.

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

Management measures proposed in the Comprehensive ACL Amendment are intended to prevent overfishing from occurring for species in Snapper Grouper, Dolphin Wahoo, Golden Crab, and *Sargassum* FMPs. More restrictive management measures proposed in the Comprehensive ACL Amendment could result in an effort shift to other species and fisheries causing a change in the magnitude of harvest and number of discards in those fisheries. Reduced fishing pressure on species in this amendment would be expected to result in an increase in the mean size and age of species. In addition, biomass and the percentage of males for grouper species would be expected to increase. The relative abundance, size structure, and age structure of other species in other communities could be expected to change in response to reduced fishing pressure on species in the Comprehensive ACL Amendment as well as potential shifts in effort. Thus, ecological changes could occur in the community structure of reef ecosystems through the proposed actions. These ecological changes could affect the nature and magnitude of bycatch over time.

1.4 Effects on Marine Mammals and Birds

Under Section 118 of the Marine Mammal Protection Act (MMPA), NMFS must publish, at least annually, a List of Fisheries (LOF) that places all U.S. commercial fisheries into one of three categories based on the level of incidental serious injury and mortality of marine mammals that occurs in each fishery. Of the gear utilized within the snapper grouper fishery, only the black sea bass pot is considered to pose an entanglement risk to marine mammals. The southeast U.S. Atlantic black sea bass pot fishery is included in the grouping of the Atlantic mixed species trap/pot fisheries, which the 2010 proposed List of Fisheries classifies as a Category II (74 FR 27739; June 11, 2009). Gear types used in these fisheries are determined to have occasional incidental mortality and serious injury of marine mammals. For the snapper grouper fishery, the

best available data on protected species interactions are from the Southeast Fisheries Science Center (SEFSC) Supplementary Discard Data Program (SDDP) initiated in July of 2001 and sub-samples 20% of the vessels with an active permit. Since August 2001, only three interactions with marine mammals have been documented; each was taken by handline gear and each released alive (McCarthy SEFSC database). The bottom longline/hook-and-line component of the South Atlantic snapper grouper fishery remains a Category III under the LOF.

Although the black sea bass pot fishery can pose an entanglement risk to large whales due to their distribution and occurrence, sperm, fin, sei, and blue whales are unlikely to overlap with the black sea bass pot fishery operated within the snapper grouper fishery since it is executed primarily off North Carolina and South Carolina in waters ranging from 70-120 feet deep (21.3-36.6 meters). There are no known interactions between the black sea bass pot fishery and large whales. NOAA Fisheries Service's biological opinion on the continued operation of the South Atlantic snapper grouper fishery determined the possible adverse effects resulting from the fishery are extremely unlikely. Thus, the continued operation of the snapper grouper fishery in the southeast U.S. Atlantic EEZ is not likely to adversely affect sperm, fin, sei, and blue whales (NMFS 2006).

North Atlantic right and humpback whales may overlap both spatially and temporally with the black sea bass pot fishery. Recent revisions to the Atlantic Large Whale Take Reduction Plan have folded the Atlantic mixed species trap/pot fisheries into the plan (72 FR 193; October 5, 2007). The new requirements will help further reduce the likelihood of North Atlantic right and humpback whale entanglement in black sea bass pot gear.

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

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

Observer data and vessel logbooks indicate that pelagic longline fishing for Atlantic swordfish and tunas results in catch of non-target finfish species such as bluefin tuna, billfish, and undersized swordfish, and of protected species, including threatened and endangered sea turtles. Also, this fishing gear incidentally hooks marine mammals and sea birds during tuna and swordfish operations. Appendix C of the Dolphin Wahoo FMP (FSEIS for HMS Regulatory Amendment 1) contains data on dolphin wahoo pelagic longline fishery analysis. The data presented on page C-66 and in Table C-4 indicate that pelagic longlines targeting dolphin do result in a bycatch of HMS species. Implementation of regulations Dolphin Wahoo FMP

addressed the Magnuson-Stevens Act requirements to reduce bycatch and the mortality of bycatch. Further, the establishment of fixed commercial ACLs for dolphin and wahoo in this amendment could reduce or cap bycatch mortality.

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

Actions in the Comprehensive ACL Amendment would be expected to affect the cost of fishing operations. It is likely that all four states (NC, SC, GA & FL) would be affected by the regulations (closures, ACLs, etc.) and the variety/number of species included in this amendment. Additionally, factors such as waterfront property values, availability of less expensive imports, etc. may affect economic decisions made by recreational and commercial fishermen. Amendment 18A (under development) proposes to enhance current data collection programs. This might provide more insight in calculating the changes in fishing, processing, disposal and marketing costs.

1.6 Changes in Fishing Practices and Behavior of Fishermen

Actions proposed in the Comprehensive ACL Amendment could result in a modification of fishing practices by commercial and recreational fishermen, thereby affecting the magnitude of discards. Furthermore, reductions in the season lengths, new or reduced ACLs could cause some commercial and recreational fishermen to reduce effort. However, it is difficult to quantify any of the measures in terms of reducing discards until the magnitude of bycatch has been monitored over several years.

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

Research and monitoring is needed to understand the effectiveness of proposed management measure in reducing bycatch. Additional work is needed to determine the effectiveness of measures in the Comprehensive ACL Amendment, recently implemented amendments, and by future actions being proposed by the Council to reduce bycatch. Amendment 18A is being developed, which proposes to enhance current data collection programs. Some observer information has recently been provided by MARFIN and Cooperative Research Programs but more is needed. Approximately 20% of commercial fishermen are asked to fill out discard information in logbooks; however, a greater percentage of fishermen could be selected with emphasis on individuals that dominate landings. The use of electronic logbooks could be enhanced to enable fishery managers to obtain information on species composition, size distribution, geographic range, disposition, and depth of fishes that are released. Additional administrative and enforcement efforts will be needed to implement and enforce these regulations. NOAA Fisheries Service established the South East Fishery-Independent Survey in 2010 to strengthen fishery-independent sampling efforts in southeast US waters, addressing both immediate (e.g., red snapper) and long-term fishery-independent data needs, with an overarching goal of improving fishery-independent data utility for stock assessments. Meeting these data

needs is critical to improving scientific advice to the management process, ensuring overfishing does not occur, and successfully rebuilding overfished stocks on schedule.

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

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

1.9 Changes in the Distribution of Benefits and Costs

Attempts were made to ensure ACLs are based on the proportion of historical catches in the commercial and recreational sectors. The extent to which new ACLs and AMs will increase or decrease the magnitudes of discards is unknown. Reduced catches associated with ACLs and reductions in the length of fishing seasons as an AM, should the ACL be exceeded, are likely to provide substantial decreases in bycatch. Some measures specified in Snapper Grouper Amendments 16 and 17A, such as the requirement for dehooking devices, requirement for circle hooks north of 28 degrees latitude, a recreational/commercial seasonal closure for gag, reduction of recreational bag limits, and closing all shallow water groupers when a gag quota is met or during a gag seasonal closure could help to reduce bycatch. It is likely that some ACLs could increase the number of discards. However, this depends on if fishermen shift effort to other species, seasons, or fisheries and if effort decreases in response to more restrictive management measures as well as changes in community structure and age/size structures that could result from ending overfishing.

1.10 Social Effects

The social effects of all the management measure, including those most likely to reduce bycatch, are described in **Section 4**.

1.11 Conclusion

This section evaluates the practicability of taking additional action to minimize bycatch and bycatch mortality using the ten factors provided at 50 CFR 600.350(d)(3)(i). In summary, ACLs and AMs proposed in the Comprehensive ACL Amendment could provide substantial decreases in bycatch of species if there are reductions in effort and species groups containing co-occurring species are closed when AMs are triggered. The requirements of dehooking devices, circle hooks, a recreational/commercial seasonal closure for gag, reduction of recreational bag limits, and closing all shallow water groupers when a gag quota is met or during a gag seasonal closure specified in previous amendments could also help to reduce bycatch. It is likely that ACLs could increase the number of discards. However, this depends on if fishermen shift effort to other species, seasons, or fisheries and if effort decreases in response to more restrictive management measures as well as changes in community structure and age/size structures that could result from ending overfishing. Furthermore, overall fishing effort could decrease in the commercial

and recreational sectors in response to more restrictive management measures, thereby reducing the potential for bycatch.

Reduced fishing pressure on species in Comprehensive ACL Amendment would be expected to result in an increase in the mean size/age of affected species. In addition, an increase would be expected in the percentage of male groupers and population biomass. Overlapping closures for co-occurring could be expected to reduce bycatch and fishing mortality. The relative abundance, size structure, and age structure of other communities could be expected to change in response to reduced fishing pressure as well as potential shifts in effort. Thus, ecological changes could occur in the community structure of reef ecosystems through actions that would end overfishing. These ecological changes could affect the nature and magnitude of bycatch over time.

Appendix I. Other Applicable Law

1. Other Applicable Law

1.1. Administrative Procedure Act

All federal rulemaking is governed under the provisions of the Administrative Procedure Act (APA) (5 U.S.C. Subchapter II), which establishes a "notice and comment" procedure to enable public participation in the rulemaking process. Under the APA, NOAA Fisheries Service is required to publish notification of proposed rules in the Federal Register and to solicit, consider, and respond to public comment on those rules before they are finalized. The APA also establishes a 30-day waiting period from the time a final rule is published until it takes effect. The Council has chosen a requirement for circle hooks in Amendment 17A. This requirement would not be effective until 90 days after the final rule publishes in order to allow fishermen to obtain the necessary gear.

1.2. Coastal Zone Management Act

Section 307(c)(1) of the federal Coastal Zone Management Act (CZMA) of 1972 requires that all federal activities that directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable. While it is the goal of the Council to have management measures that complement those of the states, federal and state administrative procedures vary and regulatory changes are unlikely to be fully instituted at the same time. Based on the analysis of the environmental consequences of the proposed action in Section 4.0, the Council has concluded this amendment would improve federal management of snapper grouper species.

1.3. Endangered Species Act

The Endangered Species Act (ESA) of 1973 (16 U.S.C. Section 1531 et seq.) requires that federal agencies ensure actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered species or the habitat designated as critical to their survival and recovery. The ESA requires NOAA Fisheries Service to consult with the appropriate administrative agency (itself for most marine species and the U.S. Fish and Wildlife Service for all remaining species) when proposing an action that may affect threatened or endangered species or adversely modify critical habitat. Consultations are necessary to determine the potential impacts of the proposed action. They are concluded informally when proposed actions may affect but are "not likely to adversely affect" threatened or endangered species or designated critical habitat. Formal consultations, resulting in a biological opinion, are required when proposed actions may affect and are "likely to adversely affect" threatened or endangered species or adversely modify designated critical habitat.

Snapper Grouper Fishery

On June 7, 2006, a formal consultation and associated biological opinion on the continued authorization of the South Atlantic snapper-grouper fishery on sea turtles and smalltooth sawfish was completed. The opinion concluded the continued authorization of the fishery would not affect ESA-listed marine mammals and is not likely to jeopardize

the continued existence of any other ESA-listed species. An incidental take statement authorizing a limited number of sea turtle and smalltooth sawfish incidental captures was issued for the fishery. Subsequent to the 2006 biological opinion, two species of coral (*Acropora cervicornis* and *Acropora palmata*) were listed as threatened and critical habitat for these species was designated. In a consultation memorandum dated July 9, 2007, NOAA Fisheries Service concluded the continued authorization of the South Atlantic snapper-grouper fishery, is not likely to adversely affect these *Acropora* species. In a consultation memorandum dated December 2, 2008, NOAA Fisheries Service concluded the continued authorization of the snapper-grouper fishery is not likely to adversely affect designated *Acropora* critical habitat.

Dolphin Wahoo Fishery

On August 27, 2003, formal consultation was completed on the continued authorization of the Atlantic dolphin-wahoo fishery (NMFS 2003a). The biological opinion concluded the fishery would not affect ESA-listed marine mammals or smalltooth sawfish, and is not likely to jeopardize the continued existence of any listed sea turtle species. An incidental take statement authorizing a limited number of incidental sea turtle captures was issued for the fishery. Subsequent to the 2003 biological opinion, two species of coral (*Acropora cervicornis* and *Acropora palmata*) were listed as threatened and critical habitat for these species was designated. In a consultation memorandum dated May 18, 2010, NOAA Fisheries Service concluded the continued authorization of the dolphin-wahoo fishery is not likely to adversely affect these *Acropora* species or their designated critical habitat.

Sargassum Fishery

On March 31, 2003, formal consultation was completed on the continued authorization of pelagic *Sargassum* harvest (NMFS 2003b). The biological opinion concluded the continued harvest of *Sargassum* would not affect ESA-listed marine mammals. The opinion also concluded that interactions between the fishery and sea turtles hatchlings and pelagic immature sea turtles were likely, but those interactions were not likely to jeopardize the continued existence of any listed sea turtle species. The opinion authorized the incidental take of a small number neonatal or pelagic-immature green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles over consecutive 5-year periods.

Golden Crab Fishery

Informal consultations on the golden crab fishery were conducted on April 28, 1989, November 14, 1995, and February 22, 2000. These consultations concluded that the management actions in the FMP were not likely to adversely affect listed species. Since the completion of those consultations the smalltooth sawfish and two species of *Acropora* coral have been listed and critical habitat has been designated for *Acropora*. In a May 18, 2010, consultation memorandum NOAA Fisheries Service determined the continued authorization of the fishery was still not likely to adversely affect ESA-listed sea turtles and marine mammals. That memorandum also determined that because the fishery operates at depths beyond those inhabited by smalltooth sawfish and the two *Acropora* species it was unlikely to adversely affect these species.

1.4. Executive Order 12612: Federalism

E.O. 12612 requires agencies to be guided by the fundamental federalism principles when formulating and implementing policies that have federalism implications. The purpose of the Order is to guarantee the division of governmental responsibilities between the federal government and the states, as intended by the framers of the Constitution. No federalism issues have been identified relative to the actions proposed in this amendment and associated regulations. The affected states have been closely involved in developing the proposed management measures and the principal state officials responsible for fisheries management in their respective states have not expressed federalism related opposition to the proposed action.

1.5 Executive Order 12866: Regulatory Planning and Review

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

1.6 Executive Order 12898: Environmental Justice

This Executive Order mandates that each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions. Federal agency responsibilities under this Executive Order include conducting their programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons from participation in, denying persons the benefit of, or subjecting persons to discrimination under, such programs policies, and activities, because of their race, color, or national origin. Furthermore, each federal agency responsibility set forth under this Executive Order shall apply equally to Native American programs.

Specifically, federal agencies shall, to the maximum extent practicable; conduct human health and environmental research and analysis; collect human health and environmental data; collect, maintain and analyze information on the consumption patterns of those who principally rely on fish and/or wildlife for subsistence; allow for public participation and access to information relating to the incorporation of environmental justice principals in

federal agency programs or policies; and share information and eliminate unnecessary duplication of efforts through the use of existing data systems and cooperative agreements among Federal agencies and with State, local, and tribal governments.
The Council conducted a series of scoping meetings for this amendment in which the public was invited to provide input on actions contained therein. A summary of the scoping meetings can be found in Appendix L of this document. Comments received were considered during the development of Amendment 17A, and no environmental justice issues were raised during the scoping process. No Native American programs would be affected by actions contained within this amendment; therefore, no tribal consultation has been initiated.

Section 3.8 describes several areas in North Carolina, South Carolina, Georgia, and Florida where South Atlantic snapper grouper fisheries have a local presence. These communities were identified as key communities involved in the South Atlantic snapper grouper fishery based on fishing permit and employment data. The demographic information reported for these communities were derived from census data. Although the Census Bureau does not supply race or income data at the community level, such data are available for each county in which the fishing communities exist. Based on 2005 Census data, none of the counties within which any of the subject fishing communities is located has a disproportionately high poverty rate[1], or minority population[2]. The proposed actions would be applied to all participants in the fishery, regardless of their race, color, national origin, or income level, and as a result are not expected to result in adverse or disproportionate environmental or public health impacts. Comments received during scoping did not indicate proposed actions are expected to affect any existing subsistence consumption patterns. Therefore, no environmental justice issues are anticipated and no modifications to any proposed actions have been made to address environmental justice issues.

1.7 Executive Order 12962: Recreational Fisheries

E.O. 12962 requires federal agencies, in cooperation with states and tribes, to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities through a variety of methods including, but not limited to, developing joint partnerships; promoting the restoration of recreational fishing areas that are limited by water quality and habitat degradation; fostering sound aquatic conservation and restoration endeavors; and evaluating the effects of federally funded, permitted, or authorized actions on aquatic systems and recreational fisheries,

---

[1] Following the Office of Management and Budget's (OMB) Statistical Policy Directive 14 if a family's total income is less than the family's threshold, then that family and every individual in it is considered in poverty. The official poverty definition uses money income before taxes and does not include capital gains or noncash benefits (such as public housing, Medicaid, and food stamps) (U.S. Census, 2008).

[2] A minority population is one either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis (U.S. Census, 2008).

and documenting those effects. Additionally, the order establishes a seven member National Recreational Fisheries Coordination Council responsible for, among other things, ensuring that social and economic values of healthy aquatic systems that support recreational fisheries are considered by federal agencies in the course of their actions, sharing the latest resource information and management technologies, and reducing duplicative and cost-inefficient programs among Federal agencies involved in conserving or managing recreational fisheries. The Council also is responsible for developing, in cooperation with federal agencies, states and tribes, a Recreational Fishery Resource Conservation Plan - to include a five-year agenda.

APPENDIX J. National Standard 1 Guidelines

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 600

[Docket No. 070717348–81398–03]

RIN 0648–AV60

Magnuson-Stevens Act Provisions; Annual Catch Limits; National Standard Guidelines

AGENCY: National Marine Fisheries Service (NMFS); National Oceanic and Atmospheric Administration (NOAA); Commerce.

ACTION: Final rule.

SUMMARY: This final action amends the guidelines for National Standard 1 (NS1) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA). This action is necessary to provide guidance on how to comply with new annual catch limit (ACL) and accountability measure (AM) requirements for ending overfishing of fisheries managed by Federal fishery management plans (FMPs). It also clarifies the relationship between ACLs, acceptable biological catch (ABC), maximum sustainable yield (MSY), optimum yield (OY), and other applicable reference points. This action is necessary to facilitate compliance with requirements of the Magnuson-Stevens Act to end and prevent overfishing, rebuild overfished stocks and achieve OY.

DATES: Effective February 17, 2009.

ADDRESSES: Copies of the Regulatory Impact Review (RIR)/Regulatory Flexibility Act Analysis (RFAA) can be obtained from Mark R. Millikin, National Marine Fisheries Service, 1315-East-West Highway, Room 13357, Silver Spring, Maryland 20910. The RIR/RFAA document is also available via the internet at *http://www.nmfs.noaa.gov/msa2007/catchlimits.htm*. Public comments that were received can be viewed at the Federal e-Rulemaking portal: *http://www.regulations.gov.*

FOR FURTHER INFORMATION CONTACT: Mark R. Millikin by phone at 301–713–2341, by FAX at 301–713–1193, or by *e-mail: Mark.Millikin@noaa.gov.*

SUPPLEMENTARY INFORMATION:

Table of Contents

I. Overview of Revisions to the NS1 Guidelines
II. Major Components of the Proposed Action
III. Major Changes Made in the Final Action
IV. Overview of the Major Aspects of the Final Action
A. Stocks in the Fishery and Ecosystem Component Species
B. Definition Framework for OFL, ABC, and ACL
C. Accountability Measures (AMs)
D. SSC Recommendations and Process
E. Management Uncertainty and Scientific Uncertainty
V. Response to Comments
VI. Changes from Proposed Action
VII. References Cited
VIII. Classification

I. Overview of Revisions to the NS1 Guidelines

The MSA serves as the chief authority for fisheries management in the U.S. Exclusive Economic Zone (EEZ). The Act provides for ten national standards (NS) for fishery conservation and management, and requires that the Secretary establish advisory guidelines based on the NS to assist in the development of fishery management plans. Guidelines for the NS are codified in subpart D of 50 CFR part 600. NS1 requires that conservation and management measures ''shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.''

The Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (MSRA) amended the MSA to include new requirements for annual catch limits (ACLs) and accountability measures (AMs) and other provisions regarding preventing and ending overfishing and rebuilding fisheries. To incorporate these new requirements into current NS1 guidance, NMFS initiated a revision of the NS1 guidelines in 50 CFR 600.310. NMFS published a notice of intent (NOI) to prepare an environmental impact statement (EIS) and commenced a scoping period for this action on February 14, 2007 (72 FR 7016), and proposed NS1 guidelines revisions on June 9, 2008 (73 FR 32526). Further background is provided in the above-referenced **Federal Register** documents and is not repeated here. The proposed guidelines provided a description of the reasons that overfishing is still occurring and the categories of reasons for overfishing likely to be addressed by new MSA requirements combined with the NS1 guidelines. The September 30, 2008 NMFS Quarterly Report on the Status of U.S. Fisheries indicates that 41 stocks managed under Federal FMPs are undergoing overfishing.

NMFS solicited public comment on the proposed NS1 guidelines revisions through September 22, 2008, and during that time, held three public meetings, on July 10, 2008 (Silver Spring, Maryland), July 14, 2008 (Tampa, Florida), and July 24, 2008 (Seattle, Washington), and made presentations on the proposed revisions to each of the eight Regional Fishery Management Councils (Councils). NMFS received over 158,000 comments on all aspects of the proposed NS1 guidelines revisions. Many of the comment letters were form letters or variations on a form letter. In general, the environmental community supported the provisions in the proposed action but commented that they needed to be strengthened in the final action. Alternatively, comments from the fishing industry and some of the Councils said the proposed revisions were confusing, too proscriptive or strict, and lacked sufficient flexibility.

II. Major Components of the Proposed Action

Some of the major items covered in the proposed NS1 guidelines were: (1) A description of the relationship between MSY, OY, overfishing limits (OFL), ABC, ACLs, and annual catch targets (ACT); (2) guidance on how to combine the use of ACLs and AMs for a stock to prevent overfishing when possible, and adjust ACLs and AMs, if an ACL is exceeded; (3) statutory exceptions to requirements for ACLs and AMs and flexibility in application of NS1 guidelines; (4) ''stocks in the fishery'' and ''ecosystem component species'' classifications; (5) replacement of MSY control rules with ABC control rules and replacement of OY control rules with ACT control rules; (6) new requirements for scientific and statistical committees (SSC); (7) explanation of the timeline to prepare new rebuilding plans; (8) revised guidance on how to establish rebuilding time targets; (9) advice on action to take at the end of a rebuilding period if a stock is not yet rebuilt; and (10) exceptions to the requirements to prevent overfishing.

III. Major Changes Made in the Final Action

The main substantive change in the final action pertains to ACTs. NMFS proposed ACT as a required reference point that needed to be included in FMPs. The final action retains the concept of an ACT and an ACT control rule, but does not require them to be included in FMPs. After taking public comment into consideration, NMFS has decided that ACTs are better addressed as AMs. The final guidelines provide that: ''For fisheries without inseason management control to prevent the ACL from being exceeded, AMs should utilize ACTs that are set below ACLs so that catches do not exceed the ACL.''

In response to public comment, this final action also clarifies text on ecosystem component species, OFL, OY specification, ABC control rule and specification, SSC recommendations, the setting of ACLs, sector-ACLs, and AMs, and makes minor clarifications to other text. Apart from these clarifications, the final action retains the same approaches described in the proposed guidelines with regard to: (1) Guidance on how to combine the use of ACLs and AMs for a stock to prevent overfishing when possible, and adjust ACLs and AMs, if an ACL is exceeded; (2) statutory exceptions to requirements for ACLs and AMs and flexibility in application of NS1 guidelines; (3) ''stocks in the fishery'' and ''ecosystem component species'' classifications; (4) new requirements for SSCs; (5) the timeline to prepare new rebuilding plans; (6) rebuilding time targets; (7) advice on action to take at the end of a rebuilding period if a stock is not yet rebuilt; and (8) exceptions to the requirements to prevent overfishing. Further explanation of why changes were or were not made is provided in the ''Response to Comments'' section below. Detail on changes made in the codified text is provided in the ''Changes from Proposed Action'' section.

IV. Overview of the Major Aspects of the Final Action

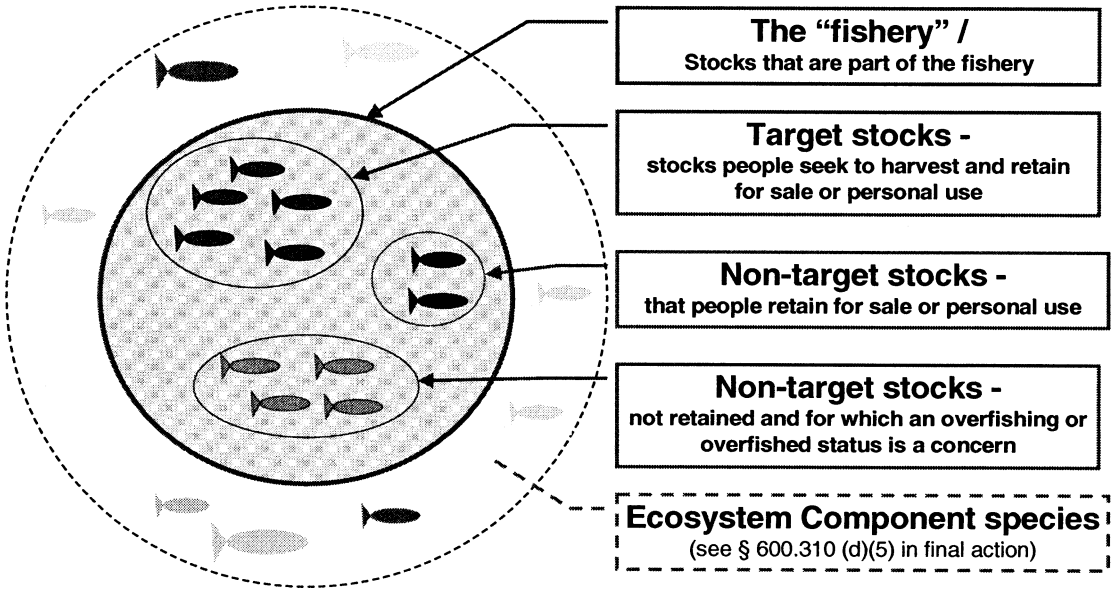
A. Stocks in the Fishery and Ecosystem Component Species

The proposed NS1 guidelines included suggested classifications of ''stocks in the fishery'' and ''ecosystem component (EC) species.'' *See* Figure 1 for diagram of classifications. Public comments reflected confusion about this proposal, so NMFS has clarified its general intent with regard to these classifications. More detailed responses to comments on this issue are provided later in this document.

The classifications in the NS1 guidelines are intended to reflect how FMPs have described ''fisheries,'' and to provide a helpful framework for thinking about how FMPs have incorporated and may continue to incorporate ecosystem considerations. To that end, the proposed NS1 guidelines attempted to describe the fact that FMPs typically include certain target species, and sometimes certain non-target species, that the Councils and/or the Secretary believed required conservation and management. In some FMPs, Councils have taken a broader approach and included hundreds of species, many of which may or may not require conservation and management but could be relevant in trying to further ecosystem management in the fishery.

NMFS wants to encourage ecosystem approaches to management, thus it proposed the EC species as a possible classification a Council or the Secretary could—but is not required to—consider. The final NS1 guidelines do not require a Council or the Secretary to include all target and non-target species as ''stocks in the fishery,'' do not mandate use of the EC species category, and do not require inclusion of particular species in an FMP. The decision of whether conservation and management is needed for a fishery and how that fishery should be defined remains within the authority and discretion of the relevant Council or the Secretary, as appropriate. NMFS presumes that stocks or stock complexes currently listed in an FMP are ''stocks in the fishery,'' unless the FMP is amended to explicitly indicate that the EC species category is being used. ''Stocks in the fishery'' need status determination criteria, other reference points, ACL mechanisms and AMs; EC species would not need them. NMFS recognizes the confusion caused by wording in the proposed action and has revised the final action to be more clear on these points.

Figure 1. General Framework for "Stocks in the Fishery" versus "Ecosystem Component Species." This figure describes the kind of stocks or stock complexes that might fall into the two classifications, but should not be viewed as requiring FMPs to include specific stocks or stock complexes in either category.

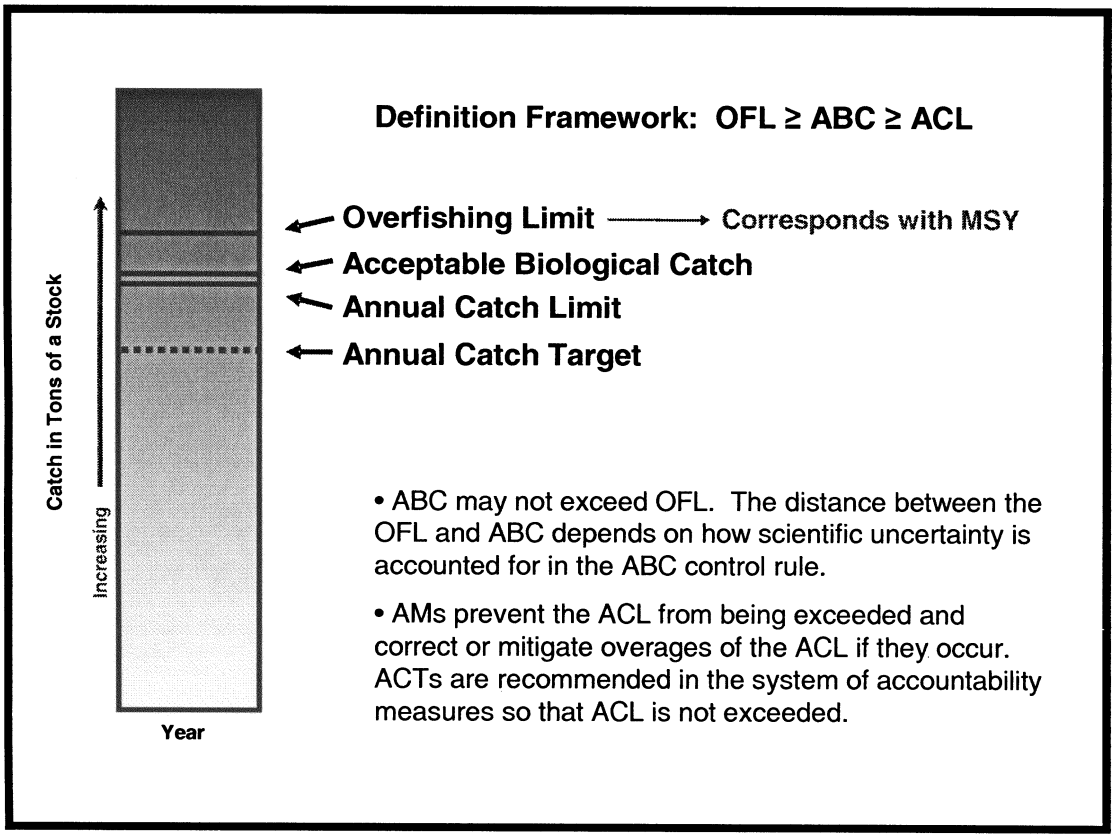


B. Definition Framework for OFL, ABC, and ACL

The MSRA does not define ACLs, AMs, and ABC, so NMFS proposed definitions for these terms in the proposed action. NMFS also proposed definitions for the terms OFL and ACT because it felt that they would be useful tools in helping ensure that ACLs are not exceeded and overfishing does not occur. The proposed NS1 guidelines described the relationship between the terms as: OFL ≥ ABC ≥ ACL ≥ ACT. In response to public comment, the final action revises the definition framework as: OFL ≥ ABC ≥ ACL. As described above, NMFS has retained ACT and the ACT control rule in the NS1 guidelines, but believes that they are more appropriate as AMs. NMFS believes ACTs could prove useful as management tools in fisheries with poor management control over catch (i.e., that frequently exceed catch targets).

NMFS received many comments on the definition framework, and some commenters stated that it should be revised as: OFL > ABC > ACL. Having considered public comment and reconsidered this issue, NMFS has decided to keep the framework as: OFL ≥ ABC ≥ ACL. However, NMFS believes there are few fisheries where setting OFL, ABC, and ACL all equal to each other would be appropriate. While the final action allows ABC to equal OFL, NMFS expects that in most cases ABC will be reduced from OFL to reduce the probability that overfishing might occur in a year. NMFS has added a provision to the final NS1 guidelines stating that, if a Council recommends an ACL which equals ABC, and the ABC is equal to OFL, the Secretary may presume that the proposal would not prevent overfishing, in the absence of sufficient analysis and justification for the approach. See figure 2 for an illustration of the relationship between OFL, ABC, ACL and ACT. Further detail on the definition framework and associated issues is provided in the ''Response to Comments'' section below.

Figure 2: Relationship between OFL, ABC, ACL and ACT



C. Accountability Measures (AMs)

Another major aspect of the revised NS1 guidelines is the inclusion of guidance on AMs. AMs are management controls to prevent ACLs, including sector-ACLs, from being exceeded, and to correct or mitigate overages of the ACL if they occur. NMFS has identified two categories of AMs, inseason AMs and AMs for when the ACL is exceeded. As described above, ACTs are recommended in the system of AMs so that ACLs are not exceeded. As a performance standard, if catch exceeds the ACL for a given stock or stock complex more than once in the last four years, the system of ACLs and AMs should be re-evaluated, and modified if necessary, to improve its performance and effectiveness.

D. SSC Recommendations and Process

Section 302(h)(6) of the MSA provides that each Council is required to ''develop annual catch limits for each of its managed fisheries that may not exceed the fishing level recommendations of its scientific and statistical committee or the peer review process established under subsection (g).'' MSA did not define ''fishing level recommendations,'' but in section 302(g)(1)(B), stated that an SSC shall provide ''recommendations for acceptable biological catch, preventing overfishing, maximum sustainable yield, and achieving rebuilding targets,'' and other scientific advice.

NMFS received a variety of public comments regarding interpretation of ''fishing level recommendations.'' Some commenters felt that the SSC's ''fishing level recommendations'' that should constrain ACLs is the overfishing limit (OFL); other commenters stated that ''fishing level recommendations'' should be equated with MSY. NMFS does not believe that MSA requires ''fishing level recommendations'' to be equated to the OFL or MSY. As described above, the MSA specifies a number of things that SSCs recommend to their Councils. Of all of these things, ABC is the most directly relevant to ACL, as both ABC and ACL are levels of annual catch.

The preamble to the proposed NS1 guidelines recommended that the Councils could establish a process in their Statement of Organization, Practices and Procedures (SOPPs) for: establishing an ABC control rule, applying the ABC control rule (i.e., calculating the ABC), and reviewing the resulting ABC. NMFS believes that this may have caused confusion and that some commenters misunderstood the intent of this recommendation. NMFS received comment regarding inclusion of the ABC control rule in the SOPPs, and wants to clarify that the actual ABC control rule should be described in the FMP. NMFS believes it is important to understand how the Councils, SSC, and optional peer review process work together to implement the provisions of the MSA and therefore recommends that the description of the roles and responsibilities of the Council, SSC, and optional peer review process be included in the SOPPs, FMP, or some other public document. The SSC recommends the ABC to the Council whether or not a peer review process is utilized.

E. Management Uncertainty and Scientific Uncertainty

A major aspect of the revised NS1 guidelines is the concept of incorporating management and scientific uncertainty in using ACLs and AMs. Management uncertainty occurs because of the lack of sufficient information about catch (*e.g.*, late reporting, underreporting and misreporting of landings or bycatch). Recreational fisheries generally have late reporting because of the method of surveying catches and the lack of an ability for managers to interview only marine recreational anglers. NMFS is addressing management uncertainty in the recreational fishery by implementing a national registry of recreational fishers in the Exclusive Economic Zone (EEZ) (see proposed rule published in the **Federal Register** (73 FR 33381, June 12, 2008)) and a Marine Recreational Implementation Program that will, in part, revise the sampling design of NMFS's marine recreational survey for fishing activity.

Management uncertainty also exists because of the lack of management precision in many fisheries due to lack of inseason fisheries landings data, lack of inseason closure authority, or the lack of sufficient inseason management in some FMPs when inseason fisheries data are available. The final NS1 guidelines revisions provide that FMPs should contain inseason closure authority that gives NMFS the ability to close fisheries if it determines, based on data that it deems sufficiently reliable, that an ACL has been exceeded or is projected to be reached, and that closure of a fishery is necessary to prevent overfishing. NMFS believes that such closure authority will enhance efforts to prevent overfishing. Councils can derive some idea of their overall extent of management uncertainty by comparing past actual catches to target catches to evaluate the magnitude and frequency of differences between actual catch and target catch, and how often actual catch exceeded the overfishing limit for a stock.

Scientific uncertainty includes uncertainty around the estimate of a stock's biomass and its maximum fishing mortality threshold (MFMT); therefore, any estimate of OFL has uncertainty. Stock assessment models have various sources of scientific uncertainty associated with them and many assessments have shown a repeating pattern that the previous assessment overestimated near-future biomass, and underestimated near-future fishing mortality rates (i.e., called retrospective patterns).

V. Response to Comments

NMFS received many comments about the proposed definition framework (OFL ≥ ABC ≥ ACL ≥ ACT), especially regarding the ACT and ACT control rule. Some commenters suggested that the ACT and ACT control rule should not be required, while others supported their use. NMFS also received comments expressing: That the proposed terminology should not be required; OFL should always be greater than ABC; and concern that too many factors (i.e., management and scientific uncertainty, and ACT) will reduce future target catches unnecessarily. Some commenters felt additional emphasis should be placed on T_{min} in the rebuilding provisions. Councils, for the most part, are very concerned about the challenge of implementing ACLs and AMs by 2010, and 2011, as required. Some commenters felt the international fisheries exception to ACLs is too broad. Several commenters stated that an EIS should have been or should be prepared and two commenters stated an Initial Regulatory Flexibility Analysis under the Regulatory Flexibility Act should be prepared. NMFS also received many comments regarding the mixed-stock exception.

NMFS received many comments expressing support for the proposed revisions to the Magnuson-Stevens Act National Standard 1 guidelines. Comments included: This good faith effort to implement Congress' intent will work to end overfishing and protect the marine ecosystem; these guidelines reduce the risk of overfishing and will work to rebuild depleted stocks through the use of science based annual catch limits, accountability measures, 'buffers' for scientific and management uncertainty, and protections for weak fish stocks; and this solid framework will ensure not only healthy stocks but healthy fisheries.

Comment 1: Several comments were received regarding NMFS's decision to not prepare an environmental impact statement or environmental assessment for this action. Some supported the decision, while others opposed it and believed that a categorical exclusion under the National Environmental Policy Act (NEPA) is not appropriate.

Response: NMFS believes a categorical exclusion is appropriate for this action. Under §§ 5.05 and 6.03c.3(i) of NOAA's Administrative Order (NAO) 216–6, the following types of actions may be categorically excluded from the requirement to prepare an EA or EIS: ''* * * policy directives, regulations and guidelines of an administrative, financial, legal, technical or procedural nature, or the environmental effects of which are too broad, speculative or conjectural to lend themselves to meaningful analysis and will be subject later to the NEPA process, either collectively or case-by-case. * * *''

In this instance, a Categorical Exclusion is appropriate for this action, because NMFS cannot meaningfully analyze potential environmental, economic, and social impacts at this stage. This action revises NS1 guidelines, which are advisory only; MSA provides that NS guidelines ''shall not have the force and effect of law.'' MSA section 301(b). *See Tutein* v. *Daley*, 43 F. Supp.2d 113, 121–122 (D. Mass. 1999) (reaffirming that the guidelines are only advisory and holding that the national standards are not subject to judicial review under the

MSA). The NS1 guidelines are intended to provide broad guidance on how to comply with new statutory requirements. While the guidelines explain in detail how different concepts, such as ACL, ABC, MSY, and OY, should be addressed, the guidelines do not mandate specific management measures for any fishery. It is not clear what Councils will or will not do in response to the NS1 guidelines. Thus, it is not possible to predict any concrete impacts on the human environment without the necessary intervening actions of the Councils, e.g., consideration of best available scientific information and development of specific conservation and management measures that may be needed based on that information. Any analysis of potential impacts would be speculative at best.

None of the exceptions for Categorical Exclusions provided by § 5.05c of NAO 216–6 apply. While there is controversy concerning the NS1 guidelines revisions, the controversy is primarily related to different views on how new MSA requirements should be interpreted, rather than potential environmental consequences. The NS1 guidelines would not, in themselves, have uncertain environmental impacts, unique or unknown risks, or cumulatively significant or adverse effects upon endangered or threatened species or their habitats. Moreover, this action would not establish a precedent or decision in principle about future proposals. As noted above, the guidelines provide broad guidance on how to address statutory requirements but do not mandate specific management actions.

Comment 2: One commenter criticized NMFS' approach as placing unnecessary burden on the Councils to conduct the NEPA analysis.

Response: No change was made. One of the Councils' roles is to develop conservation and management measures that are necessary and appropriate for management of fisheries under their authority. NMFS believes that Councils should continue to have the discretion to determine what measures may be needed in each fishery and what alternatives should be considered and analyzed as part of the fishery management planning process. Councils routinely incorporate NEPA into this process, and the actions to implement ACLs in specific fisheries must address the NEPA requirements, regardless of the level of analysis conducted for the guidelines. Therefore, having reviewed the issue again, NMFS continues to find that a categorical exclusion is appropriate for this action.

Comment 3: Two commenters stated that NMFS should have prepared an initial regulatory flexibility analysis under the RFA for this action. They said it was not appropriate to certify under the RFA because in their opinion, this action will have significant economic impacts on a substantial number of small entities.

Response: No change was made. The final NS1 guidelines will not have significant economic impacts on a substantial number of small entities. The guidelines are advisory only; they provide general guidance on how to address new overfishing, rebuilding, and related requirements under the MSA. Pursuant to MSA section 301(b), the guidelines do not have the force and effect of law. When the Councils/Secretary apply the guidelines to individual fisheries and implement ACL and AM mechanisms, they will develop specific measures in their FMPs and be able to analyze how the new measures compare with the status quo (e.g., annual measures before the MSRA was signed into law and the NS1 guidelines were revised) with respect to economic impacts on small entities. At this point, any analysis of impacts on small entities across the range of diverse, Federally-managed fisheries would be highly conjectural. Therefore, a certification is appropriate.

Comment 4: Several comments were received that the guidelines are too complex and they contain guidance for things, such as the ACT that are not required by the MSA. They suggested removing these provisions from the guidance, or only providing guidance for terms specifically mentioned in the statute.

Response: NMFS agrees that the guidelines can appear complex. However, the purpose of the guidelines is not simply to regurgitate statutory provisions, rather it is to provide guidance on how to meet the requirements of the statute. As discussed in other comments and responses, MSRA includes new, undefined terms (ABC and ACL), while retaining other long-standing provisions, such as the national standards. In considering how to understand new provisions in light of existing ones, NMFS considered different ways to interpret language in the MSA, practical challenges in fisheries management including scientific and management uncertainty, the fact that there are differences in how fisheries operate, and public comment on proposed approaches in the NS1 guidelines. MSA does not preclude NMFS from including additional terminology or explanations in the NS1 guidelines, as needed, in order to facilitate understanding and effective implementation of MSA mandates. In the case of NS1, conservation and management measures must prevent overfishing while achieving, on a continuing basis, the optimum yield. This is inherently challenging because preventing overfishing requires that harvest of fish be limited, while achieving OY requires that harvest of fish occur. In developing the guidelines, NMFS identified the reasons that overfishing was still occurring in about 20 percent of U.S. Fisheries, and wrote the guidelines to address the primary causes. These include:

(1) Setting OY too close to MSY,

(2) Failure to consider all sources of fishing mortality,

(3) Failure to adequately consider both uncertainty in the reference points provided by stock assessments (scientific uncertainty) and uncertainty in management control of the actual catch (management uncertainty),

(4) Failure to utilize best available information from the fishery for inseason management, and

(5) Failure to identify and correct management problems quickly.

NMFS believes that the guidelines address these causes and appropriately provide practical guidance on how to address them, while providing sufficient flexibility to acknowledge the differences in fisheries. NMFS believes that Congress intended that the ACLs be effective in ending and preventing overfishing. Simply amending the FMPs to include ACL provisions is not enough—the actual performance of the fishery is what ultimately matters. NMFS believes that all of the provisions in the guidelines are essential to achieving that goal, and that if the guidelines are followed, most of the problems that have led to continued overfishing will be addressed. NMFS has made changes in the final action to clarify the guidelines and simplify the provisions therein, to the extent possible. One specific change is that the final guidelines do not require that ACT always be established. Instead, NMFS describes how catch targets, such as ACT, would be used in a system of AMs in order to meet the requirements of NS1 to prevent overfishing and achieve OY. More details on these revisions are covered in responses pertaining to comments 8, 32, 44, 45, and 48.

Comment 5: Several commenters stated that Councils' workloads and the delay of final NS1 guidelines will result in some Councils having great difficulty or not being able to develop ACLs and AMs for overfishing stocks by 2010, and all other stocks by 2011.

Response: The requirements in MSA related to 2010 and 2011 are statutory; therefore ACLs and AMs need to be in place for those fishing years such that overfishing does not occur. NMFS understands that initial ACL measures for some fisheries have been developed before the NS1 guidelines were finalized in order to meet the statutory deadline, and thus may not be fully consistent with the guidelines. ACL mechanisms developed before the final guidelines should be reviewed and eventually revised consistent with the guidelines.

Comment 6: Several commenters stated that certain existing FMPs and processes are already in compliance with the ACL and AM provisions of the MSA and consistent with the proposed guidelines. One commenter stated that NMFS should bear the burden of determining whether current processes are inconsistent with the MSA, and indicate what action Councils should take. Another commenter stated that Congress intended Total Allowable Catch (TAC), which is already used in some fisheries, to be considered to be an ACL. NMFS also received comments stating that certain terms have had longstanding use under FMPs, and changing the terminology could cause too much confusion.

Response: NMFS believes that some existing FMPs may be found to need little or no modification in order to be found to be consistent with the MSA and NS1 guidelines. In general, these are fisheries where catch limits are established and the fishery is managed so that the limits are not exceeded, and where overfishing is not occurring. NMFS agrees that, in some fisheries, the TAC system currently used may meet the requirements of an ACL. However, there are a wide variety of fisheries that use the term TAC, and while some treat it as a true limit, others treat it simply as a target value on which to base management measures. Therefore, NMFS does not agree that the use of a TAC necessarily means the fishery will comply with the ACL and AM provisions of the MSA. NMFS will have to review specific FMPs or FMP amendments. In addition, upon request of a Council, NMFS can provide input regarding any changes to current processes that might be needed for consistency with the MSA and guidance in the NS1 guidelines.

Regarding the comment about terminology, the preamble to the proposed action provided that Councils could opt to retain existing terminology and explain in a proposed rule how the terminology and approaches to the FMPs are consistent with those set forth in the NS1 guidelines. NMFS has given this issue further consideration and believes that a proposed rule would not be necessary or appropriate. Instead, a Council could explain in a **Federal Register** notice why its terminology and approaches are consistent with the NS1 guidelines.

Comment 7: Some commenters thought that before requiring implementation of a new management system, it should first be demonstrated that the current management system is not effective at preventing overfishing or rebuilding stocks that are overfished, and that a new management system would be more effective. Changing a management system that is effective and responsive would not be productive.

Response: While NMFS understands that current conservation and management measures prevent overfishing in some fisheries, the MSA requires a mechanism for specifying ACLs and AMs in all fisheries, including those that are not currently subject to overfishing, unless an exception applies. There is no exception to the requirement for ACLs and AMs for fisheries where other, non-ACL management measures are preventing overfishing. NMFS is required by the MSRA to implement the new provisions in all FMPs, unless an exception applies, even on those whose current management is preventing overfishing. NMFS believes the guidance provides the tools for Councils to implement ACLs in these fisheries that will continue to prevent overfishing without disrupting successful management approaches. The guidelines provide flexibility to deviate from the specific framework described in the guidelines, if a different approach will meet the statutory requirements and is more appropriate for a specific fishery (*see* § 600.310(h)(3) of the final action).

Comment 8: Some commenters supported the use of ACT to address management uncertainty in the fishery. Others did not support ACTs, and commented that ACTs are not required under the MSA and that inclusion of ACTs in the guidelines creates confusion and complexity. One commenter stated that the proposed guidelines were ''out of line'' with NMFS's mandate and authority provided under the MSA because the guidelines for ACTs and associated control rules completely undermine the clear directive Congress provides in National Standard 1 to achieve optimum yield on an ongoing basis.

Response: The proposed guidelines stressed the importance of addressing scientific and management uncertainty in establishing ACL and AM mechanisms. Scientific uncertainty was addressed in the ABC control rule, and management uncertainty was addressed in the ACT control rule. Use of catch targets associated with catch limits is a well-recognized principle of fishery management. The current NS1 guidelines call for establishment of limits, and targets set sufficiently below the limits so that the limits are not exceeded. The revised guidelines are based on this same principle, but, to incorporate the statutory requirements for ABC and ACLs, are more explicit than the current guidelines. While MSA does not refer to the term ACT, inclusion of the term in the NS1 guidelines is consistent with the Act. The NS1 guidelines are supposed to provide advice on how to address MSA requirements, including how to understand terminology in the Act and how to apply that terminology given the practical realities of fisheries management. In developing the proposed guidelines, NMFS considered a system that used ABC as the limit that should not be exceeded, and that required that ACL be set below the ABC to account for management uncertainty. This had the advantage of minimizing the number of terms, but would result in the ACL having been a target catch level. NMFS decided, that since Congress called for annual catch limits to be set, that the ACL should be considered a true limit—a level not to be exceeded. ACT was the term adopted for the corresponding target value which the fishery is managed toward so that the ACL is not exceeded.

Taking public comment into consideration, NMFS has decided to retain ACTs and ACT control rules in the final guidelines, but believes they are better addressed as AMs for a fishery. One purpose of the AMs is to prevent the ACL from being exceeded. Setting an ACT with consideration of management uncertainty is one way to achieve this, but may not be needed in all cases. In fisheries where monitoring of catch is good and in-season management measures are effective, managers may be able to prevent ACLs from being exceeded through direct monitoring and regulation of the fishery. Therefore, the final guidelines make ACTs optional, but, to prevent ACLs from being exceeded, Councils must adequately address the management uncertainty in their fisheries using the full range of AMs.

NMFS disagrees that ACTs undermine NS1. NS1 requires that conservation and management measures prevent overfishing while achieving, on a continuing basis, the OY. The MSA describes that OY is based on MSY, as reduced based on consideration of

several factors. In some cases, the amount of reduction may be zero, but in no case may the OY exceed MSY. Therefore, if OY is set close to MSY, the conservation and management measures in the fishery must have very good control of the amount of catch in order to achieve the OY without overfishing.

The amount of fishing mortality that results in overfishing is dictated by the biology of the stock and its environment, and establishes a limit that constrains fisheries management. However, the specification of OY and the conservation and management measures for the fishery are both set by fishery managers. To achieve the dual requirements of NS1, Councils must specify an OY and establish conservation and management measures for the fishery that can achieve the OY without overfishing. The closer that OY is set to MSY, the greater degree of control over harvest is necessary in order to meet both objectives. The choice of conservation and management measures for a fishery incorporates social and economic considerations. For example, a Council may prefer to use effort controls instead of hard quotas to have a year-round fishery without a ''race for fish,'' and to provide higher average prices for the fishermen. However, compared to hard quotas, management with effort controls gives more uncertainty in the actual amount of fish that will be caught. Because of this increased uncertainty, the OY needs to be reduced from MSY so that overfishing does not occur. Thus the social and economic considerations of the choice of management measures should be considered in setting the OY.

In cases where the conservation and management measures for a fishery are not capable of achieving OY without overfishing occurring, overfishing must be ended even if it means the OY is not achieved in the short-term. Overfishing a stock in the short term to achieve OY jeopardizes the capacity of the stock to produce OY in the long term, and thus cannot be sustained. Preventing overfishing in a fishery on an annual basis is important to ensure that a fishery can continue to achieve OY on a continuing basis. The specification of OY and the associated conservation and management measures need to be improved so that OY can be achieved without overfishing occurring. In a fishery where the NS1 objectives are fully met, the OY specification will adequately account for the management uncertainty in the associated conservation and management measures. Overfishing will not occur, and the OY will be achieved.

Comment 9: Commenters stated that the designation of the Virgin Islands Coral Reef Monument was not being taken into account in the Caribbean Council's FMPs.

Response: NMFS does not believe any revision of the NS1 guidelines is necessary in response to this comment but will forward the comment to the Council for its consideration.

Comment 10: NMFS received comments in support of the flexibility given to councils to manage stocks for which ACLs are not a good fit, such as management of Endangered Species Act listed species, stocks with unusual life history characteristics, and aquaculture operations. Commenters noted that Pacific salmon should be treated with flexibility under the NS1 guidelines, because they are managed to annual escapement levels that are functionally equivalent to ACLs, and there are accountability, review, and oversight measures in the fishery.

Response: NMFS agrees that flexibility is needed for certain management situations, and clarifies that § 600.310(h)(3) provides for flexibility in application of the NS1 guidelines but is not an exception from requirements of MSA section 303(a)(15) or other sections.

Comment 11: Congress did not mandate that all fisheries be managed by hard quotas, and so NMFS should include guidance for the continuation of successful, non-quota management systems, such as that used to successfully manage the Atlantic sea scallop fishery.

Response: NMFS agrees that the conservation and management measures for a fishery are not required to be ''hard quotas.'' However, NMFS believes that the ACL was intended by Congress to be a limit on annual catch. Therefore, conservation and management measures must be implemented so that the ACL is not exceeded, and that accountability measures must apply whenever the ACL is exceeded. Congress did not exempt any fisheries from the ACL requirement on the basis that current management was successful. If the current conservation and management measures are effective in controlling harvest of sea scallops such that the ACL is not regularly exceeded, the ACL would have little effect on the fishery. If the current management measures are not effective in keeping catch from exceeding the ACL, then consistent with the ACL requirement in the MSA, additional management action should be taken to prevent overfishing.

Comment 12: The summary list of items to be included in FMPs should be ''as appropriate'' (see § 600.310(c) of the final action).

Response: No change was made. NMFS believes that if any item does not apply to a particular fishery, the Council can explain why it is not included, but believes that ''as appropriate'' would create further confusion as there is no clear definition of what appropriate means in this context.

Comment 13: The list of items to include in FMPs related to NS1 is extremely long, and it is unclear whether each item on the list needs to be addressed for all stocks that are ''in the fishery,'' which is a very broad term. Including the extra information is unlikely to materially improve management.

Response: As a default, all the stocks or stock complexes in an FMP are considered ''in the fishery'' (see § 600.310(d)(1)), unless they are reclassified as ecosystem component stocks through an FMP amendment process. Further explanation of these classifications is provided below in other comments and responses. The benefit of including this list of items is to provide transparency in how the NS1 guidelines are being met. In addition, Councils should already have some of the items in their FMPs (ex: MSY, status determination criteria (SDC), and OY). The other items are new requirements of the MSA or a logical extension of the MSA.

Comment 14: NMFS received several comments both supporting and opposing the proposed ''stocks in a fishery'' and ''ecosystem component species'' (EC) classifications of stocks in a FMP. Comments included: EC species are not provided under the MSA and should not be required in FMPs; EC species classification is needed but may lead to duplication in different FMPs; support for the distinction between ''stocks in a fishery'' and EC species; and clarify how data collection only species should be classified.

Response: NMFS provided language for classifying stocks in a FMP into two categories: (1) ''Stocks in the fishery'' and (2) ''ecosystem component species.'' MSA requires that Councils develop ACLs for each of their managed fisheries (see MSA sections 302(h)(6) and 303(a)(15)), but Councils have had, and continue to have, considerable discretion in defining the ''fishery'' under their FMPs. As a result, some FMPs include one or a few stocks (*e.g.* , Bluefish FMP, Dolphin-Wahoo FMP) that have been traditionally managed for OY, whereas others have begun including hundreds of species (e.g., Coral Reef Ecosystem of the Western Pacific Region FMP) in an

effort to incorporate ecosystem approaches to management.

While EC species are not explicitly provided in the MSA, in the MSRA, Congress acknowledged that certain Councils have made significant progress in integrating ecosystem considerations, and also included new provisions to support such efforts (*e.g.*, MSA section 303(b)(12)). As noted in the preamble of this action, NMFS wants to continue to encourage Councils to incorporate ecosystem considerations, and having classifications for ''stocks in the fishery'' versus ''ecosystem component species'' could be helpful in this regard. Thus, the final guidelines do not require Councils or the Secretary to change which species are or are not included in FMPs, nor do the guidelines require FMPs to incorporate the EC species classification. NMFS has revised the final guidelines to state explicitly that Councils or the Secretary may—but are not required to—use an EC species classification.

In developing the text regarding EC species and ''stocks in the fishery,'' NMFS examined what existing FMPs are already doing and utilized that in its description of these classifications. For example, based on existing FMPs, the guidelines envision that species included for data collection and other monitoring purposes could be considered EC species (assuming they meet the criteria described in § 600.310(d)(5)(i)). However, such species could also be ''stocks in the fishery,'' as described under the NS3 guidelines (§ 600.320(d)(2)). NMFS recognizes the desire for greater specificity regarding exactly which species could or could not be considered EC species, but does not believe that further detail in the guidelines could clarify things definitively. Determining whether the EC category is appropriate requires a specific look at stocks or stock complexes in light of the general EC species description provided in the NS1 guidelines as well as the broader mandates and requirements of the MSA. If Councils decide that they want to explore potential use of the EC species classification, NMFS will work closely with them to consider whether such a classification is appropriate.

Comment 15: NMFS received several comments regarding the level of interaction that would be appropriate for the EC classification. Comments included: *de minimis* levels of catch should be defined to clarify the difference between ''stocks in a fishery'' and EC species; all stocks that interact with a fishery should be included as ''stocks in a fishery''; requiring non-target stocks to be considered part of the fishery as written supersedes NS9; guidelines should clarify that EC species do not have significant interaction with the fishery; and, bycatch species should not be included as ''stocks in a fishery.''

Response: NMFS is revising the final guidelines to clarify preliminary factors to be taken into account when considering a species for possible classification as an EC species. Such factors include that the species should: (1) Be a non-target species or non-target stock; (2) not be determined to be subject to overfishing, approaching overfished, or overfished; (3) not likely to become subject to overfishing or overfished, according to the best available information, in the absence of conservation and management measures; and (4) not generally retained for sale or personal use. Factors (2) and (3) are more relevant to species that are currently listed in FMPs and that have specified SDCs. With regard to factor (4), the final guidelines add new language in § 600.310(d)(5)(i)(D)—''not generally retained for sale or personal use''—in lieu of ''*de minimis* levels of catch'' and clarify that occasional retention of a species would not, in itself, preclude consideration of a species in the EC classification. The NS1 guidelines provide general factors to be considered, as well as some examples of possible reasons for using the EC category. However, the decision of whether to use an EC classification requires consideration of the specific fishery and a determination that the EC classification will be consistent with conservation and management requirements of the MSA.

Under the MSA, a Council prepares and submits FMPs for each fishery under its authority that requires conservation and management, and there is considerable latitude in the definition of the fishery under different FMPs. The definition of ''fishery'' is broad, and could include one or more stocks of fish treated as a unit for different purposes, as well as fishing for such stock (see MSA section 3(13)(B)). While some comments encouraged inclusion of all species that might interact with a fishery, all bycatch species, or all species for which there may be ''fishing'' as defined in MSA section 3(13)(B), NMFS does not believe that MSA mandates such a result. MSA does not compel FMPs to include particular stocks or stock complexes, but authorizes the Councils or the Secretary to make the determination of what the conservation and management needs are and how best to address them. Taking the broader approaches noted above would interfere with this discretion and also could result in overlapping or duplicative conservation and management regimes in multiple FMPs under different Council jurisdictions. As National Standard 6 requires that conservation and management measures, where practicable, minimize costs and avoid unnecessary duplication, NMFS believes that Councils should retain the discretion to determine which fisheries require specific conservation and management measures. With regard to bycatch, regardless of whether a species is identified as part of a fishery or not, National Standard 9 requires that FMPs, to the extent practicable, minimize bycatch and to the extent it cannot be avoided minimize bycatch mortality. Additional protections are afforded to some species under the Endangered Species Act, regardless of whether they are listed as stocks in a fishery. Further, as a scientific matter, NMFS disagrees that every bycatch species would require conservation and management measures to protect the species from becoming overfished, because some bycatch species exhibit high productivity levels (*e.g.*, mature early) and low susceptibilities to fishery (*e.g.*, rarely captured) that preclude them from being biologically harmed or depleted by particular fisheries.

Comment 16: NMFS received several comments requesting that the guidelines include a description of vulnerability and how it should be determined, since it is referenced throughout the guidelines.

Response: NMFS agrees, and has added § 600.310(d)(10) to the final action, to define vulnerability. In general, to determine the vulnerability of a species/stock becoming overfished, NMFS suggests using quantitative estimates of biomass and fishing rates where possible; however, when data are lacking, qualitative estimates can be used. NMFS is currently developing a qualitative methodology for evaluating the productivity and susceptibility of a stock to determine its vulnerability to the fishery, and anticipates the methodology to be finalized by February 2009. The methodology is based on the productivity-susceptibility analysis (PSA) developed by Stobutzki *et al.* (2001), which was suggested by many commenters. Stocks that have low susceptibilities (*e.g.*, rarely interact with the fishery, no indirect impacts to habitat, etc.) and high productivities (*e.g.*, mature at an early age, highly fecund, etc.) are considered to have a low vulnerability of becoming overfished, while stocks that have low productivities and high susceptibilities

to the fishery are considered highly vulnerable to becoming overfished.

Comment 17: Some commenters noted that the EC classification could be used to avoid reference point specification.

Response: NMFS believes that the guidelines provide mechanisms to address this issue. As a default, NMFS presumes that all stocks or stock complexes that Councils or the Secretary decided to include in FMPs are ''stocks in the fishery'' that need ACL mechanisms and AMs and biological reference points. Whether it would be appropriate to include species in the EC category would require consideration of whether such action was consistent with the NS1 guidelines as well as the MSA as a whole. If a Council or the Secretary wishes to add or reclassify stocks, a FMP amendment would be required, which documents rationale for the decision. However, the guidelines have been modified to note that EC species should be monitored to the extent that any new pertinent scientific information becomes available (*e.g.*, catch trends, vulnerability, etc.) to determine if the stock should be reclassified.

Comment 18: With regard to ecological, economic, and social (EES) factors related to OY, some commenters requested more specific guidance in incorporating the factors, and others commented that accounting for the factors is too time consuming. Other commenters expressed support for the reference to forage fish species and suggested including text on maximum economic yield and fish health.

Response: The NS1 guidelines generally describe OY as the long-term average amount of desired yield from a stock, stock complex, or fishery. OY is prescribed on the basis of MSY as reduced by EES factors (MSA section 3(33)). The NS1 guidelines set forth examples of different considerations for each factor, and NMFS believes the examples provide sufficient guidance on EES factors. NMFS has not made substantive changes from the proposed action, but has clarified that FMPs must address each factor but not necessarily each example.

Comment 19: NMFS received several comments in support of using stock complexes as a management tool in data poor situations and other comments that expressed concern about the use of stock complexes and indicator species. Comments included: stock complexes should only be used when sufficient data are lacking to generate species-specific SDCs and related reference points; there is little ecological basis for using indicator species to set ACLs for stock complexes (see Shertzer and Williams (2008)) as stocks within a stock complex exhibit different susceptibilities to the fishery; if used, stock complexes should be managed using the weakest or most vulnerable stock within the complex as a precautionary approach to management; it would be helpful to have examples of how a data poor stock could be periodically examined to determine if the stock is overfished or subject to overfishing.

Response: NMFS agrees that where possible Councils should generate stock-specific SDCs and related reference points for stocks in fishery; however, there are other circumstances in which stock complex management could be used. NMFS notes in § 600.310(d)(8) of the final action that stocks may be grouped into complexes for various reasons, including: where stocks in a multispecies fishery cannot be targeted independent of one another and MSY can not be defined on a stock-by-stock basis (see § 600.310(e)(1)(iii) of the final action); where there is insufficient data to measure their status relative to SDC; or when it is not feasible for fishermen to distinguish individual stocks among their catch.

NMFS believes that the guidelines sufficiently addressed the issue that stock complexes should be managed using the most vulnerable stock within the complex. In § 600.310(d)(9) of the final action the guidelines note that ''if the stocks within a stock complex have a wide range of vulnerability, they should be reorganized into different stock complexes that have similar vulnerabilities; otherwise the indicator stock should be chosen to represent the more vulnerable stocks within the complex. In instances where an indicator stock is less vulnerable than other members of the complex, management measures need to be more conservative so that the more vulnerable members of the complex are not at risk from the fishery.'' Additionally, these guidelines address the concerns of Shertzer and Williams (2008), by recommending that both productivity and susceptibility of the stock (*i.e.*, vulnerability to the fishery) is considered when creating or re-organizing stock complexes.

Lastly, NMFS agrees and has modified the phrase in § 600.310(d)(9) of the proposed action ''Although the indicator stock(s) are used to evaluate the status of the complex, individual stocks within complexes should be examined periodically using available quantitative or qualitative information to evaluate whether a stock has become overfished or may be subject to overfishing'' to provide examples of quantitative or qualitative analysis.

Comment 20: NMFS received comments regarding the process for specifying the ACL for either a stock complex or for a single indicator species. The commenters were concerned that the proper data will not be utilized to determine whether the ACL should be set for the stock complex or for single indicator species. They feel that the use of single indicator species would not represent the stock's abundance, especially in the St. Thomas/St. John and St. Croix fisheries.

Response: NMFS understands the concern, but does not believe the guidelines need to be revised. NMFS will refer this comment to the Council.

Comment 21: NMFS received comments stating that the final action should clarify how SDCs and ACLs should be applied to stocks that are targeted in one fishery and bycatch in another, as well as circumstances where the stock is targeted by two or more FMPs that are managed by different regional councils.

Response: NMFS believes that the guidelines sufficiently addressed this issue in § 600.310(d)(7) of the final action, which notes ''* * * Councils should choose which FMP will be the primary FMP in which management objectives, SDC, the stock's overall ACL and other reference points for the stock are established.'' NMFS believes that the Councils should continue to have the discretion to make such determinations. NMFS, however, suggests that the primary FMP should usually be the FMP under which the stock is targeted. In instances where the stock is targeted in two or more FMPs (*e.g.*, managed by two or more Councils), Councils should work together to determine which FMP is the primary.

Comment 22: Several commenters requested further clarification on how prohibited species should be classified under the proposed classification scheme (see § 600.310(d)) because they felt it was unclear whether a species for which directed catch and retention is prohibited would be classified as ''in the fishery'' or as an ''ecosystem component''.

Response: NMFS believes that the information in § 600.310(d) provides a sufficient framework in which decisions can be made about how to classify a prohibited species under an FMP. Prohibition on directed catch and/or retention can be applied to either a stock that is ''in the fishery'' or an ''ecosystem component'' species. Managers should consider the classification scheme outlined in § 600.310(d) of the final action as well

as MSA conservation and management requirements generally. If a stock contains one of the ''in the fishery'' characteristics, then it belongs ''in the fishery'', regardless of the management tools that will be applied to it (*e.g.*, prohibition, bag limits, quotas, seasons, etc.). Also, if the intent is to prohibit directed fishing and retention throughout the exclusive economic zone (EEZ) for which a Council has jurisdiction, then the stock would, most likely, be identified in an FMP as ''in the fishery'' rather than as an ecosystem component of one particular FMP.

Comment 23: Several commenters asked at what level an ACL would be specified for a species for which directed catch and retention is prohibited. Setting the ACL at zero would not be logical because if even one was caught incidentally then AMs would be triggered. Setting it higher would also not be logical because the point is to ensure little to no catch of the stock.

Response: Prohibiting retention is a management measure to constrain the catch to a minimal amount. If listed as a stock in the fishery, the reference points for the species, such as OFL and ABC, should be set based on the MSY for the stock, or, if ESA listed, would be set according to the associated ESA consultation's incidental take statement, regardless of the management approach used. The ACL may not exceed the ABC, but should be set at a level so that the mortality resulting from catch and discard is less than the ACL.

Comment 24: NMFS received a comment stating that the specification of MSY must incorporate risk, be based on gear selectivity and support a healthy, functioning ecosystem. The commenter supported revisions to § 600.310(e)(1) of the proposed action but suggested that it should be strengthened to address ecosystem principles. The commenter cited NOAA Tech Memo NMFS–F/SPO–40 in contending that the concept of MSY contains inherent risks that must be addressed in establishing reference points. Other commenters stated that: Councils establish management measures with high probabilities of success (*e.g.*, 80 percent); ''fishery technological characteristics'' should be re-evaluated every two years; and MSY values normally equate to fishing down a population to forty percent of historic abundance and this may not be consistent with ecosystem based management.

Response: NMFS agrees that ecological conditions and ecosystem factors should be taken into account when specifying MSY and has added additional language to § 600.310(e)(1)(iv) of the final action to highlight this point. Such factors might include establishing a higher target level of biomass than normally associated with the specific stock's B_{msy}. In addition, ecological conditions not directly accounted for in the specification of MSY can be among the ecological factors considered when setting OY below MSY. Regarding the comment about establishing management measures with a high probability of success, this is addressed in comment #63. NMFS does not believe that the NS1 guidelines need to be revised to require that fishery technological characteristics be evaluated every 2 years; such characteristics would be routinely updated with each stock assessment. The MSA bases management of fishery resources on MSY, but provides that OY can be reduced from MSY for ecological factors. NMFS believes the guidelines are consistent with the MSA and allow Councils to implement ecosystem approaches to management.

Comment 25: Several comments requested the guidelines state that specification of reference points should not be required for a stock ''in the fishery'' if its directed catch and retention is prohibited because managers applied the prohibition in an effort to prevent overfishing.

Response: Prohibition of retention does not necessarily mean that overfishing is prevented. Even though the species cannot be retained, the level of fishing mortality may still result in overfishing. Many stocks for which prohibitions are currently in place are considered data-poor. NMFS acknowledges that specifying reference points and AMs will be a challenge for such stocks, but reiterates the requirement to establish ACLs and AMs for all managed fisheries, unless they fall under the two statutory exceptions (see § 600.310(h)(2) of the final action), and also the need to take into consideration best scientific information available per National Standard 2.

Comment 26: NMFS received comments voicing a concern about the NMFS process of determining the overfishing status of a fishery, because fishery management measures have been implemented to end overfishing, but stocks are still listed as subject to overfishing and require ACLs by 2010. The commenters felt that several species under the Caribbean Fishery Management Council's protection should currently be removed from the overfished species list.

Response: NMFS agrees that this is an important issue. Due to the process inherent in determining the status of a stock there is inevitably a lag time between implementation of management measures and a new assessment of the stock's status under those measures. NMFS is required by the MSA to establish new requirements to end and prevent overfishing through the use of ACLs and AMs. The fisheries subject to overfishing, including several in the Caribbean, are required to have ACLs by 2010, and all other fisheries must have ACLs by 2011. The Council's Comprehensive Amendment that implemented the Sustainable Fisheries Act in 2006 included measures designed to end overfishing. Although these measures may have ameliorated fishing pressure for some fishery resources in the U.S. Virgin Islands, the Council will need to evaluate the existing fishery management measures to determine whether they are sufficient to meet the new statutory requirements for ACLs and AMs.

Comment 27: Several commenters stated that NMFS should not include the OFL as the basis for overfishing SDC. Specific comments included: (1) The MSA does not define or require OFL, so NMFS should not use it in the guidelines; (2) catch-based SDC are inconsistent with the Magnuson-Stevens Act intent and SDC should only be based on the fishing mortality rate as it relates to a stock or stock complex's capacity to achieve MSY on a continual basis; (3) the Magnuson-Stevens Act does not require use of the long term average OFL as MSY; (4) NMFS increases the risk of overfishing when theoretical catch estimates or a constant fishing mortality rate (F) are used to manage a fishery especially when a retrospective pattern exists in a stock or stock complex.

Response: The term, OFL, is not defined in the MSA. However, OFL is directly based on requirements of the MSA, including the concept of MSY, and the requirement to prevent overfishing. NMFS does not believe that lack of a definition in the MSA precludes definition and use of OFL in order to meet the objectives of the MSA. The MSA defines overfishing as a rate or level of fishing mortality that jeopardizes the capacity of the stock to produce MSY. This mortality rate is defined by NMFS as the MFMT. The OFL for a year is calculated from the MFMT and the best estimate of biomass for a stock in that year, and thus is simply the MFMT converted into an amount of fish. The OFL is an annual level of catch that corresponds directly to the MFMT, and is the best estimate of the catch level above which overfishing is occurring. OFL is in terms

of catch, and thus is in the same units as ABC and ACL. NMFS believes, therefore, that comparing catch to OFL is a valid basis for determining if overfishing has occurred that year. The relationship of MSY to OFL is that MSY is the maximum yield that the stock can provide, in the long term, while OFL is an annual estimate of the amount of catch above which overfishing is occurring. The annual OFL varies above and below the MSY level depending on fluctuations in stock size. Since both MSY and OFL are related to the highest fishing mortality rate that will not result in overfishing, it is expected that the long-term average of OFLs would equate to MSY, provided that the stock abundance is high enough to support MSY.

The NS1 guidelines give the Councils flexibility to determine if overfishing occurs by using either MFMT (F > MFMT) or actual annual catch (catch > OFL) as the criteria for overfishing determinations. There are advantages and disadvantages of using either measure. The advantages of using OFL as a SDC are that catch can be easily understood by constituents, a determination can be made as soon as catch totals are available, and there is no retrospective problem with setting the SDC itself. Use of OFL might not be appropriate for stocks with highly variable recruitment that can not be predicted and therefore incorporated into the forecast of stock condition on which OFL is based. The advantage of using MFMT to determine if overfishing is occurring is because F is based on a stock assessment analyzing the past performance of the fishery. This means that the MFMT method is less sensitive than the OFL method to recent fluctuations in recruitment. However, F cannot not be calculated until an assessment has been updated, which may lag the fishery by several years. Therefore, a status determination based on MFMT could be less current than a determination based on OFL and catch, and reflects past, rather than current, fishery performance. Also, if there is a retrospective pattern in the assessment, then the hindsight estimate of F for a particular year used for the SDC will be different than the forecast estimate of stock condition used when setting target catch levels and management measures for that same year. The choice of SDC for a stock should consider things like the frequency of stock assessments, the ability to forecast future stock size, and any known retrospective patterns in the assessment. If the SDC are appropriately chosen, NMFS does not believe that one method necessarily presents more risk that overfishing will occur.

Comment 28: NMFS received one comment which proposed that instead of being required to choose between OFL or MFMT as the SDC, that Councils should have the flexibility to use both. The comment implied that this would allow Councils to use MFMT as the SDC in years in which there is an assessment and OFL in years in which there is not an assessment.

Response: The NS1 guidelines require documentation for the rationale a Council uses to select the SDC within the FMP including defining overfishing status in terms of the MFMT (*i.e.*, fishing mortality rate) or OFL (*i.e.*, annual total catch) in such a way that overfishing can be monitored and determined on an annual basis. A Council could develop SDC based on both criteria, if sufficient rationale is provided.

Comment 29: NMFS received two comments in opposition to the ''overfished'' definition used by NMFS in the proposed rule. They point out that the current overfished definition could include stocks that are ''depleted'' due to changing environmental conditions not caused by fishing pressure. They propose that NMFS should revise the definition of ''overfished'' and create a ''depleted'' category for stocks that have declined below the minimum stock size threshold (MSST) due to changing environmental conditions.

Response: The overfished definition used by NMFS is consistent with the MSA. NMFS acknowledges that factors other than fishing mortality can reduce stock size below the MSST but NMFS believes the definition of overfished should not be altered. For stocks in a FMP, the MSA requires the Councils to rebuild the stock to a level consistent with producing the MSY regardless of the contributing factors. In most cases, the variation in relative contribution of environmental and fishing factors from year to year in reducing stock abundance is not known. When specifying SDC the Council is required to provide an analysis of how the SDC were chosen and how they relate to the reproductive potential of the stock. Specifically, the MSST should be expressed in terms of reproductive potential or spawning biomass. Furthermore, the stock assessment process can adjust the B_{msy} estimates and associated SDC due to environmental and ecological factors or changes in the estimates of reproductive potential, size/age at maturity, or other biological parameters.

Comment 30: Several comments suggested that NMFS should strike § 600.310(e)(2)(iii)(B) from the proposed action as it contradicts § 600.310(e)(2)(iii)(A) and could increase fishing pressure on a depleted stock by attributing low stock abundance to environmental conditions. Commenters criticized the requirement at § 600.310(e)(2)(iii)(B) that Councils ''must'' take action to modify SDC, and stated that there is little scientific evidence to show linkages between stock size and environmental conditions (citing to Restrepo *et al.* 1998 and NMFS. 2000. Endangered Species Act—Section 7 Consultation Biological Opinion and Incidental Take Statement). Commenters asserted that there is no statutory basis for this provision in the MSA and the legal standard for the word ''affect'' is vague and inadequate for ending overfishing. The comments stated that, in a time of anthropogenic climate change, stock dynamics are likely to change and by establishing this provision in the final action NMFS will undermine the statute's mandate to end overfishing. Commenters asserted that fisheries managers have and will respecify SDC to justify circumventing rebuilding targets, and the final guidelines should establish a high burden of proof to modify SDC due to changing environmental conditions or ''regime change'' (citing Fritz & Hinckley 2005).

Response: Section 600.310(e)(2)(iii) of this final action is essentially the same as text at § 600.310(d)(4) in the current NS1 guidelines, except for clarifications noted below. There is no change in the usage of ''must'' between the current guidance and this final NS1 guidance at § 600.310(e)(2)(iii). NMFS believes that the requirement of NS2, that conservation and management measures be based on the best available science, applies to the establishment of SDC. Therefore, in cases where changing environmental conditions alter the long-term reproductive potential of a stock, the SDC must be modified. As stocks and stock complexes are routinely assessed, long-term trends are updated with current environmental, ecological, and biological data to estimate SDCs. NMFS allows for flexibility in these provisions to account for variability in both environmental changes and variation in a stock's biological reaction to the environment.

The guidelines include language requiring a high standard for changing SDC that is consistent with NMFS Technical Guidance (Restrepo *et al.* 1998). NMFS outlines the relationship of SDC to environmental change in both the short and long-term in

§ 600.310(e)(2)(iii) of the final action. Total mortality of fish stocks includes many factors other than fishing mortality. Short-term environmental changes may alter the size of a stock or complex, for instance, by episodic recruitment failures, but these events are not likely to change the reproductive biology or reproductive potential of the stock over the long-term. In this case the Council should not change the SDC. Other environmental changes, such as some changes in ocean conditions, can alter both a stock's short-term size, and alter long-term reproductive biology. In such instances the Councils are required to respecify the SDC based on the best available science and document how the changes in the SDC relate to reproductive potential. In all cases, fishing mortality must be controlled so that overfishing does not occur. NMFS notes that, depending on the impact of the environmental change on the stock, failure to respecify SDC could result in overfishing, or could result in failure to achieve OY. In both cases, the fishery would not meet the requirements of NS1.

One change from § 600.310(d)(4) of the current NS1 guidelines occurs in § 600.310(e)(2)(iii)(A) of this final action. NMFS clarified that SDC ''should not'' rather than ''need not'' be changed if the long-term reproductive potential of a stock has not been affected by a changing environment. NMFS feels that this is consistent with setting a high standard for changing the SDC due to environmental changes. In addition, this action changes the phrase ''long-term productive capacity'' from the current NS1 guidance to ''long-term reproductive potential.'' NMFS believes the latter phrase is clearer and more accurately reflects the language in MSA section 303(a)(10).

Any changes to SDC are subject to Secretarial approval (§ 600.310(e)(2)(iv) of the final action), and the NS1 guidelines set a high standard for respecification of SDC due to environmental change. The Council must utilize the best available science, provide adequate rationale, and provide a basis for measuring the status of the stock against these criteria, and the SDC must be consistent with § 600.310(e)(2)(iii) of the final action. If manmade environmental changes are partially responsible for the overfished condition, the Council should recommend restoration of habitat and ameliorative programs in addition to curtailing fishing mortality.

Comment 31: NMFS received several comments that state that by requiring reference points to be point estimates NMFS is not acknowledging the uncertainty inherent in fishery management science. The comments expressed that the best way to incorporate uncertainty was to express SDCs as ranges and not point estimates.

Response: NMFS believes that uncertainty in SDC, OFL, and other fishing level quantities is best dealt with by fully analyzing the probability that overfishing will occur and that the stock might decline into an overfished condition, but we recognize that such a full analysis is not possible in many data-limited situations. When using a probability based approach, the distribution of probabilities includes a point estimate and it extends along a range. A probability based approach is already used in many rebuilding plans, for example, what fishing level will provide at least a 70% chance that the stock will be rebuilt in 10 years. NMFS scientists are working on a technical document that will describe some of the currently available methods to do such calculations, as well as some proxy approaches that could be used in situations where available data and methods do not allow calculation of the probability distributions.

Comment 32: NMFS received a number of comments regarding the proposed description of the relationship between ACT and OY—that achieving the ACT on an annual basis would, over time, equate to the OY. Comments requested more clarification, or did not agree with the described ACT–OY relationship.

Response: NMFS has revised the final action to remove the requirement that ACT be established, and instead discussed how targets, including ACT, function within the system of AMs to prevent the ACL from being exceeded. NMFS has also removed the discussion about the relationship of ACT to OY, based on the comments received. The full range of conservation and management measures for a fishery, which include the ACL and AM provisions, are required to achieve the OY for the fishery on a continuing basis. NMFS interprets the phrase ''achieving, on a continuing basis, the optimum yield for each fishery'' to mean producing from each stock or stock complex or fishery a long-term series of catches such that the average catch is equal to OY, overfishing is prevented, the long-term average biomass is near or above B_{msy}, and overfished stocks and stock complexes are rebuilt consistent with timing and other requirements of section 304(e)(4) of the MSA and § 600.310(j) of the final NS1 guidelines. NMFS notes that for fisheries where stock abundance is below the level that can produce the OY without the fishing mortality rate exceeding the MFMT, the annual yield will be less than the long-term OY level. In the case of an overfished fishery, ''optimum'' with respect to yield from a fishery means providing for rebuilding to a level consistent with producing the MSY in such fishery. When stock abundance is above B_{msy}, a constant fishing mortality control rule may allow the annual catch to exceed the long-term average OY without overfishing occurring, but frequent stock assessments need to be conducted to update the level of stock abundance.

Comment 33: One commenter stated that ''OY equates with the acceptable biological catch (''ABC''), which in turn is the level at which ACL should be set.'' Another commenter stated that, in specifying ACLs, a Council should not exceed MSY, because MSY—as opposed to ABC—is the ''fishing level recommendation'' that should not be exceeded per MSA 302(h)(6).

Response: MSA includes the terms ''fishing level recommendations,'' ''acceptable biological catch,'' and ''annual catch limits'' but does not define them. As such, NMFS has considered how to interpret these provisions in light of the statutory text and taking into consideration public comment during scoping and in response to the proposed NS1 guidelines. NMFS believes that ABC refers to a level of ''catch'' that is ''acceptable'' given the ''biological'' characteristics of the stock or stock complex. As such, OY does not equate with ABC. The specification of OY is required to consider a variety of factors, including social and economic factors, and the protection of marine ecosystems, which are not part of the ABC concept. The Councils determine the ACL, which may not exceed the fishing level recommendations of its science advisors. Of the several required SSC recommendations (MSA 302(g)(1)(B)), the ABC is most directly applicable as the constraint on the Council's ACL. Although MSY and ABC are both derived from a control rule, the ABC is the appropriate constraint on ACL because it is the annualized result of applying that control rule (thus is responsive to current stock abundance) whereas the MSY is the expected long-term average from a control rule. The Council should generally set the ACL lower than the ABC to take into account other factors related to preventing overfishing or achieving OY, or it may set the ACL equal to the ABC and take these additional factors into account when setting an ACT below the ACL.

Comment 34: Several commenters stated that NMFS's definition

framework for ACLs contains buffers that are not required by the Magnuson-Stevens Act and reduce or prevent the likelihood that OY can be achieved for a stock (Reducing a stock's OFL for scientific and management uncertainty, and OY factors results in too many reductions and makes it too difficult to achieve OY).

Response: NMFS believes that fisheries managers cannot consistently meet the requirements of the MSA to prevent overfishing and achieve, on a continuing basis, OY unless they address scientific and management uncertainty. The reductions in fishing levels that may be necessary in order to prevent overfishing should be only the amount necessary to achieve the results mandated by the MSA. Properly applied, the system described in the guidelines does not result in ''too many deductions,'' but rather, sets forth an approach that will prevent overfishing, achieve on a continuing basis OY, and incorporate sufficient flexibility so that the guidelines can be applied in different fisheries.

Comment 35: Several commenters suggested that NMFS clarify language to ensure that all aspects of fishing mortality (e.g., dead discards and post-release mortality) are accounted for in the estimates of ABC or when setting the ACL, and that all catch is counted against OY. NMFS also received comments that accounting for bycatch mortality in data poor situations should not be required.

Response: NMFS agrees that all sources of fishing mortality, including dead discards and post-release mortality from recreational fisheries must be accounted for, but believes that language in § 600.310(e)(3)(v)(C), (f)(2)(i) and (f)(3)(i) in both the proposed and final action sufficiently explains that catch includes fish that are retained for any purposes, mortality of fish that have been discarded, allocations for scientific research, and mortality from any other fishing activity. NMFS, however, disagrees that, when bycatch data is lacking, managers could ignore this known source of fishing mortality. Ignoring a known source of fishing mortality because data are lacking leads to underestimating catch. Unless this is factored in—for instance, as increased uncertainty leading to more conservative ABC and appropriate AMs (including ACT control rules)—overfishing could occur. NMFS's National Bycatch Report (due to be published in late 2008 or early 2009) provides comprehensive estimates of bycatch of fish, marine mammals, and non-marine mammal protected resources in major U.S. commercial fisheries. For instances where the National Bycatch Report does not provide bycatch data, NMFS suggests developing proxies based on National Bycatch Report bycatch ratios in similar fisheries until better data are available. For more information on the National Bycatch Report, *see http://www.st.nmfs.noaa.gov/st4/nop/Outreach/NBR_Factsheet_Final.pdf*. However, the decision about the best methodology for estimating bycatch should be made by the Council in consultation with its SSC, considering the best available scientific information.

Comment 36: One commenter requested clearer guidance for the specification of ABC and ultimately an ACL in cases where scientific uncertainty ''overwhelms'' the SSC's ability to make a valid ABC recommendation.

Response: The NS1 Guidelines recognize that precise quantitative assessments are not available for all stocks and some stocks do not have sufficient data for any assessment beyond an accounting of historical catch. It remains important to prevent overfishing in these situations, even though the exact level of catch that causes overfishing is not known. The overall guidance is that when stocks have limited information about their potential yield, harvest rates need to be moderated until such information can be obtained. Possible approaches include setting the ABC as 75% of recent average catch; see NMFS' Technical Guidance in Restrepo *et al.* (1998). NMFS is currently working on a report on control rules that will provide additional examples of possible approaches for data-limited situations as well as approaches that can use a better set of information.

Comment 37: ABC and ACT control rules should be revised to require consideration of life history characteristics (e.g., productivity, geographic range, habitat preferences, etc.) of a stock when setting control rules or catch limits.

Response: NMFS agrees that the productivity of stock, as well as the stocks susceptibility to the fishery should be considered when developing the ABC control rule. NMFS refers to these factors together as the vulnerability of stock, which is defined in § 600.310(d)(10) of the final action. The ABC control rule (see § 600.310(f)(4) of the final action) is based on scientific knowledge about the stock, which includes a stock's vulnerability to the fishery.

Regarding the ACT control rule, the final guidelines do not require that ACTs always be established, but provide that ACTs may be used as part of a system of AMs. When used, ACT control rules address management uncertainty, which is not related to the productivity of the stock. As noted in § 600.310(g)(3) of the final action, however, a Council could choose a higher performance standard (e.g., a stock's catch should not exceed its ACL more often than once every five or six years) for a stock that is particularly vulnerable to the effects of overfishing. In considering the performance standard, a Council should consider if the vulnerability of the stock has been accounted for in the ABC control rule, so as not to double count this type of uncertainty and provide unduly cautious management advice.

Comment 38: NMFS received comments requesting that text in § 600.310(f) of the proposed action be modified to clarify that ABC may not equal or exceed OFL; Councils are required to establish ABC control rules; the ABC and ACT control rules must stipulate the stock level at which fishing will be prohibited; and ACL cannot equal or exceed the ABC.

Response: NMFS does not agree that the guidelines should prohibit ABC from being equal to OFL, or ACL from being equal to ABC. NMFS has added text to the guidelines (§ 600.310(f)(3) and (f)(4)) to clarify that it believes that ABC should be reduced from OFL in most cases, and that if a Council recommends an ACL which equals ABC, and the ABC is equal to OFL, the Secretary may presume that the proposal would not prevent overfishing, in the absence of sufficient analysis and justification for the approach. NMFS agrees that an ABC control rule is required. NMFS does not agree, however, that the ABC and ACT control rules must stipulate the level at which fishing is prohibited. Here it is important to distinguish between setting an annual level of catch equal to zero because the stock biomass is low, from prohibiting landings for the remainder of a fishing year because the ACL has already been achieved. For the first type of prohibition, an ABC control rule could stipulate the level at which fishing is prohibited due to low stock biomass, but such a low level of biomass is likely to be below the MSST which will invoke development of a rebuilding plan with associated modification of the ABC control rule for the duration of the plan. NMFS, however, disagrees that the ACT control rule should have a similar stipulation as the primary function of this control rule is to account for management uncertainty and to serve as the target for inseason management actions.

Comment 39: NMFS received several comments that spatial-temporal management of ACLs should be employed as an integral part of effective catch-limit management. The commenters noted that apportioning ACLs by seasons and areas could reduce bycatch, protect sensitive habitats, reduce competition among fishery sectors, avoid localized and serial depletions of stocks, and ensure geographic and seasonal availability of prey to key predators.

Response: NMFS acknowleges that spatial and temporal considerations of fishery removals from a stock can be important. Many fisheries currently incorporate spatial and temporal considerations. However, in the context of NS1, these considerations would be relevant only if the overfishing definition or the OY definition for a stock included spatial or temporal divisions of the stock structure. NMFS believes the guidelines give Councils flexibility to consider spatial and temporal issues in establishing ACLs for a stock, and does not agree that the NS1 guidelines need to specifically address this issue. Apportioning ACLs by seasons and areas could be considered as Councils develop conservation and management measures for a fishery to meet the full range of MSA requirements, including the NS for basing conservation and management measures upon the best scientific information available (NS2); taking into account the importance of fishery resources to fishing communities to provide sustained participation and minimize adverse economic impacts (NS8); minimizing bycatch (NS9); and allocating fishing privileges among various U.S. fishermen that are fair and equitable, reasonably calculated, and carried out in such a manner that no particular entity acquires an excessive share of the catch (NS4).

Comment 40: NMFS received several comments about the role of the SSC in specifying ABC. Several commenters stated that the final ABC recommendation should be provided by the SSC (i.e., final peer review process), rather than an additional peer review process. Some commenters expressed concern that both the SSC and peer review process would recommend an ABC, leaving the Council to use the lower of the two recommended ABC values. One comment stated that the SSC should have the discretion to recommend an ABC that is different from the result of the control rule calculation in cases where there was substantial uncertainty or concern relating to the control rule calculated ABC.

Response: NMFS agrees that the SSC should provide the final ABC recommendation to their Council. In the preamble of the proposed NS1 revisions, NMFS acknowledged that the statutory language could be subject to different interpretations (*see* p. 32532 of 73 FR 32526; June 9, 2008). MSA refers to not exceeding fishing level recommendations of ''scientific and statistical committee or peer review process'' in one place and SSC recommendations for ABC and MSY in another place. Compare MSA sections 302(h)(6) and 302(g)(1)(B). Section 302(g)(1)(E) of the MSA provides that the Secretary and a Council may, but are not required to, establish a peer review process. NMFS feels that the Council should not receive ABC recommendations from two different sources (SSC and peer review). In order to avoid confusion, and in consideration of the increased role of SSCs in the MSA, NMFS believes that the SSC should provide the ABC recommendation and Councils should establish a clear process for receiving the ABC recommendation (as described in § 600.310(f)(3) of this action). The advance notice of proposed rulemaking (ANPR) (73 FR 54132; September 18, 2008) for potential revision of the National Standard 2 Guidelines includes consideration of the relationship between SSCs and peer review processes. NMFS believes the roles of the peer review process and the SSC complement each other. For example, a peer review process may conduct an extensive technical review of the details of each stock assessment. The SSC can then use the assessment document and its peer review, consider unresolved uncertainties, seek consistency with assessment decisions made for other stocks in the region, and arrive at an ABC recommendation. In addition, NMFS agrees that SSCs could provide an ABC recommendation that differed from the result of the ABC control rule calculation based on the full range of scientific information available to the SSC. The SSC would have explain why the recommendation differed from the calculated value. NMFS has added clarifying language into § 600.310(f)(3) of this action.

Comment 41: NMFS received a variety of comments on the role of the SSC and suggestions that the SSC role should be clarified. Comments included: There should be a mandatory peer review of significant SSC recommendations; the SSC should be directed to draw information and recommendations from the broadest possible range of scientific opinion; the SSC recommendation should include a discussion of alternative recommendations that were considered and alternative methodologies that were explored; what is the role of the SSC in providing recommendations for achieving rebuilding targets?; what is the SSC's role in providing ''reports on stock status and health, bycatch, habitat status, social and economic impacts of management measures and sustainability of fishing practices''?; the rule should clarify that the SSC is not charged with actually collecting the data and writing reports; the guidelines should specify the appropriate qualifications and membership of the SSCs and peer review process; the guidelines should specify the relative roles of the SSCs, peer review process, and Councils in establishing ACLs; the guidelines should specify the relative roles of NMFS, the Councils, the SSCs and the peer review process in selecting and evaluating AMs; NMFS should establish formal criteria for SSC membership, including formal training and/or experience in fisheries and/or ecological science or economics; NMFS should create oversight mechanisms and responsibility within NMFS to ensure that members are both qualified and acting in the public interest rather than representing stakeholders; NMFS should provide adequate training programs so that new members are well-prepared to meet these challenges; and NMFS should provide a mechanism for SSC members to identify and challenge political interventions, including potentially the development of a new scientific appeal function, staffed by a board of objective, external expert scientists.

Response: In developing the NS1 guidelines, NMFS focused on the SSC recommendation of the ABC as it is an important reference point for the Councils to use when developing ACLs. NMFS feels that the NS1 guidelines as proposed are clear in that the SSC provides the ABC recommendation and the Councils establish the ACLs. Both the ABC control rules and the ACT control rules could be developed with input from the SSC, Council, and peer review process as appropriate. NMFS believes that the NS1 guidelines adequately address the requirements for SSC recommendations that pertain to NS1. NMFS believes that other specific roles of the SSC would be more appropriately addressed in the National Standard 2 (NS2) guidelines.

Comment 42: Some commenters supported the proposed guidelines regarding the SSC, its relation to the Council, and provision of science advice such as ABC, but requested that the

guidelines further emphasize that managers follow the advice of their scientific advisors in all cases when setting catch limits. Other commenters opposed the provisions and stated that accounting for scientific uncertainty is a matter of policy, not science and therefore should be delegated to the Council. Instead, the commenters proposed that the SSC should be recommending the OFL and that the Council may not set an ACL in excess of the OFL as determined by the SSC.

Response: NMFS believes that determining the level of scientific uncertainty is not a matter of policy and is a technical matter best determined by stock assessment scientists as reviewed by peer review processes and SSCs. Determining the acceptable level of risk of overfishing that results from scientific uncertainty is the policy issue. The SSC must recommend an ABC to the Council after the Council advises the SSC what would be the acceptable probability that a catch equal to the ABC would result in overfishing. This risk policy is part of the required ABC control rule. The Council should use the advice of its science advisors in developing this control rule and should articulate the control rule in the FMP. In providing guidance on establishing a control rule for the ABC, NMFS recognizes that all estimates of the OFL are uncertain, and that in order to prevent overfishing with more than a 50 percent probability of success, the ABC must be reduced from the OFL. The guidance is clear that the control rule policy on the degree of reduction appropriate for a particular stock is established by the Council. To the extent that it results in the ABC being reduced from the OFL, the SSC is carrying out the policy established by the Council. NMFS disagrees that the SSC should recommend OFL and not ABC. The MSA specifies a number of things that make up the recommendations that SSCs provide to their Council including recommendations for ABC, preventing overfishing, MSY, achieving rebuilding targets, reports on stock status and health, bycatch, habitat status, social and economic impacts of management measures, and sustainability of fishing practices. Of these, the ABC is directly relevant as the fishing level recommendation that constrains the ACL.

Comment 43: One comment expressed that Councils must be allowed to specify information needed in the SAFE report.

Response: NMFS agrees. NMFS has removed the following sentence from § 600.310(b)(2)(v)(B) of the final action: ''The SSC may specify the type of information that should be included in the Stock Assessment and Fishery Evaluation (SAFE) report (see § 600.315).''

The contents of the SAFE report fall under the purview of the National Standard 2 (NS2) guidelines. NMFS is currently considering revising the NS2 guidelines, including modification of the language describing the content and purpose of SAFE reports. NMFS recently published an advance notice of proposed rulemaking (73 FR 54132; September 18, 2008) to revise the NS2 guidelines and encourages the public to provide comment.

Comment 44: One commenter believed the ACT should be a suggested component of a fishery management plan rather than a mandated component of an FMP. Although the ACT may clearly distinguish management uncertainty from other sources of uncertainty, adding a target does not fundamentally improve the process. It is more important to correctly adjust the ACL based on actual performance data than to create a separate target or ACT control rule based on theory to account solely for management uncertainty.

Response: The final guidelines do not require that ACTs always be established, but provide that ACTs may be used as part of a system of AMs. NMFS disagrees that a target does not fundamentally improve the process. ACL is to be treated as a limit—an amount of catch that the fishery should not exceed. The purpose of utilizing an ACT is so that, given uncertainty in the amount of catch that will result from the conservation and management measures in the fishery, the ACL will not be exceeded. Whether or not an ACT is explicitly specified, the AMs must address the management uncertainty in the fishery in order to avoid exceeding the ACL. ACLs are subject to modification by AMs.

Comment 45: One comment stated that the purpose of an ACT is to address ''management uncertainty'' which seems to be a very abstract and unquantifiable concept that the Councils are likely to struggle with.

Response: NMFS disagrees that management uncertainty is an abstract concept. It relates to the difference between the actual catch and the amount of catch that was expected to result from the management measures applied to a fishery. It can be caused by untimely catch data that usually prevents inseason management measures from being effective. Management uncertainty also results from underreporting, late reporting and misreporting and inaccurate assumptions about discard mortality of a stock in commercial and recreational fisheries. One way to estimate management uncertainty is to examine a set of annual actual catches compared to target catches or catch quotas for a stock. If all or most of the catches fall closely around their target catches and don't exceed the OFL then management uncertainty is low; if actual catches often or usually result in overfishing then the management uncertainty is high and should be accounted for when establishing the AMs for a fishery, which may include setting an ACT.

Comment 46: NMFS received several comments regarding scientific and management uncertainty. In general these comments included: Clarify the meaning of scientific uncertainty; clarify that some types of uncertainty may not be considered in the ABC control rule process; increase research efforts in order to deal with scientific uncertainty; provide flexibility in the guidelines regarding how the Councils deal with uncertainty; and recognize that recreational fisheries are unduly impacted by the guidelines due to delayed monitoring of catch.

Response: Scientific uncertainty occurs in estimates of OFL because of uncertainty in calculations of MFMT, projected biomass amounts, and estimates in F (i.e., confidence intervals around those parameter estimates). In addition, retrospective patterns in estimates of future stock biomass and F (i.e., biomass may be overestimated and F underestimated on a regular basis) occur in some stock assessments and should be accounted for in determining ABC. NMFS revised the guidelines to make clear that all sources of scientific uncertainty—not just uncertainty in the level of the OFL—must be considered in establishing the ABC, and that SSCs may incorporate consideration of uncertainty beyond that specifically accounted for in the ABC control rule, when making their ABC recommendation. Management uncertainty should be considered primarily in establishing the ACL and AMs, which could include ACTs, rather than in specification of the ABC.

Comment 47: The definition of ABC in § 600.310(f)(2)(ii) of the proposed rule provides that ABC is a level of catch ''that accounts for scientific uncertainty in the estimate of OFL'' and is specified based on the ABC control rule. Scientific uncertainty is not and should not be limited to the estimate of OFL. That restriction would make it more difficult to implement other appropriate methods for incorporating scientific uncertainty in other quantities such as distribution of long term yield.

Response: NMFS agrees. NMFS has revised §§ 600.310(f)(2)(ii), (f)(2)(iii),

and (f)(4) of the action to state that ABC accounts for scientific uncertainty in the estimate of OFL and other scientific uncertainty.

Comment 48: Several commenters stated that buffers, or margins of safety, need to be required between the overfishing level and annual catch limits to account for uncertainty, and that the final action should require the use of such buffers to achieve a high probability that overfishing does not occur. NMFS received comments suggesting that buffers between limit and target fishing levels reduce the chance that overfishing will occur and should be recognized as an accountability measure. Other commenters thought that the provision for setting ACT less than ACL meant that a Council has no discretion but to establish buffers. They said that while buffers may be appropriate in certain circumstances, they may also prevent achievement of OY in some circumstances.

Response: As noted elsewhere, NMFS has revised the final guidelines: they do not require that ACTs always be established, but provide that ACTs may be used as part of a system of AMs. The guidelines are intended only to provide Councils with direction on how the requirements of NS1 can be met, incorporating the requirement for ACLs and AMs such that overfishing does not occur. To prevent overfishing, Councils must address scientific and management uncertainty in establishing ABC, ACLs, and AMs. In most cases, some reduction in the target catch below the limit will result. NMFS does not believe that requiring buffers is appropriate, as there may be circumstances where that is not necessary to prevent overfishing. However, the guidelines require that AMs in a fishery be adequate to prevent ACLs from being exceeded, and that additional AMs are invoked if ACL is exceeded.

Comment 49: Some commenters stated that Councils needed flexibility to effectively tailor fishery management plans to the unique conditions of their fisheries, and that Councils should also have flexibility in how to account for scientific and management uncertainty.

Response: NMFS agrees that Councils should have flexibility, so long as they meet the requirements of the statute. ACLs to prevent overfishing are required, and management and scientific uncertainty must be considered and addressed in the management system in order to achieve that objective. NMFS also believes that Councils should be as transparent and explicit as possible in how uncertainty is determined and addressed, and believes the guidelines provide a good framework to meet these objectives.

Comment 50: One commenter supported NMFS' attention to scientific and management uncertainty, but thought that the better approach to deal with uncertainty is to reduce uncertainty. They stated that to accomplish this objective NMFS must increase its support for agency scientific research specific to stock assessments and ecosystem science.

Response: NMFS agrees. However, the processes proposed in the guidelines will address the current levels of uncertainty and accommodate reduced uncertainty in the future, as improvements in data are made.

Comment 51: Some commenters said that implementing ACLs would lead to economic disruption, particularly in the recreational fishing sector, because of a large degree of management uncertainty. One commenter cited difficulties in obtaining timely and accurate data, particularly for recreational fisheries, and asked if recreational allocations would have to be reduced due to delays in obtaining recreational harvest estimates.

Response: Preventing overfishing is a requirement of the MSA. The ACL mechanisms and AMs for a fishery must be adequate to meet that requirement, and in some cases, reductions in catch levels and economic benefits from a fishery may result. The specific impacts of implementing ACLs in a fishery will be analyzed when the ACLs are established in an FMP.

Comment 52: One commenter stated that the guidelines would require reducing catches well below existing OY levels, and that many species are known to be fished at low levels which are highly unlikely to lead to overfishing. They stated that this is inconsistent with responsible marine management and seems unlikely to represent the intent of Congress.

Response: Nothing in the guidelines would require a reduction in fishing if, in fact, the stocks are fished at low levels which are highly unlikely to lead to overfishing, and this conclusion is supported by science.

Comment 53: One commenter asked if OY could be specified for a fishery or a complex, or if the guidelines would require specification of OY for each species or complex.

Response: The guidelines provide that OY can be specified at the stock, stock complex or fishery level.

Comment 54: NMFS received several comments both supporting and opposing the use of inseason AMs (§ 600.310(g) of the proposed action). The commenters that supported the use of inseason AMs typically suggested that the Councils and NMFS improve their capability to use inseason AMs and/or that NMFS must make inseason closure authority a required element of FMPs. Opponents of inseason AMs commented that it is more reasonable to implement AMs after reviewing annual fishery performance data; there is no requirement in the law to impose inseason measures; inseason closures without individual transferable quotas will generate derby fisheries; and the requirement to use inseason AMs whenever possible would be difficult where monitoring data is not available.

Response: MSA provides for ACLs to be limits on annual catch, thus it is fully appropriate and consistent with the Act that available data be utilized to prevent ACLs from being exceeded. Conservation and management measures for a fishery should be designed so that ACLs are not routinely exceeded. Therefore, FMPs should contain inseason closure authority giving NMFS the ability to close fisheries if it determines, based on data that it deems sufficiently reliable, that an ACL has been exceeded or is projected to be reached, and that closure of the fishery is necessary to prevent overfishing. NMFS believes that the alternative result, which is that data are available inseason that show an ACL is being exceeded, but no management action is taken to prevent overfishing, would not meet the intent of the MSA. The MSA requires ACLs in all fisheries. It does not provide an exemption based on a concern about derby fishing. NMFS has modified the language in § 600.310(g)(2) of this action to indicate that ''For fisheries without inseason management control to prevent the ACL from being exceeded, AMs should utilize ACTs that are set below ACLs so that catches do not exceed the ACL.''

Comment 55: NMFS received some comments that generally expressed that AMs will be difficult to implement and that the provisions need to be clarified. Comments included: if an ACL is exceeded, a review by the Council must occur before implementation of the AMs; the Council must examine the ''problem'' that caused the overage—which means nothing will happen quickly; and it is not clear what ''biological consequences'' means in § 600.310(g)(3) of the proposed action.

Response: As proposed, AMs are management measures designed to prevent an ACL from being exceeded, as well as measures to address an overage of an ACL if it does occur. NMFS recommends that, whenever possible, Councils implement AMs that allow inseason monitoring and adjustment of

the fishery. The AMs should consider the amount of time required for a Council to conduct analyses and develop new measures. In general, AMs need to be pre-planned so they can be effective/available in the subsequent year, otherwise, there could be considerable delay from the time that an overage occurs to the time when measures are developed to address the overage. Not all overages may warrant the same management response. Consider hypothetically the example of a fishery for which a 3 fish bag limit with 16 inch minimum size is expected to achieve the target catch level without exceeding the ACL. For such a fishery, the Council might implement AMs such that, if the catch was under the ACL or exceeded it by less than 5 percent, the same bag and size limits would apply the following year. If the ACL was exceeded by 5–25 percent, the bag limit the following year would be reduced to 2 fish, and if the ACL was exceeded by more than 25 percent the bag limit would be reduced to 1 fish. The AMs could also address a situation where catch was below the target level, indicating that the initial measures might be too strict. The objective is to have pre-planned management responses to ACL overages that will be implemented in the next season, so that flawed management measures do not result in continuing overages for years while Councils consider management changes. An FMP must contain AMs (see § 600.310(c)(5) of the final action). However, NMFS believes that the FMP could contain more general framework measures and that specific measures, such as those described hypothetically above, could be implemented through harvest specifications or another rulemaking process.

By ''biological consequences,'' NMFS means the impact on the stock's status, such as its ability to produce MSY or achieve rebuilding goals. For example, if information was available to indicate that, because of stronger than expected recruitment, a stock was above its B_{msy} level and continued to grow, even though the ACL was exceeded for the year, that could indicate that the overage did not have any adverse biological consequences that needed to be addressed through the AM. On the other hand, if the ACL for a long lived stock with low reproductive potential was exceeded by 100 percent, AMs should be responsive to the likelihood that some long-term harm to the stock may have been caused by the overage.

Comment 56: One commenter expressed concern about the term ''re-evaluated'' in §§ 600.310(g)(3) and (g)(4) in the proposed action. They stated that this could imply that Councils simply have to increase ACLs when they have ACL exceedances, and suggested that, if catch exceeds ACL more than once in last four years, there should be automatic buffer increases in setting ACL below OFL to decrease likelihood of exceeding ACL.

Response: If the performance standard is not met, the Councils must re-evaluate the system of ACLs and AMs, and modify it if necessary so that the performance standard is met. Since the ACL cannot exceed the ABC recommended by the SSC, NMFS does not believe that the scenario described by the commenter would arise. NMFS also does not believe that the guidelines should recommend automatic buffer increases in this case. The specific factors that caused the performance standard to not be met need to be analyzed and addressed. NMFS also notes that, in addition to this re-evaluation of the system of ACLs and AMs, AMs themselves are supposed to prevent and address ACL overages.

Comment 57: Several comments were received related to accountability measures for when catch exceeds the ACL. Some comments supported the concept that a full payback of ACL overages should be required for all stocks. Comments included: Overage deductions should be normal business for rebuilding and healthy stocks alike; NMFS should require all overages to be accounted for in full for all managed fisheries no later than when the ACL for the following fishing year is determined; and overage deductions must be viewed as an independent requirement from actions geared to preventing overages from occurring in the future, such as modifications of management measures or changes to the full system of ACLs, ACTs, and AMs.

Response: MSRA is silent with regard to mandatory payback of ACL overages. However, in developing the ACL provisions in the MSRA, it appears that Congress considered mandatory paybacks and did not include that requirement in the MSRA. NMFS believes that paybacks may be an appropriate AM in some fisheries, but that they should not be mandated, but rather considered on a case by case basis for stocks and stock complexes that are not in a rebuilding plan.

Comment 58: Several comments opposed the concept of an overage adjustment when catch exceeds the ACL for stocks that are in rebuilding plans (§ 600.310(g)(3) of the proposed action). Comments included: The MSA does not require this, this provision was removed from the drafts of the MSRA, and a full ''payback'' the following year may be unnecessary. Other comments supported the concept but wanted to strengthen § 600.310(g)(3) of the guidelines to remove text that stated: ''unless the best scientific information available shows that a reduced overage adjustment, or no adjustment, is needed to mitigate the effects of the overages.''

Response: NMFS believes that more stringent requirements for AMs are necessary for stocks in rebuilding plans. MSA 304(e)(3) provides that, for overfished stocks, an FMP, FMP amendment, or proposed regulations are needed to end overfishing immediately in the fishery and rebuild overfished stocks. There are a number of examples where failure to constrain catch to planned levels early in a rebuilding plan has led to failure to rebuild and the imposition of severe catch restrictions in later years in order to attempt to meet the required rebuilding timeframe. Thus, for rebuilding stocks, NMFS believes that an AM which reduces a subsequent year's ACL by the amount of any overage is appropriate, and will help prevent stocks failing to rebuild due to annual rebuilding targets being exceeded. NMFS does provide that if there is an analysis to show that all or part of the deduction is not necessary in order to keep the stock on its rebuilding trajectory, the full overage payback is not necessary. For example, an updated stock assessment might show that the stock size has increased faster than expected, in spite of the overage, and that a deduction from the subsequent ACL was not needed. For most rebuilding stocks, assessments cannot be updated annually, and in the absence of such analytical information, NMFS believes that the guideline provision is necessary to achieve rebuilding goals for overfished stocks.

Comment 59: Some commenters expressed support for the AMs as proposed and agreed that AMs should prevent catch from exceeding the ACL and address overages if they should occur. Other commenters suggested that AMs should be tied to overfishing or that AMs should be triggered when catch exceeds the ABC (as opposed to the ACL). Some commenters expressed that the MSA does not require the application of AMs if the ACL is exceeded.

Response: In developing the guidelines, NMFS considered using OFL or ABC as a point at which mandatory AMs should be triggered. However, NMFS believes that Congress intended the ACL to be a limit, and as such, it should not be exceeded. In addition, ''measures to ensure accountability'' are required in association with the ACL in MSA section 303(a)(15). Therefore, it is

most appropriate to apply AMs if the ACL is exceeded. In addition, the purpose of ACLs is to prevent overfishing, and AMs triggered at the ACL level should be designed so that the ABC and OFL are not exceeded.

Comment 60: Several comments were received regarding the proposed performance standards. The performance standard that NMFS proposed in the proposed action stated that: ''If catch exceeds the ACL more than once in the last four years, the system of ACLs, ACTs and AMs should be re-evaluated to improve its performance and effectiveness.'' In cases where AMs are based on multi-year average data, the proposed performance standard stated: ''If average catch exceeds the average ACL more than once in the last four years, then the ACL, ACT and AM system should be re-evaluated.'' The commenters that supported the proposed performance standard suggested that it would allow the Council more flexibility in the management of their fisheries with ACLs. Commenters that disliked the proposed performance standard suggested that the Councils should have more flexibility in determining the performance standards, expressed concerns that the performance standard may not be precautionary enough, or expressed that it was arbitrary.

Response: NMFS believes it is important to establish a performance standard to establish accountability for how well the ACL mechanisms and AMs are working that is consistent across all Councils and fisheries. NMFS believes that ACLs are designed to prevent overfishing and that it is important to prevent catches from exceeding ACLs. NMFS also believes that, given scientific and management uncertainty, it is possible that catch will occasionally exceed ACL for a given stock or stock complex. However, it would be unacceptable to allow catch to continually exceed ACL. Therefore, NMFS proposed the performance standard to allow for some flexibility in the management system but also prevent overfishing. It should not limit a Council from establishing stronger performance measures, or from reevaluating their management measures more often. Notwithstanding the performance standard, if, at any time, a Council determines that the conservation and management measures for a fishery are not achieving OY while preventing overfishing, it should revise the measures as appropriate.

Comment 61: Several comments were received that suggested that fishery managers should or be required to re-evaluate the system of ACLs, ACT and AMs every time catch exceeds ACL. In addition, some expressed that NMFS should make clear that the ''reevaluation'' called for in the proposed action does not authorize simply raising ACLs or other numeric fishing restrictions in order to avoid the inconvenient fact that they have been exceeded.

Response: NMFS does not agree that a re-evaluation of the entire system of ACLs and AMs should be required every time an ACL is exceeded. If catch exceeds ACL in any one year, or if the average catch exceeds the average ACL, then AMs will be implemented and they should correct the operational issues that caused the overage, as well as any biological consequences resulting from the overage. Councils should be allowed the opportunity to see if their AMs work to prevent future overages of the ACL.

Comment 62: NMFS received comments that requested clarification or changes to the proposed performance standard. For example, one commenter suggested that NMFS should require a higher performance standard for vulnerable stocks. Two commenters expressed that the performance standard should apply at the stock or stock complex level as opposed to the fishery or FMP level. Another commenter questioned if the performance standard was if catch exceeds the ACL more than once in the last four years or if average catch exceeds the average ACL more than once in the last four years. NMFS also received some comments about the phrase ''to improve its performance and effectiveness'' in paragraph § 600.310(g)(3) of the proposed action. Those comments included: The phrase does not make sense in this context, because simply re-evaluating a system cannot improve its performance or effectiveness (only changing a system can do so); and use of this phrase in § 600.310(g)(3) is inconsistent with a similar sentence in paragraph § 600.310(g)(4) of the proposed action, where the same requirement is expressed, but this phrase does not appear.

Response: NMFS stated in the preamble of the proposed guidelines that a Council could choose a higher performance standard for a stock that is particularly vulnerable to the effects of overfishing. While NMFS agrees that a higher performance standard could be used for a stock or stock complex that is particularly vulnerable, NMFS believes the discretion to use a higher performance standard should be left to the Council. To reiterate this point, NMFS is adding additional language in § 600.310(g)(3) of the final action. NMFS intended that the performance standards would apply at the stock or stock complex level and is adding additional clarifying language in the regulatory text. The National Standard 1 guidelines as proposed offered two performance standards, one applies when annual catch is compared to the ACL for a given stock or stock complex, as described in paragraph § 600.310(g)(3) of this action, the other performance standard applies in instances when the multi-year average catch is compared to the average ACL, as described in § 600.310(g)(4) of this action. NMFS intended that in both scenarios, if the catch exceeds the ACL more than once in the last four years, or if the average catch exceeds the average ACL more than once in the last four years, then the system of ACLs and AMs should be re-evaluated and modified if necessary to improve its performance and effectiveness. NMFS has modified language to § 600.310(g)(3) and (4) of this action to clarify this issue.

Comment 63: NMFS received several suggestions to require a specific and high probability of success in either preventing overfishing, preventing catch from exceeding the ACL, or achieving the ACT. Comments included: The rule should make clear that management measures must have a high probability of success in achieving the OY or ACT; we recommend a probability of at least eighty percent of achieving the OY or ACT; NMFS should establish a performance standard that defines low risk, as well as an acceptable probability of successfully managing catch levels of 90 percent; National Standard guidelines should explicitly define the maximum acceptable risk of overfishing. One commenter cited to several court cases (NRDC v. Daley, Fishermen's Dock Coop., and Coastal Conservation Ass'n) and stated that the ACT control rule should be revised to state that the risk of exceeding the ACL due to management uncertainty is no greater than 25 percent.

Response: Considering and making appropriate allowances for uncertainty in science and management is emphasized in the NS1 guidelines. NMFS believes that, if this is done, ACLs will not often be exceeded, and when they are, the overages will typically be small and will not jeopardize the status of the stock. Fisheries where ACLs are exceeded regularly or by large amounts should be quickly modified to improve the measures.

During the initial scoping period, NMFS received many comments on the topic of setting a specific probability of success; some commenters expressed that a 50 percent probability of success is all that is legally required, while other

commenters expressed that the probability of success should be higher (e.g. 75 or 100 percent). When developing the definition framework of OFL, ABC, ACL, and ACT, NMFS considered including specific probabilities of success regarding preventing overfishing or preventing catch from exceeding ACL. NMFS did not specify a particular probability in the NS1 guidelines, for a number of reasons. NMFS did not believe it had a basis for picking a specific probability number that would be appropriate for all stocks and stock complexes in a fishery. Councils should analyze a range of alternatives for the probability that ACL will not be exceeded or that overfishing will not occur. NMFS recognizes that fisheries are different and that the biological, social and economic impacts of managing at a specific probability will differ depending on the characteristics of the fishery. NMFS also recognizes that it is not possible to calculate a probability of success in many fisheries, due to data limitations.

NMFS does not believe that MSA and relevant case law require use of specific probabilities. However, a 50 percent probability of success is a lower bound, and NMFS believes it should not simply be used as a default value. Therefore, in § 600.310(f)(4) of the final action, NMFS states that the determination of ABC should be based, when possible, on the probability that catch equal to the stock's ABC would result in overfishing, and that this probability cannot exceed 50 percent and should be a lower value.

To determine if the system of ACLs was working adequately, NMFS decided to establish a performance standard in terms of the frequency that ACLs were exceeded. The comparison of catch to an ACL is a simpler task than calculating a probability of success, and can be applied to all fisheries, albeit some fisheries have more timely catch data than others. This does not preclude the Councils from using the probability based approach to setting limits and targets in their fisheries if they are able to do so.

Comment 64: Several comments were received urging NMFS to either require or encourage the use of sector ACLs and AMs and hold each sector accountable. Comments expressed that to provide the right incentives for conservation, catch reductions and increases must be tied to compliance and performance in adhering to ACLs. One commenter stated that MSA 303(a)(14) compels distinct ACLs and AMs for each sector due in part to the variation in management uncertainty among sectors. Sector management should be required in FMPs to ensure equitable treatment for all stakeholder groups including harvest restrictions and benefits to each sector.

Response: Separate ACLs and AMs for different fishery sectors may be appropriate in many situations, but the Councils should have the flexibility to determine this for each fishery. The decision to use sectors should be at the discretion of each Council. NMFS agrees that, if Councils decide to use sectors, each sector should be held accountable if catches for a sector exceed sector-ACLs. In addition, the NS1 guidelines provide that the ACL/AM system must protect the stock or stock complex as a whole. NMFS does not believe that MSA necessarily compels use of sector ACLs and AMs, thus the final action does not require their use. However, in developing any FMP or FMP amendment, it is important to ensure consistency with MSA 303(a)(14), NS 4, and other MSA provisions. Section 303(a)(14) pertains to allocation of harvest restrictions or recovery benefits fairly and equitably among commercial, recreational, and charter fishing sectors. NS 4, in part, pertains to fair and equitable allocations.

Comment 65: Some commenters expressed that managing recreational fisheries with ACLs and AMs will be difficult as they typically lack timely data. Comments included: The initiative to set ACLs and AMs for any fishery that has a recreational component cannot be done and any attempt will be arbitrary at best; in-season management is impractical in most recreational fisheries; current data collection programs used to evaluate recreational fishing activity do not offer a level of confidence to fisheries managers or fishermen to implement ACL in the recreational sector; and NMFS should improve recreational data collection to a level where inseason management is possible.

Response: NMFS acknowledges that recreational fisheries often do not have timely catch data and that is why NMFS suggested the multi-year averaging provision for AMs. NMFS and the Council still need to meet the mandate of the MSA and have ACLs for all fisheries. NMFS is developing a new data collection program for recreational fisheries to improve the data needed to implement the new provisions of the MSA.

Comment 66: Some commenters suggested that for recreational fisheries, catch limits should be expressed in terms of fishing mortality rates or in terms of numbers of fish instead of pounds of fish.

Response: NMFS intends that ACLs be expressed in terms of weight or numbers of fish. In fact, the definition of ''catch'' in the proposed guidelines indicates that catch is measured in weight or numbers of fish. NMFS disagrees that ACL can be expressed in terms of fishing mortality rates. While conservation and management measures for a fishery can be designed to achieve a target fishing mortality rate, the fishing mortality rates that are achieved can only be estimated by performing a stock assessment. Stock assessments usually lag the fishery by a year or more, and are not suitable as the basis for ACL accountability measures.

Comment 67: One commenter suggested that when recreational fisheries account for a significant portion of the catch, the buffers should be correspondingly larger to account for the management uncertainty.

Response: NMFS believes that management uncertainty should be addressed in all fisheries. Accountability measures may include an ACT set below the ACL based on the degree of uncertainty that the conservation and management measures will achieve the ACL. This applies to all fisheries, commercial or recreational.

Comment 68: NMFS received a few comments expressing that Councils should have flexibility when specifying AMs.

Response: NMFS agrees and believes that the guidelines provide this flexibility.

Comment 69: AMs should be approved by the Secretary of Commerce, should be subject to regular scientific review, and should provide opportunities for public comment; performance must be measurable and AMs must be modified if not working; AMs should be reviewed annually as part of the catch specification process.

Response: AMs will be implemented through public processes used for amending FMPs and implementing regulations. There is no need for additional guidance in the NS1 guidelines.

Comment 70: NMFS received comments that support the use of AMs based on comparisons of average catch to average ACL, if there is insufficient data to compare catch to ACL, either inseason or on an annual basis. In recreational fisheries, the use of a three-year rolling average ACL would moderate wild swings in ACLs due to variable fishing conditions and participation from year to year. Flexibility, such as the use of a multi-year average for the recreational sector, is needed due to limitations in the data collection. However, some commenters

expressed concerns about using the multi-year averaging approach and stated that it should be used rarely. In order to use such an approach, Councils should provide clear and compelling reasons in their FMPs as to why the use of multi-year average data are necessary and a plan for moving the fishery to AMs based on annual data. The guidelines should make it clear that AMs will be triggered annually in cases where the average catch exceeds the average ACL. NMFS should engage its quantitative experts in an investigation of the performance of using multi-year averages for managing highly variable fisheries with poor inseason data. Until such results are available, NMFS should use annual statistics for management of all fisheries, including those involving highly variable stocks or catch limits.

Response: Use of AMs based on comparison of average catch to average ACL is only appropriate in a limited number of fisheries, such as fisheries that have high variability in the estimate of total annual catch or highly fluctuating annual catches and no effective way to monitor and control catches inseason. NMFS intends that a comparison of the moving average catch to the average ACL would be conducted annually and that AMs would be implemented if average catch exceeds the average ACL. If the average catch exceeds the average ACL more than once in the last four years, then the system of ACLs and AMs should be re-evaluated and modified if necessary to improve its performance and effectiveness. NMFS agrees that the Council should analyze and explain why they are basing AMs on multi-year averaged data. NMFS has added clarifying language to § 600.310(g)(4) of the final action to make these points clear. Future improvements in data and management approaches should also be pursued so that true annual accountability for catch can be achieved. In addition, NMFS believes that AMs such as the use of ACT may be appropriate in fisheries that use the multi-year averaging approach.

Comment 71: Several comments were received regarding ACLs and AMs for fisheries that occur partly in state waters. Some comments stated that accountability measures for State-Federal fisheries could use further elaboration and should specifically address fisheries where management had been delegated to the state. Some commenters supported separate ACLs and AMs for Federal and state portions of the fishery, while others wanted combined overall ACLs and AMs. Some comments disagreed that closure of Federal waters while fishing continues in non-Federal waters is a preferred option, and that efforts should be made to undertake cooperative management that allows coordinated responses.

Response: When stocks are co-managed by Federal, state, tribal, and/or territorial fishery managers, the goal should be to develop collaborative conservation and management strategies to prevent overfishing of shared stocks and ensure their sustainability. NMFS encourages collaboration with state managers to develop ACLs and AMs that prevent overfishing of the stock as a whole. As FMPs currently consider whether overfishing is occurring for a stock or stock complex overall, NMFS thinks it is appropriate to specify an overall ACL for the stock or stock complex. This ACL could be subdivided into state and Federal ACLs, similar to the approach used for sector-ACLs. However, NMFS recognizes that Federal management authority is limited to that portion of the fishery under Federal jurisdiction and therefore the NS1 guidelines only require AMs for the Federal fishery. The AMs could include closing the EEZ when the Federal portion of the ACL is reached, closing the EEZ when the overall stock or stock complex's ACL is reached, or other measures. NMFS recognizes the problem that may occur when Federal fisheries are closed but fishing continues in state waters. NMFS will continue to work with states to ensure consistency and effectiveness of management measures. If Councils delegate management under an FMP to the states, the FMPs still need to meet the requirements of the MSA, including establishment of ACLs and AMs.

Comment 72: One commenter asked, in the case where ACLs are exceeded because of the regulatory failures of one state, if other states in the Council's or the Atlantic States Marine Fisheries Commission's (ASMFC) area of jurisdiction be affected through mandatory AMs. Barring state-by-state allocations for all species (as with summer flounder), the proposed regulations could punish commercial fishermen and anglers in all states in a region.

Response: The guidelines acknowledge that NMFS and the Councils cannot mandate AMs on state fisheries. However, NMFS encourages collaboration between state and Federal managers to develop ACLs and AMs to prevent overfishing for the stock as a whole. In cases where there is collaboration, accountability measures for the fishery should be designed to address this issue. Specific AMs that may be needed would have to be evaluated and addressed on a case-by-case basis.

Comment 73: NMFS received a question regarding the meaning of the phrase ''large majority'' in § 600.310(g)(5) of the proposed action. NMFS had stated that: ''For stocks or stock complexes that have a large majority of harvest in state or territorial waters, AMs should be developed for the portion of the fishery under Federal authority and could include closing the EEZ when the Federal portion of the ACL is reached, or the overall stock's ACL is reached, or other measures.'' The commenter stated that the meaning of the term ''large majority'' and its importance is not clear and should therefore be eliminated.

Response: NMFS agrees that ACL and AMs need to be established for all stocks and stock complexes in Federal fisheries regardless of the whether a large majority of harvest occurs in state waters. NMFS agrees the amount, *i.e.*, ''large majority,'' is not pertinent to this provision. Therefore, § 600.310(f)(5)(iii) and (g)(5) have been revised in the final action.

Comment 74: NMFS received several comments noting that NMFS should require or recommend the use of limited access privilege programs (LAPPs) or catch shares by Councils in the final rule. Many commenters referenced an article on catch shares (Costello *et al.* 2008).

Response: The article cited above and other articles note the potential benefits of LAPPs. NMFS supports use of LAPPs, and believes they can be a beneficial approach to use in implementing effective ACLs. However, while ACLs are required in all fisheries, under the MSRA, LAPPs are optional and at the discretion of each Council. NMFS does not have authority to require Councils to use LAPPs, but is currently developing guidelines on LAPPs that will be published for public comment in the future.

Comment 75: One comment requested that NMFS expand the concept of accountability measures to include effective catch monitoring, data collection and analysis, and enforcement. The commenter suggested that for accountability measures that are not LAPPs, managers should demonstrate how the measures will ensure compliance with the ACLs as well as improve data and enforcement, reduce bycatch, promote safety, and minimize adverse economic impacts at least as well as LAPPs.

Response: NMFS agrees that catch monitoring, data collection and analysis, and enforcement are all important to consider in developing

AMs for a fishery and believes the guidelines are adequate. Under § 600.310(i) of the final action, FMPs, or associated documents such as SAFE reports, must describe data collection methods. In addition, § 600.310(g)(2) of the final action, states that whenever possible, inseason AMs should include inseason monitoring and management measures to prevent catch from exceeding ACLs. NMFS believes the guidelines are clear that catch monitoring data is very important to consider when Councils establish their AMs. Councils are already directed to: minimize adverse economic impacts under National Standard 8; minimize bycatch and bycatch mortality under National Standard 9; and promote safety of human life at sea under National Standard 10. *See* MSA 301(a)(8), (9), and (10) (setting forth specific requirements of the national standards).

Comment 76: NMFS received comments expressing concern about establishing ACL and AM mechanisms in FMPs. One commenter expressed concern that if ACL and AM mechanisms were located in the FMP, it would require a multi-year process to change any measure. They instead suggested that Councils should have the ability to framework the mechanisms and establish an annual or multi-year process for making adjustments. Another commenter suggested that Councils should be required to modify their SOPPs to incorporate a mechanism for specifying ACLs and reviewing AMs annually through regular catch specification procedures. NMFS received another comment that disagreed with the idea that the Council's SOPPs are the proper place to describe the process for establishing ABC Control Rules, including the role of SouthEast Data Assessment and Review (SEDAR) and the SSC. This commenter recommended instead that ABC Control Rules be included in Fishery Management Plans and have the ability to refine management through framework actions.

Response: The FMP needs to contain the ACL mechanisms and AMs, as they are part of the conservation and management measures for the fishery. The ACL mechanisms and AMs can contain framework provisions and utilize specification processes as appropriate. NMFS does not agree that the ACL and AM mechanisms should be established in the SOPPs. Also, NMFS never intended that ABC control rules would be described in the SOPPs and agrees that the ABC control rules should be described in the Fishery Management Plans. However, it is important to understand how the Councils, SSC, and peer review process work together to implement the provisions of the MSA, and that can be explained in the SOPPs, FMP, or some other document.

Comment 77: NMFS received several comments supporting the exception to the ACL rule for stocks with a life cycle of approximately one year. Commenters asked for a list of species which fit the exception, specific guidance on how to set ACLs for these stocks if they become overfished, and expansion of the exception to species with a two year life cycle.

Response: Due to their unique life history, the process for setting ACLs does not fit well for stocks which have a life cycle of approximately one year. The exception for species with an annual life cycle allows flexibility for Councils to use other management measures for these stocks which are more appropriate for the unique life history for each stock and the specifics of the fishery which captures them. NMFS believes that the final guidance should not include a list of stocks which meets these criteria; this is a decision that is best made by the regional Councils. Even though ACLs are not required for these stocks, Councils are still required to estimate other biological reference points such as SDC, MSY, OY, ABC and an ABC control rule. However, the MSA limits the exception and clearly states that if overfishing is occurring on the stock, the exception can not be used, therefore ACLs would be required. MSA only provided for a 1-year life cycle exception, thus NMFS cannot expand the exception to two years. Section (h)(3) of the final action acknowledges that there may be circumstances when flexibility is needed in applying the NS1 guidelines. Whether such flexibility is appropriate for certain two year life cycle species would have to be considered on a case-by-case basis.

Comment 78: NMFS received many comments expressing different interpretations of the MSA's ACL international exception. Some commented that the exception only pertains to the 2010/2011 timing requirement. If fisheries under international agreements were intended to be exempt from ACLs, Congress could have drafted the exception to say that ACLs ''shall not apply'' to such fisheries, similar to language used in the one-year life cycle exception. Several comments stated that by requiring ACLs for U.S. fishermen, the U.S. would be in a better bargaining position in international fora by taking the ''higher ground.'' Others agreed with the exception as set forth in the proposed guidelines but requested clarification. For example, one comment was that the exception should be expanded to cover the US/Canada Resource Sharing Understanding and other arrangements that may not be formal international agreements. Other suggestions included clarifying that the exception applied where a regional fishery management organization had approved a stock assessment, where there were conservation and management measures under an international agreement, or where there were annual catch limits established under international agreement consistent with MSA overfishing and rebuilding requirements.

Response: The ACL international exception is set forth in an uncodified note to MSA section 303. MSRA, Public Law 109–479 section 104(b)(1). The text is vague, and NMFS has spent considerable time looking at different possible interpretations of this text in light of the plain language of the text, public comments, and other relevant MSA provisions. NMFS agrees that one possible interpretation, in light of the text of the one-year life cycle exception (MSRA section 104(b)(2)), is that stocks under international management are only exempt from timing requirements. However, Congress added significant new requirements under the MSRA regarding international fisheries, thus NMFS has tried to interpret the exception in light of these other statutory provisions.

In many fisheries, the U.S. unilaterally cannot end overfishing or rebuild stocks or make any measurable progress towards those goals, even if it were to stop all U.S. harvest. Thus, it has signed onto various treaties and negotiates binding, international conservation and management measures at regional fishery management organizations (RFMOs) to try to facilitate international efforts to end overfishing and rebuild overfished stocks. MSRA acknowledged the challenges facing the United States in international fisheries by, among other things, including a new ''International Overfishing'' section (MSA section 304(i)) that refers domestic regulations to address ''relative impact'' of U.S. vessels; changes to highly migratory species provisions (MSA section 102(b)–(c)); and amendments to the High Seas Driftnet Fishing Moratorium Protection Act, 16 U.S.C. 1826h–1826k, to encourage strengthening of RFMOs and establish a process for identification and certification of nations whose vessels engage in illegal, unreported or unregulated (IUU) fishing and bycatch of protected living marine resources.

While NMFS actively communicates and promotes MSA requirements regarding ending overfishing and rebuilding overfished stocks at the international level (*see*, *e.g.*, MSA section 102(c)), it is unlikely that RFMOs will adopt ACL/AM mechanisms as such mechanisms are understood and required in the context of U.S. domestic fisheries. Given the practical problem of ensuring the U.S. could negotiate such mechanisms, and Congress' clear recognition of U.S. fishing impact versus international fishing effort, NMFS believes that a reasonable interpretation of the exception is that it should apply to the ACL requirement, not just the effective date. If ACLs were required, a likely outcome is that U.S. fishermen may be subject to more restrictive measures than their foreign counterparts, *e.g.*, each country may be assigned a catch quota but the U.S. portion may be subject to further restriction below the assigned amount. Further, requiring ACLs may raise potential conflicts with implementing legislation for some of the international fishery agreements.

NMFS believes that the intent of MSRA is to not unfairly penalize U.S. fishermen for overfishing which is occurring predominantly at the international level. In many cases, applying ACL requirements to U.S. fishermen on just the U.S. portion of the catch or quota, while other nations fished without such additional measures, would not lead to ending overfishing and could disadvantage U.S. fishermen. The guidance given for the international exception allows the Councils to continue managing the U.S. portion of stocks under international agreements, while the U.S. delegation works with RFMOs to end overfishing through international cooperation. The guidelines do not preclude Councils or NMFS from applying ACLs or other catch limits to stocks under international agreements, if such action was deemed to be appropriate and consistent with MSA and other statutory mandates.

NMFS considered different suggestions on how the exception might be clarified, *e.g.*, exception would only apply where there is an approved stock assessment, conservation and management measures, annual catch limits consistent with MSA overfishing and rebuilding requirements, etc. Regardless of how the exception could be revised, establishing ACL mechanisms and AMs on just the U.S. portion of the fishery is unlikely to have any impact on ending overfishing and rebuilding. For these reasons, and taking into consideration possible statutory interpretations and public comment, NMFS has decided not to revise the international exception.

With regard to whether an arrangement or understanding is an ''international agreement,'' it will be important to consider the facts and see if the arrangement or understanding qualifies as an ''international agreement'' as understood under MSA section 3(24) (defining ''international fishery agreement'') and as generally understood in international negotiation. The Case-Zablocki Act, 1 U.S.C. 112b, and its implementing regulations provide helpful guidance on interpreting the term ''international agreement.''

Comment 79: With regard to fisheries data (§ 600.310(i) of NS1 guidelines), comments included: data collection guidelines are burdensome, clarification is needed on how the Councils would implement the data collection requirements, and that data collection performance standards and real-time accounting are needed.

Response: NMFS believes that § 600.310(i) of the final action provides sufficient guidance to the Councils in developing and updating their FMPs, or associated public documents such as SAFE reports, to address data needed to meet the new requirements of the MSRA. There is a close relationship between the data available for fishery management and the types of conservation and management measures that can be employed. Also, for effective prevention of overfishing, it is essential that all sources of fishing mortality be accounted for. NMFS believes that detailing the sources of data for the fishery and how they are used to account for all sources of fishing mortality in the annual catch limit system will be beneficial. NMFS revised the final guidelines to clarify that a SAFE report, or other public document adopted by a Council, can be used to document the required fishery data elements.

Comment 80: NMFS received several comments requesting that better data be used when creating conservation and management measures.

Response: NMFS agrees that improvements in fishery data can lead to more effective conservation and management measures, including ACLs. NMFS is aware of the various gaps in data collection and analysis for FMPs in U.S. fisheries, and has ongoing and future plans to improve the data needed to implement the new provisions of the MSRA. NMFS programs and initiatives that will help produce better quality data include the: Marine Recreational Information Program (MRIP), National Permits System, and Fisheries Information and National Saltwater Angler Registry.

Comment 81: Some comments recognized the ongoing programs to improve data, but were concerned that the time that it would take to implement and fold these new data into the management process could cause overly restrictive measures when implementing ACLs on fisheries that are data poor (*e.g.* recreational fisheries).

Response: ACLs must be implemented using the best data and information available. Future improvements in data will allow corresponding improvements in conservation and management measures. This is an incremental process. NMFS believes that Councils must implement the best ACLs possible with the existing data, but should also look for opportunities to improve the data and the ACL measures in the future. It is important that the ACL measures prevent overfishing without being overly restrictive. In data poor situations, it is important to monitor key indicators, and have accountability measures that quickly adjust the fishery in response to changes in those indicators.

Comment 82: Some commenters noted they want more transparency in the data being used to manage fisheries.

Response: NMFS believes the NS1 guidelines provide sufficient guidance to the Councils in developing and updating their FMPs, or associated public documents such as SAFE reports, to address data needed to meet the new requirements of the MSRA. NMFS agrees that transparency in the Council process and NMFS decision process in regard to data and data analysis is critical to the public and user groups understanding of how fisheries are managed. NMFS is aware of this issue and will continue to seek improvements in such processes.

Comment 83: NMFS received several comments about the timing associated with submitting a rebuilding plan. Commenters asked for clarification on when the clock started for the implementation of the plan, stated that Councils should have two years to submit the plan to the Secretary, and suggested that a 6-month review/implementation period be used instead of a 9-month period. Commenters noted that MSA provides for specific time periods for Secretarial review.

Response: Ending overfishing and rebuilding overfished stocks is an important goal of the MSA and the performance of NMFS is measured by its ability to reach this goal. Currently, the Council has 12 months to submit an FMP, FMP amendment, or proposed

regulations to the Secretary, but there is no time requirement for implementation of such actions. MSA section 304(e)(3), which is effective July 12, 2009, requires that a Council prepare and implement an FMP, FMP amendment, or proposed regulations within 2 years of the Secretary notifying the council that the stock is overfished or approaching a condition of being overfished. The guidelines provide that such actions should be submitted to the Secretary within 15 months so NMFS has 9 months to review and implement the plan and regulations. NMFS recognizes that there are timing requirements for Secretarial review of FMPs and regulations (MSA section 304(a),(b)). The 15-month period was not intended to expand the time for Secretarial review, but rather, to address the new requirement that actions be implemented within two years. NMFS believes the timing set forth in the guidelines is appropriate as a general rule: it would continue to allow for 60 days for public comment on an FMP, 30 days for Secretarial review, and 6 months for NMFS to implement the rebuilding plan. However, in specific cases NMFS and a Council may agree on a schedule that gives the Council more time, if the overall objective can still be met.

Comment 84: NMFS received many comments in support of the language regarding ending overfishing immediately. One comment, however, stated that intent of the MSA is to end all overfishing, not just chronic overfishing, as described in the preamble.

Response: NMFS agrees that the intent of the MSA is to end overfishing, and in the context of a rebuilding plan, overfishing must be ended immediately. However, as long as fishing is occurring, there always is a chance that overfishing may occur given scientific and management uncertainty. The guidelines explain how to incorporate scientific and management uncertainty so that fishing may continue but with an appropriately low likelihood of overfishing. The term ''chronic overfishing'' is used to mean that annual fishing mortality rates exceed the MFMT on a consistent basis over a period of years. The MSA definition of overfishing is ''* * * a rate or level of fishing mortality that jeopardizes the capacity of a fishery to produce the maximum sustainable yield on a continuing basis.'' NMFS believes that the best way to ensure that overfishing does not occur is to keep annual fishing mortality rates below the MFMT. However, exceeding the MFMT occasionally does not necessarily jeopardize the capacity of a fishery to produce the MSY on a continuing basis. The more frequently MFMT is exceeded, the more likely it becomes that the capacity of a fishery to produce the MSY on a continuing basis is jeopardized. Thus, NMFS believes that ACLs and AMs should be designed to prevent overfishing on an annual basis, but that conservation and management measures need not be so conservative as to prevent any possibility that the fishing mortality rate exceeds the MFMT in every year.

Comment 85: NMFS received several comments regarding what happens when a rebuilding plan reaches T_{max} but the stock is not fully rebuilt. Commenters supported the approach in the proposed action that provided that the rebuilding F should be reduced to no more than 75 percent of MFMT until the stock or stock complex is rebuilt. One commenter suggested clarifying the final guidelines text to provide: ''If the stock or stock complex has not rebuilt by T_{max}, then the fishing mortality rate should be maintained at $F_{rebuild}$ or 75% of the MFMT, whichever is less.'' Other commenters stated that 75 percent MFMT is not precautionary enough and that 50 percent MFMT (or less) should be used.

Response: This new language in the guidelines fills a gap in the current guidelines which did not prescribe how to proceed when a stock had reached T_{max} but had not been fully rebuilt. NMFS believes that requiring that F does not exceed $F_{rebuild}$ or 75 percent MFMT, whichever is lower, is an appropriate limit, but Councils should consider a lower mortality rate to meet the requirement to rebuild stocks in as short a time as possible, pursuant to the provisions in MSA section 304(e)(4)(a)(i). NMFS agrees that the suggested edit would clarify the provision, and has revised the guidelines.

Comment 86: NMFS received many comments on the relationship between T_{min}, T_{target} and T_{max}. Some comments supported the proposed guidelines and others stated that the guidelines should be modified. Comments included: T_{min} is inconsistent with MSA's requirement to take into account needs of fishing communities and should include those needs when evaluating whether rebuilding can occur in 10 years or less; management measures should be designed to achieve rebuilding by the T_{target} with at least a 50% probability of success and achieve T_{max} with a 90% probability of success; as in the 2005 proposed NS1 guidelines revisions, T_{max} should be calculated as T_{min} plus one mean generation time for purposes of determining whether rebuilding can occur in 10 years or less; per *NRDC* v. *NMFS,* 421 F.3d 872 (9th Cir. 2005), T_{target} should be as close to T_{min} as possible without causing a short-term disaster; rebuilding timeframes should only be extended above T_{min} where ''unusually severe impacts on fishing communities can be demonstrated, and where biological and ecological implications are minimal;'' rebuilding times for stock complexes must not be used to delay recovery of complex member species; and the ''generation time'' calculation for T_{max} should refer to generation time of the current population.

Response: In developing the guidance for rebuilding plans, NMFS developed guidelines for Councils which, if followed, are strong enough to rebuild overfished stocks, yet flexible enough to work for a diverse range of fisheries. The timeline for a rebuilding plan is based on three time points, T_{min}, T_{target} and T_{max}. T_{min} is the amount of time, in the absence of any fishing mortality, for the stock to have a 50% probability of reaching the rebuilding goal, B_{msy}. T_{min} is the basis for determining the rebuilding period, consistent with section 304(e)(4)(A)(ii) of the MSA which requires that rebuilding periods not exceed 10 years, except in cases where the biology of the stock of fish, other environmental conditions, or management measures under an international agreement in which the United States participates dictate otherwise. T_{min} provides a biologically determined lower limit to T_{target}. Needs of fishing communities are not part of the criteria for determining whether a rebuilding period can or cannot exceed 10 years, but are an important factor in establishing T_{target}.

Just as T_{min} is a helpful reference point of the absolute shortest time to rebuild, T_{max} provides a reference point of the absolute longest rebuilding period that could be consistent with the MSA. T_{max} is clearly described in the guidelines as either 10 years, if T_{min} is 10 years or less, or T_{min} plus one generation time for the stock if T_{min} is greater than 10 years. NMFS agrees that this calculation can cause a discontinuity problem when calculating T_{max}, and proposed revisions to the NS1 guidelines in 2005 that would have addressed the issue by basing T_{max} on T_{min} + one generation time in all cases, which would have removed the requirement that T_{max} is 10 years in all cases where T_{min} was less than 10 years. NMFS did not finalize those revisions, but proposed the same changes to the MSA in the Administration's proposed MSA reauthorization bill. However,

when MSRA was passed, Congress did not accept the Administration's proposal and chose to keep the existing provision. NMFS has, therefore, not revised this aspect of the NS1 guidelines.

The generation time is defined in the guidelines as ''the average length of time between when an individual is born and the birth of its offspring.'' Typically this is calculated as the mean age of the spawners in the absence of fishing mortality (per Restrepo *et al.,* 1998), but the exact method is not specified in the guidance.

T_{max} is a limit which should be avoided. When developing a rebuilding plan, it is good practice for Councils to calculate the probability of the potential management alternatives to achieve rebuilding by T_{max}, in order to inform their decision.

T_{target} is bounded by T_{min} and T_{max} and is supposed to be established based on the factors specified in MSA section 304(e)(4). Section 600.310(j)(3) of the final action reiterates the statutory criteria on specifying rebuilding periods that are ''as short as possible,'' taking into account specified factors. Management measures put in place by the rebuilding plan should be expected (at least 50% probability) to achieve rebuilding by T_{target}. NMFS does not believe these sections should be revised to focus on ''short-term disasters'' or ''unusually severe'' community impacts, as the MSA provides for several factors to be considered. NMFS believes the final guidelines provide sufficient general guidance on the MSA requirements, but acknowledges that there is case law in different jurisdictions (such as NRDC v. NMFS), that fishery managers should consider in addition to the general guidance.

Comment 87: A commenter stated that § 600.310(j)(3)(i)(E) of the proposed action should be revised to state that ''as short as possible'' is a mandate, not just a priority.

Response: NMFS deleted the ''priority'' text in § 600.310 (j)(3)(i)(E) of the final action. That text is unnecessary given that § 600.310 (j)(3)(i) of the guidelines explains ''as short as possible'' and other rebuilding time period requirements from MSA section 304(e)(4).

Comment 88: Commenters raised several questions about the relationship of NS1 and National Standard 8 (NS 8), including whether NS 1 ''trumps'' NS 8 and whether the ACL guidance provides sufficient flexibility to address NS 8 considerations.

Response: NS 1 states: ''Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.'' MSA section 301(a)(1). NS 8 states: ''Conservation and management measures shall, *consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks,* take into account the importance of fishery resources to fishing communities by utilizing economic and social data that meet the requirements of paragraph (2) [*i.e.*, National Standard 2] , in order to (A) provide for sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.'' MSA section 301(a)(8) (*emphasis added*).

The objectives in NS8 for sustained participation of fishing communities and minimization of adverse economic impacts do not provide a basis for continuing overfishing or failing to rebuild stocks. The text of NS8 explicitly provides that conservation and management measures must prevent overfishing and rebuild overfished stocks. MSA does provide, however, for flexibility in the specific conservation and management measures used to achieve its conservation goals, and NMFS took this into consideration in developing the revised NS1 guidelines.

Comment 89: NMFS received many comments regarding § 600.310(m) of the proposed action, a provision commonly called the ''mixed stock exception.'' One comment supported the revision as proposed. Some commenters noted that the provision is very important in managing specific mixed stock fisheries, and that changes in the proposed guidelines would make it impossible to use. Specific concern was noted about text that stated that the ''resulting rate of fishing mortality will not cause any stock or stock complex to fall below its MSST more than 50 percent of the time in the long term.'' In addition, commenters stated that the proposed revisions do not allow for social and economic aspects to be taken in to account adequately and would negatively impact several fisheries and fishing communities. Many others commented that the provision should be removed entirely, because it is contrary to the intent of the MSA. The MSA, as amended by the MSRA, requires preventing and ending overfishing, and a mixed stock exception would allow for chronic overfishing on vulnerable fish stocks within a complex.

Response: MSRA amended overfishing and rebuilding provisions of the MSA, reflecting the priority to be given to the Act's conservation goals. NMFS believes that the final NS1 guidelines provide helpful guidance on the new statutory requirements and will strengthen efforts to prevent overfishing from occurring in fisheries. Preventing overfishing and achieving, on a continuing basis, the OY is particularly challenging in mixed stock fisheries. To address this issue, the proposed action retained a mixed stock exception. NMFS recognizes the concerns raised about how the exception will impact efforts to prevent and end overfishing, and thus, revised the current NS1 guidelines text in light of new MSRA provisions.

The current mixed stock exception allows overfishing to occur on stocks within a complex so long as they do not become listed under the Endangered Species Act (ESA). As explained in the proposed guidelines, NMFS believes that ESA listing is an inappropriate threshold, and that stocks should be managed so they retain their potential to achieve MSY. The revised guidelines propose a higher threshold, limiting F to a level that will not lead to the stock becoming overfished in the long term. In addition, if any stock, including those under the mixed stock exception, were to drop below its MSST, it would be subject to the rebuilding requirements of the MSA, which require that overfishing be ended immediately and that the stock be rebuilt to B_{msy} (see § 600.310(j)(2)(ii)(B) of the final action). The exception, as revised, addresses concerns regarding social, economic, and community impacts as it could allow for continued harvest of certain stocks within a mixed stock fishery.

Having considered public comments on the proposed guidelines, NMFS has decided to retain the mixed stock exception as proposed in the guidance. While NMFS has chosen in the NS1 guidelines to emphasize the importance of stock-level analyses, MSA refers to preventing overfishing in a fishery and provides for flexibility in terms of the specific mechanisms and measures used to achieve this goal. The mixed stock exception provides Councils with needed flexibility for managing fisheries, while ensuring that all stocks in the fishery continue to be subject to strong conservation and management. However, NMFS believes that the mixed stock exception should be applied with a great deal of caution, taking into consideration new MSRA requirements and NS1 guidance regarding stock complexes and indicator species. NMFS also believes that Councils should work to improve selectivity of fishing gear and practices in their mixed-stock fisheries so that the need to apply the mixed stock exception is reduced in the future.

VI. Changes From Proposed Action

Annual catch target (ACT) is described as a management option, rather than a required reference point in paragraphs (f)(1), (f)(2)(v), (f)(6), (f)(6)(i), and (g)(2) in the final action.

The following sentence was deleted from paragraph (b)(2)(v)(B): ''The SSC may specify the type of information that should be included in the Stock Assessment and Fishery Evaluation (SAFE) report (*see* § 600.315).'' Paragraph (b)(2)(v)(C) was revised to make some clarifying edits regarding the SSC and peer review process. The following sentence was included in (b)(2)(v)(D): ''The SSC recommendation that is the most relevant to ACLs is ABC, as both ACL and ABC are levels of annual catch.''

Paragraph (c)(5) is removed because ''ACT control rule'' is no longer a required part of the definition framework. Paragraph (c)(6) in the proposed action is re-designated as paragraph (c)(5) in the final action. Paragraph (c)(7) in the proposed action is re-designated as paragraph (c)(6) in the final action.

Paragraph (d)(1) was revised to clarify that Councils may, but are not required to, use the ''ecosystem component'' species classification. Paragraphs (d)(2) through (d)(7) were revised to better clarify the classification system for stocks in an FMP. Paragraph (d)(9) is revised to emphasize that indicator stocks are stocks with SDC that can be used to help manage more poorly known stocks that are in a stock complex. Paragraph (d)(10) has been added to describe in general how to evaluate ''vulnerability'' of a stock.

Paragraph (e)(1)(iv) was revised to clarify that ecological conditions should be taken into account when specifying MSY. The following sentence was added to paragraph (e)(2)(i)(C): ''The MFMT or reasonable proxy may be expressed either as a single number (a fishing mortality rate or F value), or as a function of spawning biomass or other measure of reproductive potential.'' The following sentence was added to paragraph (e)(2)(i)(D): ''The OFL is an estimate of the catch level above which overfishing is occurring.'' The following sentence was deleted from (e)(2)(ii)(A)(*1*): ''The MFMT must not exceed F_{msy}.'' Paragraph (e)(3)(iv) was revised to improve clarity. The following sentence was deleted from (e)(3)(v)(A): ''As a long-term average, OY cannot exceed MSY.''

Paragraph (f)(1) was revised to give examples of scientific and management uncertainty. Paragraphs (f)(2)(ii) and (iii) were revised to clarify that scientific uncertainty in the OFL and any other scientific uncertainty should be accounted for when specifying ABC and the ABC control rule. Paragraph (f)(3) was revised to improve clarity; to acknowledge that the SSC may recommend an ABC that differs from the result of the ABC control rule calculation; and to state that while the ABC is allowed to equal OFL, NMFS expects that in most cases ABC will be reduced from OFL to reduce the probability that overfishing might occur in a year. Paragraph (f)(4) on the ABC control rule was revised to include the following sentences: ''The determination of ABC should be based, when possible, on the probability that an actual catch equal to the stock's ABC would result in overfishing. This probability that overfishing will occur cannot exceed 50 percent and should be a lower value. The ABC control rule should consider reducing fishing mortality as stock size declines and may establish a stock abundance level below which fishing would not be allowed.'' Paragraph (f)(5)(i) was revised to include the following sentences: ''ACLs in coordination with AMs must prevent overfishing (see MSA section 303(a)(15)). If a Council recommends an ACL which equals ABC, and the ABC is equal to OFL, the Secretary may presume that the proposal would not prevent overfishing, in the absence of sufficient analysis and justification for the approach.'' Also, paragraph (f)(5)(i) was revised to clarify that ''a multiyear plan must provide that, if an ACL is exceeded for a year, then AMs are triggered for the next year consistent with paragraph (g)(3) of this section.'' Paragraph (f)(5)(ii) now clarifies that ''if the management measures for different sectors differ in degree of management uncertainty, then sector-ACLs may be necessary so appropriate AMs can be developed for each sector.'' Paragraphs (f)(5)(iii) and (g)(5) were revised to remove the phrase ''large majority'' from both provisions. The description of the relationship between OFL to MSY and ACT to OY was removed from paragraph (f)(7) and is replaced with the following sentence: ''A Council may choose to use a single control rule that combines both scientific and management uncertainty and supports the ABC recommendation and establishment of ACL and if used ACT.''

Paragraph (g)(2) on inseason AMs was revised to include the following sentences: ''FMPs should contain inseason closure authority giving NMFS the ability to close fisheries if it determines, based on data that it deems sufficiently reliable, that an ACL has been exceeded or is projected to be reached, and that closure of the fishery is necessary to prevent overfishing. For fisheries without inseason management control to prevent the ACL from being exceeded, AMs should utilize ACTs that are set below ACLs so that catches do not exceed the ACL.'' Paragraph (g)(3) was revised to improve clarity and to include the following sentence: ''A Council could choose a higher performance standard (e.g., a stock's catch should not exceed its ACL more often than once every five or six years) for a stock that is particularly vulnerable to the effects of overfishing, if the vulnerability of the stock has not already been accounted for in the ABC control rule.'' Paragraph (g)(4) on AMs based on multi-year average data was revised to clarify: That Councils should explain why basing AMs on a multi-year period is appropriate; that AMs should be implemented if the average catch exceeds the average ACL; the performance standard; and that Councils can use a stepped approach when initially implementing AMs based on multi-year average data.

Paragraph (h) was revised to include the sentence: ''These mechanisms should describe the annual or multiyear process by which specific ACLs, AMs, and other reference points such as OFL, and ABC will be established.'' Paragraph (h)(1)(v) was removed because the requirement to describe fisheries data is covered under paragraph (i). Paragraph (i) is revised to clarify that Councils must describe ''in their FMPs, or associated public documents such as SAFE reports as appropriate,'' general data collection methods.

Paragraph (j)(2)(ii)(C) was removed and paragraph (j)(2)(ii)(B) was revised to include information about stocks or stock complexes that are approaching an overfished condition. Paragraph (j)(3)(i)(E) was revised to remove the ''priority'' text. That text is unnecessary given that section (j)(3)(i) explains ''as short as possible'' and other rebuilding time period requirements from MSA section 304(e)(4). Paragraph (j)(3)(ii) was revised to clarify that ''if the stock or stock complex has not rebuilt by T_{max}, then the fishing mortality rate should be maintained at $F_{rebuild}$ or 75 percent of the MFMT, whichever is less.''

Introductory language (General) has been added to paragraph (l) to clarify the relationship of other national standards to National Standard 1. Also, paragraph (l)(4) has been revised to ensure that the description about the relationship between National Standard 8 with National Standard 1 reflects more

accurately, section 301(a)(8) of the Magnuson-Stevens Act.

The words ''should'' or ''recommended'' in the proposed rule are changed to ''must'' or ''are required'' or ''need to'' in this action's codified text if NMFS interprets the guidance to refer to ''requirements of the Magnuson-Stevens Act'' and ''the logical extension thereof'' (see section 600.305(c) of the MSA). In the following, items in paragraphs of § 600.310 are followed by an applicable MSA section that contains pertinent requirements:

Paragraph (b)(3) is revised to state that Councils ''must take an approach that considers uncertainty in scientific information and management control of the fishery'' because it needs to meet requirements in MSA section 303(a)(15).

Paragraph (c) is revised to state ''* * * Councils must include in their FMPs * * *'' because it needs to meet various requirements in MSA section 303(a).

Paragraph (c) is revised to state ''Councils must also describe fisheries data * * *'' because it needs to meet requirements of various portions of MSA sections 303(a) and 303(a)(15).

Paragraph (c) is revised to state ''* * * Councils must evaluate and describe the following items in their FMPs * * *'' because it needs to meet requirements of various portions of MSA sections 303(a) and 303(a)(15).

Paragraph (e)(1) is revised to state that ''Each FMP must include an estimate of MSY * * *'' because it needs to meet requirements of MSA section 303(a)(3).

Paragraph (e)(2)(ii) is revised to state that a Council ''must provide an analysis of how the SDC were chosen * * *'' because it needs to meet requirements of MSA section 303(a)(10).

Paragraph (e)(2)(ii)(A) is revised to state ''each FMP must describe which of the following two methods * * *'' because it needs to meet requirements of MSA section 303(a)(10).

Paragraph (e)(2)(ii)(B) is revised to state ''the MSST or reasonable proxy must be expressed in terms of spawning biomass * * *'' because it needs to meet requirements of MSA section 303(a)(10).

Paragraph (f)(4) is revised to state each Council ''must establish an ABC control rule * * *'' because it needs to meet requirements of MSA sections 303(a)(15) and 302(g)(1)(B).

Paragraph (f)(4) is revised to state ''The ABC control rule must articulate how ABC will be set compared to the OFL * * *'' because it needs to meet requirements of MSA sections 303(a)(15) and 301(a)(2).

Paragraph (f)(5)(i) is revised to state ''A multiyear plan must include a mechanism for specifying ACLs for each year * * *'' because it needs to meet requirements of MSA section 303(a)(15).

Paragraph (f)(5)(i) is also revised to state ''A multiyear plan must provide that, if an ACL is exceeded * * *'' because it needs to meet requirements of MSA section 303(a)(15).

Paragraph (f)(6)(i) is revised to state ''Such analyses must be based on best available scientific * * *'' because it needs to meet requirements of MSA section 301(a)(2).

Paragraph (g)(3) is revised to state a Council ''must determine as soon as possible after the fishing year if an ACL is exceeded * * *'' because it needs to meet requirements of MSA sections 303(a)(15), 301(a)(1) and 301(a)(2).

Paragraph (h) is revised to state FMPs or FMP amendments ''must establish ACL mechanisms and AMs * * *'' because it needs to meet requirements of MSA section 303(a)(15).

Paragraph (h)(3) is revised to state ''Councils must document their rationale for any alternative approaches * * *'' because it needs to meet requirements of MSA section 303(a)(15).

Paragraph (j)(2) is revised to state ''FMPs or FMP amendments must establish ACL and AM mechanisms in 2010 * * *'' because it needs to meet requirements of MSA section 303(a)(15).

Paragraph (j)(2)(i)(A) is revised to state that '' * * * ACLs and AMs themselves must be specified * * *'' because it needs to meet requirements of MSA section 303(a)(15).

Paragraph (k) is revised to state that ''The Secretary, in cooperation with the Secretary of State, must immediately take appropriate action at the international level * * *'' because it needs to meet requirements of MSA section 304(i)—INTERNATIONAL OVERFISHING.

Paragraph (k)(3) is revised to state that ''Information used to determine relative impact must be based upon the best available scientific * * *'' because it needs to meet requirements of MSA section 301(a)(2).

Paragraph (l)(2) is revised to state that ''Also scientific assessments must be based on the best information * * *'' because it needs to meet requirements of MSA section 301(a)(2).

VII. References Cited

A complete list of all the references cited in this final action is available online at: *http://www.nmfs.noaa.gov/msa2007/catchlimits.htm* or upon request from Mark Millikin [*see* **FOR FURTHER INFORMATION CONTACT**].

VIII. Classification

Pursuant to the Magnuson-Stevens Act, the NMFS Assistant Administrator has determined that these final NS1 guidelines are consistent with the Magnuson-Stevens Act, and other applicable law.

The final NS1 guidelines have been determined to be significant for purposes of Executive Order 12866. NOAA prepared a regulatory impact review of this rulemaking, which is available at: *http://www.nmfs.noaa.gov/msa2007/catchlimits.htm.* This analysis discusses various policy options that NOAA considered in preparation of the proposed action, given NOAA's interpretation of the statutory terms in the MSRA, such as the appropriate meaning of the word ''limit'' in ''Annual Catch Limit,'' and NOAA's belief that it has become necessary for Councils to consider separately the uncertainties in fishery management and the scientific uncertainties in stock evaluation in order to effectively set fishery management policies and ensure fulfillment of the goals to end overfishing and rebuild overfished stocks.

The Chief Counsel for Regulation of the Department of Commerce certified to the Chief Counsel for Advocacy of the Small Business Administration during the proposed rule stage that these revisions to the NS1 guidelines, if adopted, would not have any significant economic impact on a substantial number of small entities. The factual basis for the certification was published in the proposed action and is not repeated here. Two commenters stated that an initial regulatory flexibility analysis should be prepared, and NMFS has responded to those comments in the ''Response to Comments.'' After considering the comments, NMFS has determined that a certification is still appropriate for this action. Therefore, a regulatory flexibility analysis is not required for this action and none was prepared.

List of Subjects in 50 CFR Part 600

Fisheries, Fishing, Reporting and recordkeeping requirements.

Dated: January 9, 2009.

James W. Balsiger,

Acting Assistant Administrator, for Fisheries, National Marine Fisheries Service.

PART 600—MAGNUSON-STEVENS ACT PROVISIONS

■ 1. The authority citation for part 600 continues to read as follows:

Authority: 16 U.S.C. 1801 *et seq.*

■ 2. Section 600.310 is revised to read as follows:

§ 600.310 National Standard 1—Optimum Yield.

(a) *Standard 1.* Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield (OY) from each fishery for the U.S. fishing industry.

(b) *General.* (1) The guidelines set forth in this section describe fishery management approaches to meet the objectives of National Standard 1 (NS1), and include guidance on:

(i) Specifying maximum sustainable yield (MSY) and OY;

(ii) Specifying status determination criteria (SDC) so that overfishing and overfished determinations can be made for stocks and stock complexes that are part of a fishery;

(iii) Preventing overfishing and achieving OY, incorporation of scientific and management uncertainty in control rules, and adaptive management using annual catch limits (ACL) and measures to ensure accountability (AM); and

(iv) Rebuilding stocks and stock complexes.

(2) *Overview of Magnuson-Stevens Act concepts and provisions related to NS1*—(i) *MSY.* The Magnuson-Stevens Act establishes MSY as the basis for fishery management and requires that: The fishing mortality rate does not jeopardize the capacity of a stock or stock complex to produce MSY; the abundance of an overfished stock or stock complex be rebuilt to a level that is capable of producing MSY; and OY not exceed MSY.

(ii) *OY.* The determination of OY is a decisional mechanism for resolving the Magnuson-Stevens Act's conservation and management objectives, achieving a fishery management plan's (FMP) objectives, and balancing the various interests that comprise the greatest overall benefits to the Nation. OY is based on MSY as reduced under paragraphs (e)(3)(iii) and (iv) of this section. The most important limitation on the specification of OY is that the choice of OY and the conservation and management measures proposed to achieve it must prevent overfishing.

(iii) *ACLs and AMs.* Any FMP which is prepared by any Council shall establish a mechanism for specifying ACLs in the FMP (including a multiyear plan), implementing regulations, or annual specifications, at a level such that overfishing does not occur in the fishery, including measures to ensure accountability (Magnuson-Stevens Act section 303(a)(15)). Subject to certain exceptions and circumstances described in paragraph (h) of this section, this requirement takes effect in fishing year 2010, for fisheries determined subject to overfishing, and in fishing year 2011, for all other fisheries (Magnuson-Stevens Act section 303 note). ''Council'' includes the Regional Fishery Management Councils and the Secretary of Commerce, as appropriate (*see* § 600.305(c)(11)).

(iv) *Reference points.* SDC, MSY, acceptable biological catch (ABC), and ACL, which are described further in paragraphs (e) and (f) of this section, are collectively referred to as ''reference points.''

(v) *Scientific advice.* The Magnuson-Stevens Act has requirements regarding scientific and statistical committees (SSC) of the Regional Fishery Management Councils, including but not limited to, the following provisions:

(A) Each Regional Fishery Management Council shall establish an SSC as described in section 302(g)(1)(A) of the Magnuson-Stevens Act.

(B) Each SSC shall provide its Regional Fishery Management Council recommendations for ABC as well as other scientific advice, as described in Magnuson-Stevens Act section 302(g)(1)(B).

(C) The Secretary and each Regional Fishery Management Council may establish a peer review process for that Council for scientific information used to advise the Council about the conservation and management of a fishery (see Magnuson-Stevens Act section 302(g)(1)(E)). If a peer review process is established, it should investigate the technical merits of stock assessments and other scientific information used by the SSC or agency or international scientists, as appropriate. For Regional Fishery Management Councils, the peer review process is not a substitute for the SSC and should work in conjunction with the SSC. For the Secretary, which does not have an SSC, the peer review process should provide the scientific information necessary.

(D) Each Council shall develop ACLs for each of its managed fisheries that may not exceed the ''fishing level recommendations'' of its SSC or peer review process (Magnuson-Stevens Act section 302(h)(6)). The SSC recommendation that is the most relevant to ACLs is ABC, as both ACL and ABC are levels of annual catch.

(3) *Approach for setting limits and accountability measures, including targets, for consistency with NS1.* In general, when specifying limits and accountability measures intended to avoid overfishing and achieve sustainable fisheries, Councils must take an approach that considers uncertainty in scientific information and management control of the fishery. These guidelines describe how to address uncertainty such that there is a low risk that limits are exceeded as described in paragraphs (f)(4) and (f)(6) of this section.

(c) *Summary of items to include in FMPs related to NS1.* This section provides a summary of items that Councils must include in their FMPs and FMP amendments in order to address ACL, AM, and other aspects of the NS1 guidelines. As described in further detail in paragraph (d) of this section, Councils may review their FMPs to decide if all stocks are ''in the fishery'' or whether some fit the category of ''ecosystem component species.'' Councils must also describe fisheries data for the stocks, stock complexes, and ecosystem component species in their FMPs, or associated public documents such as Stock Assessment and Fishery Evaluation (SAFE) Reports. For all stocks and stock complexes that are ''in the fishery'' (see paragraph (d)(2) of this section), the Councils must evaluate and describe the following items in their FMPs and amend the FMPs, if necessary, to align their management objectives to end or prevent overfishing:

(1) MSY and SDC (see paragraphs (e)(1) and (2) of this section).

(2) OY at the stock, stock complex, or fishery level and provide the OY specification analysis (see paragraph (e)(3) of this section).

(3) ABC control rule (see paragraph (f)(4) of this section).

(4) Mechanisms for specifying ACLs and possible sector-specific ACLs in relationship to the ABC (see paragraphs (f)(5) and (h) of this section).

(5) AMs (see paragraphs (g) and (h)(1) of this section).

(6) Stocks and stock complexes that have statutory exceptions from ACLs (see paragraph (h)(2) of this section) or which fall under limited circumstances which require different approaches to meet the ACL requirements (see paragraph (h)(3) of this section).

(d) *Classifying stocks in an FMP*—(1) *Introduction.* Magnuson-Stevens Act section 303(a)(2) requires that an FMP contain, among other things, a description of the species of fish involved in the fishery. The relevant Council determines which specific target stocks and/or non-target stocks to include in a fishery. This section provides that a Council may, but is not required to, use an ''ecosystem component (EC)'' species classification. As a default, all stocks in an FMP are

considered to be ''in the fishery,'' unless they are identified as EC species (see § 600.310(d)(5)) through an FMP amendment process.

(2) *Stocks in a fishery.* Stocks in a fishery may be grouped into stock complexes, as appropriate. Requirements for reference points and management measures for these stocks are described throughout these guidelines.

(3) ''Target stocks'' are stocks that fishers seek to catch for sale or personal use, including ''economic discards'' as defined under Magnuson-Stevens Act section 3(9).

(4) ''Non-target species'' and ''non-target stocks'' are fish caught incidentally during the pursuit of target stocks in a fishery, including ''regulatory discards'' as defined under Magnuson-Stevens Act section 3(38). They may or may not be retained for sale or personal use. Non-target species may be included in a fishery and, if so, they should be identified at the stock level. Some non-target species may be identified in an FMP as ecosystem component (EC) species or stocks.

(5) *Ecosystem component (EC) species.* (i) To be considered for possible classification as an EC species, the species should:

(A) Be a non-target species or non-target stock;

(B) Not be determined to be subject to overfishing, approaching overfished, or overfished;

(C) Not be likely to become subject to overfishing or overfished, according to the best available information, in the absence of conservation and management measures; and

(D) Not generally be retained for sale or personal use.

(ii) Occasional retention of the species would not, in and of itself, preclude consideration of the species under the EC classification. In addition to the general factors noted in paragraphs (d)(5)(i)(A)–(D) of this section, it is important to consider whether use of the EC species classification in a given instance is consistent with MSA conservation and management requirements.

(iii) EC species may be identified at the species or stock level, and may be grouped into complexes. EC species may, but are not required to, be included in an FMP or FMP amendment for any of the following reasons: For data collection purposes; for ecosystem considerations related to specification of OY for the associated fishery; as considerations in the development of conservation and management measures for the associated fishery; and/or to address other ecosystem issues. While EC species are not considered to be ''in the fishery,'' a Council should consider measures for the fishery to minimize bycatch and bycatch mortality of EC species consistent with National Standard 9, and to protect their associated role in the ecosystem. EC species do not require specification of reference points but should be monitored to the extent that any new pertinent scientific information becomes available (e.g., catch trends, vulnerability, etc.) to determine changes in their status or their vulnerability to the fishery. If necessary, they should be reclassified as ''in the fishery.''

(6) *Reclassification.* A Council should monitor the catch resulting from a fishery on a regular basis to determine if the stocks and species are appropriately classified in the FMP. If the criteria previously used to classify a stock or species is no longer valid, the Council should reclassify it through an FMP amendment, which documents rationale for the decision.

(7) *Stocks or species identified in more than one FMP.* If a stock is identified in more than one fishery, Councils should choose which FMP will be the primary FMP in which management objectives, SDC, the stock's overall ACL and other reference points for the stock are established. Conservation and management measures in other FMPs in which the stock is identified as part of a fishery should be consistent with the primary FMP's management objectives for the stock.

(8) *Stock complex.* ''Stock complex'' means a group of stocks that are sufficiently similar in geographic distribution, life history, and vulnerabilities to the fishery such that the impact of management actions on the stocks is similar. At the time a stock complex is established, the FMP should provide a full and explicit description of the proportional composition of each stock in the stock complex, to the extent possible. Stocks may be grouped into complexes for various reasons, including where stocks in a multispecies fishery cannot be targeted independent of one another and MSY can not be defined on a stock-by-stock basis (*see* paragraph (e)(1)(iii) of this section); where there is insufficient data to measure their status relative to SDC; or when it is not feasible for fishermen to distinguish individual stocks among their catch. The vulnerability of stocks to the fishery should be evaluated when determining if a particular stock complex should be established or reorganized, or if a particular stock should be included in a complex. Stock complexes may be comprised of: one or more indicator stocks, each of which has SDC and ACLs, and several other stocks; several stocks without an indicator stock, with SDC and an ACL for the complex as a whole; or one of more indicator stocks, each of which has SDC and management objectives, with an ACL for the complex as a whole (this situation might be applicable to some salmon species).

(9) *Indicator stocks.* An indicator stock is a stock with measurable SDC that can be used to help manage and evaluate more poorly known stocks that are in a stock complex. If an indicator stock is used to evaluate the status of a complex, it should be representative of the typical status of each stock within the complex, due to similarity in vulnerability. If the stocks within a stock complex have a wide range of vulnerability, they should be reorganized into different stock complexes that have similar vulnerabilities; otherwise the indicator stock should be chosen to represent the more vulnerable stocks within the complex. In instances where an indicator stock is less vulnerable than other members of the complex, management measures need to be more conservative so that the more vulnerable members of the complex are not at risk from the fishery. More than one indicator stock can be selected to provide more information about the status of the complex. When indicator stock(s) are used, periodic re-evaluation of available quantitative or qualitative information (e.g., catch trends, changes in vulnerability, fish health indices, etc.) is needed to determine whether a stock is subject to overfishing, or is approaching (or in) an overfished condition.

(10) *Vulnerability.* A stock's vulnerability is a combination of its productivity, which depends upon its life history characteristics, and its susceptibility to the fishery. Productivity refers to the capacity of the stock to produce MSY and to recover if the population is depleted, and susceptibility is the potential for the stock to be impacted by the fishery, which includes direct captures, as well as indirect impacts to the fishery (e.g., loss of habitat quality). Councils in consultation with their SSC, should analyze the vulnerability of stocks in stock complexes where possible.

(e) *Features of MSY, SDC, and OY.*—(1) *MSY.* Each FMP must include an estimate of MSY for the stocks and stock complexes in the fishery, as described in paragraph (d)(2) of this section).

(i) *Definitions.* (A) *MSY* is the largest long-term average catch or yield that can be taken from a stock or stock complex

under prevailing ecological, environmental conditions and fishery technological characteristics (e.g., gear selectivity), and the distribution of catch among fleets.

(B) *MSY fishing mortality rate (F_{msy})* is the fishing mortality rate that, if applied over the long term, would result in MSY.

(C) *MSY stock size (B_{msy})* means the long-term average size of the stock or stock complex, measured in terms of spawning biomass or other appropriate measure of the stock's reproductive potential that would be achieved by fishing at F_{msy}.

(ii) *MSY for stocks.* MSY should be estimated for each stock based on the best scientific information available (see § 600.315).

(iii) *MSY for stock complexes.* MSY should be estimated on a stock-by-stock basis whenever possible. However, where MSY cannot be estimated for each stock in a stock complex, then MSY may be estimated for one or more indicator stocks for the complex or for the complex as a whole. When indicator stocks are used, the stock complex's MSY could be listed as ''unknown,'' while noting that the complex is managed on the basis of one or more indicator stocks that do have known stock-specific MSYs, or suitable proxies, as described in paragraph (e)(1)(iv) of this section. When indicator stocks are not used, MSY, or a suitable proxy, should be calculated for the stock complex as a whole.

(iv) *Specifying MSY.* Because MSY is a long-term average, it need not be estimated annually, but it must be based on the best scientific information available (*see* § 600.315), and should be re-estimated as required by changes in long-term environmental or ecological conditions, fishery technological characteristics, or new scientific information. When data are insufficient to estimate MSY directly, Councils should adopt other measures of reproductive potential, based on the best scientific information available, that can serve as reasonable proxies for MSY, F_{msy}, and B_{msy}, to the extent possible. The MSY for a stock is influenced by its interactions with other stocks in its ecosystem and these interactions may shift as multiple stocks in an ecosystem are fished. These ecological conditions should be taken into account, to the extent possible, when specifying MSY. Ecological conditions not directly accounted for in the specification of MSY can be among the ecological factors considered when setting OY below MSY. As MSY values are estimates or are based on proxies, they will have some level of uncertainty associated with them. The degree of uncertainty in the estimates should be identified, when possible, through the stock assessment process and peer review (*see* § 600.335), and should be taken into account when specifying the ABC Control rule. Where this uncertainty cannot be directly calculated, such as when proxies are used, then a proxy for the uncertainty itself should be established based on the best scientific information, including comparison to other stocks.

(2) *Status determination criteria*—(i) *Definitions.* (A) *Status determination criteria (SDC)* mean the quantifiable factors, MFMT, OFL, and MSST, or their proxies, that are used to determine if overfishing has occurred, or if the stock or stock complex is overfished. Magnuson-Stevens Act (section 3(34)) defines both ''overfishing'' and ''overfished'' to mean a rate or level of fishing mortality that jeopardizes the capacity of a fishery to produce the MSY on a continuing basis. To avoid confusion, this section clarifies that ''overfished'' relates to biomass of a stock or stock complex, and ''overfishing'' pertains to a rate or level of removal of fish from a stock or stock complex.

(B) *Overfishing* (to overfish) occurs whenever a stock or stock complex is subjected to a level of fishing mortality or annual total catch that jeopardizes the capacity of a stock or stock complex to produce MSY on a continuing basis.

(C) *Maximum fishing mortality threshold (MFMT)* means the level of fishing mortality (F), on an annual basis, above which overfishing is occurring. The MFMT or reasonable proxy may be expressed either as a single number (a fishing mortality rate or F value), or as a function of spawning biomass or other measure of reproductive potential.

(D) *Overfishing limit (OFL)* means the annual amount of catch that corresponds to the estimate of MFMT applied to a stock or stock complex's abundance and is expressed in terms of numbers or weight of fish. The OFL is an estimate of the catch level above which overfishing is occurring.

(E) *Overfished.* A stock or stock complex is considered ''overfished'' when its biomass has declined below a level that jeopardizes the capacity of the stock or stock complex to produce MSY on a continuing basis.

(F) *Minimum stock size threshold (MSST)* means the level of biomass below which the stock or stock complex is considered to be overfished.

(G) *Approaching an overfished condition.* A stock or stock complex is approaching an overfished condition when it is projected that there is more than a 50 percent chance that the biomass of the stock or stock complex will decline below the MSST within two years.

(ii) *Specification of SDC and overfishing and overfished determinations.* SDC must be expressed in a way that enables the Council to monitor each stock or stock complex in the FMP, and determine annually, if possible, whether overfishing is occurring and whether the stock or stock complex is overfished. In specifying SDC, a Council must provide an analysis of how the SDC were chosen and how they relate to reproductive potential. Each FMP must specify, to the extent possible, objective and measurable SDC as follows (*see* paragraphs (e)(2)(ii)(A) and (B) of this section):

(A) *SDC to determine overfishing status.* Each FMP must describe which of the following two methods will be used for each stock or stock complex to determine an overfishing status.

(1) *Fishing mortality rate exceeds MFMT.* Exceeding the MFMT for a period of 1 year or more constitutes overfishing. The MFMT or reasonable proxy may be expressed either as a single number (a fishing mortality rate or F value), or as a function of spawning biomass or other measure of reproductive potential.

(2) *Catch exceeds the OFL.* Should the annual catch exceed the annual OFL for 1 year or more, the stock or stock complex is considered subject to overfishing.

(B) *SDC to determine overfished status.* The MSST or reasonable proxy must be expressed in terms of spawning biomass or other measure of reproductive potential. To the extent possible, the MSST should equal whichever of the following is greater: One-half the MSY stock size, or the minimum stock size at which rebuilding to the MSY level would be expected to occur within 10 years, if the stock or stock complex were exploited at the MFMT specified under paragraph (e)(2)(ii)(A)(1) of this section. Should the estimated size of the stock or stock complex in a given year fall below this threshold, the stock or stock complex is considered overfished.

(iii) *Relationship of SDC to environmental change.* Some short-term environmental changes can alter the size of a stock or stock complex without affecting its long-term reproductive potential. Long-term environmental changes affect both the short-term size of the stock or stock complex and the long-term reproductive potential of the stock or stock complex.

(A) If environmental changes cause a stock or stock complex to fall below its MSST without affecting its long-term reproductive potential, fishing mortality must be constrained sufficiently to allow rebuilding within an acceptable time frame (*also see* paragraph (j)(3)(ii) of this section). SDC should not be respecified.

(B) If environmental changes affect the long-term reproductive potential of the stock or stock complex, one or more components of the SDC must be respecified. Once SDC have been respecified, fishing mortality may or may not have to be reduced, depending on the status of the stock or stock complex with respect to the new criteria.

(C) If manmade environmental changes are partially responsible for a stock or stock complex being in an overfished condition, in addition to controlling fishing mortality, Councils should recommend restoration of habitat and other ameliorative programs, to the extent possible (see also the guidelines issued pursuant to section 305(b) of the Magnuson-Stevens Act for Council actions concerning essential fish habitat).

(iv) *Secretarial approval of SDC.* Secretarial approval or disapproval of proposed SDC will be based on consideration of whether the proposal:

(A) Has sufficient scientific merit;

(B) Contains the elements described in paragraph (e)(2)(ii) of this section;

(C) Provides a basis for objective measurement of the status of the stock or stock complex against the criteria; and

(D) is operationally feasible.

(3) *Optimum yield*—(i) *Definitions*—(A) *Optimum yield (OY).* Magnuson-Stevens Act section (3)(33) defines ''optimum,'' with respect to the yield from a fishery, as the amount of fish that will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities and taking into account the protection of marine ecosystems; that is prescribed on the basis of the MSY from the fishery, as reduced by any relevant economic, social, or ecological factor; and, in the case of an overfished fishery, that provides for rebuilding to a level consistent with producing the MSY in such fishery. OY may be established at the stock or stock complex level, or at the fishery level.

(B) In NS1, use of the phrase ''achieving, on a continuing basis, the optimum yield from each fishery'' means producing, from each stock, stock complex, or fishery: a long-term series of catches such that the average catch is equal to the OY, overfishing is prevented, the long term average biomass is near or above B_{msy}, and overfished stocks and stock complexes are rebuilt consistent with timing and other requirements of section 304(e)(4) of the Magnuson-Stevens Act and paragraph (j) of this section.

(ii) *General.* OY is a long-term average amount of desired yield from a stock, stock complex, or fishery. An FMP must contain conservation and management measures, including ACLs and AMs, to achieve OY on a continuing basis, and provisions for information collection that are designed to determine the degree to which OY is achieved. These measures should allow for practical and effective implementation and enforcement of the management regime. The Secretary has an obligation to implement and enforce the FMP. If management measures prove unenforceable—or too restrictive, or not rigorous enough to prevent overfishing while achieving OY—they should be modified; an alternative is to reexamine the adequacy of the OY specification. Exceeding OY does not necessarily constitute overfishing. However, even if no overfishing resulted from exceeding OY, continual harvest at a level above OY would violate NS1, because OY was not achieved on a continuing basis. An FMP must contain an assessment and specification of OY, including a summary of information utilized in making such specification, consistent with requirements of section 303(a)(3) of the Magnuson-Stevens Act. A Council must identify those economic, social, and ecological factors relevant to management of a particular stock, stock complex, or fishery, and then evaluate them to determine the OY. The choice of a particular OY must be carefully documented to show that the OY selected will produce the greatest benefit to the Nation and prevent overfishing.

(iii) *Determining the greatest benefit to the Nation.* In determining the greatest benefit to the Nation, the values that should be weighed and receive serious attention when considering the economic, social, or ecological factors used in reducing MSY to obtain OY are:

(A) The benefits of food production are derived from providing seafood to consumers; maintaining an economically viable fishery together with its attendant contributions to the national, regional, and local economies; and utilizing the capacity of the Nation's fishery resources to meet nutritional needs.

(B) The benefits of recreational opportunities reflect the quality of both the recreational fishing experience and non-consumptive fishery uses such as ecotourism, fish watching, and recreational diving. Benefits also include the contribution of recreational fishing to the national, regional, and local economies and food supplies.

(C) The benefits of protection afforded to marine ecosystems are those resulting from maintaining viable populations (including those of unexploited species), maintaining adequate forage for all components of the ecosystem, maintaining evolutionary and ecological processes (e.g., disturbance regimes, hydrological processes, nutrient cycles), maintaining the evolutionary potential of species and ecosystems, and accommodating human use.

(iv) *Factors to consider in OY specification.* Because fisheries have limited capacities, any attempt to maximize the measures of benefits described in paragraph (e)(3)(iii) of this section will inevitably encounter practical constraints. OY cannot exceed MSY in any circumstance, and must take into account the need to prevent overfishing and rebuild overfished stocks and stock complexes. OY is prescribed on the basis of MSY as reduced by social, economic, and ecological factors. To the extent possible, the relevant social, economic, and ecological factors used to establish OY for a stock, stock complex, or fishery should be quantified and reviewed in historical, short-term, and long-term contexts. Even where quantification of social, economic, and ecological factors is not possible, the FMP still must address them in its OY specification. The following is a non-exhaustive list of potential considerations for each factor. An FMP must address each factor but not necessarily each example.

(A) *Social factors.* Examples are enjoyment gained from recreational fishing, avoidance of gear conflicts and resulting disputes, preservation of a way of life for fishermen and their families, and dependence of local communities on a fishery (e.g., involvement in fisheries and ability to adapt to change). Consideration may be given to fishery-related indicators (e.g., number of fishery permits, number of commercial fishing vessels, number of party and charter trips, landings, ex-vessel revenues etc.) and non-fishery related indicators (e.g., unemployment rates, percent of population below the poverty level, population density, etc.). Other factors that may be considered include the effects that past harvest levels have had on fishing communities, the cultural place of subsistence fishing, obligations under Indian treaties, proportions of affected minority and low-income groups, and worldwide nutritional needs.

(B) *Economic factors.* Examples are prudent consideration of the risk of overharvesting when a stock's size or reproductive potential is uncertain (*see* § 600.335(c)(2)(i)), satisfaction of consumer and recreational needs, and encouragement of domestic and export markets for U.S. harvested fish. Other factors that may be considered include: The value of fisheries, the level of capitalization, the decrease in cost per unit of catch afforded by an increase in stock size, the attendant increase in catch per unit of effort, alternate employment opportunities, and economic contribution to fishing communities, coastal areas, affected states, and the nation.

(C) *Ecological factors.* Examples include impacts on ecosystem component species, forage fish stocks, other fisheries, predator-prey or competitive interactions, marine mammals, threatened or endangered species, and birds. Species interactions that have not been explicitly taken into account when calculating MSY should be considered as relevant factors for setting OY below MSY. In addition, consideration should be given to managing forage stocks for higher biomass than B_{msy} to enhance and protect the marine ecosystem. Also important are ecological or environmental conditions that stress marine organisms, such as natural and manmade changes in wetlands or nursery grounds, and effects of pollutants on habitat and stocks.

(v) *Specification of OY.* The specification of OY must be consistent with paragraphs (e)(3)(i)–(iv) of this section. If the estimates of MFMT and current biomass are known with a high level of certainty and management controls can accurately limit catch then OY could be set very close to MSY, assuming no other reductions are necessary for social, economic, or ecological factors. To the degree that such MSY estimates and management controls are lacking or unavailable, OY should be set farther from MSY. If management measures cannot adequately control fishing mortality so that the specified OY can be achieved without overfishing, the Council should reevaluate the management measures and specification of OY so that the dual requirements of NS1 (preventing overfishing while achieving, on a continuing basis, OY) are met.

(A) The amount of fish that constitutes the OY should be expressed in terms of numbers or weight of fish.

(B) Either a range or a single value may be specified for OY.

(C) All catch must be counted against OY, including that resulting from bycatch, scientific research, and all fishing activities.

(D) The OY specification should be translatable into an annual numerical estimate for the purposes of establishing any total allowable level of foreign fishing (TALFF) and analyzing impacts of the management regime.

(E) The determination of OY is based on MSY, directly or through proxy. However, even where sufficient scientific data as to the biological characteristics of the stock do not exist, or where the period of exploitation or investigation has not been long enough for adequate understanding of stock dynamics, or where frequent large-scale fluctuations in stock size diminish the meaningfulness of the MSY concept, OY must still be established based on the best scientific information available.

(F) An OY established at a fishery level may not exceed the sum of the MSY values for each of the stocks or stock complexes within the fishery.

(G) There should be a mechanism in the FMP for periodic reassessment of the OY specification, so that it is responsive to changing circumstances in the fishery.

(H) Part of the OY may be held as a reserve to allow for factors such as uncertainties in estimates of stock size and domestic annual harvest (DAH). If an OY reserve is established, an adequate mechanism should be included in the FMP to permit timely release of the reserve to domestic or foreign fishermen, if necessary.

(vi) *OY and foreign fishing.* Section 201(d) of the Magnuson-Stevens Act provides that fishing by foreign nations is limited to that portion of the OY that will not be harvested by vessels of the United States. The FMP must include an assessment to address the following, as required by section 303(a)(4) of the Magnuson-Stevens Act:

(A) *DAH.* Councils and/or the Secretary must consider the capacity of, and the extent to which, U.S. vessels will harvest the OY on an annual basis. Estimating the amount that U.S. fishing vessels will actually harvest is required to determine the surplus.

(B) *Domestic annual processing (DAP).* Each FMP must assess the capacity of U.S. processors. It must also assess the amount of DAP, which is the sum of two estimates: The estimated amount of U.S. harvest that domestic processors will process, which may be based on historical performance or on surveys of the expressed intention of manufacturers to process, supported by evidence of contracts, plant expansion, or other relevant information; and the estimated amount of fish that will be harvested by domestic vessels, but not processed (*e.g.*, marketed as fresh whole fish, used for private consumption, or used for bait).

(C) *Joint venture processing (JVP).* When DAH exceeds DAP, the surplus is available for JVP.

(f) *Acceptable biological catch, annual catch limits, and annual catch targets.* The following features (see paragraphs (f)(1) through (f)(5) of this section) of acceptable biological catch and annual catch limits apply to stocks and stock complexes in the fishery (see paragraph (d)(2) of this section).

(1) *Introduction.* A control rule is a policy for establishing a limit or target fishing level that is based on the best available scientific information and is established by fishery managers in consultation with fisheries scientists. Control rules should be designed so that management actions become more conservative as biomass estimates, or other proxies, for a stock or stock complex decline and as science and management uncertainty increases. Examples of scientific uncertainty include uncertainty in the estimates of MFMT and biomass. Management uncertainty may include late catch reporting, misreporting, and underreporting of catches and is affected by a fishery's ability to control actual catch. For example, a fishery that has inseason catch data available and inseason closure authority has better management control and precision than a fishery that does not have these features.

(2) *Definitions.* (i) *Catch* is the total quantity of fish, measured in weight or numbers of fish, taken in commercial, recreational, subsistence, tribal, and other fisheries. Catch includes fish that are retained for any purpose, as well as mortality of fish that are discarded.

(ii) *Acceptable biological catch (ABC)* is a level of a stock or stock complex's annual catch that accounts for the scientific uncertainty in the estimate of OFL and any other scientific uncertainty (see paragraph (f)(3) of this section), and should be specified based on the ABC control rule.

(iii) *ABC control rule* means a specified approach to setting the ABC for a stock or stock complex as a function of the scientific uncertainty in the estimate of OFL and any other scientific uncertainty (*see* paragraph (f)(4) of this section).

(iv) *Annual catch limit (ACL)* is the level of annual catch of a stock or stock complex that serves as the basis for invoking AMs. ACL cannot exceed the ABC, but may be divided into sector-ACLs (*see* paragraph (f)(5) of this section).

(v) *Annual catch target (ACT)* is an amount of annual catch of a stock or stock complex that is the management target of the fishery, and accounts for management uncertainty in controlling the actual catch at or below the ACL. ACTs are recommended in the system of accountability measures so that ACL is not exceeded.

(vi) *ACT control rule* means a specified approach to setting the ACT for a stock or stock complex such that the risk of exceeding the ACL due to management uncertainty is at an acceptably low level.

(3) *Specification of ABC.* ABC may not exceed OFL (see paragraph (e)(2)(i)(D) of this section). Councils should develop a process for receiving scientific information and advice used to establish ABC. This process should: Identify the body that will apply the ABC control rule (*i.e.* , calculates the ABC), and identify the review process that will evaluate the resulting ABC. The SSC must recommend the ABC to the Council. An SSC may recommend an ABC that differs from the result of the ABC control rule calculation, based on factors such as data uncertainty, recruitment variability, declining trends in population variables, and other factors, but must explain why. For Secretarial FMPs or FMP amendments, agency scientists or a peer review process would provide the scientific advice to establish ABC. For internationally-assessed stocks, an ABC as defined in these guidelines is not required if they meet the international exception (*see* paragraph (h)(2)(ii)). While the ABC is allowed to equal OFL, NMFS expects that in most cases ABC will be reduced from OFL to reduce the probability that overfishing might occur in a year. Also, *see* paragraph (f)(5) of this section for cases where a Council recommends that ACL is equal to ABC, and ABC is equal to OFL.

(i) *Expression of ABC.* ABC should be expressed in terms of catch, but may be expressed in terms of landings as long as estimates of bycatch and any other fishing mortality not accounted for in the landings are incorporated into the determination of ABC.

(ii) *ABC for overfished stocks.* For overfished stocks and stock complexes, a rebuilding ABC must be set to reflect the annual catch that is consistent with the schedule of fishing mortality rates in the rebuilding plan.

(4) *ABC control rule.* For stocks and stock complexes required to have an ABC, each Council must establish an ABC control rule based on scientific advice from its SSC. The determination of ABC should be based, when possible, on the probability that an actual catch equal to the stock's ABC would result in overfishing. This probability that overfishing will occur cannot exceed 50 percent and should be a lower value. The ABC control rule should consider reducing fishing mortality as stock size declines and may establish a stock abundance level below which fishing would not be allowed. The process of establishing an ABC control rule could also involve science advisors or the peer review process established under Magnuson-Stevens Act section 302(g)(1)(E). The ABC control rule must articulate how ABC will be set compared to the OFL based on the scientific knowledge about the stock or stock complex and the scientific uncertainty in the estimate of OFL and any other scientific uncertainty. The ABC control rule should consider uncertainty in factors such as stock assessment results, time lags in updating assessments, the degree of retrospective revision of assessment results, and projections. The control rule may be used in a tiered approach to address different levels of scientific uncertainty.

(5) *Setting the annual catch limit*—(i) *General.* ACL cannot exceed the ABC and may be set annually or on a multiyear plan basis. ACLs in coordination with AMs must prevent overfishing (see MSA section 303(a)(15)). If a Council recommends an ACL which equals ABC, and the ABC is equal to OFL, the Secretary may presume that the proposal would not prevent overfishing, in the absence of sufficient analysis and justification for the approach. A ''multiyear plan'' as referenced in section 303(a)(15) of the Magnuson-Stevens Act is a plan that establishes harvest specifications or harvest guidelines for each year of a time period greater than 1 year. A multiyear plan must include a mechanism for specifying ACLs for each year with appropriate AMs to prevent overfishing and maintain an appropriate rate of rebuilding if the stock or stock complex is in a rebuilding plan. A multiyear plan must provide that, if an ACL is exceeded for a year, then AMs are triggered for the next year consistent with paragraph (g)(3) of this section.

(ii) *Sector-ACLs.* A Council may, but is not required to, divide an ACL into sector-ACLs. ''Sector,'' for purposes of this section, means a distinct user group to which separate management strategies and separate catch quotas apply. Examples of sectors include the commercial sector, recreational sector, or various gear groups within a fishery. If the management measures for different sectors differ in the degree of management uncertainty, then sector ACLs may be necessary so that appropriate AMs can be developed for each sector. If a Council chooses to use sector ACLs, the sum of sector ACLs must not exceed the stock or stock complex level ACL. The system of ACLs and AMs designed must be effective in protecting the stock or stock complex as a whole. Even if sector-ACLs and AMs are established, additional AMs at the stock or stock complex level may be necessary.

(iii) *ACLs for State-Federal Fisheries.* For stocks or stock complexes that have harvest in state or territorial waters, FMPs and FMP amendments should include an ACL for the overall stock that may be further divided. For example, the overall ACL could be divided into a Federal-ACL and state-ACL. However, NMFS recognizes that Federal management is limited to the portion of the fishery under Federal authority (*see* paragraph (g)(5) of this section). When stocks are co-managed by Federal, state, tribal, and/or territorial fishery managers, the goal should be to develop collaborative conservation and management strategies, and scientific capacity to support such strategies (including AMs for state or territorial and Federal waters), to prevent overfishing of shared stocks and ensure their sustainability.

(6) *ACT control rule.* If ACT is specified as part of the AMs for a fishery, an ACT control rule is utilized for setting the ACT. The ACT control rule should clearly articulate how management uncertainty in the amount of catch in the fishery is accounted for in setting ACT. The objective for establishing the ACT and related AMs is that the ACL not be exceeded.

(i) *Determining management uncertainty.* Two sources of management uncertainty should be accounted for in establishing the AMs for a fishery, including the ACT control rule if utilized: Uncertainty in the ability of managers to constrain catch so the ACL is not exceeded, and uncertainty in quantifying the true catch amounts (*i.e.,* estimation errors). To determine the level of management uncertainty in controlling catch, analyses need to consider past management performance in the fishery and factors such as time lags in reported catch. Such analyses must be based on the best available scientific information from an SSC, agency scientists, or peer review process as appropriate.

(ii) *Establishing tiers and corresponding ACT control rules.* Tiers can be established based on levels of management uncertainty associated with the fishery, frequency and accuracy of catch monitoring data

available, and risks of exceeding the limit. An ACT control rule could be established for each tier and have, as appropriate, different formulas and standards used to establish the ACT.

(7) A Council may choose to use a single control rule that combines both scientific and management uncertainty and supports the ABC recommendation and establishment of ACL and if used ACT.

(g) *Accountability measures.* The following features (see paragraphs (g)(1) through (5) of this section) of accountability measures apply to those stocks and stock complexes in the fishery.

(1) *Introduction.* AMs are management controls to prevent ACLs, including sector-ACLs, from being exceeded, and to correct or mitigate overages of the ACL if they occur. AMs should address and minimize both the frequency and magnitude of overages and correct the problems that caused the overage in as short a time as possible. NMFS identifies two categories of AMs, inseason AMs and AMs for when the ACL is exceeded.

(2) *Inseason AMs.* Whenever possible, FMPs should include inseason monitoring and management measures to prevent catch from exceeding ACLs. Inseason AMs could include, but are not limited to: ACT; closure of a fishery; closure of specific areas; changes in gear; changes in trip size or bag limits; reductions in effort; or other appropriate management controls for the fishery. If final data or data components of catch are delayed, Councils should make appropriate use of preliminary data, such as landed catch, in implementing inseason AMs. FMPs should contain inseason closure authority giving NMFS the ability to close fisheries if it determines, based on data that it deems sufficiently reliable, that an ACL has been exceeded or is projected to be reached, and that closure of the fishery is necessary to prevent overfishing. For fisheries without inseason management control to prevent the ACL from being exceeded, AMs should utilize ACTs that are set below ACLs so that catches do not exceed the ACL.

(3) *AMs for when the ACL is exceeded.* On an annual basis, the Council must determine as soon as possible after the fishing year if an ACL was exceeded. If an ACL was exceeded, AMs must be triggered and implemented as soon as possible to correct the operational issue that caused the ACL overage, as well as any biological consequences to the stock or stock complex resulting from the overage when it is known. These AMs could include, among other things, modifications of inseason AMs or overage adjustments. For stocks and stock complexes in rebuilding plans, the AMs should include overage adjustments that reduce the ACLs in the next fishing year by the full amount of the overages, unless the best scientific information available shows that a reduced overage adjustment, or no adjustment, is needed to mitigate the effects of the overages. If catch exceeds the ACL for a given stock or stock complex more than once in the last four years, the system of ACLs and AMs should be re-evaluated, and modified if necessary, to improve its performance and effectiveness. A Council could choose a higher performance standard (e.g., a stock's catch should not exceed its ACL more often than once every five or six years) for a stock that is particularly vulnerable to the effects of overfishing, if the vulnerability of the stock has not already been accounted for in the ABC control rule.

(4) *AMs based on multi-year average data.* Some fisheries have highly variable annual catches and lack reliable inseason or annual data on which to base AMs. If there are insufficient data upon which to compare catch to ACL, either inseason or on an annual basis, AMs could be based on comparisons of average catch to average ACL over a three-year moving average period or, if supported by analysis, some other appropriate multi-year period. Councils should explain why basing AMs on a multi-year period is appropriate. Evaluation of the moving average catch to the average ACL must be conducted annually and AMs should be implemented if the average catch exceeds the average ACL. As a performance standard, if the average catch exceeds the average ACL for a stock or stock complex more than once in the last four years, then the system of ACLs and AMs should be re-evaluated and modified if necessary to improve its performance and effectiveness. The initial ACL and management measures may incorporate information from previous years so that AMs based on average ACLs can be applied from the first year. Alternatively, a Council could use a stepped approach where in year-1, catch is compared to the ACL for year-1; in year-2 the average catch for the past 2 years is compared to the average ACL; then in year 3 and beyond, the most recent 3 years of catch are compared to the corresponding ACLs for those years.

(5) *AMs for State-Federal Fisheries.* For stocks or stock complexes that have harvest in state or territorial waters, FMPs and FMP amendments must, at a minimum, have AMs for the portion of the fishery under Federal authority. Such AMs could include closing the EEZ when the Federal portion of the ACL is reached, or the overall stock's ACL is reached, or other measures.

(h) *Establishing ACL mechanisms and AMs in FMPs.* FMPs or FMP amendments must establish ACL mechanisms and AMs for all stocks and stock complexes in the fishery, unless paragraph (h)(2) of this section is applicable. These mechanisms should describe the annual or multiyear process by which specific ACLs, AMs, and other reference points such as OFL, and ABC will be established. If a complex has multiple indicator stocks, each indicator stock must have its own ACL; an additional ACL for the stock complex as a whole is optional. In cases where fisheries (e.g., Pacific salmon) harvest multiple indicator stocks of a single species that cannot be distinguished at the time of capture, separate ACLs for the indicator stocks are not required and the ACL can be established for the complex as a whole.

(1) In establishing ACL mechanisms and AMs, FMPs should describe:

(i) Timeframes for setting ACLs (e.g., annually or multi-year periods);

(ii) Sector-ACLs, if any (including set-asides for research or bycatch);

(iii) AMs and how AMs are triggered and what sources of data will be used (e.g., inseason data, annual catch compared to the ACL, or multi-year averaging approach); and

(iv) Sector-AMs, if there are sector-ACLs.

(2) *Exceptions from ACL and AM requirements*—(i) *Life cycle.* Section 303(a)(15) of the Magnuson-Stevens Act ''shall not apply to a fishery for species that has a life cycle of approximately 1 year unless the Secretary has determined the fishery is subject to overfishing of that species'' (as described in Magnuson-Stevens Act section 303 note). This exception applies to a stock for which the average length of time it takes for an individual to produce a reproductively active offspring is approximately 1 year and that the individual has only one breeding season in its lifetime. While exempt from the ACL and AM requirements, FMPs or FMP amendments for these stocks must have SDC, MSY, OY, ABC, and an ABC control rule.

(ii) *International fishery agreements.* Section 303(a)(15) of the Magnuson-Stevens Act applies ''unless otherwise provided for under an international agreement in which the United States participates'' (Magnuson-Stevens Act section 303 note). This exception applies to stocks or stock complexes

subject to management under an international agreement, which is defined as ''any bilateral or multilateral treaty, convention, or agreement which relates to fishing and to which the United States is a party'' (see Magnuson-Stevens Act section 3(24)). These stocks would still need to have SDC and MSY.

(3) *Flexibility in application of NS1 guidelines*. There are limited circumstances that may not fit the standard approaches to specification of reference points and management measures set forth in these guidelines. These include, among other things, conservation and management of Endangered Species Act listed species, harvests from aquaculture operations, and stocks with unusual life history characteristics (e.g., Pacific salmon, where the spawning potential for a stock is spread over a multi-year period). In these circumstances, Councils may propose alternative approaches for satisfying the NS1 requirements of the Magnuson-Stevens Act than those set forth in these guidelines. Councils must document their rationale for any alternative approaches for these limited circumstances in an FMP or FMP amendment, which will be reviewed for consistency with the Magnuson-Stevens Act.

(i) *Fisheries data*. In their FMPs, or associated public documents such as SAFE reports as appropriate, Councils must describe general data collection methods, as well as any specific data collection methods used for all stocks in the fishery, and EC species, including:

(1) Sources of fishing mortality (both landed and discarded), including commercial and recreational catch and bycatch in other fisheries;

(2) Description of the data collection and estimation methods used to quantify total catch mortality in each fishery, including information on the management tools used (i.e., logbooks, vessel monitoring systems, observer programs, landings reports, fish tickets, processor reports, dealer reports, recreational angler surveys, or other methods); the frequency with which data are collected and updated; and the scope of sampling coverage for each fishery; and

(3) Description of the methods used to compile catch data from various catch data collection methods and how those data are used to determine the relationship between total catch at a given point in time and the ACL for stocks and stock complexes that are part of a fishery.

(j) *Council actions to address overfishing and rebuilding for stocks and stock complexes in the fishery*—(1) *Notification*. The Secretary will immediately notify in writing a Regional Fishery Management Council whenever it is determined that:

(i) Overfishing is occurring;

(ii) A stock or stock complex is overfished;

(iii) A stock or stock complex is approaching an overfished condition; or

(iv) Existing remedial action taken for the purpose of ending previously identified overfishing or rebuilding a previously identified overfished stock or stock complex has not resulted in adequate progress.

(2) *Timing of actions*—(i) *If a stock or stock complex is undergoing overfishing*. FMPs or FMP amendments must establish ACL and AM mechanisms in 2010, for stocks and stock complexes determined to be subject to overfishing, and in 2011, for all other stocks and stock complexes (*see* paragraph (b)(2)(iii) of this section). To address practical implementation aspects of the FMP and FMP amendment process, paragraphs (j)(2)(i)(A) through (C) of this section clarifies the expected timing of actions.

(A) In addition to establishing ACL and AM mechanisms, the ACLs and AMs themselves must be specified in FMPs, FMP amendments, implementing regulations, or annual specifications beginning in 2010 or 2011, as appropriate.

(B) For stocks and stock complexes still determined to be subject to overfishing at the end of 2008, ACL and AM mechanisms and the ACLs and AMs themselves must be effective in fishing year 2010.

(C) For stocks and stock complexes determined to be subject to overfishing during 2009, ACL and AM mechanisms and ACLs and AMs themselves should be effective in fishing year 2010, if possible, or in fishing year 2011, at the latest.

(ii) *If a stock or stock complex is overfished or approaching an overfished condition*. (A) For notifications that a stock or stock complex is overfished or approaching an overfished condition made before July 12, 2009, a Council must prepare an FMP, FMP amendment, or proposed regulations within one year of notification. If the stock or stock complex is overfished, the purpose of the action is to specify a time period for ending overfishing and rebuilding the stock or stock complex that will be as short as possible as described under section 304(e)(4) of the Magnuson-Stevens Act. If the stock or stock complex is approaching an overfished condition, the purpose of the action is to prevent the biomass from declining below the MSST.

(B) For notifications that a stock or stock complex is overfished or approaching an overfished condition made after July 12, 2009, a Council must prepare and implement an FMP, FMP amendment, or proposed regulations within two years of notification, consistent with the requirements of section 304(e)(3) of the Magnuson-Stevens Act. Council actions should be submitted to NMFS within 15 months of notification to ensure sufficient time for the Secretary to implement the measures, if approved. If the stock or stock complex is overfished and overfishing is occurring, the rebuilding plan must end overfishing immediately and be consistent with ACL and AM requirements of the Magnuson-Stevens Act.

(3) *Overfished fishery*. (i) Where a stock or stock complex is overfished, a Council must specify a time period for rebuilding the stock or stock complex based on factors specified in Magnuson-Stevens Act section 304(e)(4). This target time for rebuilding (T_{target}) shall be as short as possible, taking into account: The status and biology of any overfished stock, the needs of fishing communities, recommendations by international organizations in which the U.S. participates, and interaction of the stock within the marine ecosystem. In addition, the time period shall not exceed 10 years, except where biology of the stock, other environmental conditions, or management measures under an international agreement to which the U.S. participates, dictate otherwise. SSCs (or agency scientists or peer review processes in the case of Secretarial actions) shall provide recommendations for achieving rebuilding targets (*see* Magnuson-Stevens Act section 302(g)(1)(B)). The above factors enter into the specification of T_{target} as follows:

(A) The ''minimum time for rebuilding a stock'' (T_{min}) means the amount of time the stock or stock complex is expected to take to rebuild to its MSY biomass level in the absence of any fishing mortality. In this context, the term ''expected'' means to have at least a 50 percent probability of attaining the B_{msy}.

(B) For scenarios under paragraph (j)(2)(ii)(A) of this section, the starting year for the T_{min} calculation is the first year that a rebuilding plan is implemented. For scenarios under paragraph (j)(2)(ii)(B) of this section, the starting year for the T_{min} calculation is 2 years after notification that a stock or stock complex is overfished or the first year that a rebuilding plan is implemented, whichever is sooner.

(C) If T_{min} for the stock or stock complex is 10 years or less, then the maximum time allowable for rebuilding (T_{max}) that stock to its B_{msy} is 10 years.

(D) If T_{min} for the stock or stock complex exceeds 10 years, then the maximum time allowable for rebuilding a stock or stock complex to its B_{msy} is T_{min} plus the length of time associated with one generation time for that stock or stock complex. ''Generation time'' is the average length of time between when an individual is born and the birth of its offspring.

(E) T_{target} shall not exceed T_{max}, and should be calculated based on the factors described in this paragraph (j)(3).

(ii) If a stock or stock complex reached the end of its rebuilding plan period and has not yet been determined to be rebuilt, then the rebuilding F should not be increased until the stock or stock complex has been demonstrated to be rebuilt. If the rebuilding plan was based on a T_{target} that was less than T_{max}, and the stock or stock complex is not rebuilt by T_{target}, rebuilding measures should be revised, if necessary, such that the stock or stock complex will be rebuilt by T_{max}. If the stock or stock complex has not rebuilt by T_{max}, then the fishing mortality rate should be maintained at $F_{rebuild}$ or 75 percent of the MFMT, whichever is less.

(iii) Council action addressing an overfished fishery must allocate both overfishing restrictions and recovery benefits fairly and equitably among sectors of the fishery.

(iv) For fisheries managed under an international agreement, Council action addressing an overfished fishery must reflect traditional participation in the fishery, relative to other nations, by fishermen of the United States.

(4) *Emergency actions and interim measures.* The Secretary, on his/her own initiative or in response to a Council request, may implement interim measures to reduce overfishing or promulgate regulations to address an emergency (Magnuson-Stevens Act section 304(e)(6) or 305(c)). In considering a Council request for action, the Secretary would consider, among other things, the need for and urgency of the action and public interest considerations, such as benefits to the stock or stock complex and impacts on participants in the fishery.

(i) These measures may remain in effect for not more than 180 days, but may be extended for an additional 186 days if the public has had an opportunity to comment on the measures and, in the case of Council-recommended measures, the Council is actively preparing an FMP, FMP amendment, or proposed regulations to address the emergency or overfishing on a permanent basis.

(ii) Often, these measures need to be implemented without prior notice and an opportunity for public comment, as it would be impracticable to provide for such processes given the need to act quickly and also contrary to the public interest to delay action. However, emergency regulations and interim measures that do not qualify for waivers or exceptions under the Administrative Procedure Act would need to follow proposed notice and comment rulemaking procedures.

(k) *International overfishing.* If the Secretary determines that a fishery is overfished or approaching a condition of being overfished due to excessive international fishing pressure, and for which there are no management measures (or no effective measures) to end overfishing under an international agreement to which the United States is a party, then the Secretary and/or the appropriate Council shall take certain actions as provided under Magnuson-Stevens Act section 304(i). The Secretary, in cooperation with the Secretary of State, must immediately take appropriate action at the international level to end the overfishing. In addition, within one year after the determination, the Secretary and/or appropriate Council shall:

(1) Develop recommendations for domestic regulations to address the relative impact of the U.S. fishing vessels on the stock. Council recommendations should be submitted to the Secretary.

(2) Develop and submit recommendations to the Secretary of State, and to the Congress, for international actions that will end overfishing in the fishery and rebuild the affected stocks, taking into account the relative impact of vessels of other nations and vessels of the United States on the relevant stock. Councils should, in consultation with the Secretary, develop recommendations that take into consideration relevant provisions of the Magnuson-Stevens Act and NS1 guidelines, including section 304(e) of the Magnuson-Stevens Act and paragraph (j)(3)(iv) of this section, and other applicable laws. For highly migratory species in the Pacific, recommendations from the Western Pacific, North Pacific, or Pacific Councils must be developed and submitted consistent with Magnuson-Stevens Reauthorization Act section 503(f), as appropriate.

(3) *Considerations for assessing ''relative impact.''* ''Relative impact'' under paragraphs (k)(1) and (2) of this section may include consideration of factors that include, but are not limited to: Domestic and international management measures already in place, management history of a given nation, estimates of a nation's landings or catch (including bycatch) in a given fishery, and estimates of a nation's mortality contributions in a given fishery. Information used to determine relative impact must be based upon the best available scientific information.

(l) *Relationship of National Standard 1 to other national standards—General.* National Standards 2 through 10 provide further requirements for conservation and management measures in FMPs, but do not alter the requirement of NS1 to prevent overfishing and rebuild overfished stocks.

(1) *National Standard 2 (see § 600.315).* Management measures and reference points to implement NS1 must be based on the best scientific information available. When data are insufficient to estimate reference points directly, Councils should develop reasonable proxies to the extent possible (*also see* paragraph (e)(1)(iv) of this section). In cases where scientific data are severely limited, effort should also be directed to identifying and gathering the needed data. SSCs should advise their Councils regarding the best scientific information available for fishery management decisions.

(2) *National Standard 3 (see § 600.320).* Reference points should generally be specified in terms of the level of stock aggregation for which the best scientific information is available (*also see* paragraph (e)(1)(iii) of this section). Also, scientific assessments must be based on the best information about the total range of the stock and potential biological structuring of the stock into biological sub-units, which may differ from the geographic units on which management is feasible.

(3) *National Standard 6 (see § 600.335).* Councils must build into the reference points and control rules appropriate consideration of risk, taking into account uncertainties in estimating harvest, stock conditions, life history parameters, or the effects of environmental factors.

(4) *National Standard 8 (see § 600.345).* National Standard 8 directs the Councils to apply economic and social factors towards sustained participation of fishing communities and to the extent practicable, minimize adverse economic impacts on such communities within the context of preventing overfishing and rebuilding overfished stocks as required under National Standard 1. Therefore, calculation of OY as reduced from MSY

should include economic and social factors, but the combination of management measures chosen to achieve the OY must principally be designed to prevent overfishing and rebuild overfished stocks.

(5) *National Standard 9 (see § 600.350).* Evaluation of stock status with respect to reference points must take into account mortality caused by bycatch. In addition, the estimation of catch should include the mortality of fish that are discarded.

(m) *Exceptions to requirements to prevent overfishing.* Exceptions to the requirement to prevent overfishing could apply under certain limited circumstances. Harvesting one stock at its optimum level may result in overfishing of another stock when the two stocks tend to be caught together (This can occur when the two stocks are part of the same fishery or if one is bycatch in the other's fishery). Before a Council may decide to allow this type of overfishing, an analysis must be performed and the analysis must contain a justification in terms of overall benefits, including a comparison of benefits under alternative management measures, and an analysis of the risk of any stock or stock complex falling below its MSST. The Council may decide to allow this type of overfishing if the fishery is not overfished and the analysis demonstrates that all of the following conditions are satisfied:

(1) Such action will result in long-term net benefits to the Nation;

(2) Mitigating measures have been considered and it has been demonstrated that a similar level of long-term net benefits cannot be achieved by modifying fleet behavior, gear selection/configuration, or other technical characteristic in a manner such that no overfishing would occur; and

(3) The resulting rate of fishing mortality will not cause any stock or stock complex to fall below its MSST more than 50 percent of the time in the long term, although it is recognized that persistent overfishing is expected to cause the affected stock to fall below its B_{msy} more than 50 percent of the time in the long term.

[FR Doc. E9–636 Filed 1–15–09; 8:45 am]

BILLING CODE 3510–22–P

Appendix K.

SUMMARY OF SCOPING AND PUBLIC HEARING COMMENTS ON THE COMPREHENSIVE ANNUAL CATCH LIMIT AMENDMENT

Prepared by SAFMC Staff

Scoping meetings for the Comprehensive Annual Catch Limit Amendment were held during the weeks of January 26-30, 2009 and February 2-5, 2009. Meetings took place in New Bern, NC; Charleston, SC; Pooler, GA; Cocoa Beach, FL; and Key Largo, FL.

Public hearings for this amendment were held from January 24, 2011 to February 3, 2011 in New Bern, NC; Charleston, SC; Pooler, GA; Jacksonville, FL; Cocoa Beach, FL and Key Largo, FL.

Summary of Scoping Comments

General

- Supports ACL Comprehensive Amendment and supports work with the SSC to determine the ACLs.
- Existing draft of Amendment 17 (December version) as drafted by the staff presents a well-thought out and elegant system of implementing the ACL requirement and we think it is fully compliant with the Congressional and NOAA Fisheries mandates. We encourage the Council to use the framework system of ACLs, ACTs, and AMs proposed generally as in the draft Amendment 17 document.

ACLs

- ACLs/ACTs should be done by state.
- ACL should be divided by the states according to historical harvest; ACL should be managed by the states.
- The amendment should include Control Rules for ABCs, ACLs (if a consideration), and ACTs (if a consideration). The control rules should account for management and scientific uncertainty.
- The amendment should describe how the process how ACL would be updated.

Allocations

- Allocations should be done on long-term, historical basis.
- For-hire should be included in recreational.
- For-hire operator was in favor of separating for-hire and private recreational.
- For-hire and private recreational should be separate. No way to keep track of recreational sector and better accountability of the headboat sector.

- Charter captains should be given their own allocations.

Ecosystem Component

- Should include designation of certain species as Ecosystem Components. Strongly against removing species from FMU as anything that is retained for any purpose – including bycatch and dead discards – needs to be considered. Only 11 of 73 species are historically broken out in the recreational data. Difficult to establish history of landing for most of these species. There is a risk of designating something as Ecosystem Component if the species is ignored and species could become targeted that weren't targeted before. Council should Implement some mechanism to enforce designation of ecosystem species. As an example, there could be a group cap for porgies to track landings. This would not be the same as species groupings. It would be a management cap and not a scientific cap.

Accountability Measures

- Recreational fishermen have overproduced by 300% each year. If you put a quota on the recreational fishermen, there is no way to track it and shut them down.
- Should include accountability measures when fisheries are expected to meet the targets. Should be accountability measures for failed rebuilding timelines.

Management Measures

- Change the trip limit of greater amberjack from 1000 to 2000 pounds a trip since the quota has often not been filled.
- Objects to restrictions to the recreational sector while there is a commercial fishery.
- Objects to any commercial landings while there is a reduction of the recreational landings.
- Object to limits and targets put into place until reliable data collection system put into place (MRFSS not collecting reliable data).
- Stick with daily trip limits and closed areas/seasons in order to discourage highgrading and discards.
- Best thing that could be done are area closures.
- Should develop a lottery system for goliath grouper that would allow catch.
- Prohibit all commercial spearfishing.

Summary of Public Hearing Comments

- Received approximately 1,900 comments.
- Strong opposition to proposed management measures for dolphin and wahoo.
- Opposition to species groupings approach.
- Opposition to harvest of *Sargassum.*
- Council should be clear and consistent on whether ACLs are based on landed catch or total mortality.

- Opposition to the exclusion of Warsaw grouper and speckled hind from tables.
- Request that Council provide an update on bycatch monitoring tools, including costs and percentage of use throughout fishery sectors.
- Request that the Council provide an update on the status of implementing ACCSP.
- Request that Council consider the lack of management buffer for the commercial sector either via a buffer between ABC and ACL or the use of an ACT.
- Opposition to removal of species from the FMU vs designation as EC species.
- Support for retaining the aggregate commercial and recreational ACLs for gag/black/red
- Support for retaining dolphin allocations.
- Concern that management uncertainty is not accounted for in the ACLs.

Appendix L.

DOCUMENTATION. This workbook provides several tabs summarizing average landings in whole weight (lbs) for managed species in the Gulf and South Atlantic for various time periods between 1986-2008. Data sources: SEFSC ACL Datasets from late 2010 (recreational dataset ACLspec_rec81_10wv3_15Sep10.xlsx, commercial dataset ALS_ACL_8OCT2010_WITH_JURISDICTION.xlsx). Each tab provides a summary for 'all' species, a table legend, then an additional table restricted to just managed species. **Note confidentiality issues may be associated with several tabs in this workbook (described at the bottom of this text box). The 'Gulf (NONCONF)' and 'SAFMC (NONCONF)' contain NONCONFIDENTIAL summaries of the landings data.** Note only landings from 1986 on were provided for both regions commercial sector, and for South Atlantic recreational sector, hence all summaries based on 1986-onward. In tables, the column 'Data Issues' denotes instances where at least one sector during the time series summarized had landings of 0 lbs for the species in question. For example, if gag had 0 landings in the for-hire sector in 1990, the line for gag on the 1986-2009 summary would indicate a possible data issue. See "Other Notes" for further details.

GUIDANCE FROM SEFSC REGARDING ACL DATASETS AND THEIR USE:

"In general the information corresponds to the information in the basic data bases used by SEFSC to prepare the data for the SER. Because of the relatively simple methods used to extract the data we recommend that these data will likely be useful for species not currently assessed and that the data not be used for the species for which assessments have been conducted. We think that using these landings only for un-assessed species is compatible with the intended use of the data by the SSCs for examining landings trends of un-assessed species As the SERO knows the SEFSC extractions are relatively simple treatments of the data which should be useful for most of the species managed by the two councils, though not necessarily for the species which have gone through complex assessments. For the assessed species the more simple treatments used in the SEFSC 'ACL' data extractions generally do not replicate the more complex treatments used in preparing data for assessment.

...For South Atlantic wreckfish we recommend not using the data at this time; we are working with ACCSP to revise some extraction routines particularly for South Carolina in recent years.

The relatively simple treatment of the data for these extractions means that the recreational catches from Monroe county, FL are assigned to the Gulf of Mexico. For several important species including king mackerel, greater amberjack, red grouper and gag it is highly likely that the ACL recreational data would not reflect the assessment data. The commercial data are likely geographically accurately separated for greater amberjack and red grouper. No attempt has been made to assign king mackerel to migratory group. For species such as greater amberjack, gag and black grouper for which landings under other species codes are combined or re-apportioned for stock assessments, the ACL files would not reflect the assessment data. Please be aware that the species lists used for the commercial tabulations and the recreational tabulations differ. We will attempt to standardized those lists in the future. The recreational data may include information for a species in a region even though that species in not in a regional FMU (it would be in an FMU from the other region). If SER tabulates the data only for the regional FMUs then there should not be a problem. Given the above comments the trends in abundance for Gulf of Mexico gag, red snapper and yellowedge grouper were similar to those used for assessment. Similarly the trends for tilefish and bluline tilefish were quite similar to those used for assessment after 1991; before 1992 the assessment workshop reclassified the tilefish landings by species ans so the trends differ. Some fraction of Gulf yellowfin grouper may actually be yellowedge grouper. Keeping in mind the above statements, the trends in landings of the South Atlantic species are thought to be similar to the trends of landings used in assessments." (SEFSC, 4 June 2010).

RECREATIONAL:

Note ACL recreational dataset landings estimates may differ from MRFSS website queries because 'For Hire' includes headboat and charter, and SEFSC has used improved weight substitution and charter boat estimation procedures that differ from those on the MRFSS website. Note 'Atlantic' for recreational data includes MRFSS: SE Atl. states (NC-FLE) and Headboat: Atlantic (NC-FL Keys areas 1-17). Note gag and black grouper landings have been adjusted for misidentification prior to 1990.

COMMERCIAL:

Commercial landings are based on ALS data and are subsetted by region based on fisher reported 'Catch Area', which should accurately partition Monroe County landings to Gulf vs. South Atlantic side.

1. Confidentiality is determined by a count of dealers in the "Dealers" column, less than 3 dealers and the cell is considered confidential.

2. REGION is assigned by referring
(a) to the 'WATERBODY' code
(b) the state (or coast for FL) landed. PLEASE NOTE THAT LOUISIANA HAS NO WATERBODY CODES FROM 1993-1999 except for shrimp and menhaden.
(c) in NE data, the region was assigned by landing region code first (1 = New England = 'NATL', 2 = Mid-Atlantic='MATL', 3 =. Chesapeake='MATL'...), then overwritten with 'SATL' where catch area data indicated US South Atlantic waters ('6310' -'7999').

3. Jurisdiction, State vs Federal (or International) was assigned by the waterbody code and distance from shore (where available). It is unfortunate that many state coastal offshore codes (typically ending in '0') are assigned to data that are sometimes from the EEZ. For this reason these codes were assigned an 'UNKNOWN' jurisdiction. Nevertheless, records are subject to review and edit and so the data could be accepted as STATE jurisdiction unless there are obvious gear/species data in the record which countermand that. This extract does not attempt to make that determination. List of water codes will be provided. Only distance from shore was used in determining NE data jurisdiction....

4. A filter field, 'INCLUDE_RECORD' is assigned as a SUGGESTED filter (Y for Yes, N for No), based on FMP boundaries (see esp. Black Sea Bass and Scup/Porgy, as well as some migratory species), as well as species assigned to FMP. Example: Bluefish has a 'USE_THIS_RECORD' ='Y' in the GULF region, and 'N' in rest. It is only managed in SE under the GULF Coastal Migratory FMP, the Atlantic catch is managed outside of the SE region, Thus any Atlantic catch will receive a 'USE_THIS_RECORD' ='N' for bluefish (even though the recirds are present.
(a) Trawl data for Atlantic SG species after 1988 are labled as 'USE_THIS_RECORD' =N
(b) Black Sea Bass and Scup north of Cape Hatteras are labled as 'USE_THIS_RECORD' ='N'

ONLY INFORMATION WITH 'INCLUDE RECORD" = YES is included in summaries.

OTHER NOTES:
You can filter the Gulf (NONCONF) and SAFMC (NONCONF) by Managed = 1, to see only managed Reef Fish (Gulf) and Snapper-Grouper (SAFMC).
Species with potential data issues for this time series are noted in the 'Data Issues?' column; data issues may arise because that species is either 1) not landed or 2) not identified to species for a given sector during one or several years in the time series.

Note that weight estimates in gutted lbs may not be available for all species, especially for recreational fisheries. With regards to gutted vs. total lbs, the SEFSC has recommended the following:

(1) The SEFSC does not really have any preference, one way or another, as to whether the fish units are expressed in terms of "gutted weight" or "whole weight." At the pragmatic level, whatever unit is actually used by SERO/Council in managing the fishery should also be the unit used in the analysis for consistency, to simplify the management and communication process, and to minimize errors.

However, (2) If we are required to choose just one standard unit, SEFSC scientists would rather choose "whole weight" rather than "gutted weight" due to the following reasons: (a) At some point in their lives, all fish are caught/landed whole (not gutted), (b) Not all fish/species are landed gutted, (c) Whole weight makes more sense in terms of stock assessments and biological measurements, (d) There is no standard conversion factor in place for all species, and (e) As practiced, gutting methods tend to change with time, which creates serious standardization and conversion problems.

NOTE: Wreckfish landings in ACL dataset do not accurately reflect wreckfish landings. Wreckfish landings post-1992 from Wreckfish IFQ Logbook Dataset (SEFSC). Note 2 records of wreckfish landings (1 in 2006, 1 in 2007) are from landings outside of SAFMC juridictional waters, but were landed in Florida and have been kept in the dataset; these landings total ~2000 lbs.

NOTE: These tables may contain CONFIDENTIAL data for fisheries with limited participants; please take care in its distribution.

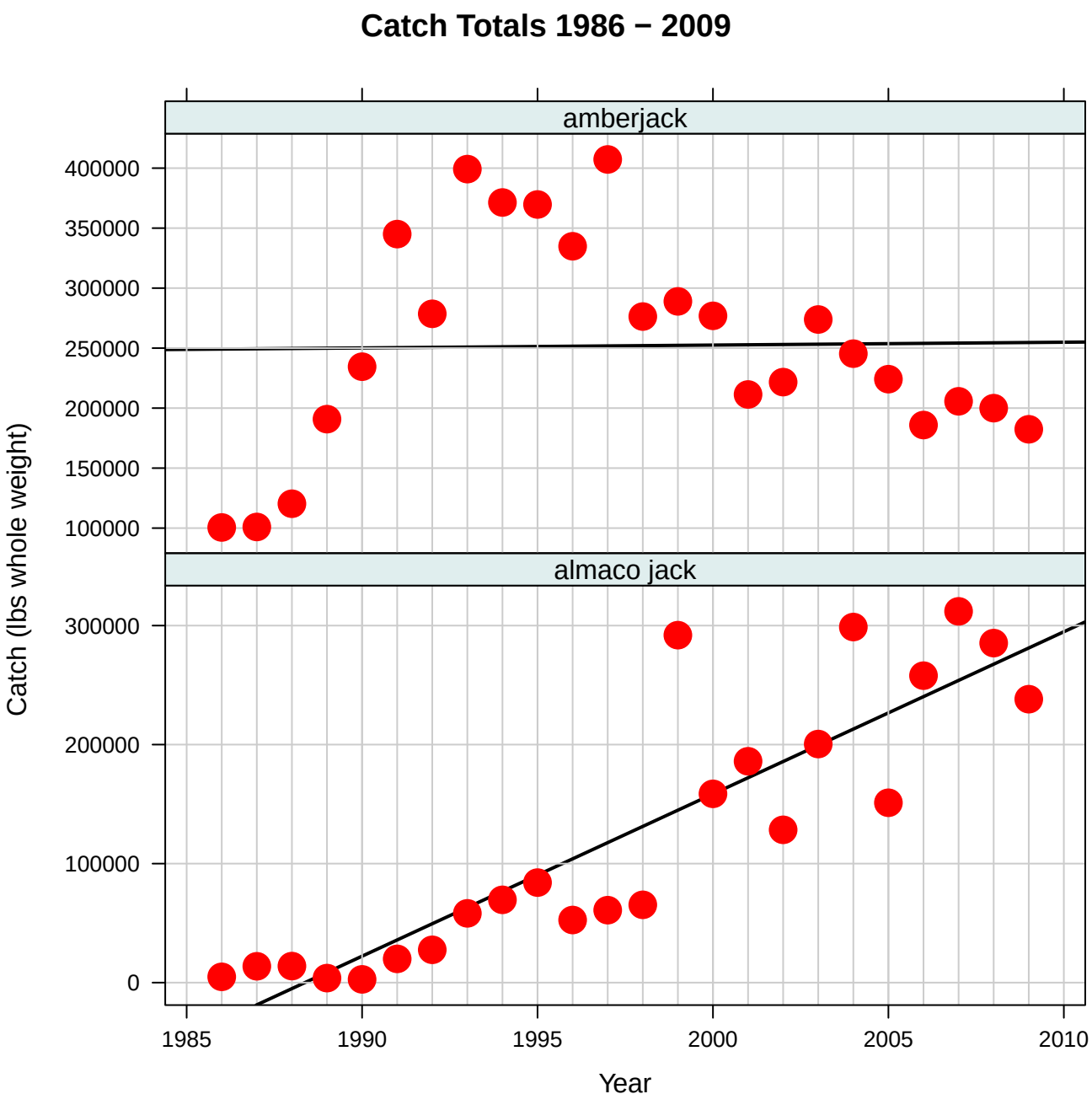
POSSIBLY CONFIDENTIAL COLUMNS: Any 'Commercial', 'For-Hire', or 'Recreational' landings or percent years column might be confidential; suggest providing only COMMON NAME, DATA ISSUES, and TOTAL LANDINGS to Councils or SSCs. REMOVE WRECKFISH ENTIRELY.

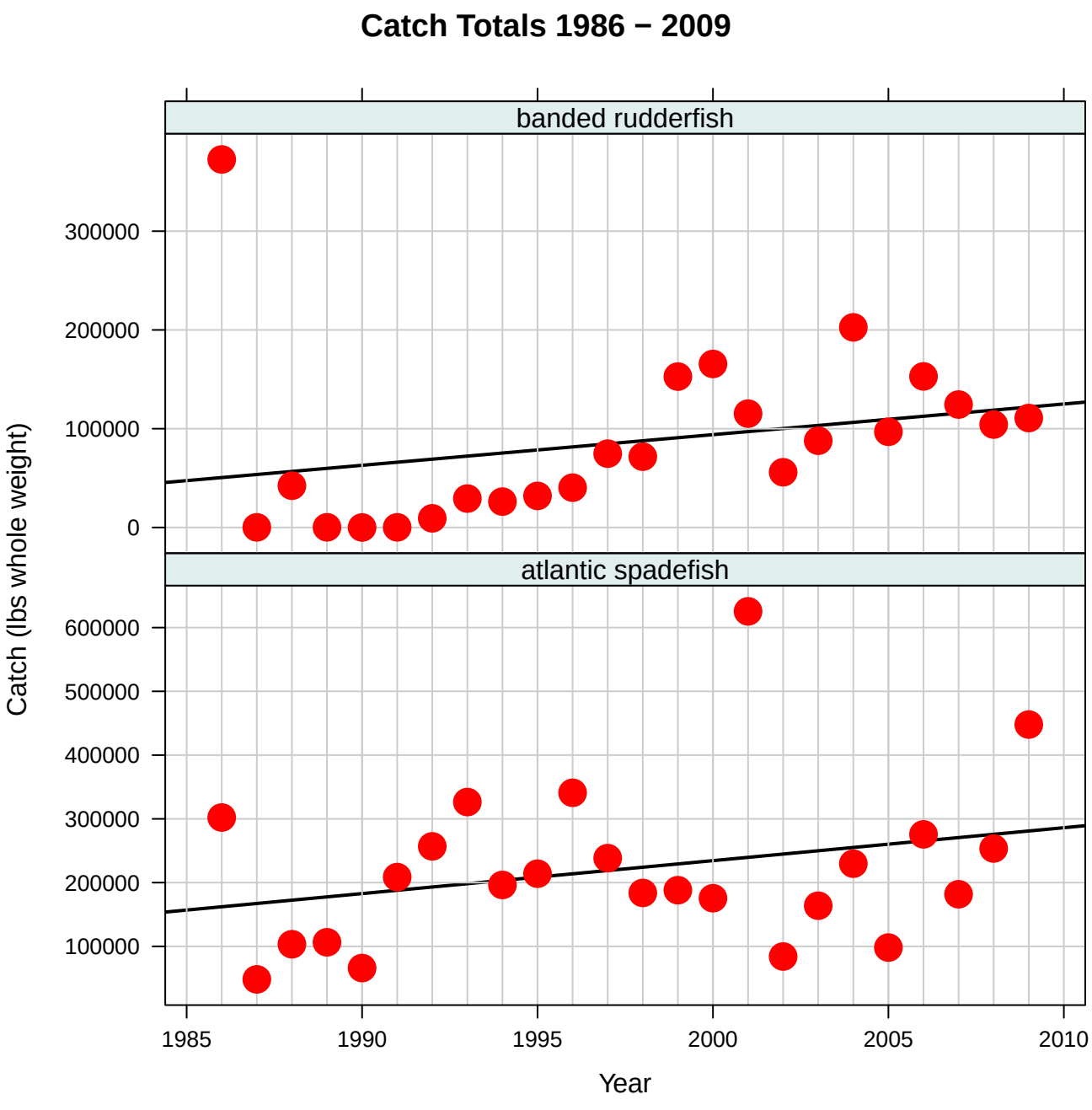
Row Labels	Average 2005-2009			TOTAL	Data Issues?			TOTAL
	Commercial	For-Hire	Private	Average 2005-2009	Commercial	For-Hire	Private	Data Issues?
almaco jack	141,026	71,643	36,469	**249,138**				**0**
amberjack genus	199,639	515	11,439	**211,593**				**0**
atlantic spadefish	33,429	119,780	131,699	**284,908**				**0**
banded rudderfish	35,397	65,490	17,043	**117,929**				**0**
bank sea bass	355	4,223	990	**5,567**				**0**
bar jack	4,528	4,711	1,487	**10,726**				**0**
black grouper[1]	78,390	32,479	116,377	**149,581**				**0**
black margate	0	44,694	41,734	**86,428**	maybe			**1**
black sea bass	493,702	239,047	451,109	**1,183,858**				**0**
black snapper	141	0	0	**141**				**0**
blackfin snapper	816	339	932	**2,087**				**0**
blackline tilefish	0	0	0	**0**	maybe			**1**
blue runner	173,419	525,292	300,415	**999,126**				**0**
bluefish	0	1,498,389	727,193	**2,225,582**	maybe			**1**
blueline tilefish	246,691	165,506	81,102	**493,299**				**0**
bluestriped grunt	0	20,549	24,324	**44,873**	maybe			**1**
cero	5,216	20,502	32,335	**58,053**				**0**
cobia	93,910	175,884	697,272	**967,067**				**0**
coney	8	293	2,152	**2,453**				**0**
cottonwick	0	6	0	**6**	maybe			**1**
crevalle jack	208,540	402,779	148,352	**759,671**				**0**
cubera snapper	4,823	6,690	7,213	**18,726**				**0**
dog snapper	528	586	5,344	**6,458**				**0**
dolphin	779,527	3,532,845	5,146,878	**9,459,249**				**0**
dwarf sand perch	0	0	0	**0**	maybe			**1**
french grunt	0	57	1,086	**1,142**	maybe			**1**
gag	618,711	163,248	371,778	**1,153,737**				**0**
golden tilefish	359,150	0	0	**359,150**		maybe	maybe	**2**
goldface tilefish	0	0	0	**0**	maybe		maybe	**2**
goliath grouper	0	11	546	**557**				**0**
grass porgy	0	137	654	**791**	maybe			**1**
gray snapper	111,210	256,374	372,371	**739,956**				**0**
gray triggerfish	0	177,742	240,823	**418,565**	maybe			**1**
graysby	520	7,981	6,147	**14,648**				**0**
greater amberjack	643,791	503,206	445,519	**1,592,516**				**0**
grunt family	154,161	25,711	48,470	**228,342**				**0**
hogfish	38,620	4,278	100,240	**143,138**				**0**
jack family	0	209,271	53,476	**262,747**	maybe			**1**
jolthead porgy	2,361	19,084	19,521	**40,966**				**0**
king and cero mackerel	4,158,734	0	0	**4,158,734**		maybe	maybe	**2**
king mackerel	0	1,143,678	3,914,232	**5,057,911**	maybe			**1**
knobbed porgy	20,487	12,456	4,674	**37,618**				**0**
lane snapper	6,151	30,698	58,269	**95,118**				**0**
leatherjacket family	0	79	4,963	**5,042**	maybe			**1**
lesser amberjack	5,100	3,602	1,410	**10,112**				**0**
little tunny	332,073	383,593	823,573	**1,539,239**				**0**
longspine porgy	12	360	0	**372**				**0**
mahogany snapper	8	125	334	**467**				**0**
margate	3,576	12,191	6,575	**22,342**				**0**
misty grouper	1,833	0	0	**1,834**				**0**
mutton snapper[1]	82,891	157,229	321,429	**561,549**				**0**
nassau grouper	0	12	0	**12**				**0**

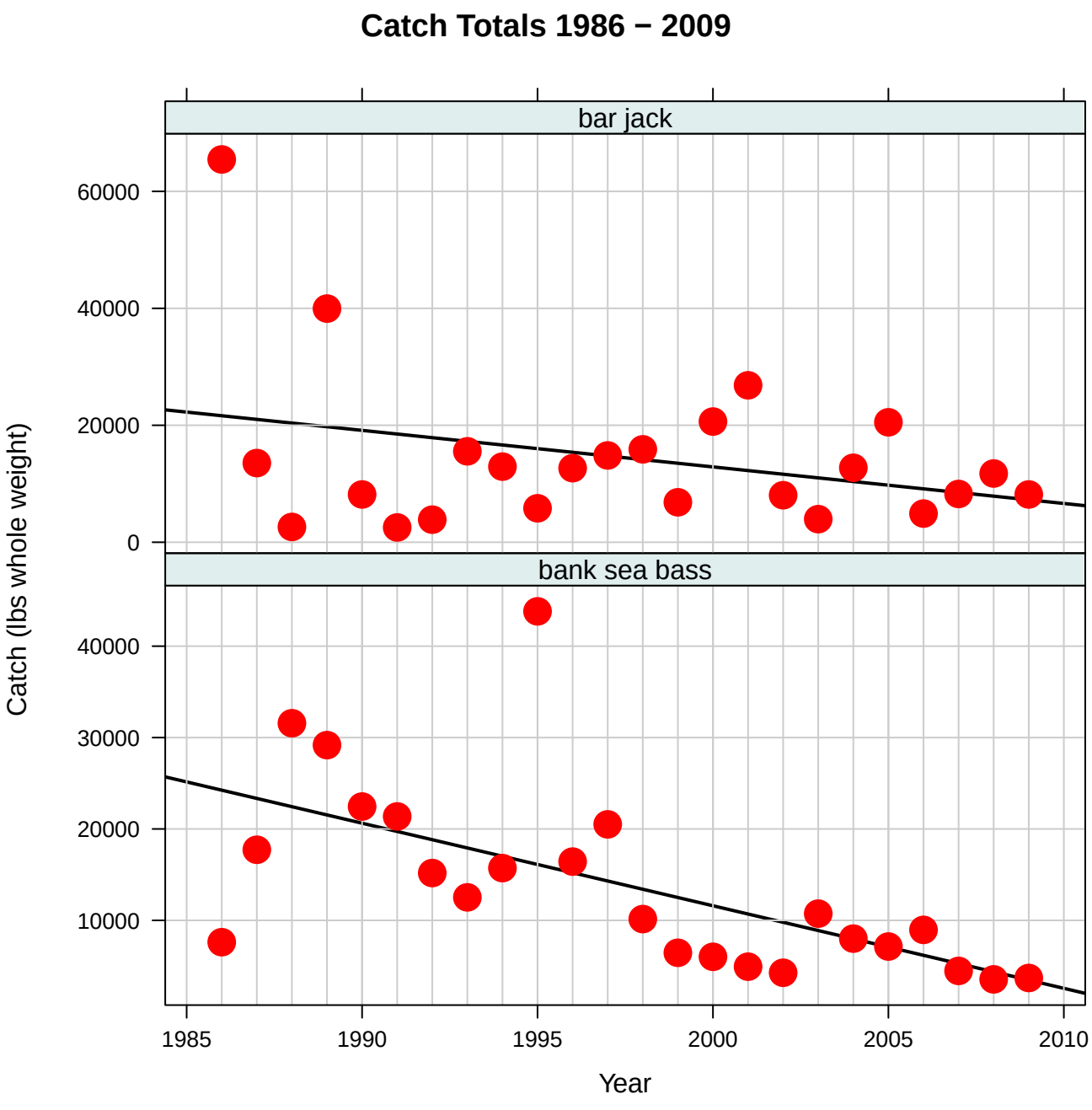
Table. SAFMC mean landings (2005-2009; lbs whole weight) for all species, by sector. For-hire includes headboat and charter landings. Private includes shore and private/rental boat. Data issues denoted if landings in any sector equal to zero for any year in the time series 2005-2009. 1 Post-stratifies MRFSS data for Monroe County to the South Atlantic.

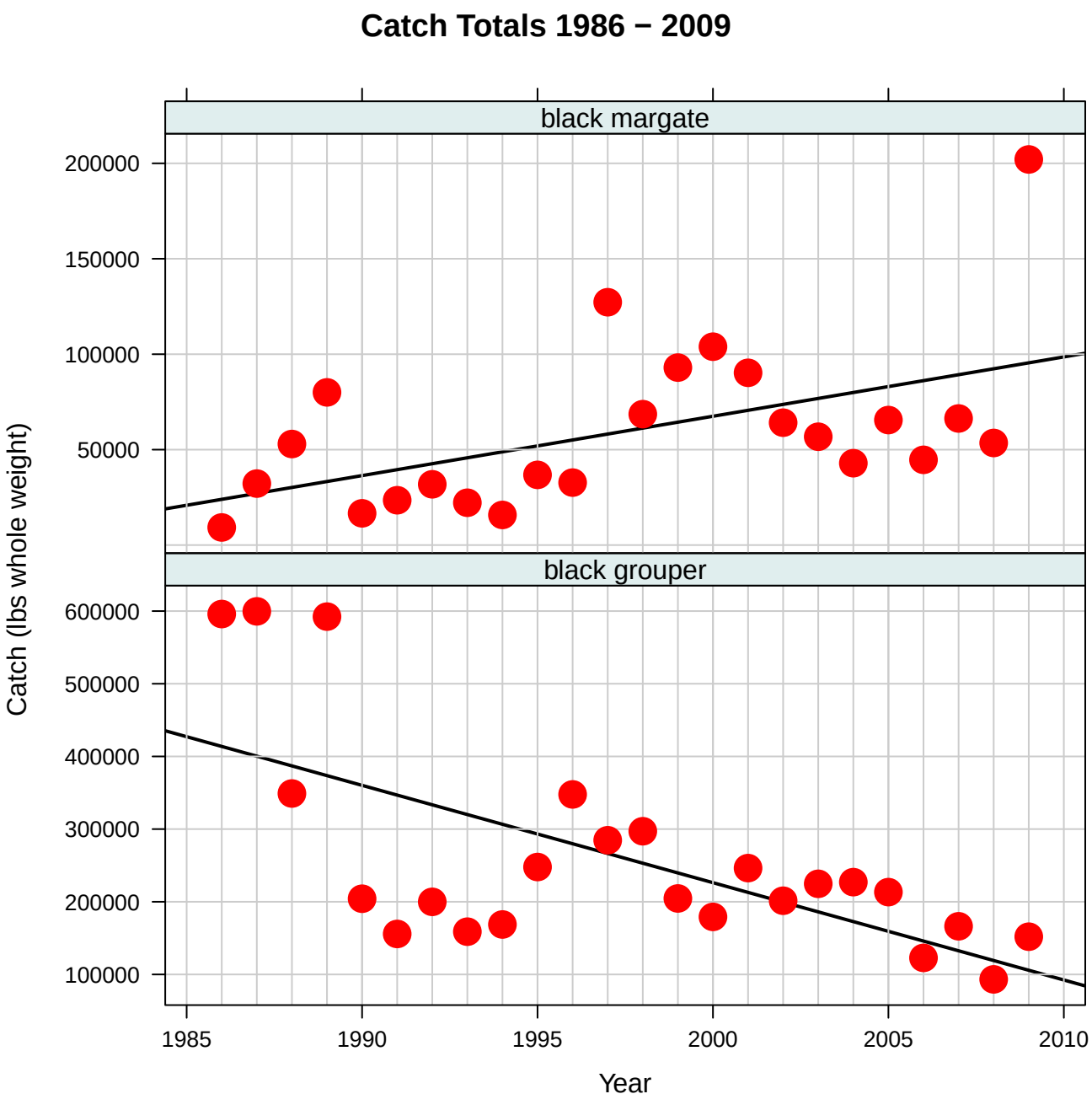
ocean triggerfish	0	1,892	9,070	**10,962**	maybe			**1**
porgy family	0	1,422	8,326	**9,749**	maybe			**1**
porkfish	0	4,689	16,068	**20,756**	maybe			**1**
puddingwife	0	4	415	**418**	maybe			**1**
queen snapper	4,804	0	282	**5,086**				**0**
queen triggerfish	0	1,971	1,532	**3,503**	maybe			**1**
red drum	193,568	269,857	1,127,834	**1,591,259**				**0**
red grouper	475,981	90,399	473,814	**1,040,195**				**0**
red hind	15,366	1,660	3,705	**20,731**				**0**
red porgy	122,134	86,891	31,517	**240,542**				**0**
red snapper	190,176	216,435	340,548	**747,160**				**0**
rock hind	22,786	7,196	4,473	**34,454**				**0**
rock sea bass	609	604	1,112	**2,325**				**0**
royal red shrimp	319,327	0	0	**319,327**		maybe	maybe	**2**
sailors choice	0	9,255	9,983	**19,239**	maybe			**1**
sand perch	0	5,882	4,575	**10,458**	maybe			**1**
sand tilefish	2,205	2,491	6,472	**11,168**				**0**
saucereye porgy	0	863	1,112	**1,975**				**0**
scamp	319,350	84,939	57,840	**462,128**				**0**
schoolmaster	186	678	4,559	**5,423**				**0**
scup	0	8,058	453	**8,511**	maybe			**1**
scups or porgies	9,719	0	0	**9,719**		maybe	maybe	**2**
sea bass family	4,388	437	2,482	**7,307**				**0**
sheepshead	251,552	349,752	1,393,620	**1,994,924**				**0**
silk snapper	16,402	5,353	173	**21,928**				**0**
slipper lobster	557	0	0	**557**		maybe	maybe	**2**
smallmouth grunt	0	0	0	**0**	maybe			**1**
snapper family	849	1,934	9,956	**12,739**				**0**
snowy grouper	160,656	55,565	29,830	**246,050**				**0**
spanish grunt	0	0	138	**138**	maybe			**1**
spanish mackerel	3,500,407	532,943	1,149,196	**5,182,546**				**0**
speckled hind	2,311	2,127	95	**4,533**				**0**
spiny lobster	1,765,070	0	0	**1,765,070**		maybe	maybe	**2**
stone crab	261,612	0	0	**261,612**		maybe	maybe	**2**
temperate bass genus	0	0	0	**0**	maybe			**1**
tiger grouper	0	0	0	**0**	maybe		maybe	**2**
tilefish	0	49,387	21,699	**71,086**	maybe			**1**
tilefish family	0	833	2,038	**2,871**	maybe			**1**
tomtate	15	35,765	30,891	**66,671**				**0**
triggerfishes	317,626	0	0	**317,626**		maybe	maybe	**2**
vermilion snapper	1,040,602	489,378	112,206	**1,642,186**				**0**
wahoo	43,118	225,450	729,051	**997,619**				**0**
warsaw grouper	832	3,761	9,867	**14,460**				**0**
wenchman	0	0	0	**0**	maybe	maybe		**2**
white grunt	31,092	235,234	150,185	**416,512**				**0**
whitebone porgy	7	7,307	13,750	**21,064**				**0**
wrasse family	0	0	0	**0**	maybe			**1**
wreckfish	86,911	0	0	**86,911**		maybe	maybe	**2**
yellow jack	8	21,185	14,024	**35,217**				**0**
yellowedge grouper	18,641	545	5,111	**24,297**				**0**
yellowfin grouper	5,562	711	6,657	**12,930**				**0**
yellowmouth grouper	17	1,490	1,997	**3,504**				**0**
yellowtail snapper[1]	826,722	144,615	231,581	**1,202,918**				**0**

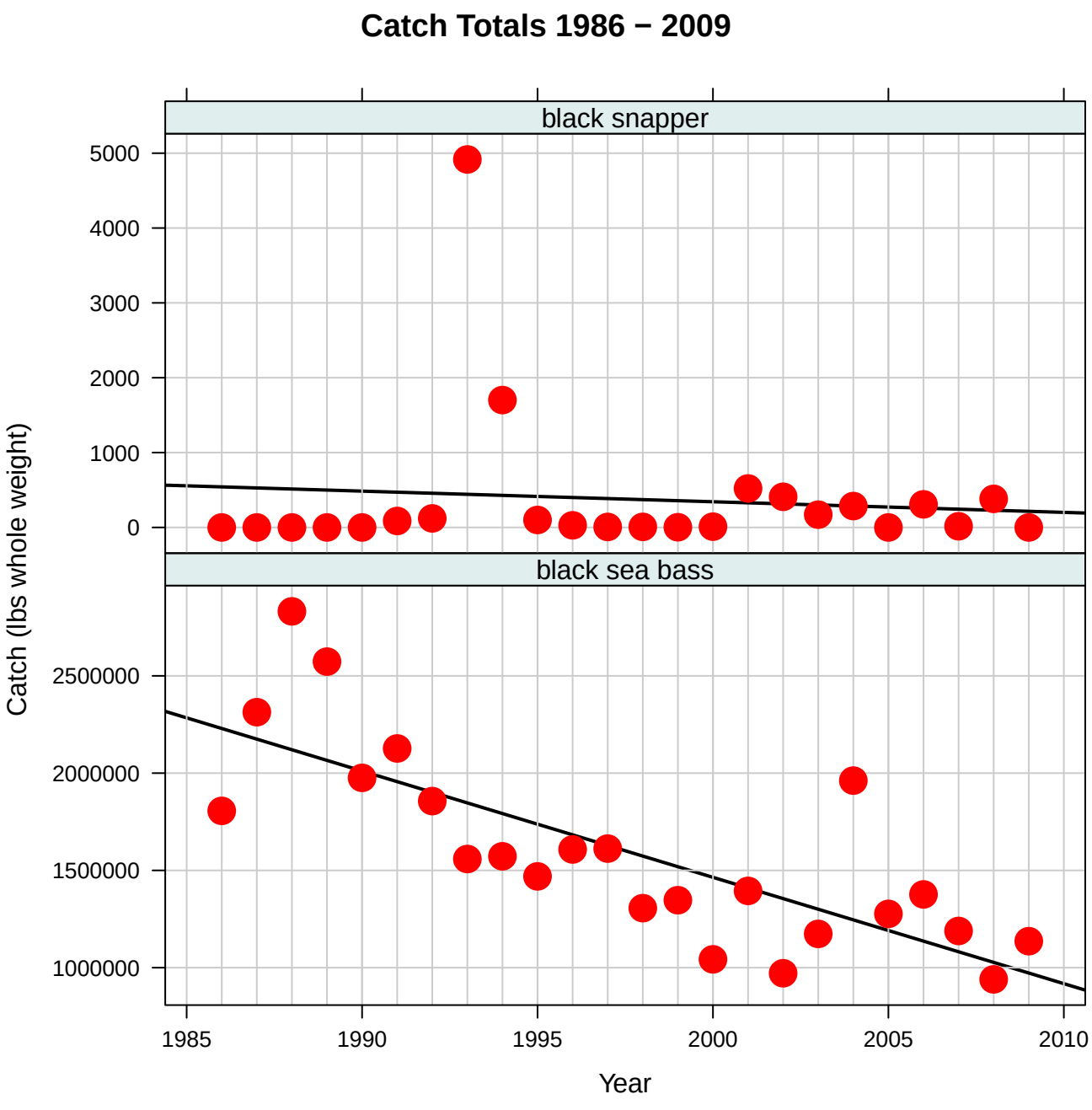
APPENDIX M. Landings Trends for Snapper Grouper Species 1986-2009

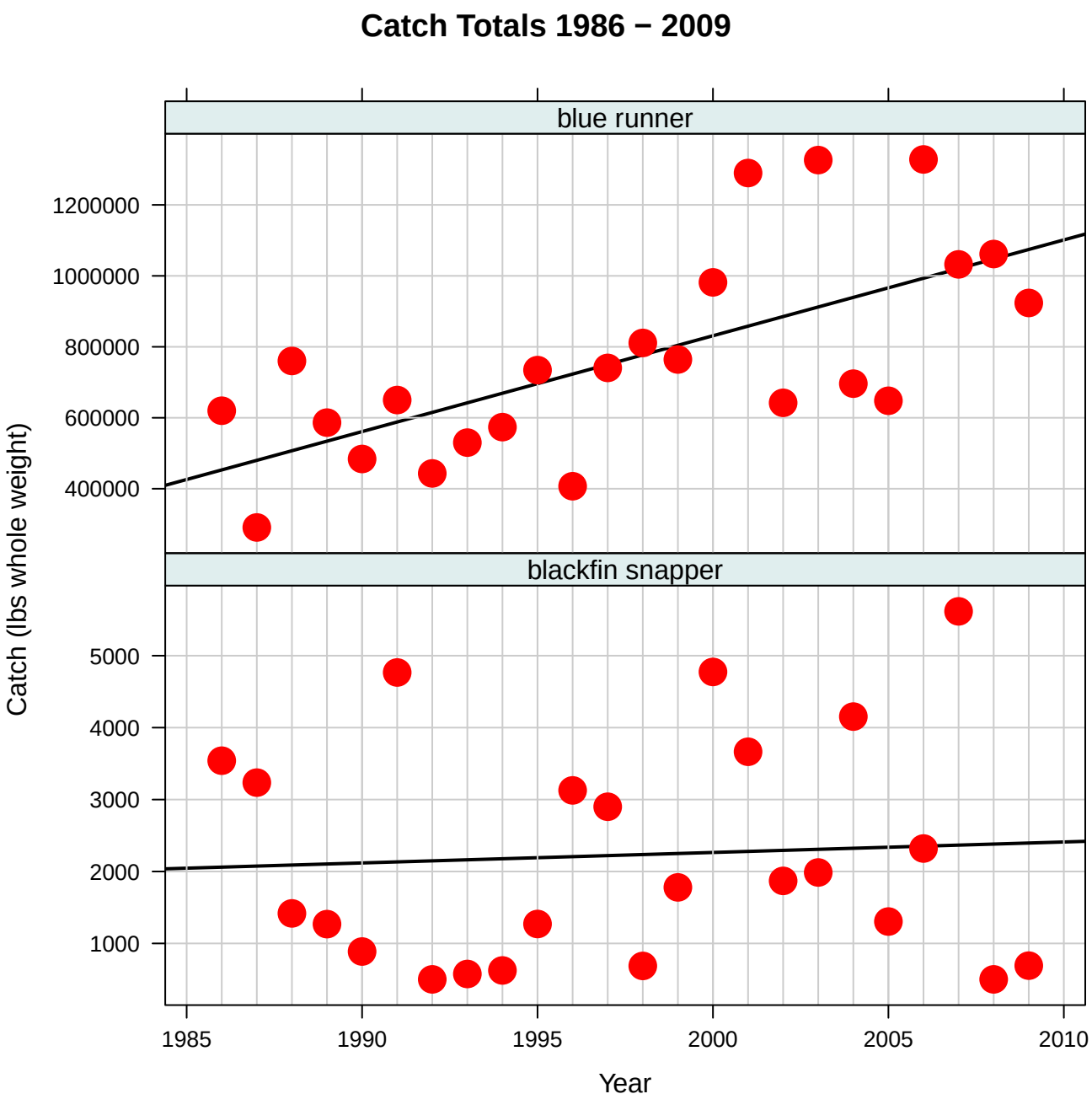

Catch Totals 1986 − 2009
amberjack
almaco jack
Catch (lbs whole weight)
400000
350000
300000
250000
200000
150000
100000
300000
200000
100000
0
1985
1990
1995
2000
2005
2010
Year

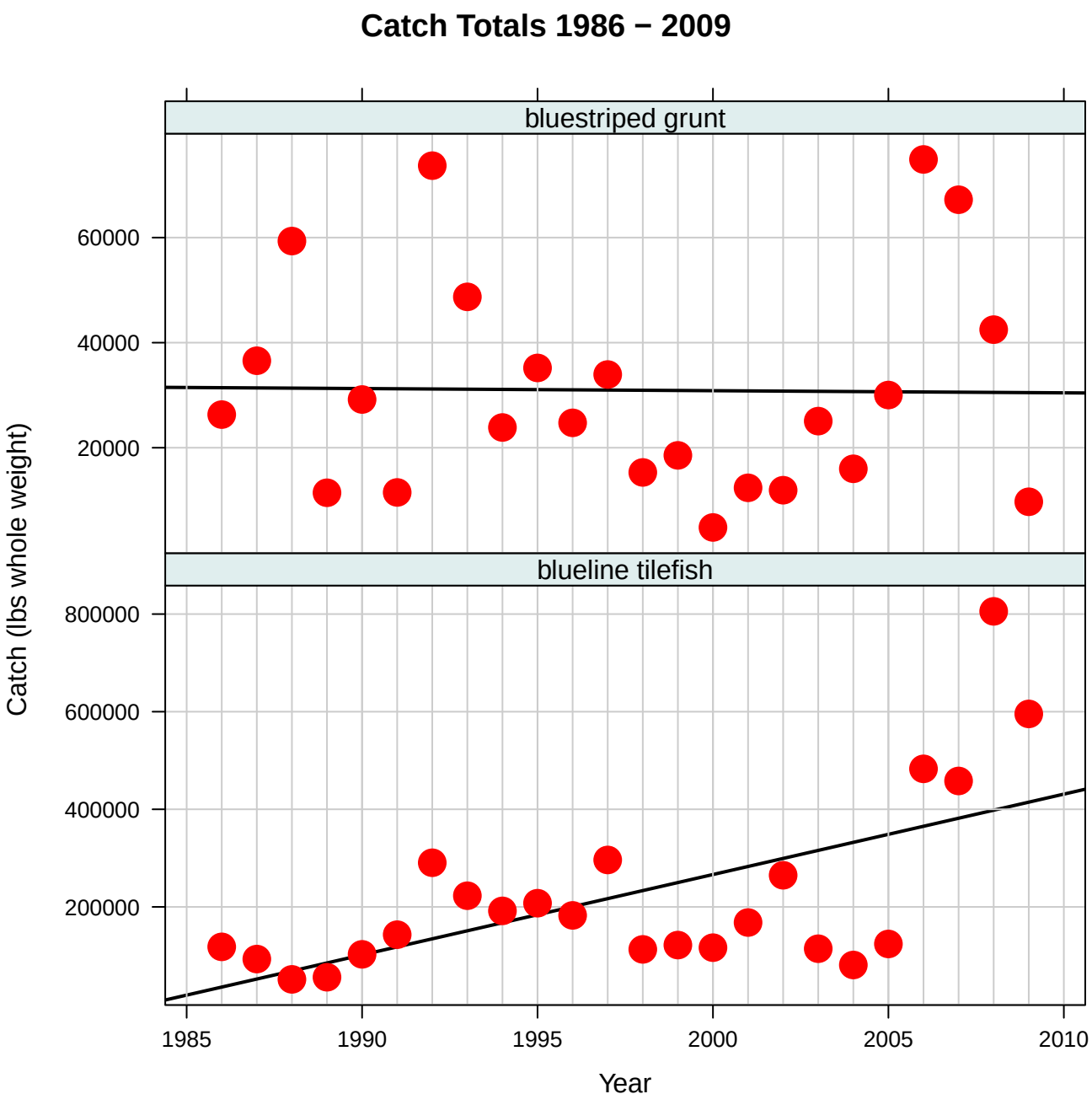

Catch Totals 1986 − 2009
banded rudderfish
atlantic spadefish
Catch (lbs whole weight)
0
100000
200000
300000
400000
500000
600000
1985
1990
1995
2000
2005
2010
Year

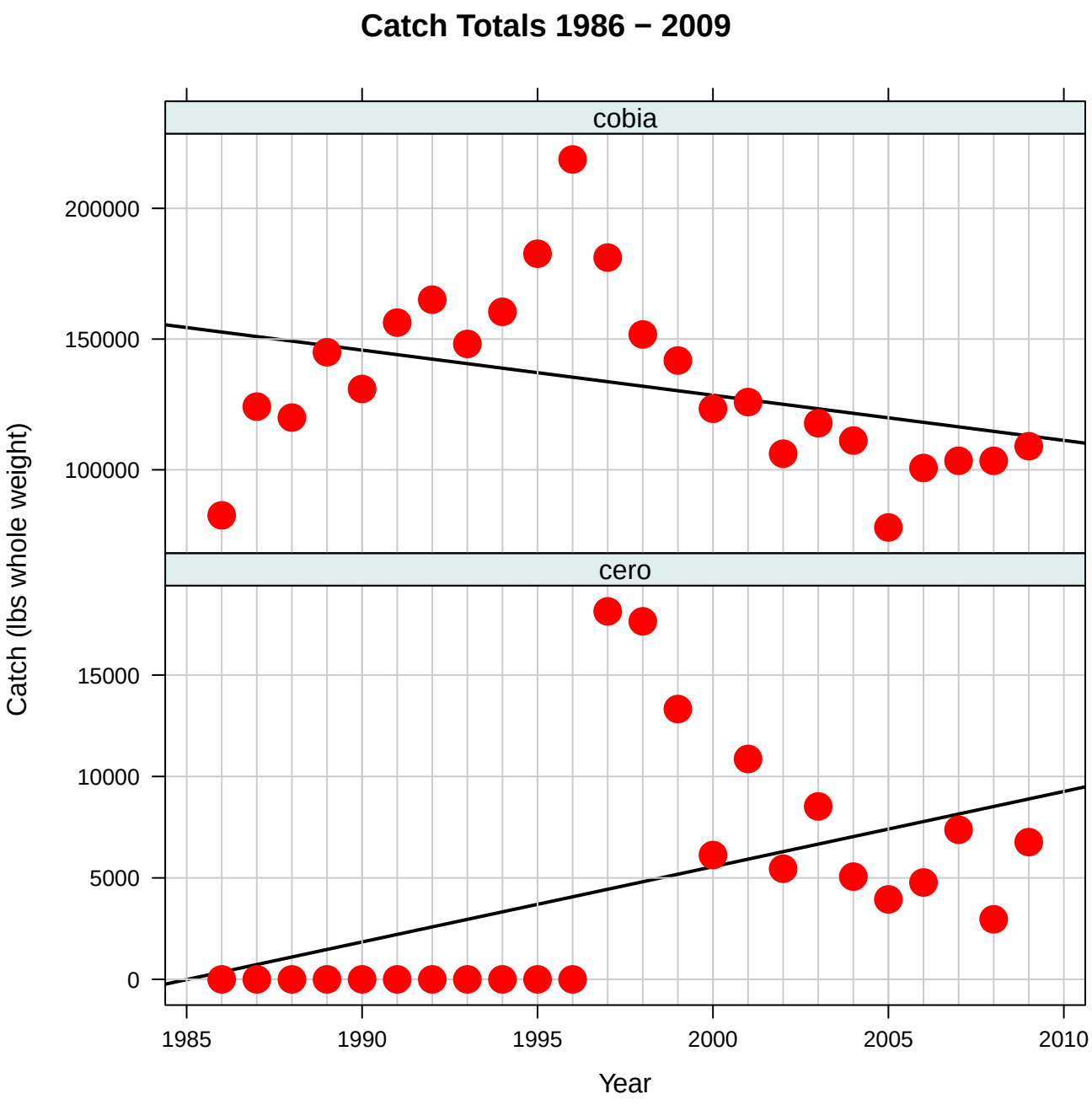

Catch Totals 1986 − 2009
bar jack
bank sea bass
Catch (lbs whole weight)
Year
0
20000
40000
60000
10000
30000
1985
1990
1995
2000
2005
2010

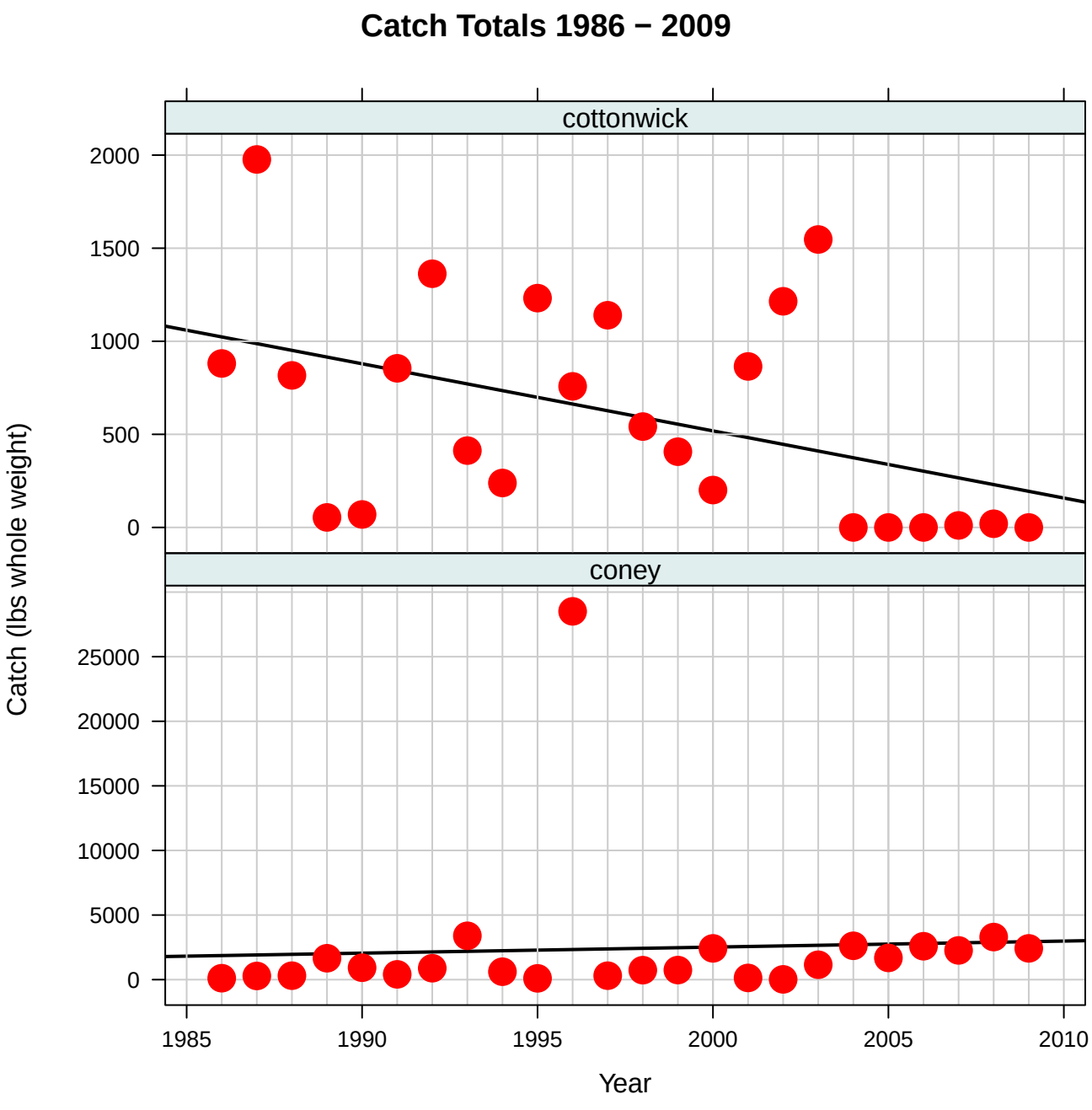

Catch Totals 1986 − 2009
black margate
black grouper
Catch (lbs whole weight)
200000
150000
100000
50000
600000
500000
400000
300000
200000
100000
1985
1990
1995
2000
2005
2010
Year

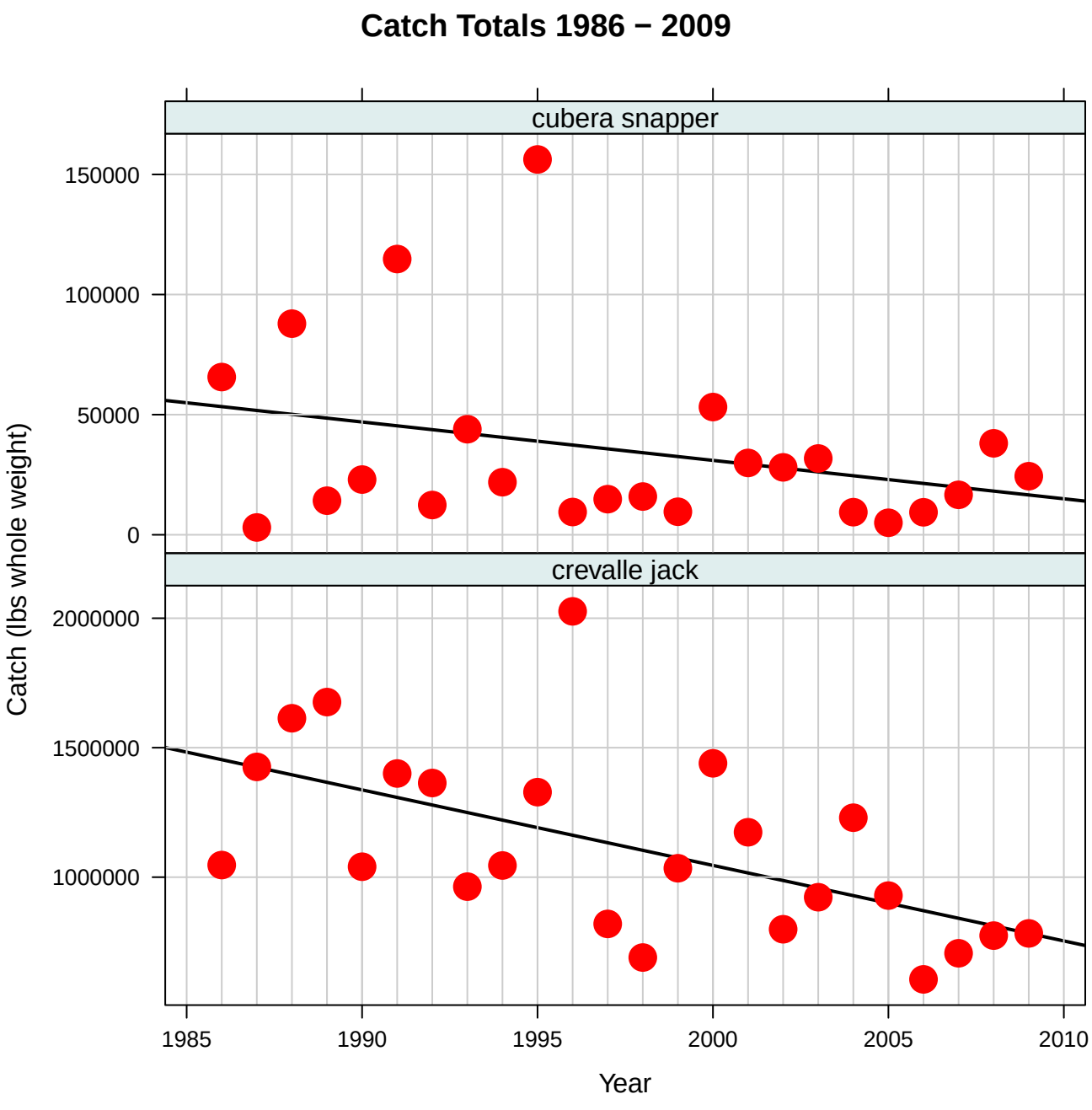

Catch Totals 1986 − 2009
black snapper
black sea bass
Catch (lbs whole weight)
5000
4000
3000
2000
1000
0
2500000
2000000
1500000
1000000
1985
1990
1995
2000
2005
2010
Year

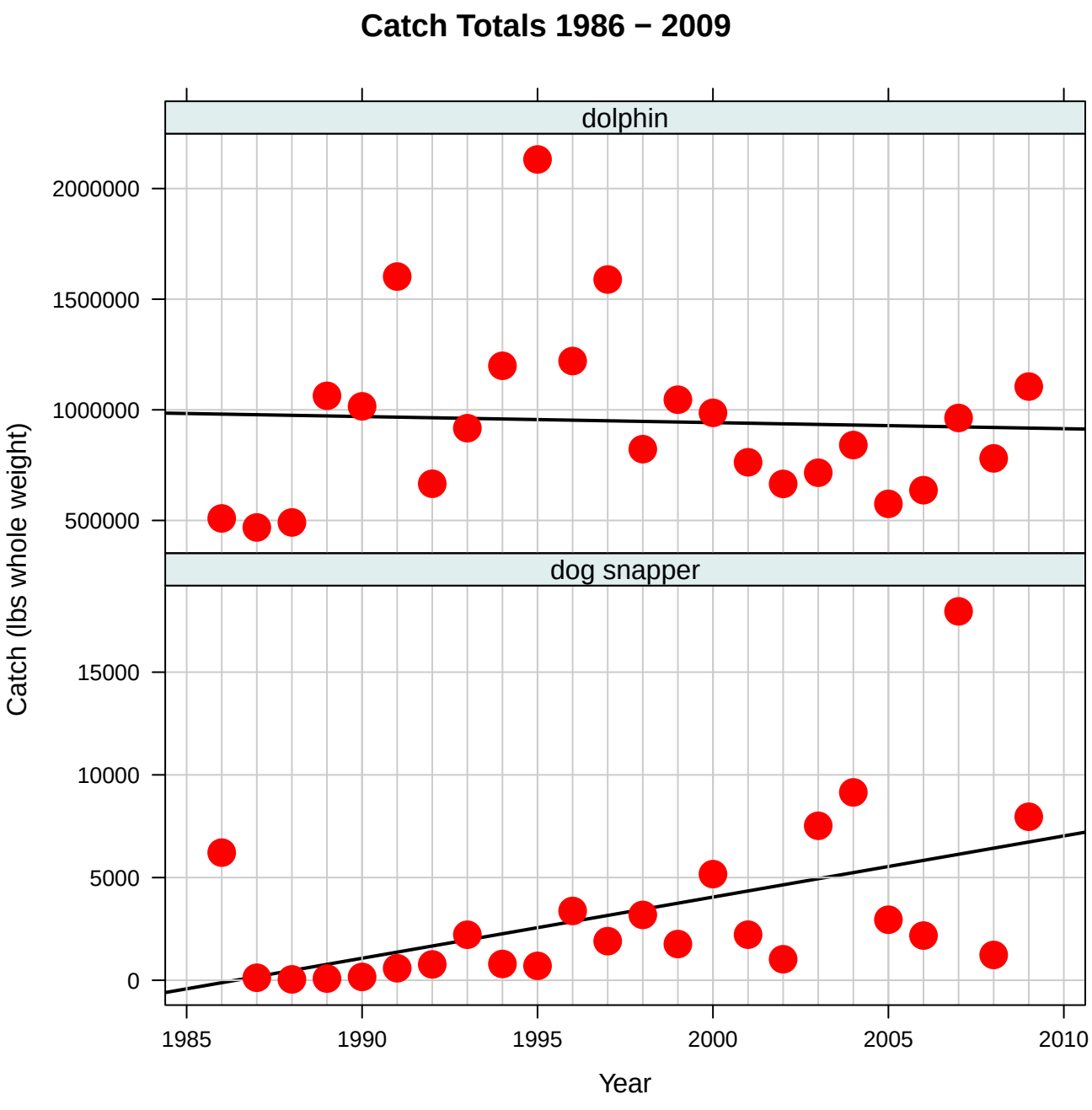

Catch Totals 1986 − 2009
blue runner
blackfin snapper
Catch (lbs whole weight)
1200000
1000000
800000
600000
400000
5000
4000
3000
2000
1000
1985
1990
1995
2000
2005
2010
Year

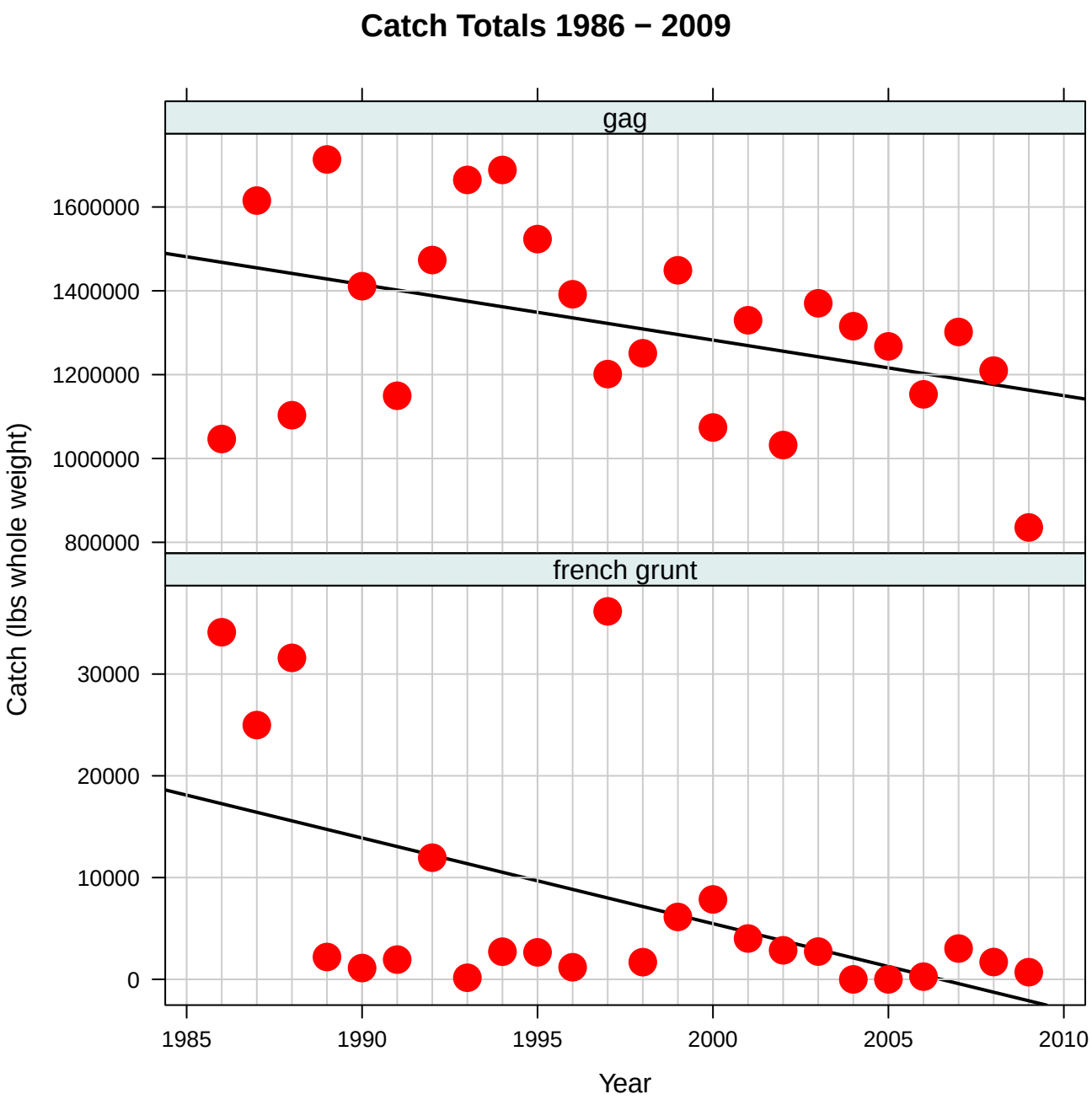

Catch Totals 1986 − 2009
bluestriped grunt
blueline tilefish
Catch (lbs whole weight)
60000
40000
20000
800000
600000
400000
200000
1985
1990
1995
2000
2005
2010
Year

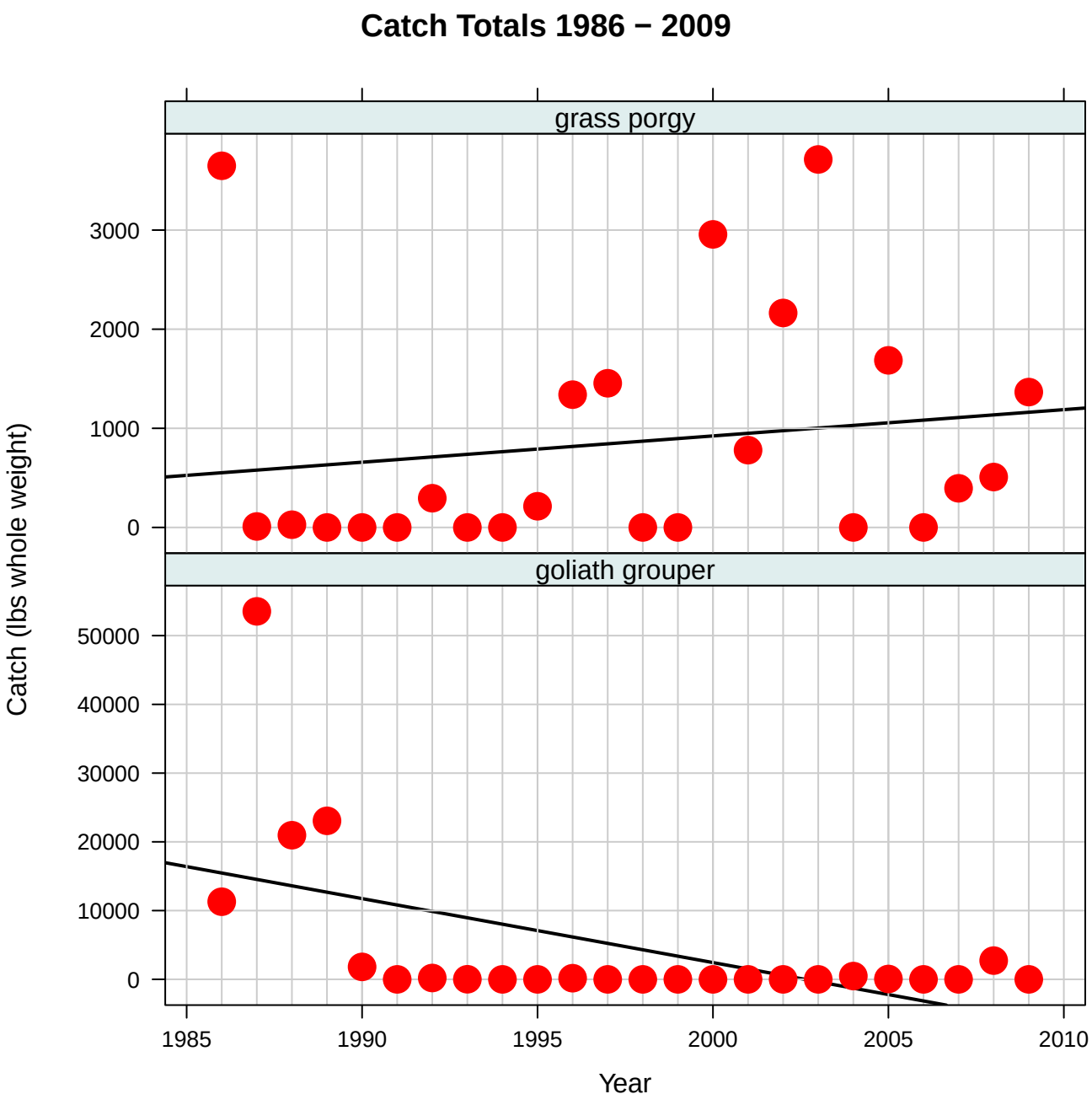

Catch Totals 1986 − 2009
cobia
cero
200000
150000
100000
15000
10000
5000
0
Catch (lbs whole weight)
1985
1990
1995
2000
2005
2010
Year

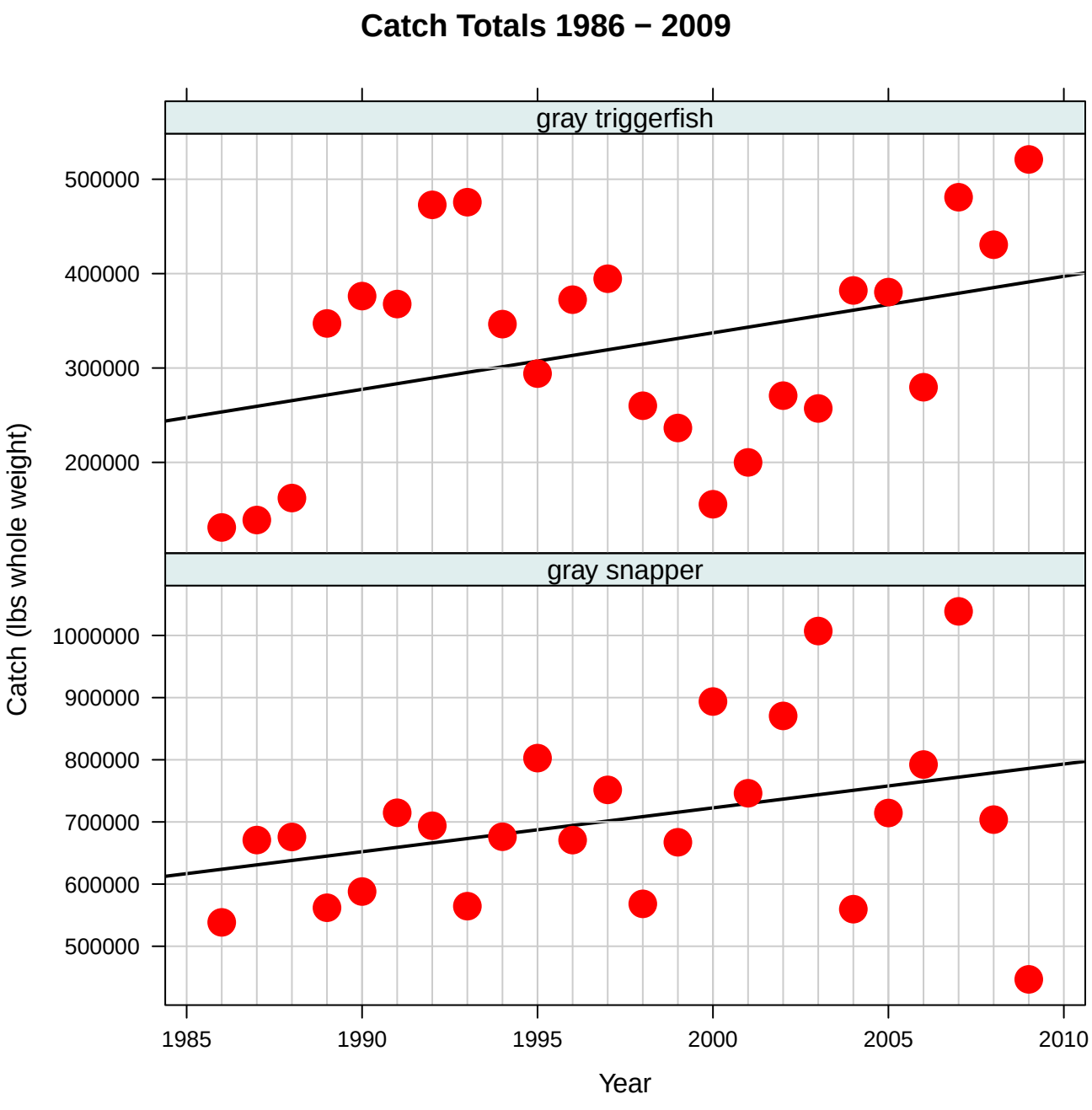

Catch Totals 1986 − 2009
cottonwick
coney
Catch (lbs whole weight)
Year
2000
1500
1000
500
0
25000
20000
15000
10000
5000
0
1985
1990
1995
2000
2005
2010

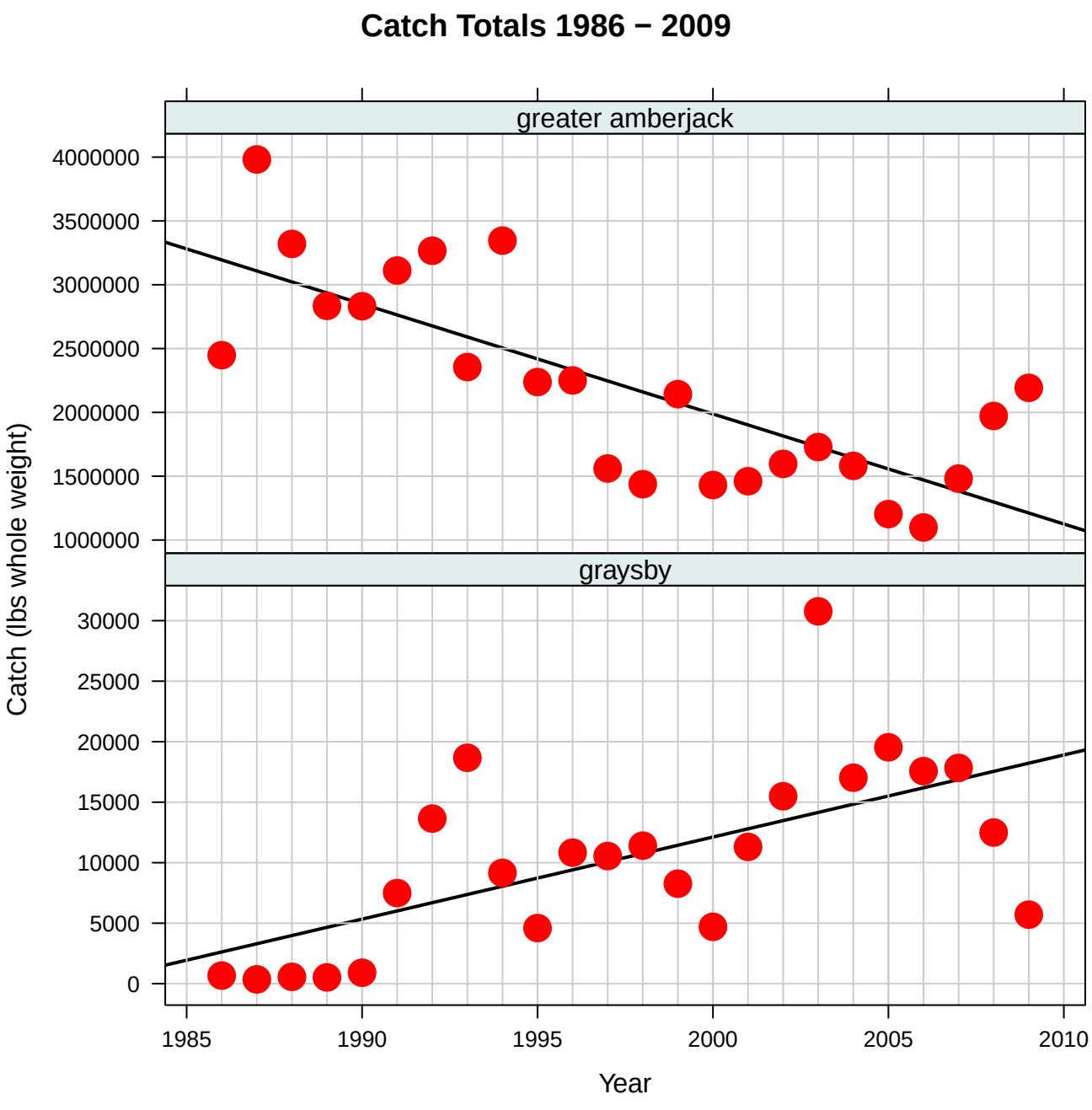

Catch Totals 1986 − 2009
cubera snapper
crevalle jack
Catch (lbs whole weight)
150000
100000
50000
0
2000000
1500000
1000000
1985
1990
1995
2000
2005
2010
Year

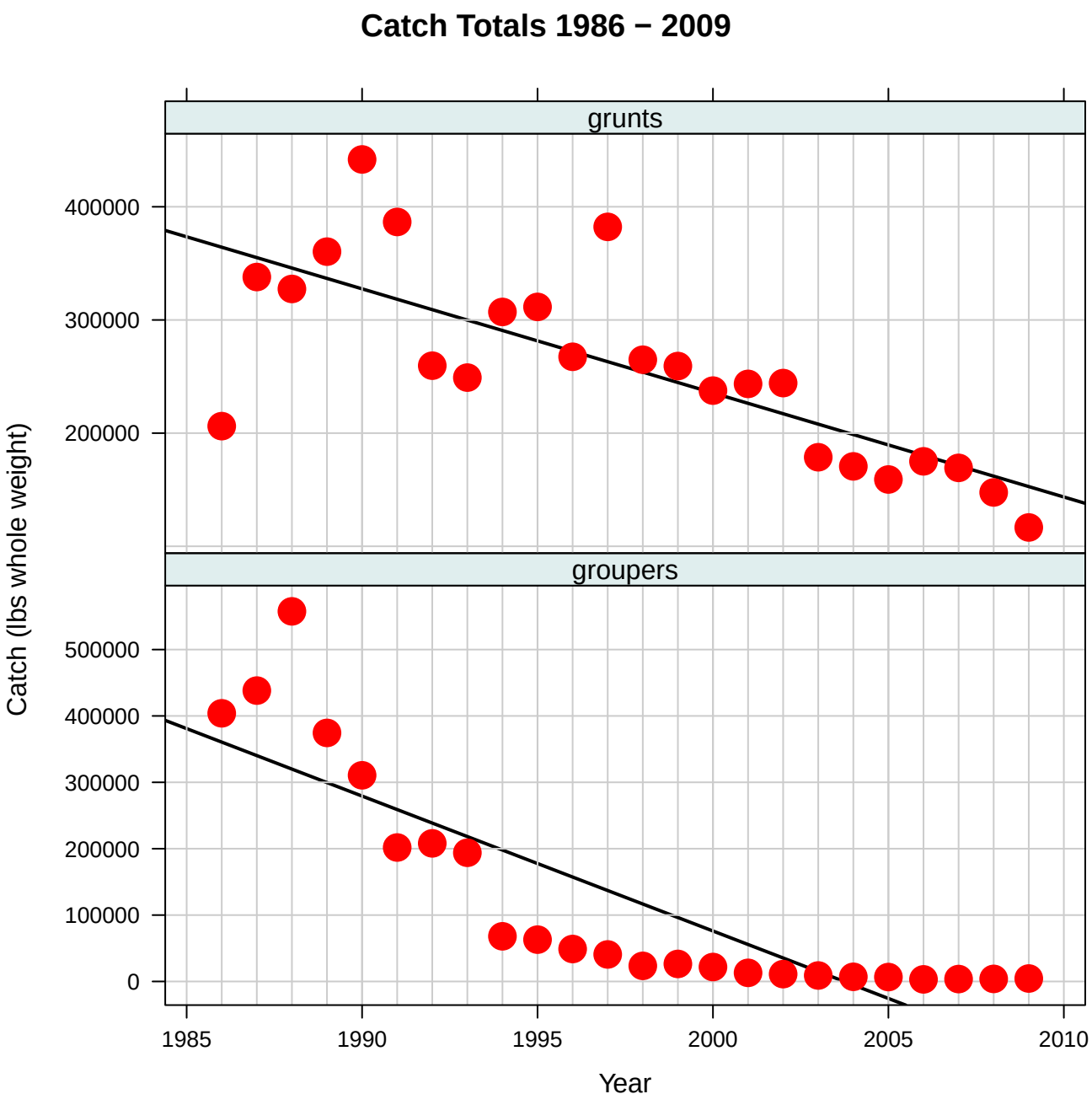

Catch Totals 1986 − 2009
dolphin
dog snapper
Catch (lbs whole weight)
2000000
1500000
1000000
500000
15000
10000
5000
0
1985
1990
1995
2000
2005
2010
Year

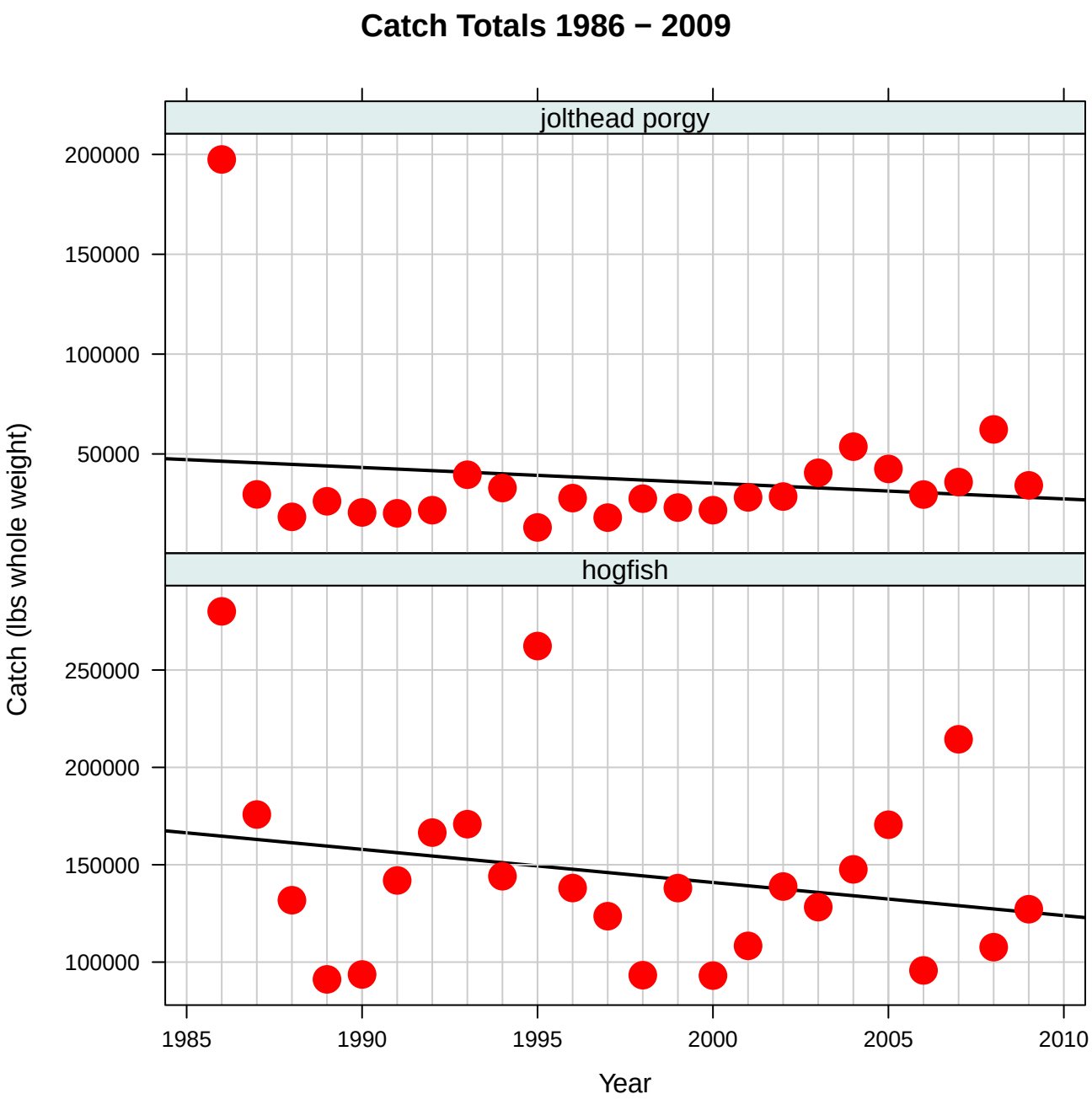

Catch Totals 1986 − 2009
gag
1600000
1400000
1200000
1000000
800000
french grunt
30000
20000
10000
0
Catch (lbs whole weight)
1985
1990
1995
2000
2005
2010
Year

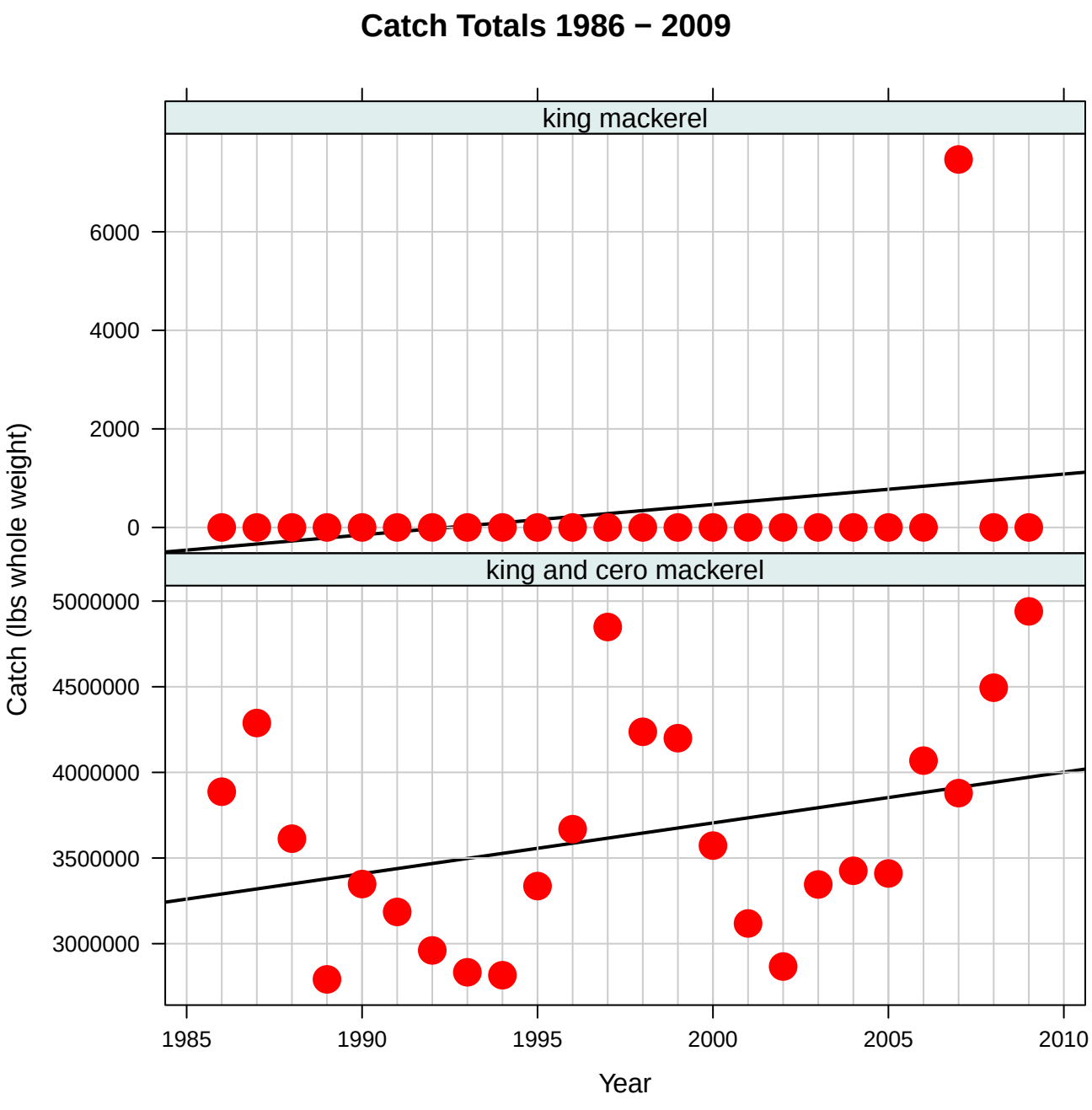

Catch Totals 1986 − 2009
grass porgy
goliath grouper
Catch (lbs whole weight)
0
1000
2000
3000
0
10000
20000
30000
40000
50000
1985
1990
1995
2000
2005
2010
Year

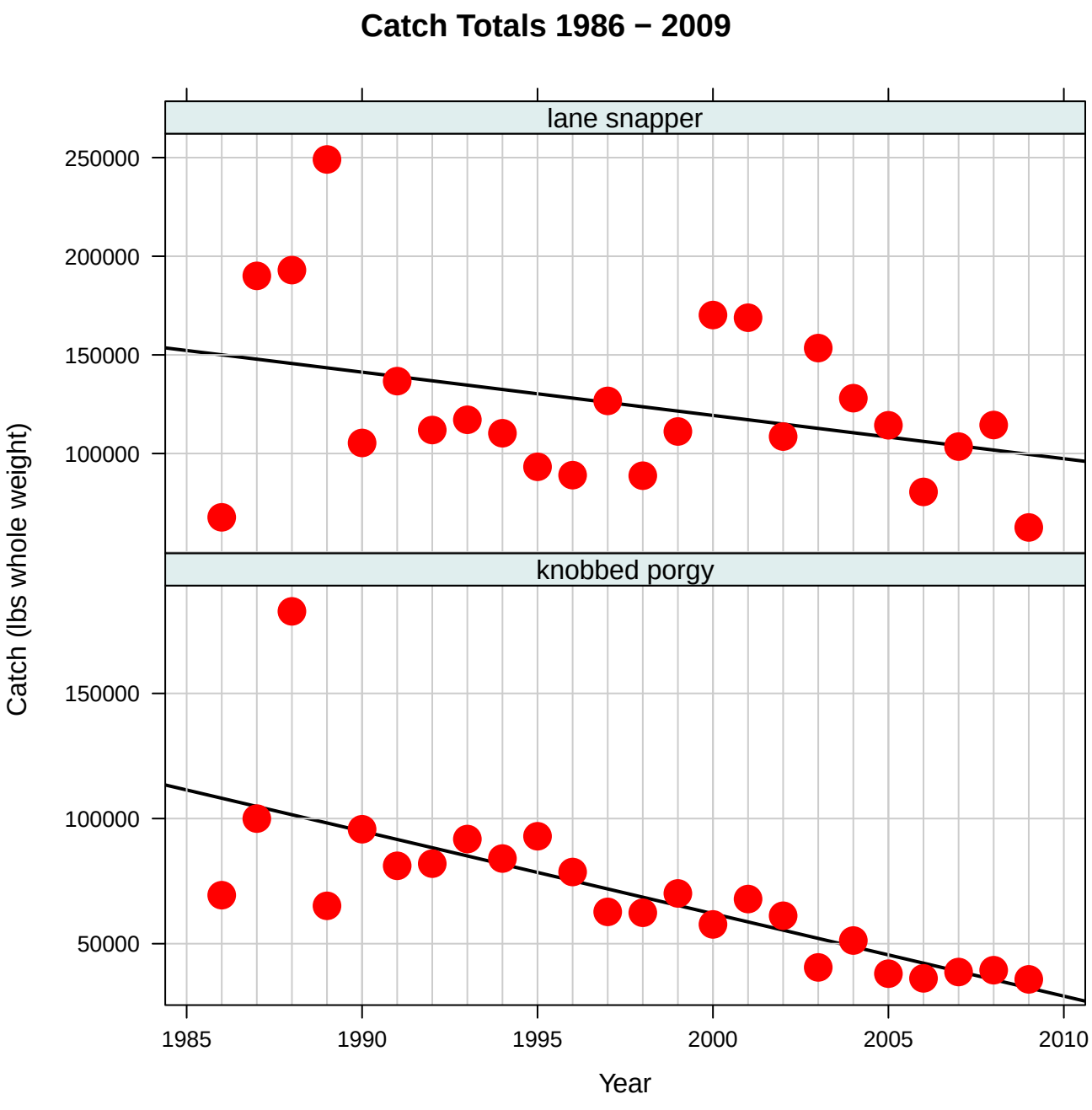

Catch Totals 1986 − 2009
gray triggerfish
gray snapper
Catch (lbs whole weight)
500000
400000
300000
200000
1000000
900000
800000
700000
600000
500000
1985
1990
1995
2000
2005
2010
Year

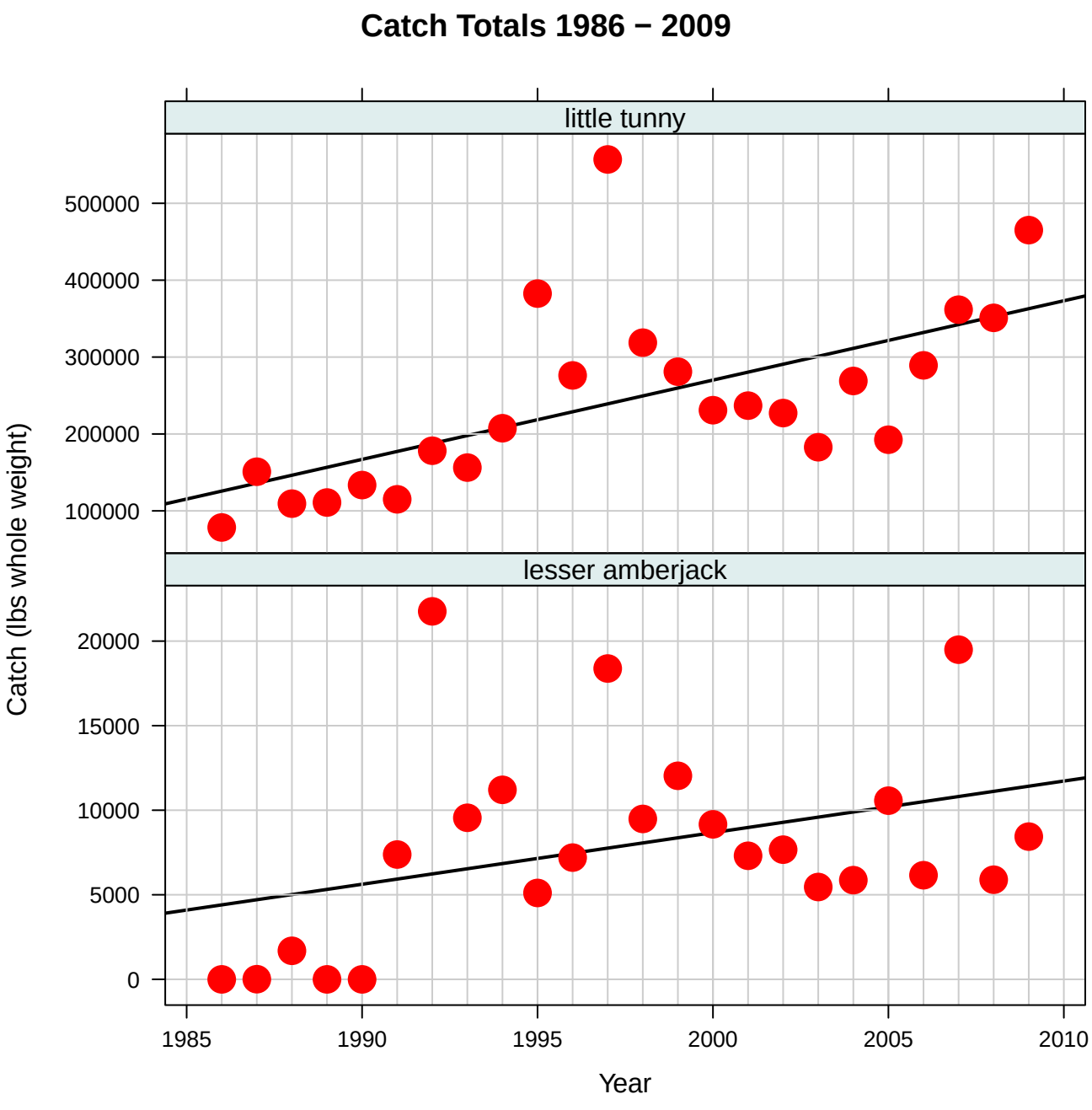

Catch Totals 1986 − 2009
greater amberjack
graysby
Catch (lbs whole weight)
Year
4000000
3500000
3000000
2500000
2000000
1500000
1000000
30000
25000
20000
15000
10000
5000
0
1985
1990
1995
2000
2005
2010

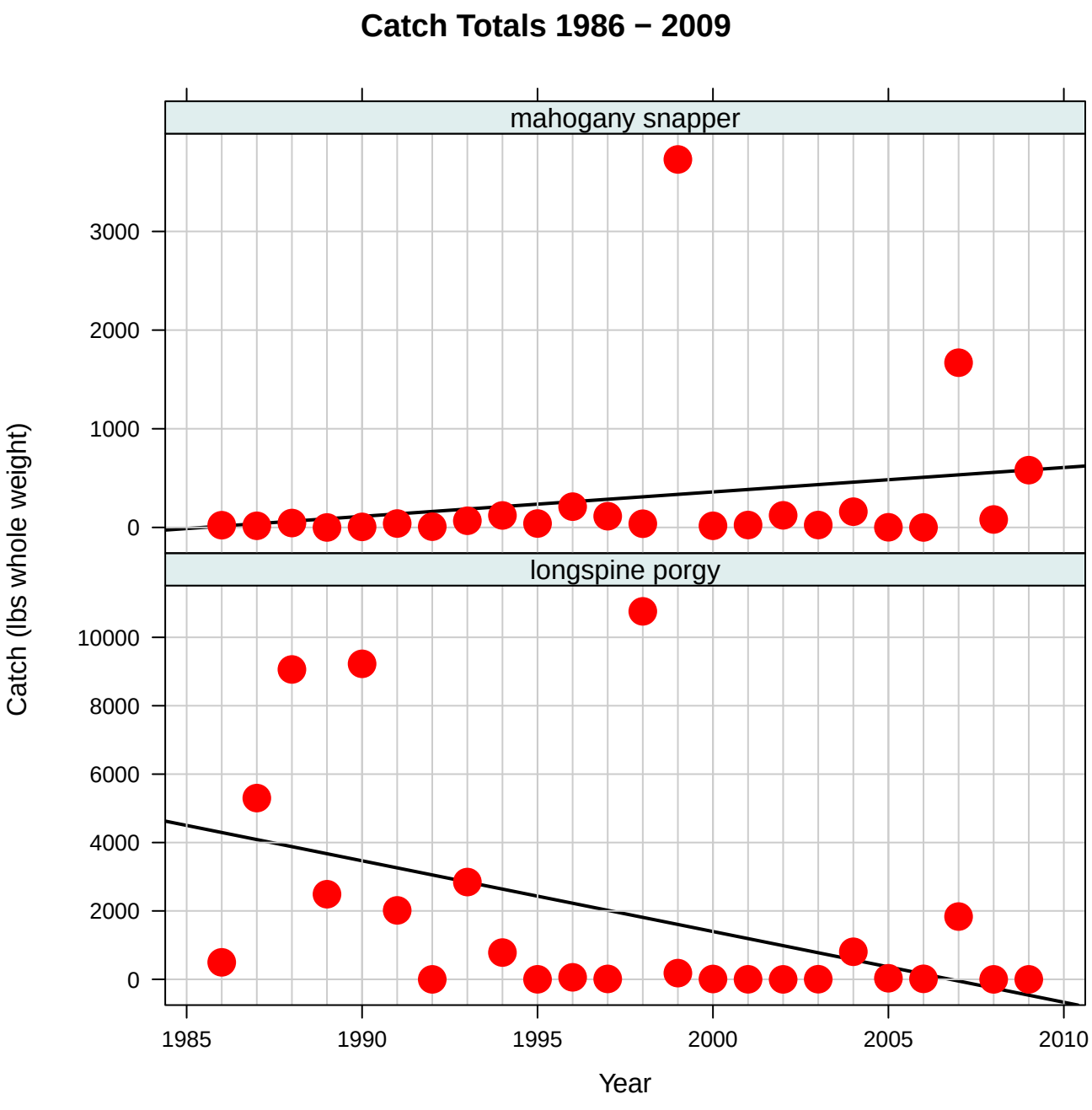

Catch Totals 1986 − 2009
grunts
groupers
400000
300000
200000
500000
400000
300000
200000
100000
0
Catch (lbs whole weight)
1985
1990
1995
2000
2005
2010
Year

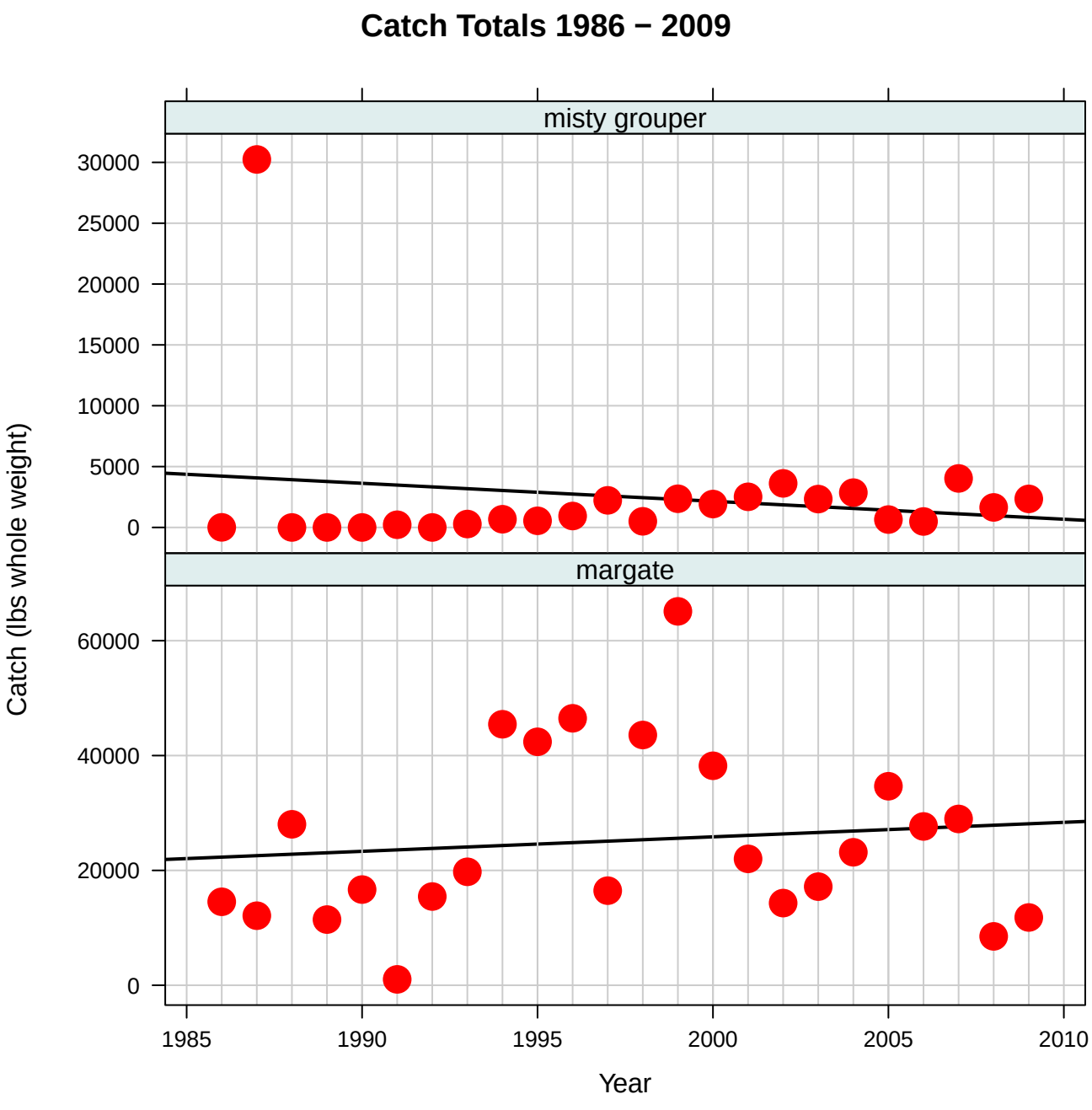

Catch Totals 1986 − 2009
jolthead porgy
hogfish
200000
150000
100000
50000
250000
200000
150000
100000
Catch (lbs whole weight)
1985
1990
1995
2000
2005
2010
Year

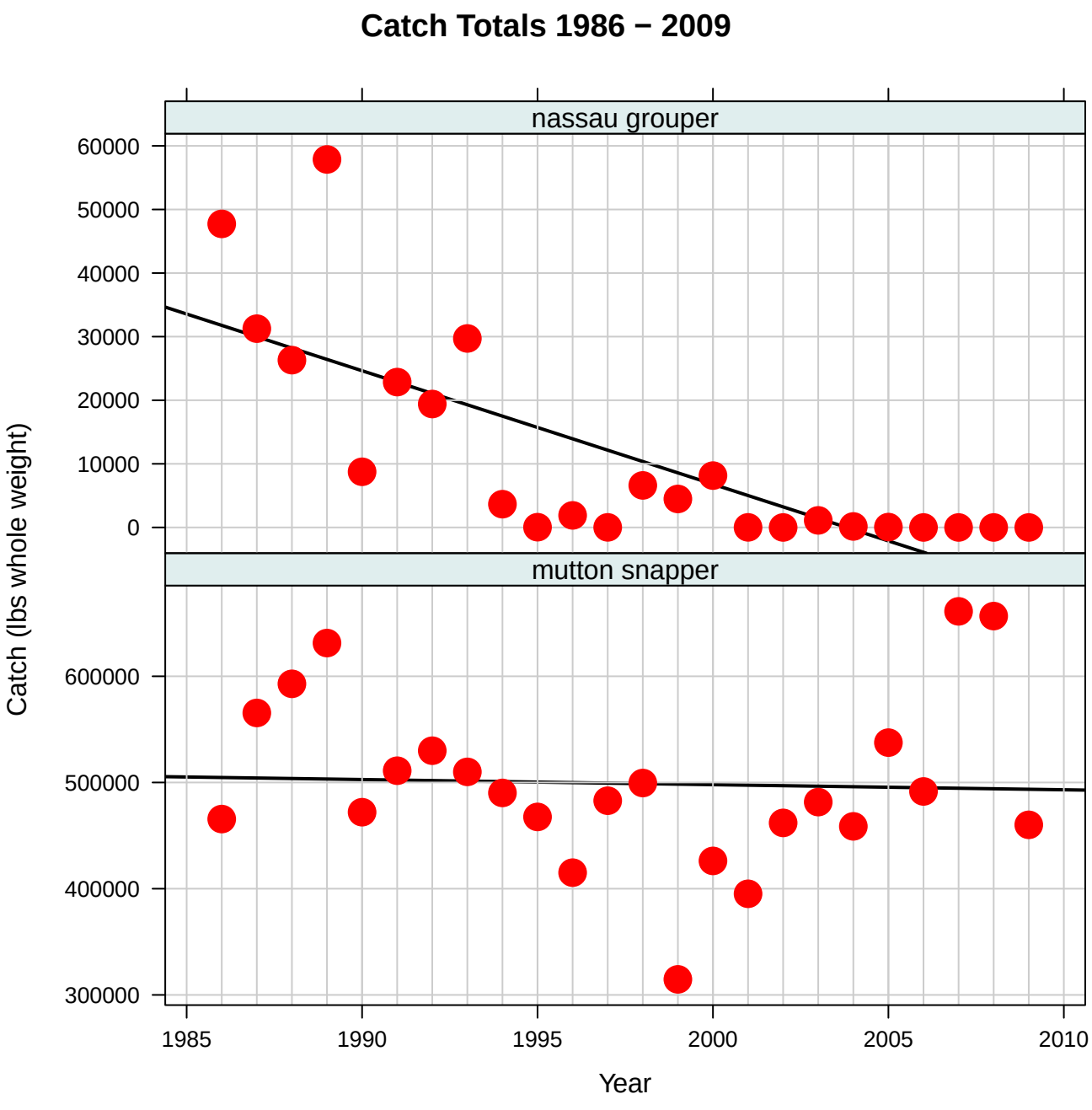

Catch Totals 1986 − 2009
king mackerel
king and cero mackerel
Catch (lbs whole weight)
6000
4000
2000
0
5000000
4500000
4000000
3500000
3000000
1985
1990
1995
2000
2005
2010
Year

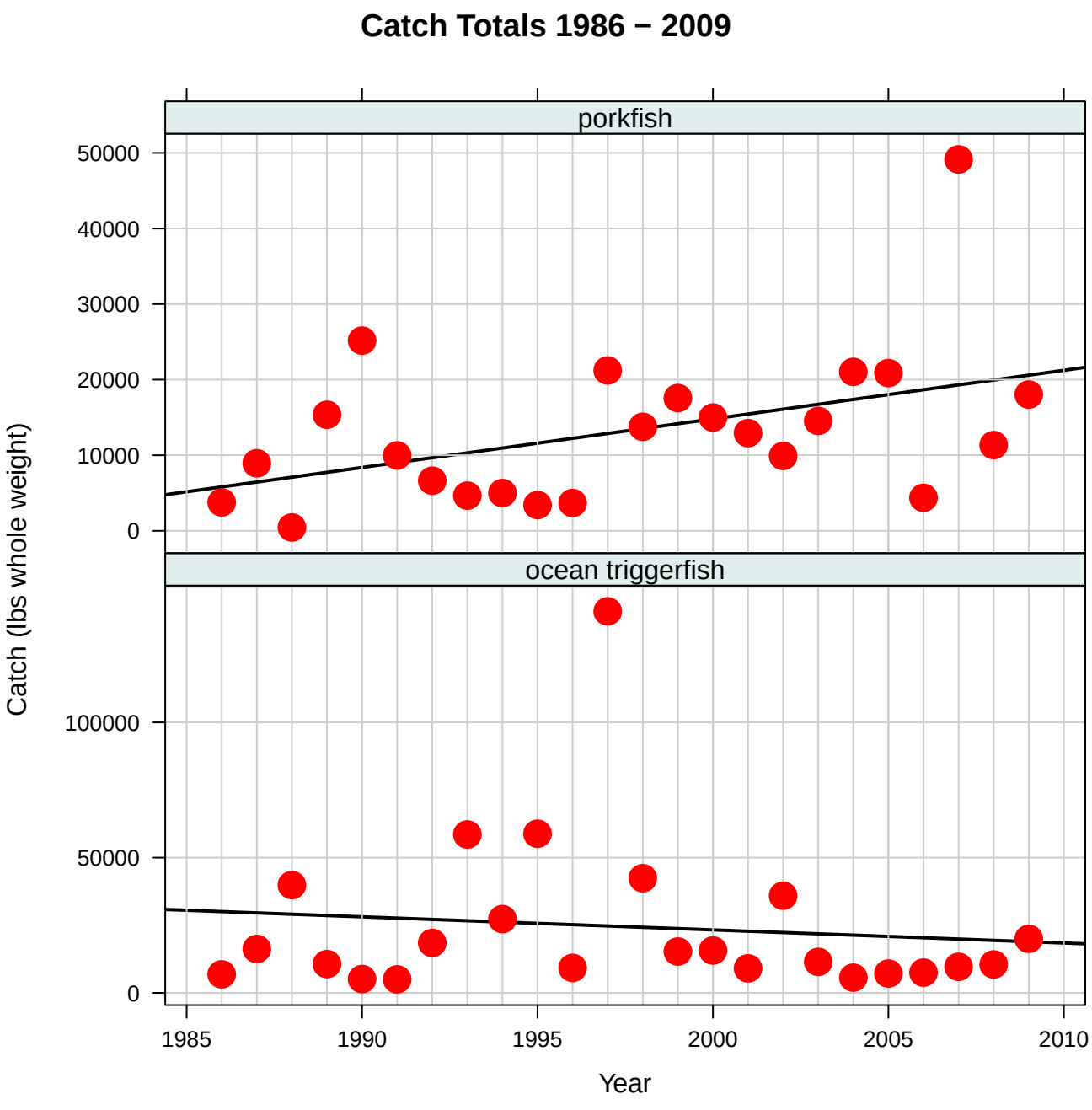

Catch Totals 1986 − 2009
lane snapper
knobbed porgy
250000
200000
150000
100000
150000
100000
50000
Catch (lbs whole weight)
1985
1990
1995
2000
2005
2010
Year

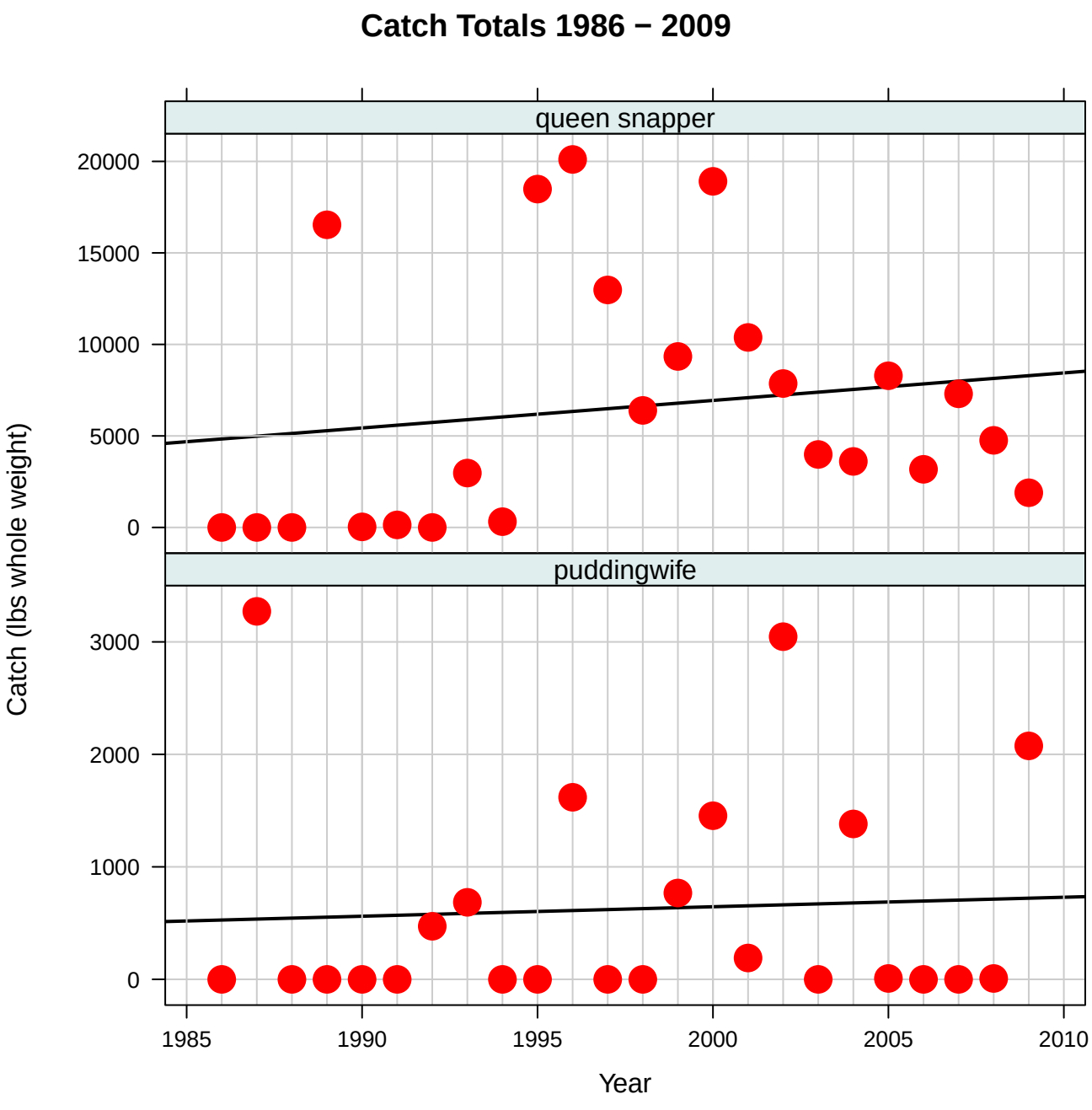

Catch Totals 1986 − 2009
little tunny
lesser amberjack
Catch (lbs whole weight)
500000
400000
300000
200000
100000
20000
15000
10000
5000
0
1985
1990
1995
2000
2005
2010
Year

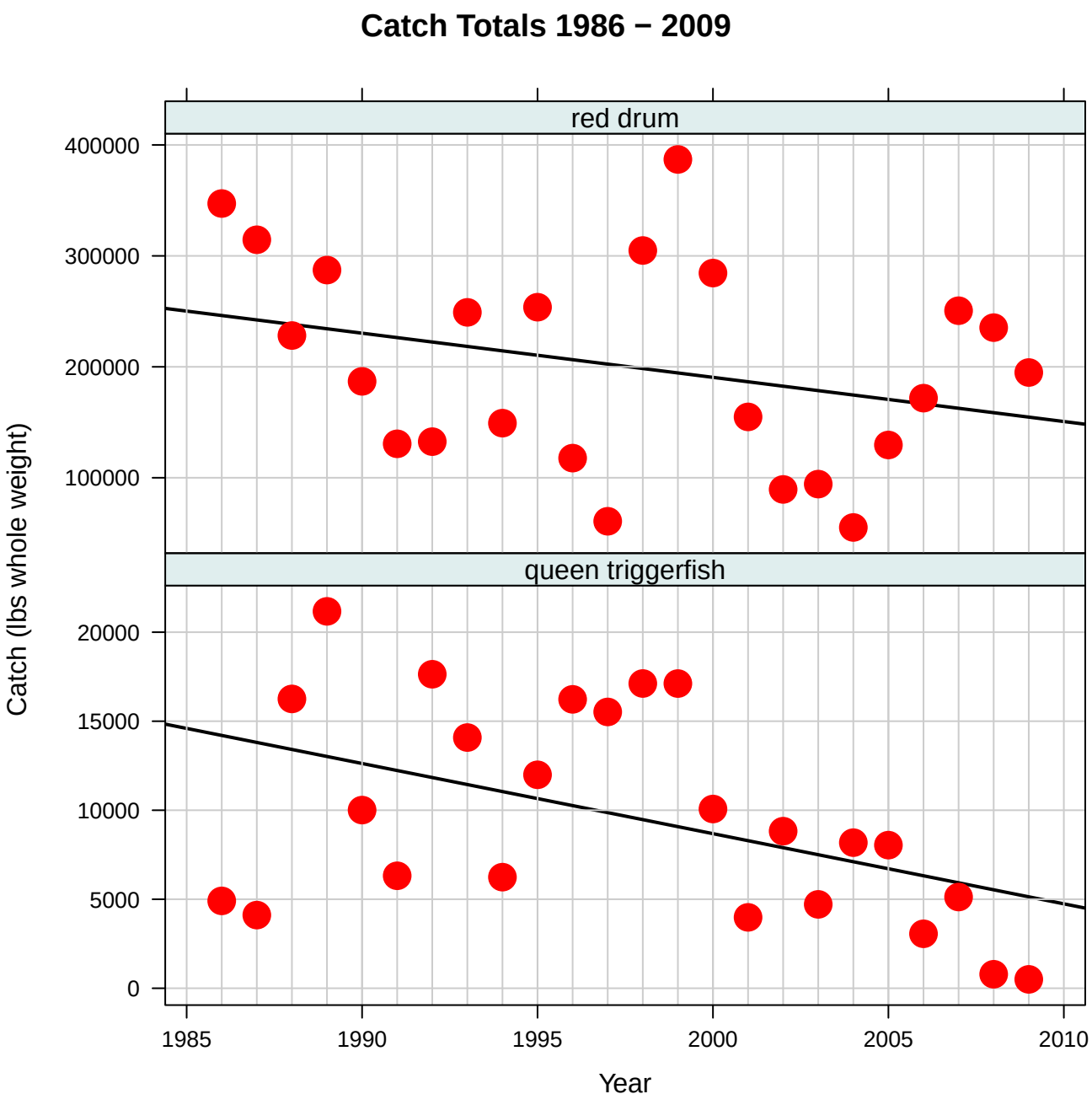

Catch Totals 1986 − 2009
mahogany snapper
longspine porgy
Catch (lbs whole weight)
Year
0
1000
2000
3000
0
2000
4000
6000
8000
10000
1985
1990
1995
2000
2005
2010

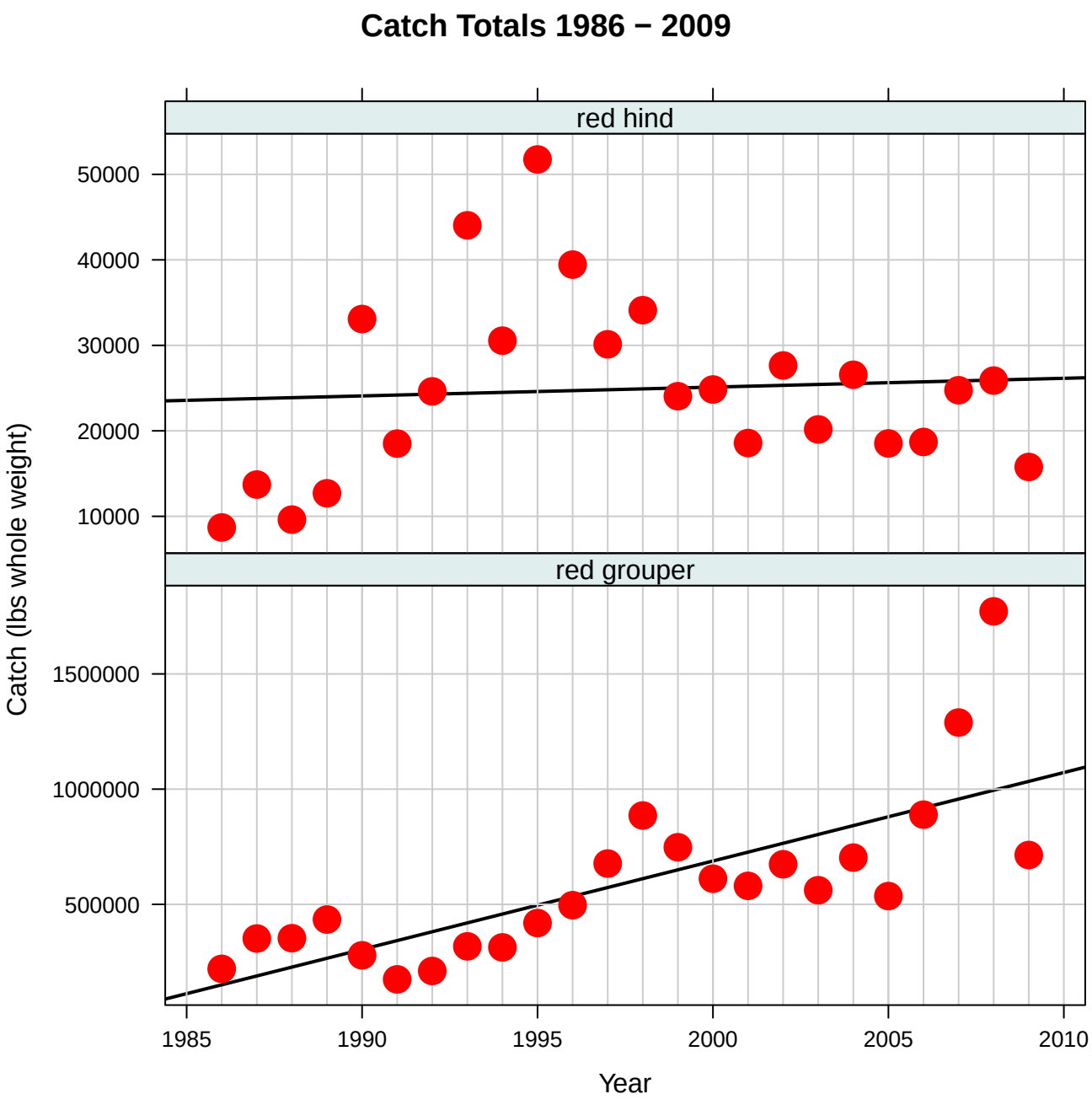

Catch Totals 1986 − 2009
misty grouper
margate
Catch (lbs whole weight)
30000
25000
20000
15000
10000
5000
0
60000
40000
20000
0
1985
1990
1995
2000
2005
2010
Year

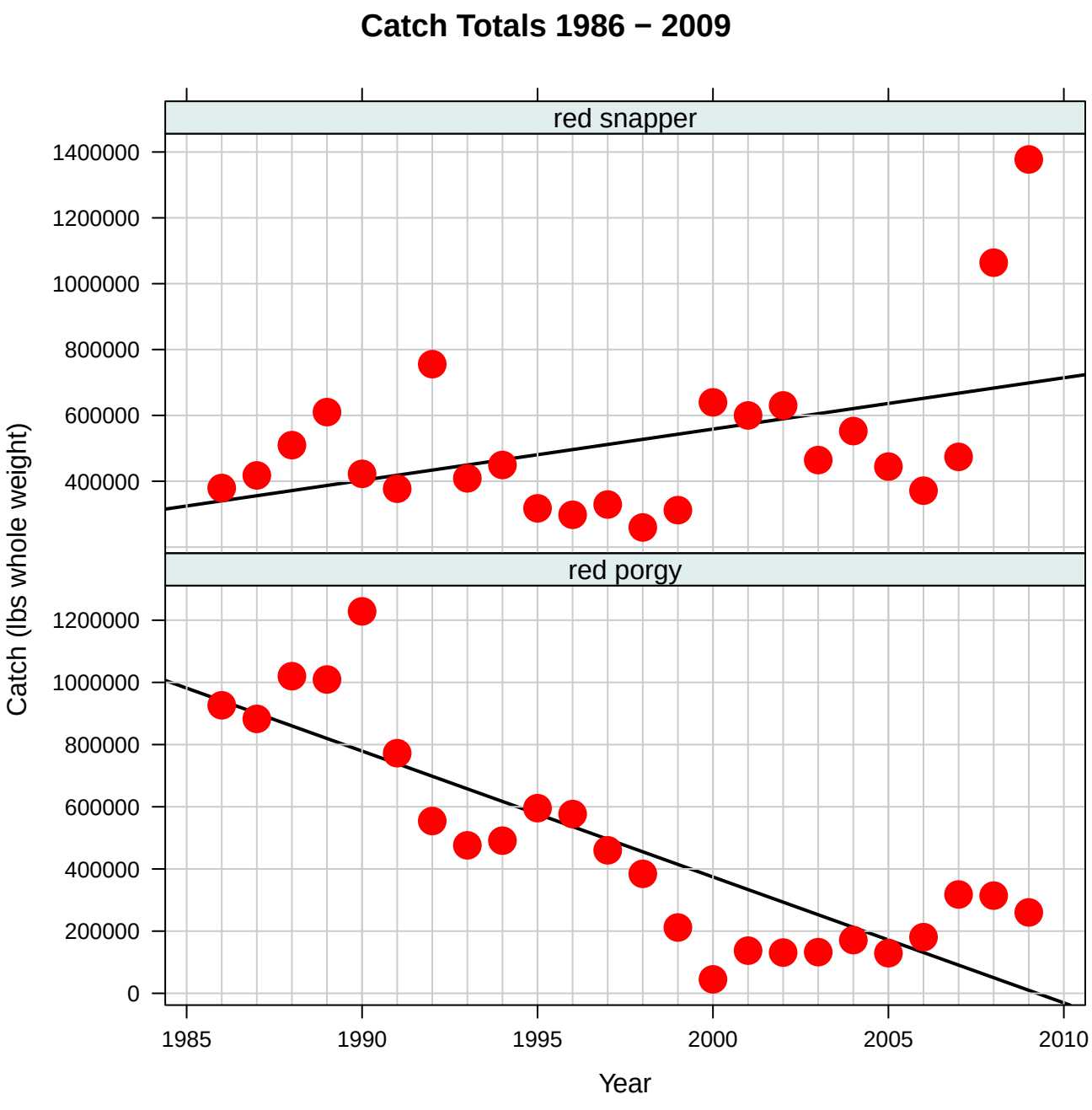

Catch Totals 1986 − 2009
nassau grouper
mutton snapper
Catch (lbs whole weight)
Year
60000
50000
40000
30000
20000
10000
0
600000
500000
400000
300000
1985
1990
1995
2000
2005
2010

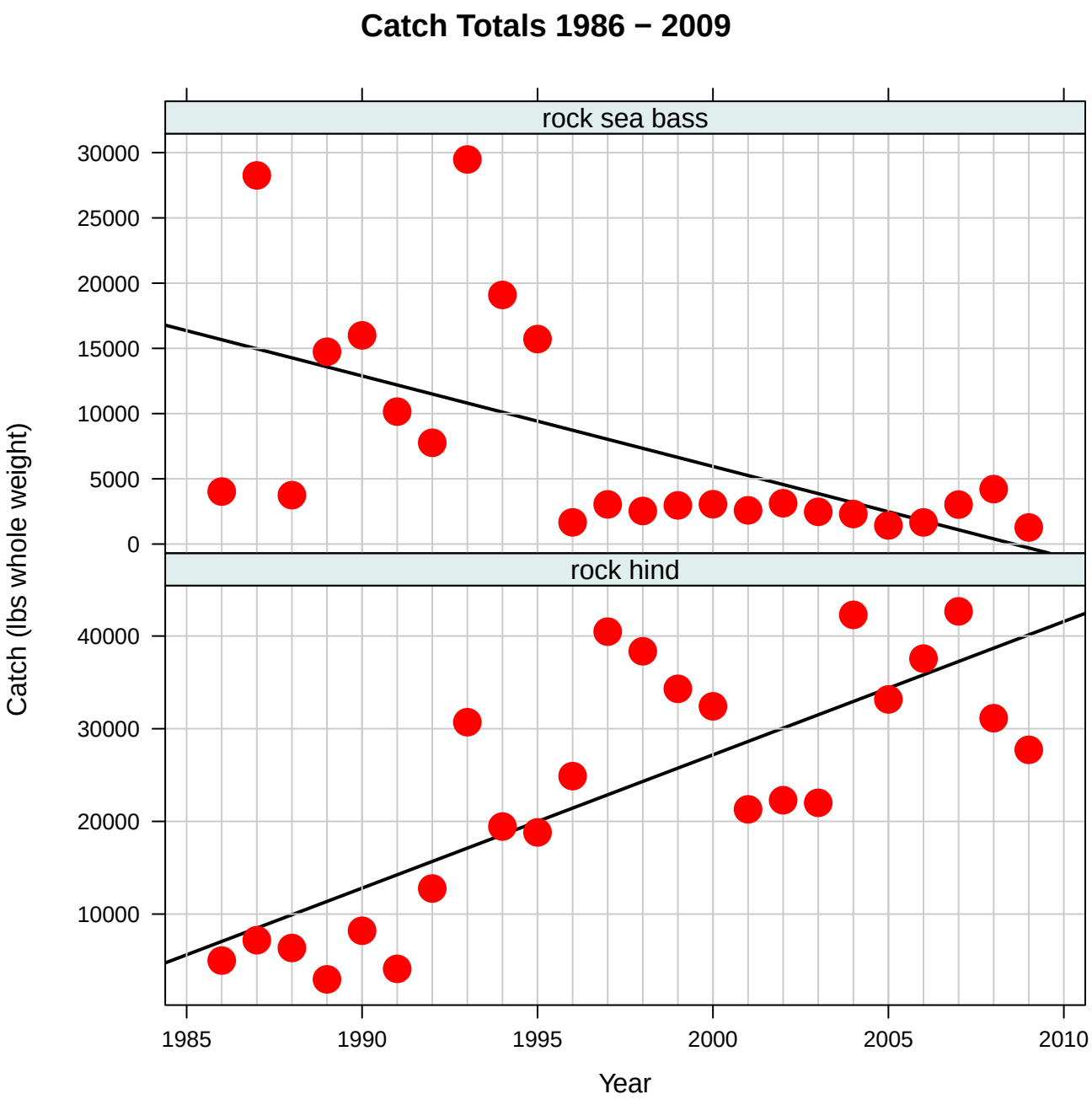

Catch Totals 1986 − 2009
porkfish
ocean triggerfish
Catch (lbs whole weight)
50000
40000
30000
20000
10000
0
100000
50000
0
1985
1990
1995
2000
2005
2010
Year

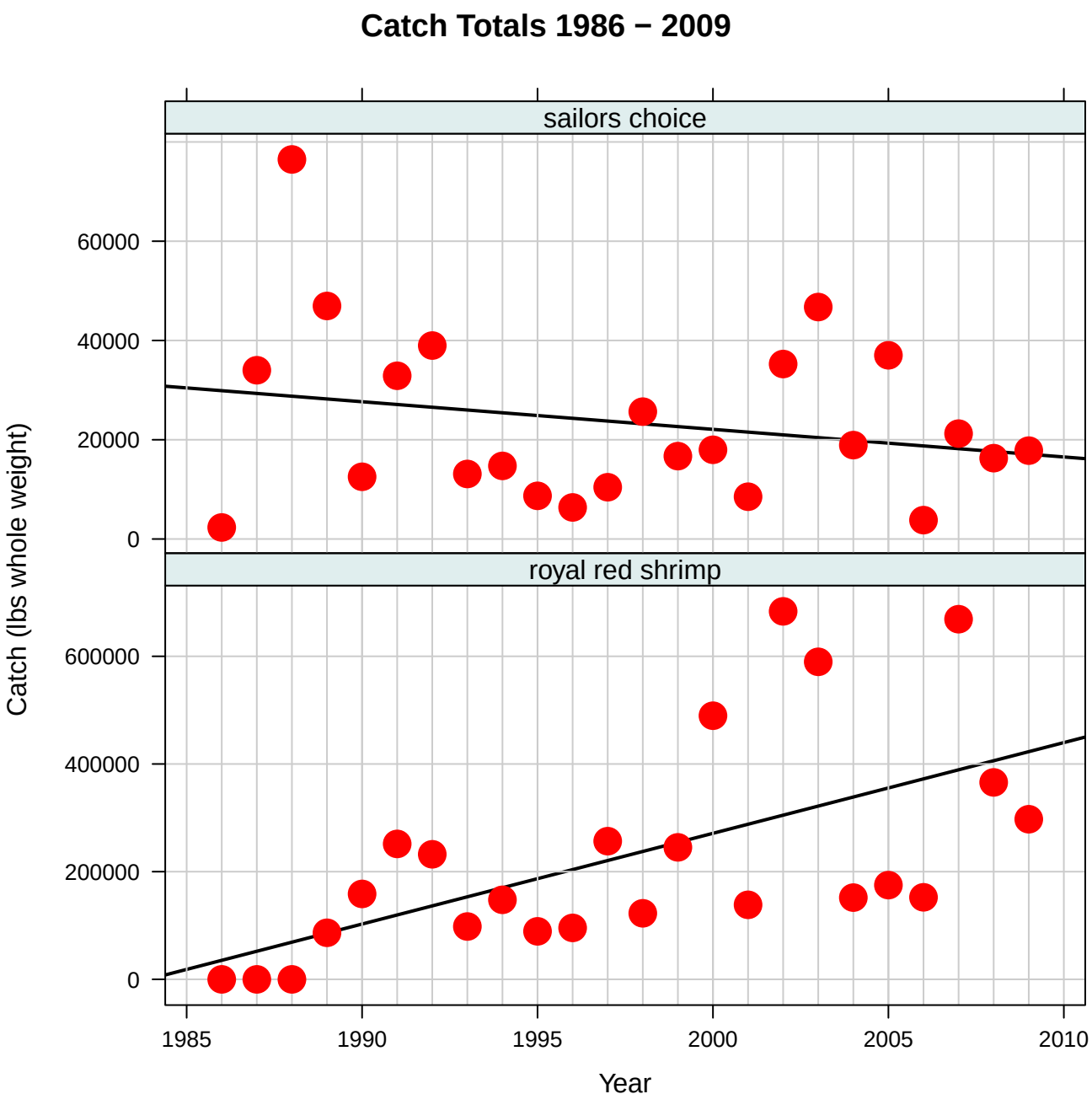

Catch Totals 1986 − 2009
queen snapper
puddingwife
Catch (lbs whole weight)
Year
0
5000
10000
15000
20000
0
1000
2000
3000
1985
1990
1995
2000
2005
2010

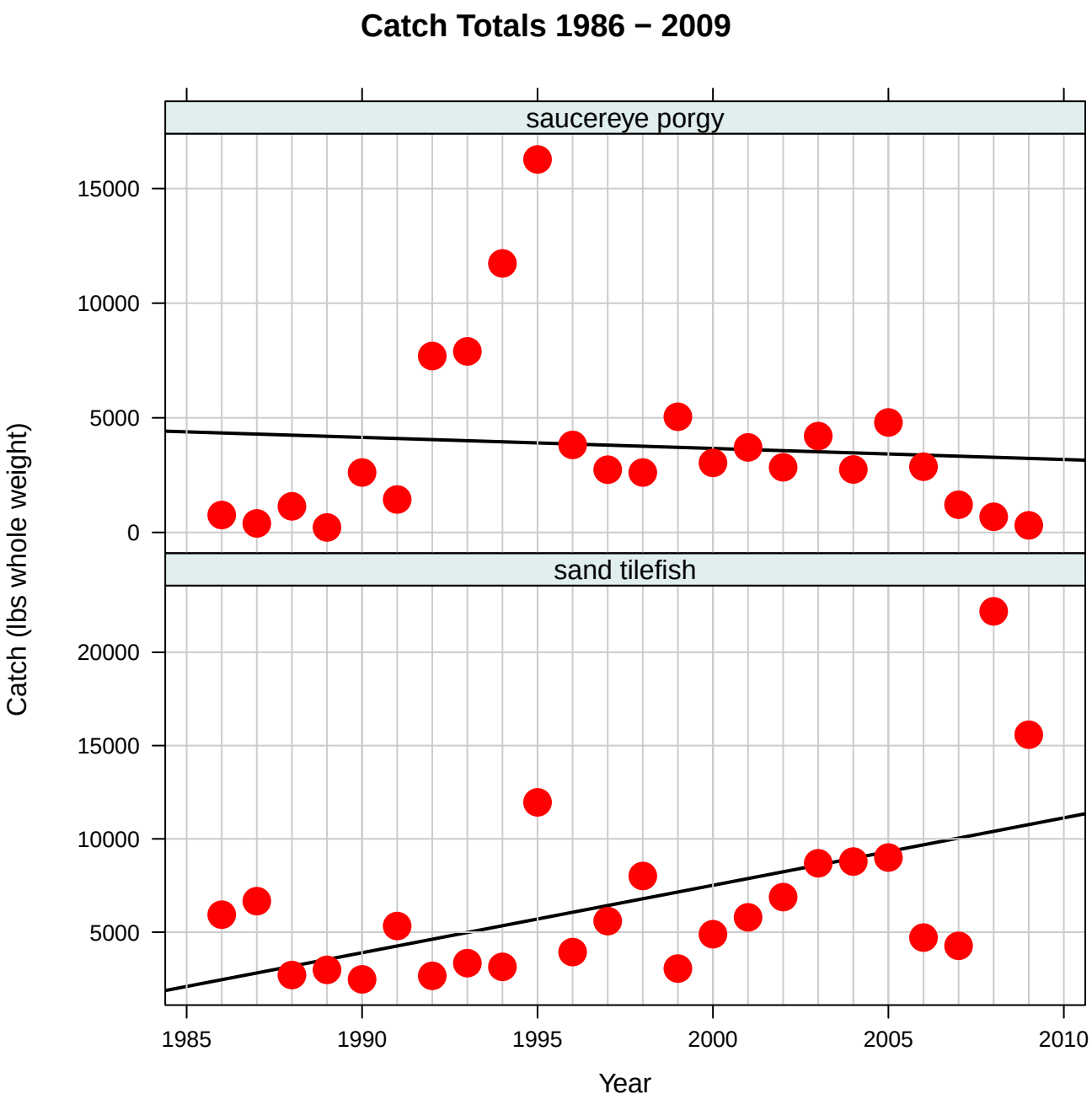

Catch Totals 1986 − 2009
red drum
queen triggerfish
Catch (lbs whole weight)
400000
300000
200000
100000
20000
15000
10000
5000
0
1985
1990
1995
2000
2005
2010
Year

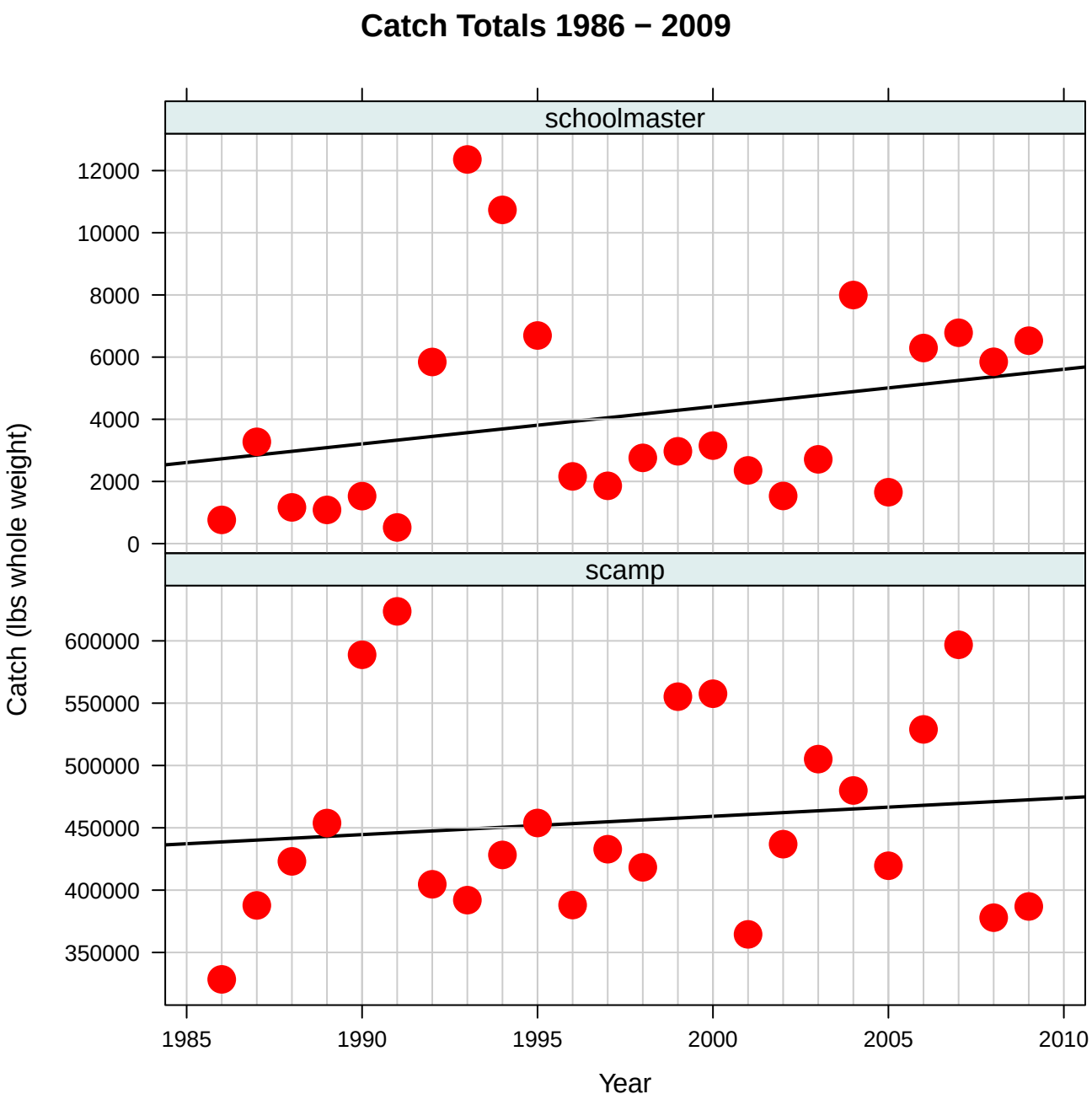

Catch Totals 1986 − 2009
red hind
red grouper
Catch (lbs whole weight)
50000
40000
30000
20000
10000
1500000
1000000
500000
1985
1990
1995
2000
2005
2010
Year

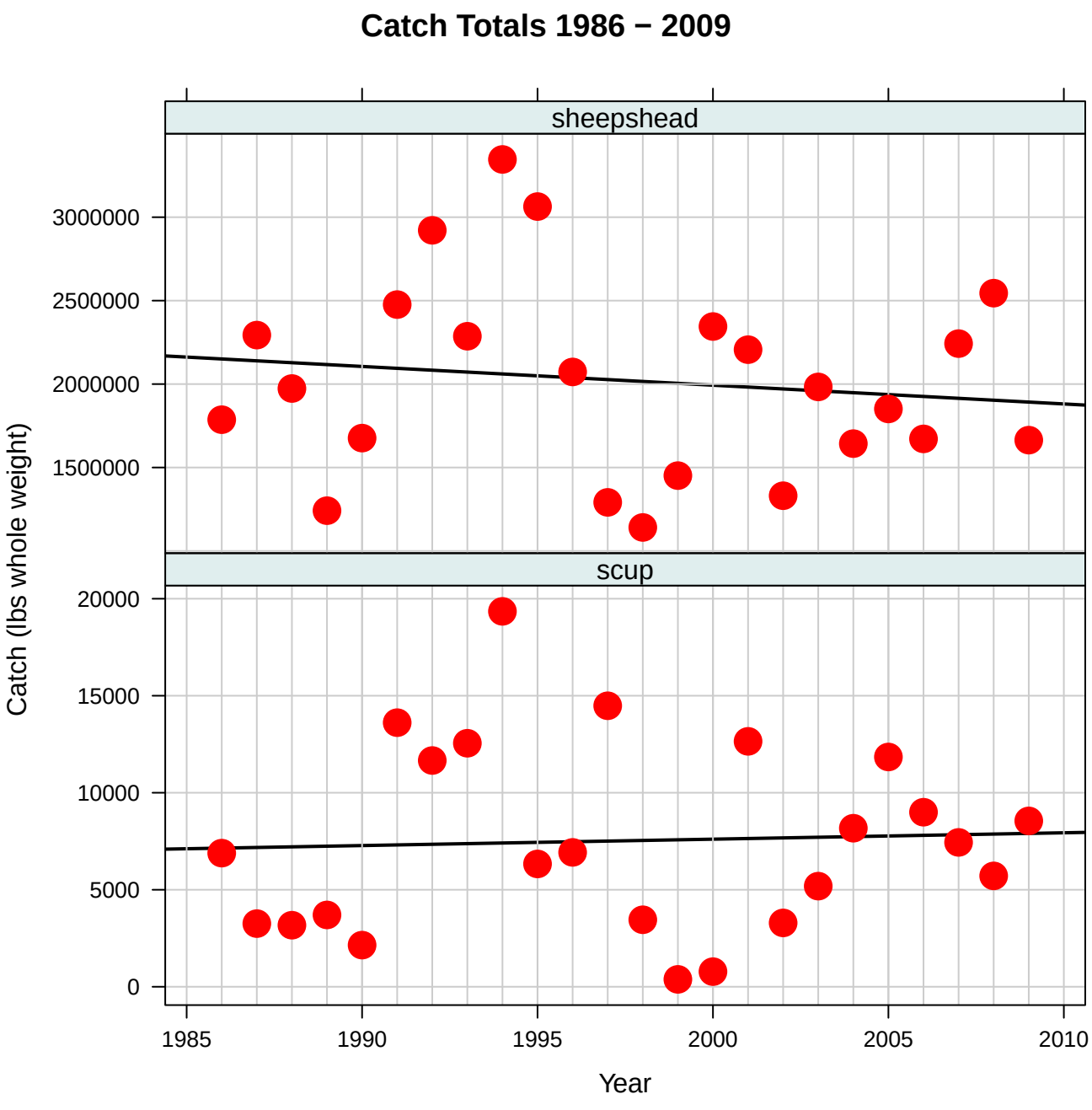

Catch Totals 1986 − 2009
red snapper
red porgy
Catch (lbs whole weight)
Year
1400000
1200000
1000000
800000
600000
400000
200000
0
1985
1990
1995
2000
2005
2010

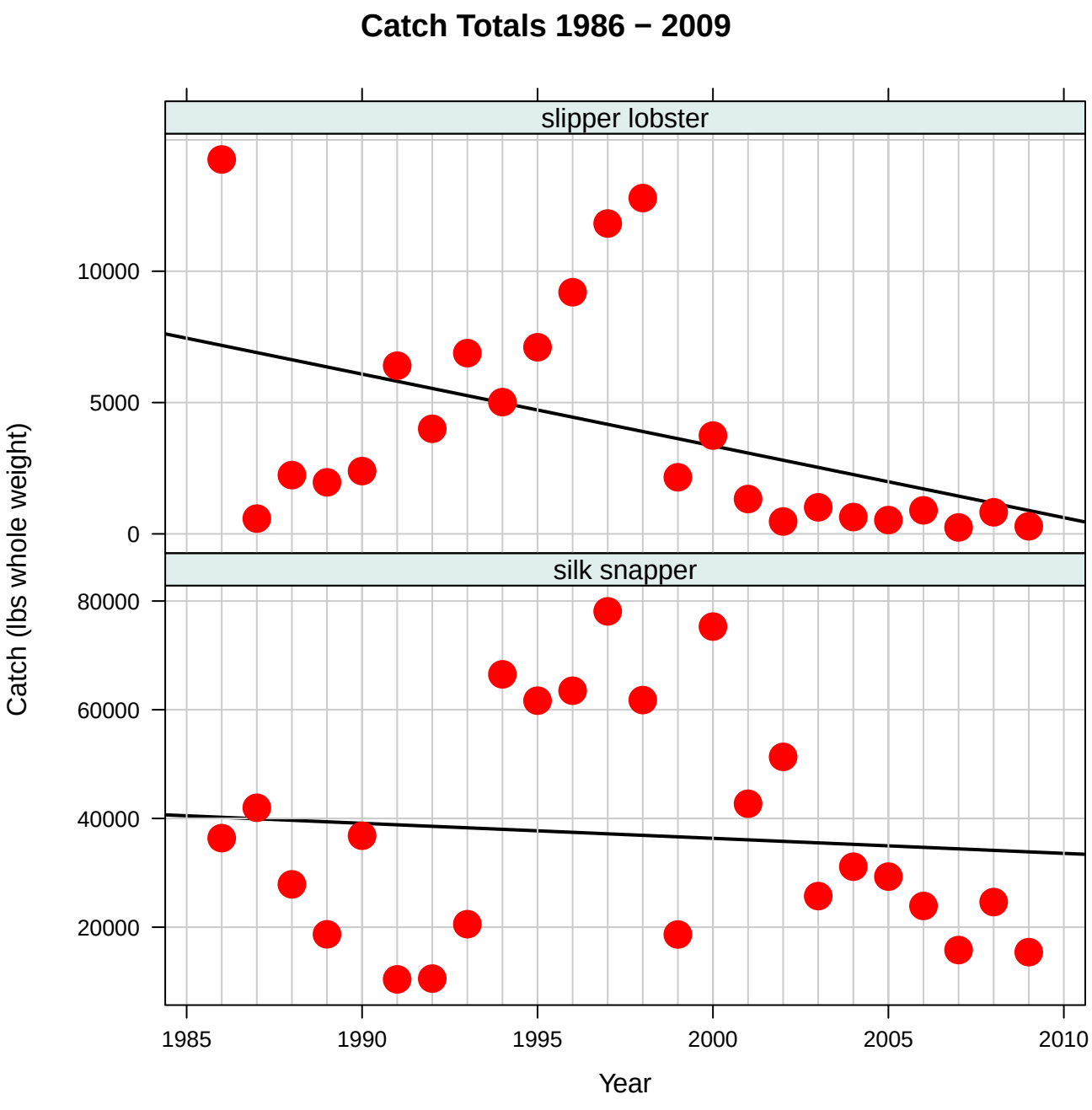

Catch Totals 1986 − 2009
rock sea bass
rock hind
Catch (lbs whole weight)
Year
30000
25000
20000
15000
10000
5000
0
40000
30000
20000
10000
1985
1990
1995
2000
2005
2010

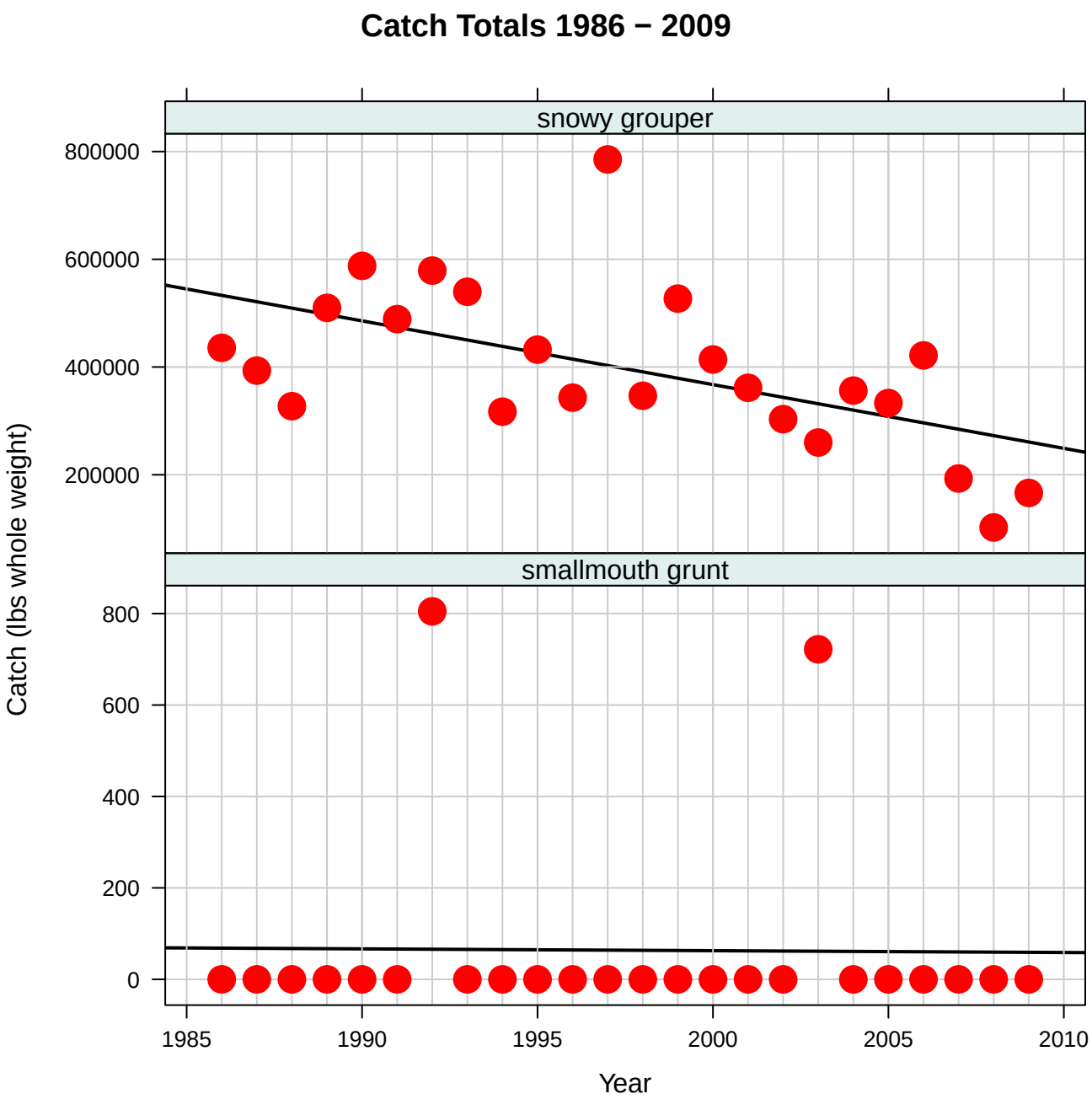

Catch Totals 1986 − 2009
sailors choice
royal red shrimp
Catch (lbs whole weight)
0
20000
40000
60000
0
200000
400000
600000
1985
1990
1995
2000
2005
2010
Year

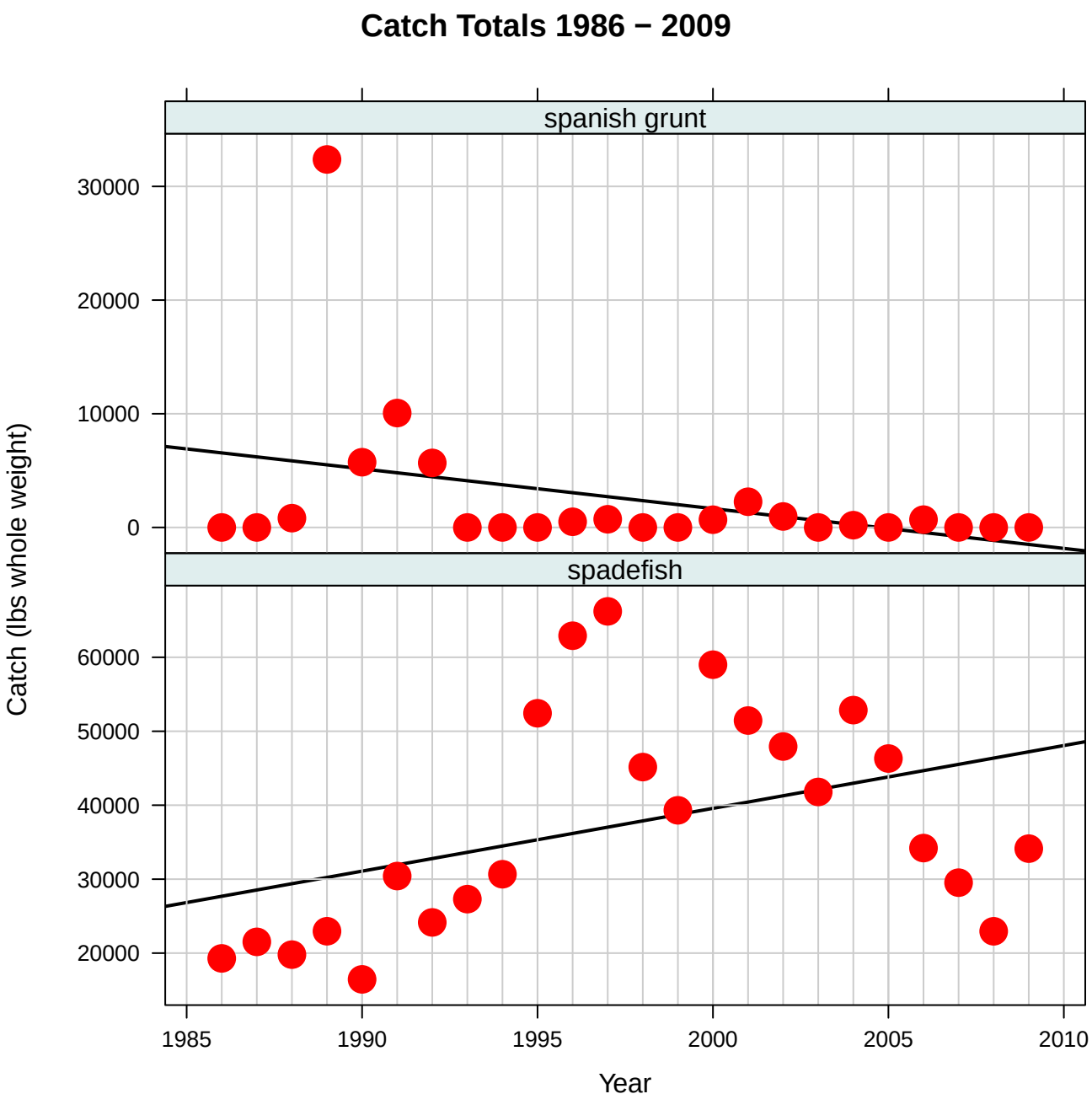

Catch Totals 1986 − 2009
saucereye porgy
sand tilefish
Catch (lbs whole weight)
Year
0
5000
10000
15000
20000
1985
1990
1995
2000
2005
2010

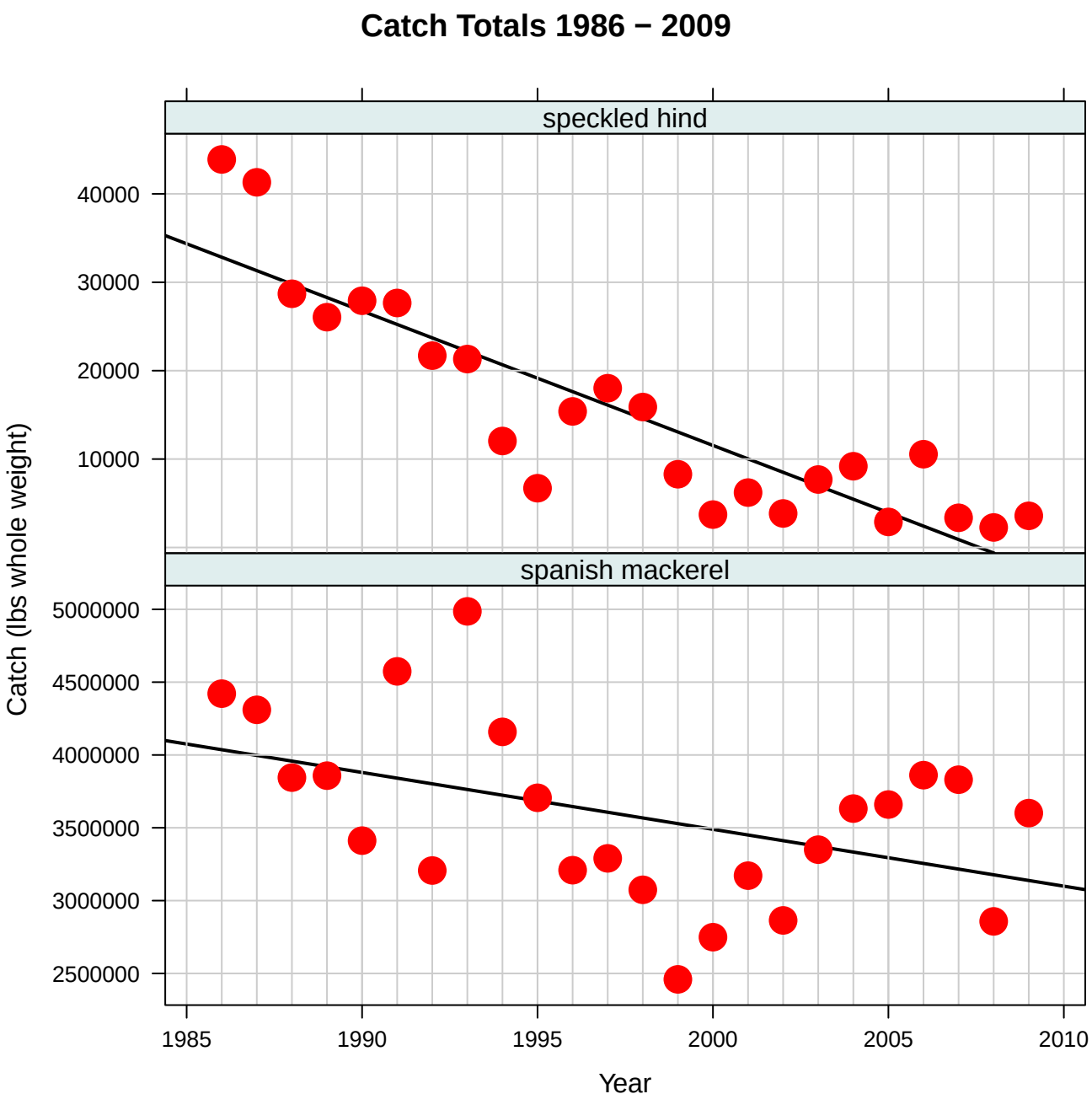

Catch Totals 1986 − 2009
schoolmaster
scamp
Catch (lbs whole weight)
Year
0
2000
4000
6000
8000
10000
12000
350000
400000
450000
500000
550000
600000
1985
1990
1995
2000
2005
2010

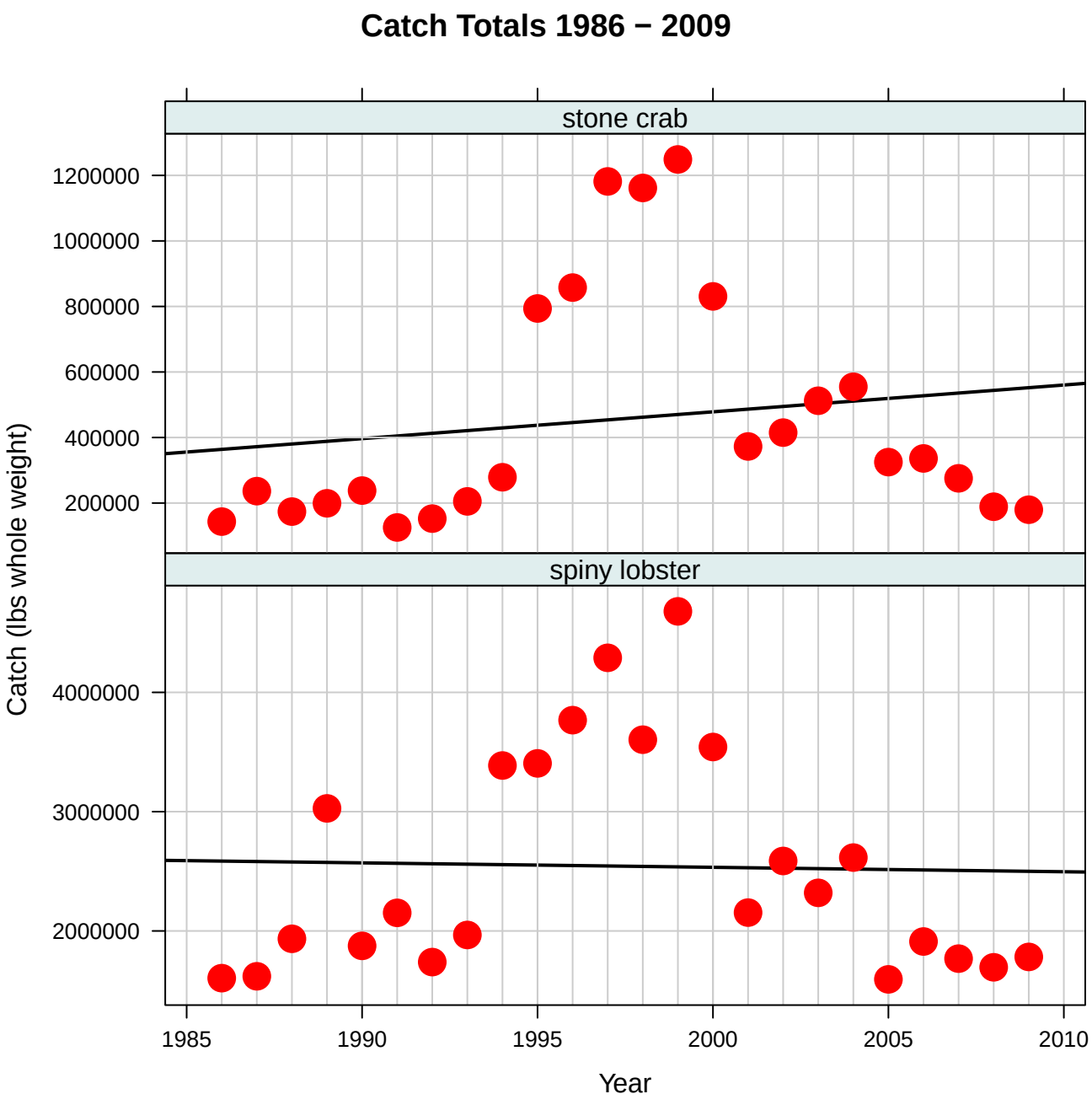

Catch Totals 1986 − 2009
sheepshead
scup
Catch (lbs whole weight)
3000000
2500000
2000000
1500000
20000
15000
10000
5000
0
1985
1990
1995
2000
2005
2010
Year

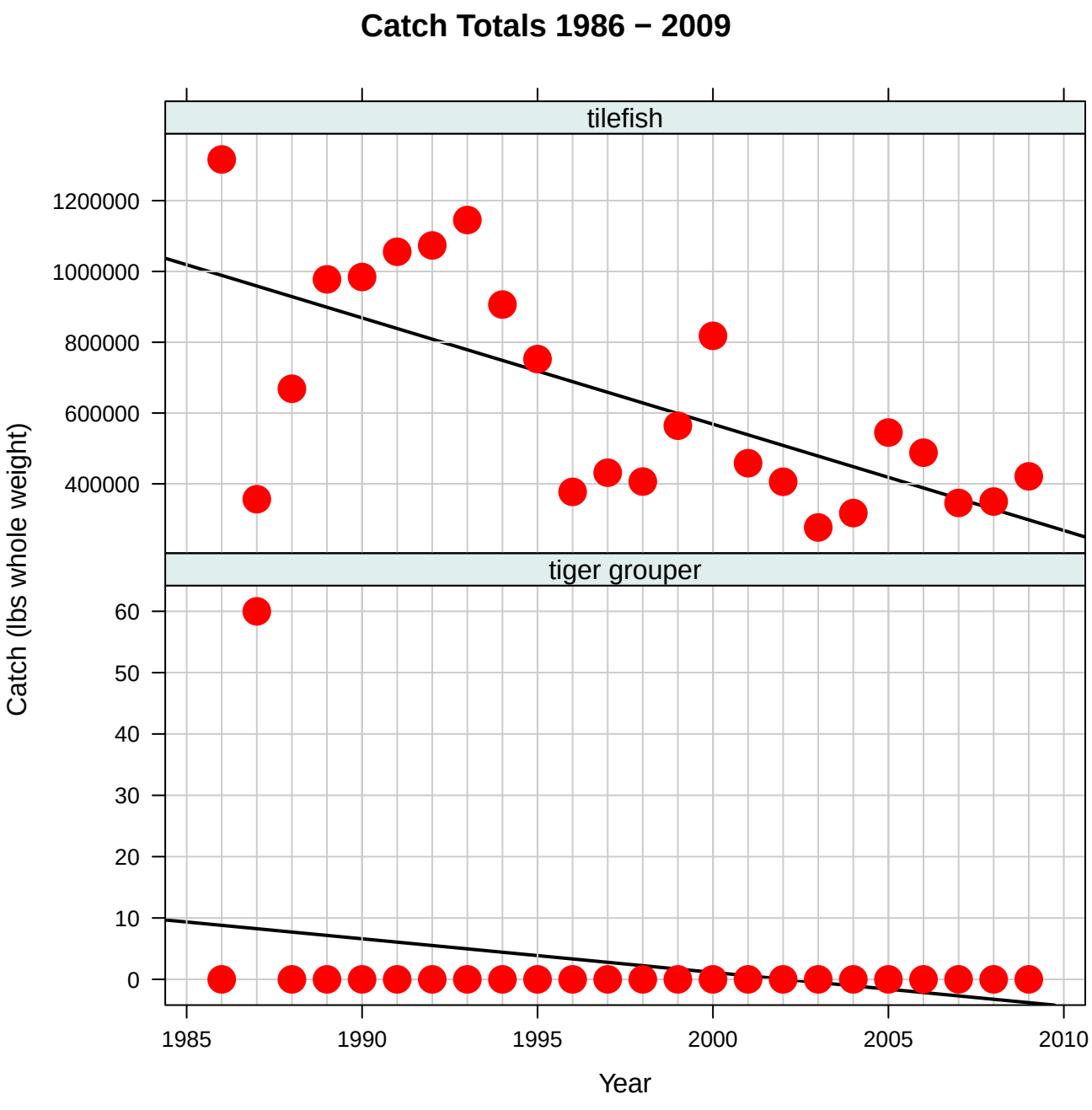

Catch Totals 1986 − 2009
slipper lobster
silk snapper
Catch (lbs whole weight)
0
5000
10000
20000
40000
60000
80000
1985
1990
1995
2000
2005
2010
Year

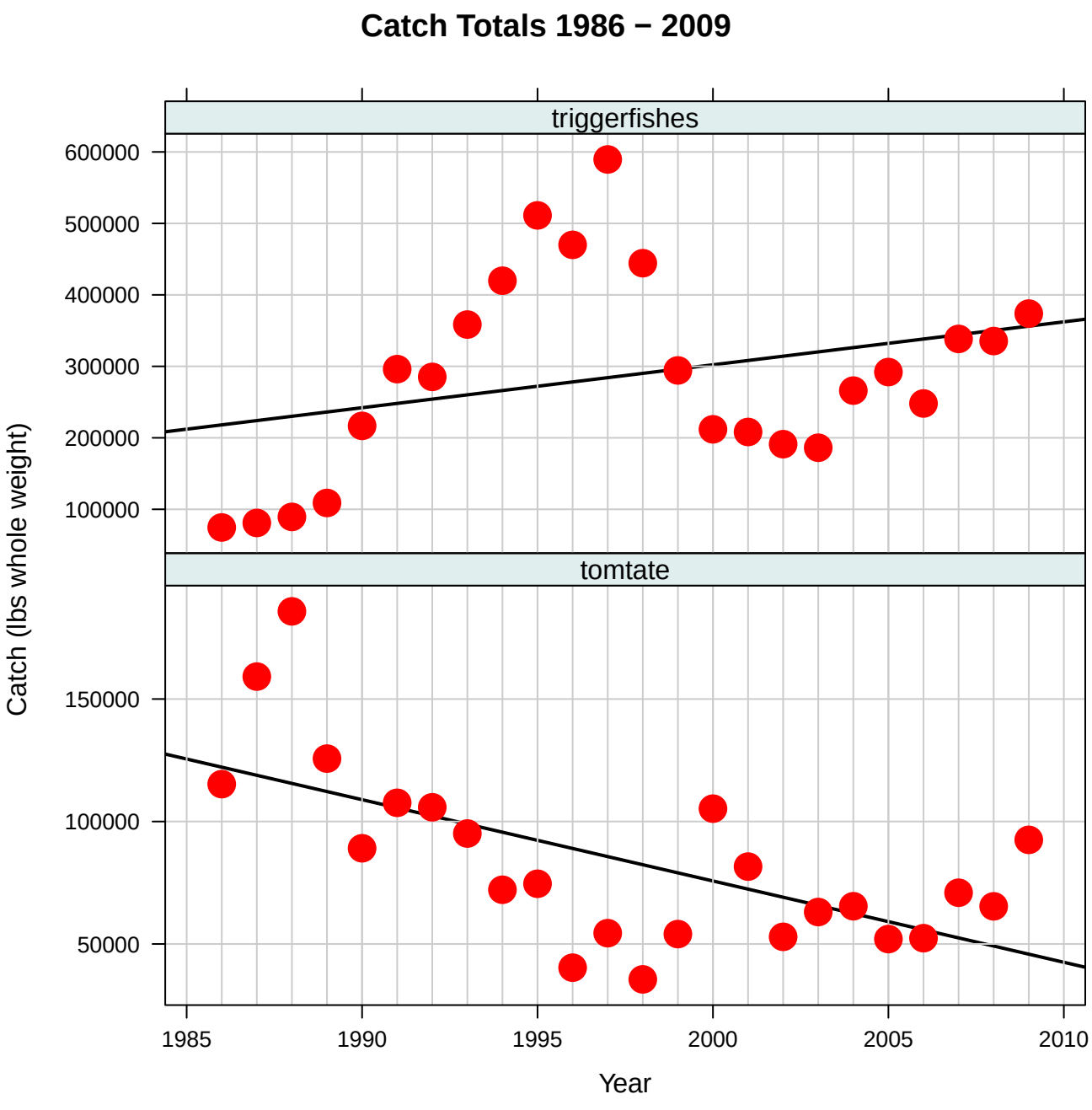

Catch Totals 1986 − 2009
snowy grouper
smallmouth grunt
800000
600000
400000
200000
800
600
400
200
0
Catch (lbs whole weight)
1985
1990
1995
2000
2005
2010
Year

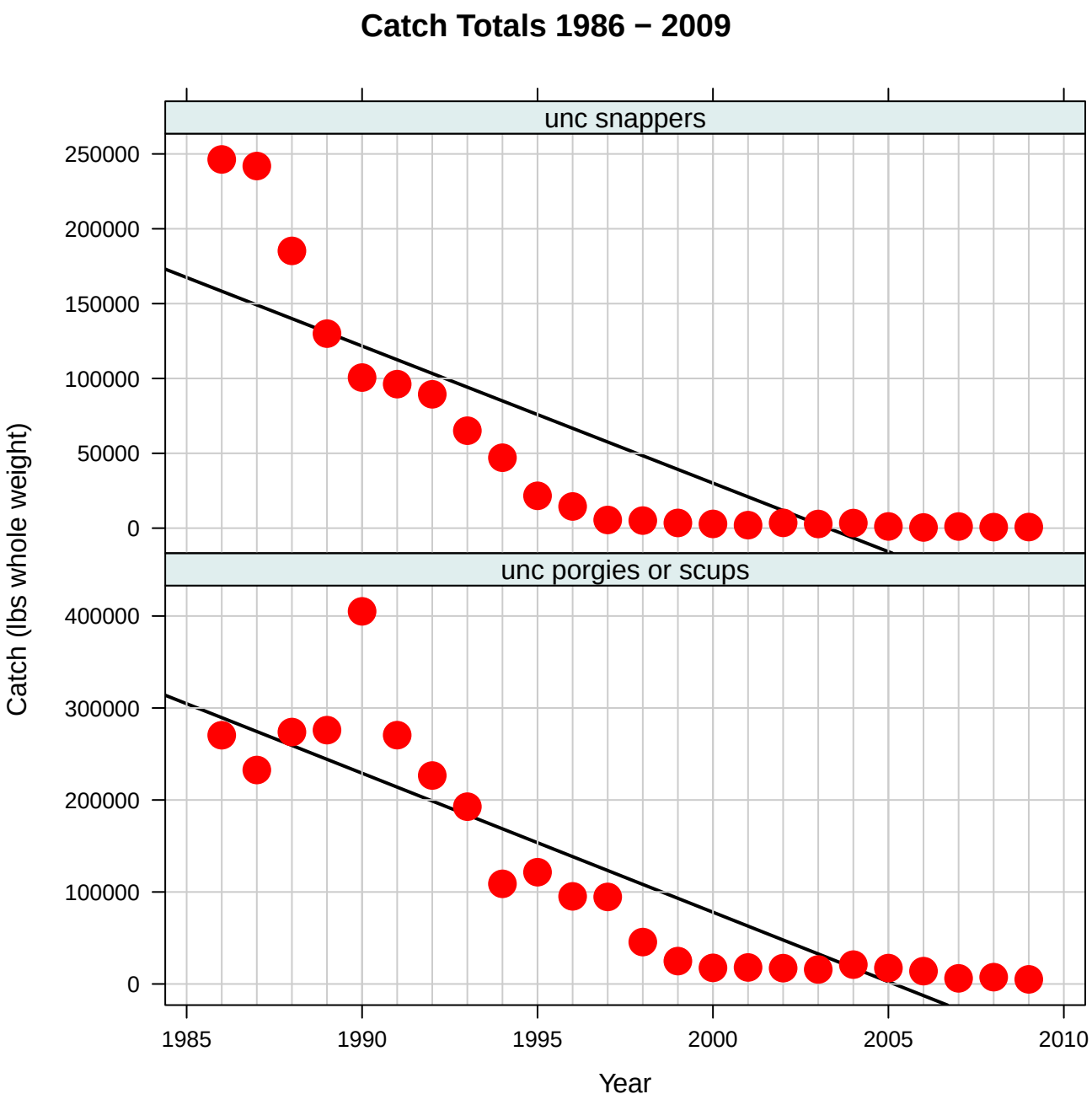

Catch Totals 1986 − 2009
spanish grunt
spadefish
Catch (lbs whole weight)
Year
30000
20000
10000
0
60000
50000
40000
30000
20000
1985
1990
1995
2000
2005
2010

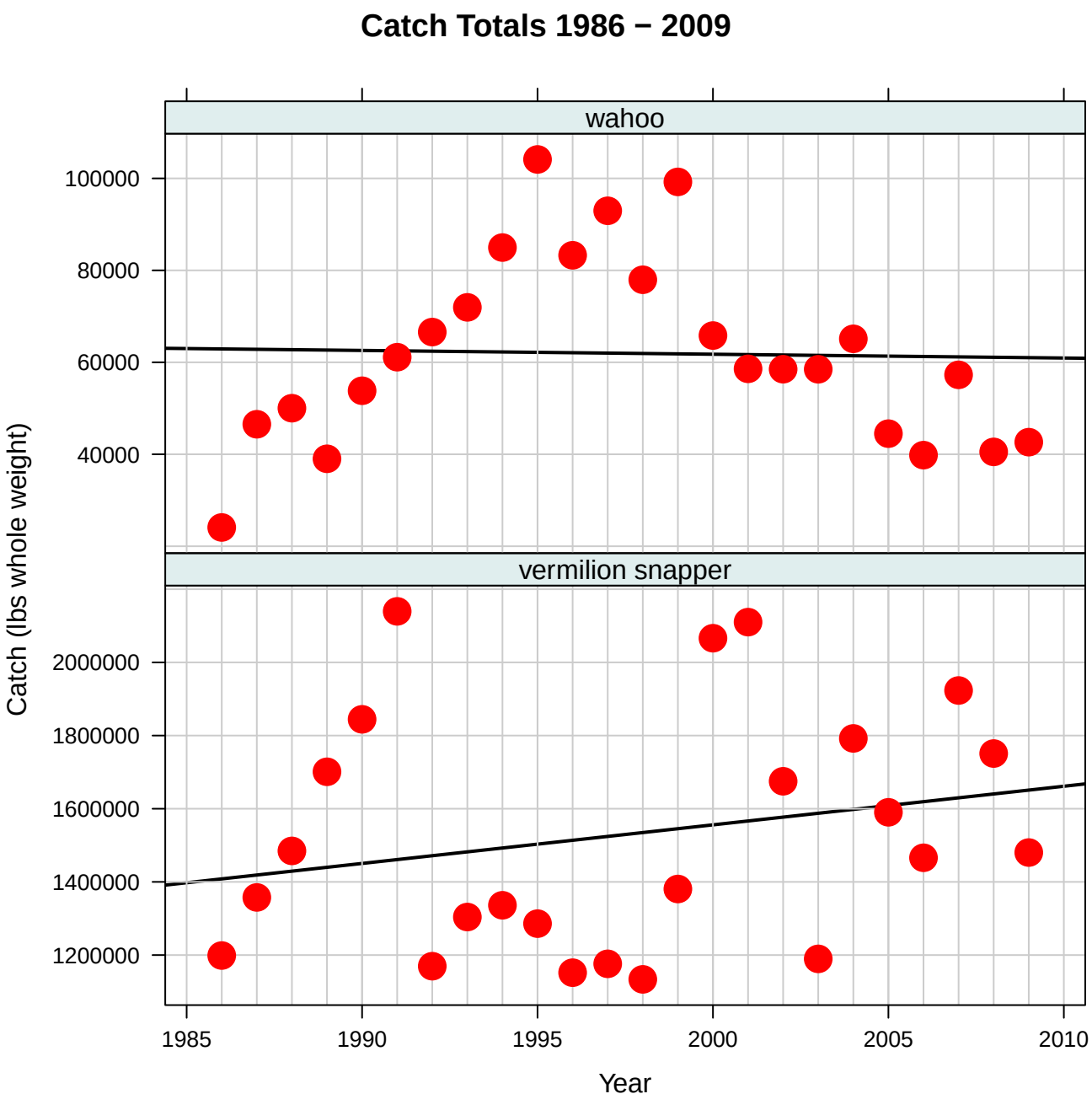

Catch Totals 1986 − 2009
speckled hind
spanish mackerel
Catch (lbs whole weight)
40000
30000
20000
10000
5000000
4500000
4000000
3500000
3000000
2500000
1985
1990
1995
2000
2005
2010
Year

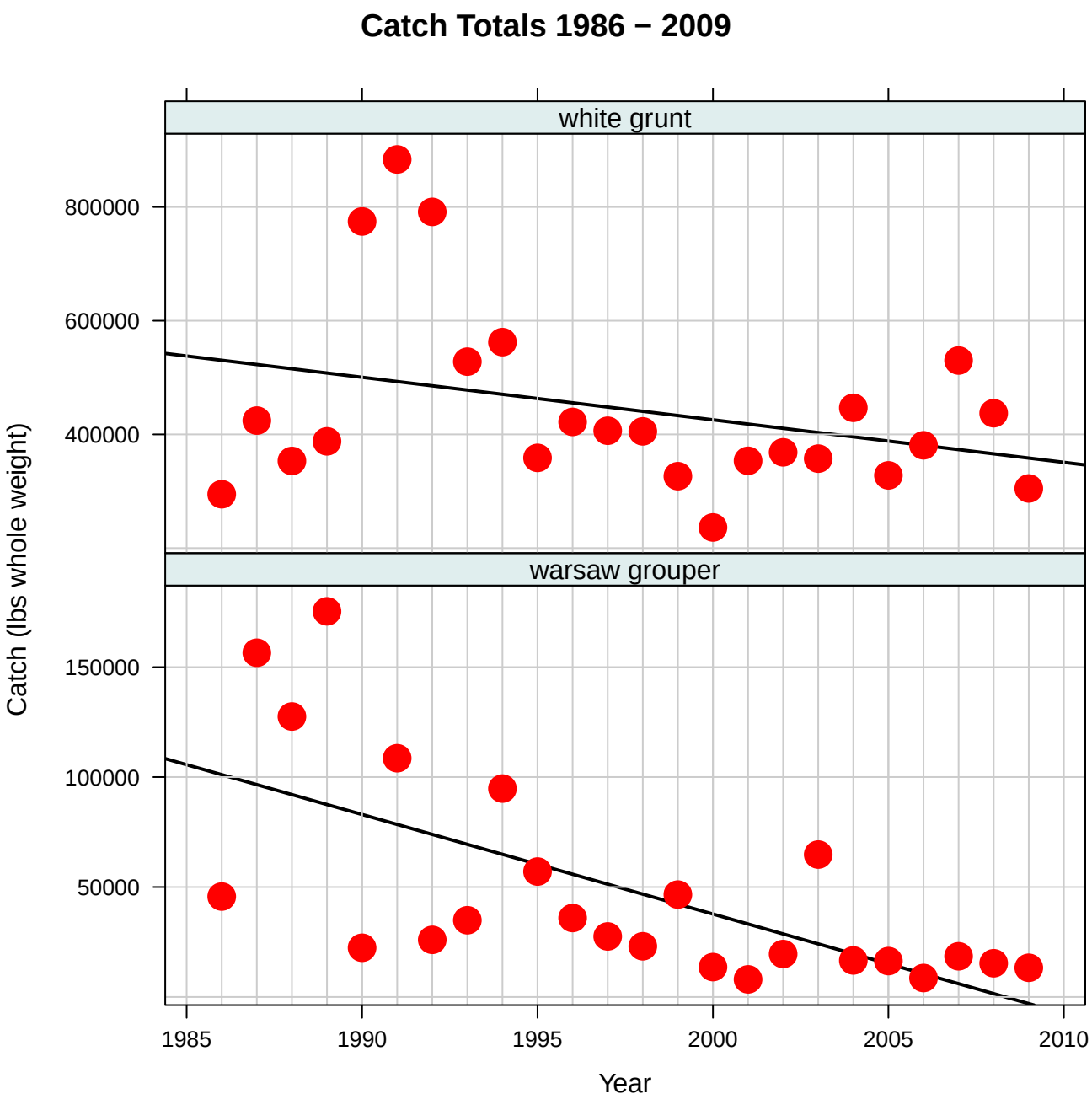

Catch Totals 1986 − 2009
stone crab
spiny lobster
Catch (lbs whole weight)
1200000
1000000
800000
600000
400000
200000
4000000
3000000
2000000
1985
1990
1995
2000
2005
2010
Year

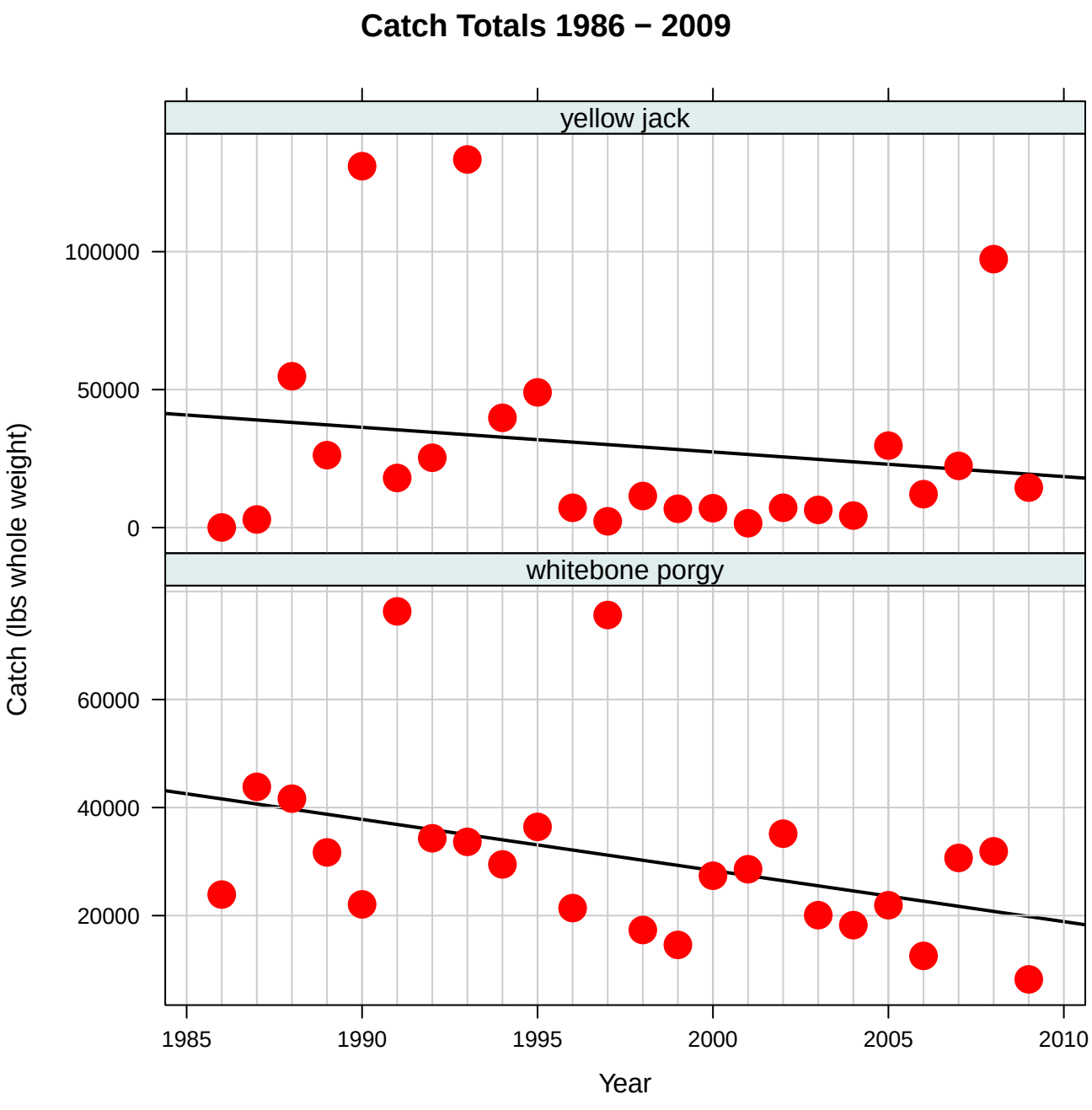

Catch Totals 1986 − 2009
tilefish
tiger grouper
Catch (lbs whole weight)
1200000
1000000
800000
600000
400000
60
50
40
30
20
10
0
1985
1990
1995
2000
2005
2010
Year

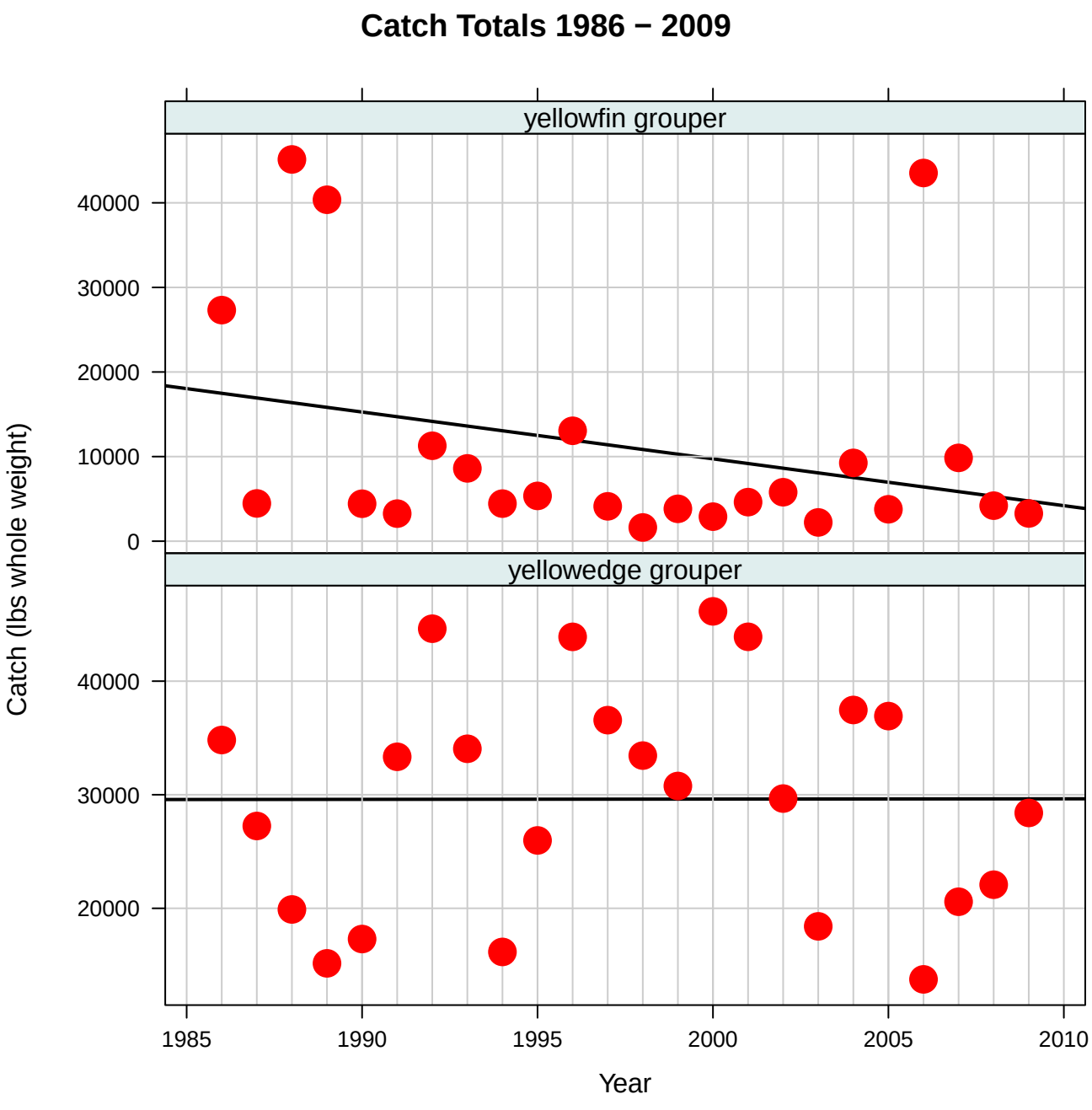

Catch Totals 1986 − 2009
triggerfishes
tomtate
600000
500000
400000
300000
200000
100000
150000
100000
50000
Catch (lbs whole weight)
1985
1990
1995
2000
2005
2010
Year

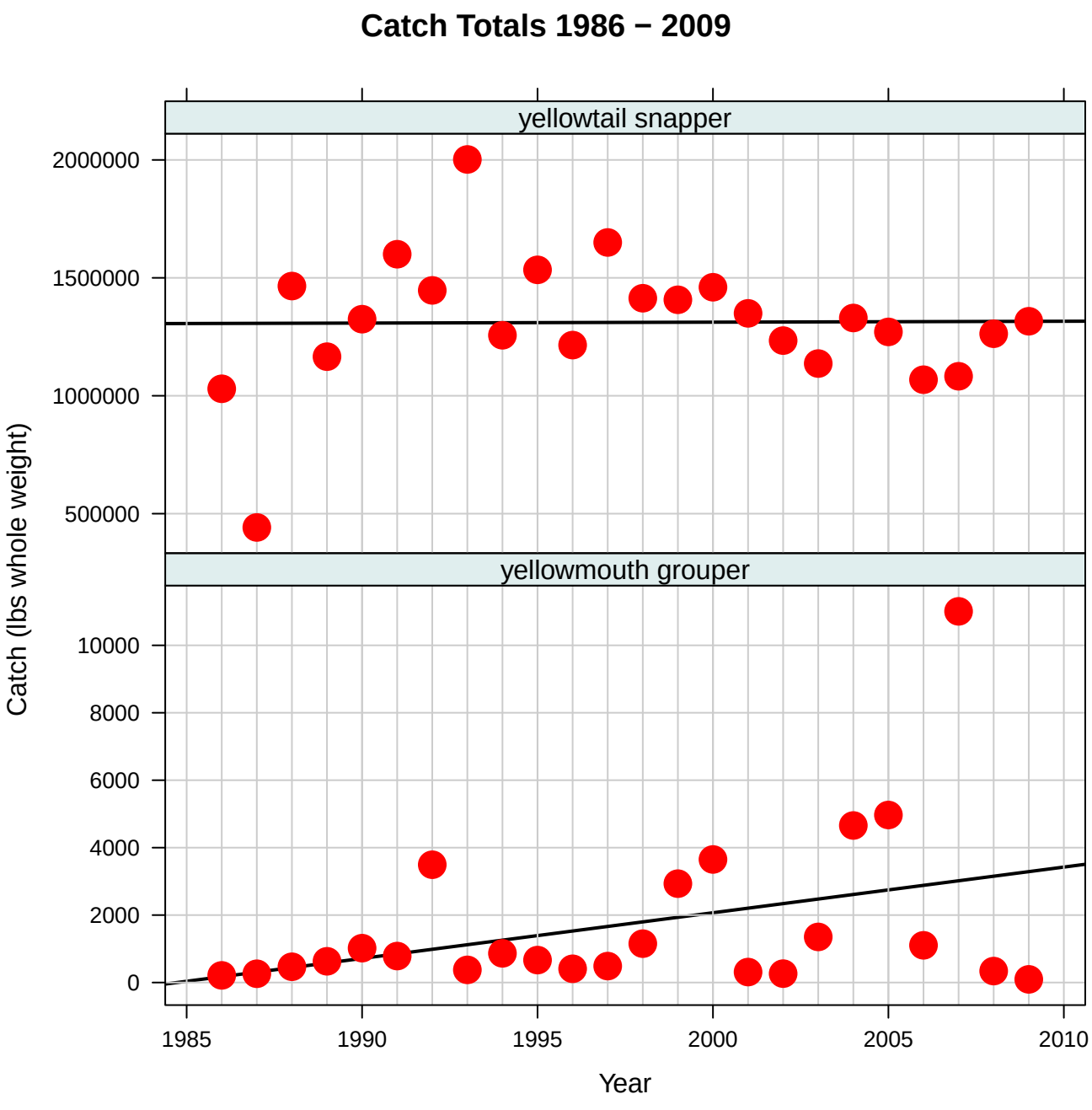

Catch Totals 1986 − 2009
unc snappers
unc porgies or scups
Catch (lbs whole weight)
Year
250000
200000
150000
100000
50000
0
400000
300000
200000
100000
0
1985
1990
1995
2000
2005
2010


Catch Totals 1986 − 2009
wahoo
vermilion snapper
100000
80000
60000
40000
2000000
1800000
1600000
1400000
1200000
Catch (lbs whole weight)
1985
1990
1995
2000
2005
2010
Year


Catch Totals 1986 − 2009
white grunt
warsaw grouper
800000
600000
400000
150000
100000
50000
Catch (lbs whole weight)
1985
1990
1995
2000
2005
2010
Year


Catch Totals 1986 − 2009
yellow jack
whitebone porgy
Catch (lbs whole weight)
100000
50000
0
60000
40000
20000
1985
1990
1995
2000
2005
2010
Year


Catch Totals 1986 – 2009
yellowfin grouper
yellowedge grouper
Catch (lbs whole weight)
Year
0
10000
20000
30000
40000
1985
1990
1995
2000
2005
2010


Catch Totals 1986 − 2009
yellowtail snapper
yellowmouth grouper
Catch (lbs whole weight)
2000000
1500000
1000000
500000
10000
8000
6000
4000
2000
0
1985
1990
1995
2000
2005
2010
Year

Appendix N. Description of commercial fisheries for snapper grouper species under previous amendments.

Gag

Gag landings are broadly distributed from North Carolina to Florida. Gag landings peaked in 2007 at 516,000 pounds gutted weight but declined to about 380,000 pounds in 2008 and 2009. Landings averaged 433,000 annually over the period 2005-2009. Approximately 395 vessels landed gag, and effort averaged 2,270 trips per year. From 2005 to 2009, the ex-vessel price (2009 dollars) per gutted pound of gag landings increased from $3.82 in 2005 to $4.25 in 2009, averaging $4.13 over the period. From 2005 to 2009, the ex-vessel revenues (2009 dollars) received for gag peaked at $2.28 million in 2007 and declined thereafter, averaging $1.79 million per year over the five-year period.

Table P-1. Number of vessels, dealers, and trips landing gag, by state, 2005-2009.

Vessels						**Average**
	2005	**2006**	**2007**	**2008**	**2009**	**2005-2009**
FL(east) and GA	138	108	123	111	119	120
FL(west)	36	18	34	21	13	24
NC	87	90	102	114	118	102
SC	47	48	53	49	47	49
Dealers						**Average**
	2005	**2006**	**2007**	**2008**	**2009**	**2005-2009**
FL(east) and GA	57	56	62	51	52	56
FL(west)	18	14	24	16	11	17
NC	39	45	47	51	50	46
SC	17	18	24	20	19	20
Trips						**Average**
	2005	**2006**	**2007**	**2008**	**2009**	**2005-2009**
FL(east) and GA	730	601	865	701	808	741
FL(west)	51	26	59	25	19	36
NC	954	962	1,045	1,001	1,041	1,001
SC	464	492	534	494	493	495
Total All States	2,199	2,081	2,503	2,221	2,361	2,273

Table P-2. Landings (gutted pounds), average annual ex-vessel prices, and ex-vessel revenues for gag, 2005-2009.

		Year Landed					Average 2005-2009
		2005	2006	2007	2008	2009	
State Landed:		125,743	115,501	185,408	126,514	121,066	134,846
FL (east coast) and GA	Pounds Gutted Weight						
	Deflated Price (2009 $) per Gutted Pound	3.82	4.13	4.22	4.28	4.29	4.15
	Deflated Ex-Vessel Revenue (2009 $)	399,567	400,699	775,527	490,663	478,048	508,901
FL (west coast)	Pounds Gutted Weight	1,068	1,006	3,593	499	320	1,297
	Deflated Price (2009 $) per Gutted Pound	3.41	3.63	3.96	3.91	3.94	3.77
	Deflated Ex-Vessel Revenue (2009 $)	3,646	3,652	14,245	1,951	1,261	4,951
NC	Pounds Gutted Weight	148,033	130,634	122,322	110,926	143,708	131,125
	Deflated Price (2009 $) per Gutted Pound	3.59	3.69	3.97	4.03	3.91	3.84
	Deflated Ex-Vessel Revenue (2009 $)	531,713	481,684	485,119	447,052	562,597	501,633
SC	Pounds Gutted Weight	183,257	173,208	204,511	148,845	116,502	165,265
	Deflated Price (2009 $) per Gutted Pound	4.34	4.57	4.89	4.94	4.89	4.73
	Deflated Ex-Vessel Revenue (2009 $)	795,140	791,156	1,000,489	735,146	569,992	778,385
All States Combined	Pounds Gutted Weight	458,100	420,350	515,834	386,784	381,597	432,533
	Deflated Price (2009 $) per Gutted Pound	3.82	4.02	4.25	4.31	4.25	4.13
	Deflated Ex-Vessel Revenue (2009 $)	1,730,068	1,677,191	2,275,380	1,674,812	1,611,898	1,793,870

Vermilion Snapper

Vermilion snapper landings are broadly distributed from North Carolina to Florida. From 2005 to 2009, vermilion snapper landings varied around the average value of 946,000 gutted pounds per year. Approximately 273 vessels landed Vermilion snapper, and effort averaged 2,355 trips per year. From 2005 to 2009, the ex-vessel price (2009 dollars) per gutted pound of vermilion snapper landings varied around an average value of $3.22. From 2005 to 2009, the ex-vessel revenues (2009 dollars) received for Vermilion snapper varied around an average value of $2.74 million.

Table P-3. Number of vessels, dealers, and trips landing vermilion snapper, by state, 2005-2009.

Vessels						**Average**
	2005	**2006**	**2007**	**2008**	**2009**	**2005-2009**
FL(east) and GA	85	74	78	100	80	83
FL(west)	27	22	18	28	12	21
NC	95	88	120	134	124	112
SC	52	53	65	60	54	57
Dealers						**Average**
	2005	**2006**	**2007**	**2008**	**2009**	**2005-2009**
FL(east) and GA	37	34	34	46	36	37
FL(west)	15	16	13	12	9	13
NC	39	42	55	62	50	50
SC	14	16	28	27	22	21
Trips						**Average**
	2005	**2006**	**2007**	**2008**	**2009**	**2005-2009**
FL(east) and GA	519	401	538	684	553	539
FL(west)	43	37	22	43	14	32
NC	979	999	1,255	1,445	1,010	1,138
SC	628	670	754	697	482	646
Total All States	2,169	2,107	2,569	2,869	2,059	2,355

Table P-4. Landings (gutted pounds), average annual ex-vessel prices, and ex-vessel revenues for vermilion snapper, 2005-2009.

		Year Landed					Average 2005-2009
		2005	2006	2007	2008	2009	
State Landed:							
FL (east coast) and GA	Pounds Gutted Weight	271,454	252,992	289,239	349,225	366,586	305,899
	Deflated Price (2009 $) per Gutted Pound	2.93	3.17	3.07	3.04	2.85	3.01
	Deflated Ex-Vessel Revenue (2009 $)	356,532	464,964	899,580	712,798	726,730	632,121
FL (west coast)	Pounds Gutted Weight	4,749	4,142	1,157	7,233	2,060	3,868
	Deflated Price (2009 $) per Gutted Pound	2.49	2.78	2.66	2.64	2.40	2.59
	Deflated Ex-Vessel Revenue (2009 $)	11,821	11,512	3,080	19,098	4,947	10,092
NC	Pounds Gutted Weight	379,732	288,384	470,654	511,701	315,164	393,127
	Deflated Price (2009 $) per Gutted Pound	3.14	3.26	3.34	3.27	3.17	3.24
	Deflated Ex-Vessel Revenue (2009 $)	1,191,447	940,005	1,571,930	1,671,595	999,030	1,274,801
SC	Pounds Gutted Weight	381,558	233,602	246,202	216,045	136,708	242,823
	Deflated Price (2009 $) per Gutted Pound	3.21	3.62	3.52	3.40	3.10	3.37
	Deflated Ex-Vessel Revenue (2009 $)	1,223,599	846,272	867,570	733,572	423,993	819,001
All States Combined	Pounds Gutted Weight	1,037,493	779,119	1,007,251	1,084,204	820,518	945,717
	Deflated Price (2009 $) per Gutted Pound	3.10	3.36	3.33	3.24	3.07	3.22
	Deflated Ex-Vessel Revenue (2009 $)	2,783,400	2,262,754	3,342,159	3,137,063	2,154,700	2,736,015

Black Sea Bass

Black sea bass are landed primarily off the coasts of North Carolina and South Carolina. Landings varied around an average of 417,000 gutted pounds over the period 2005-2009, peaking at 529,000 in 2009. Approximately 289 vessels landed black sea bass, and effort averaged 658 trap trips per year with an additional 1,449 trips per year made with other gear. From 2005 to 2009, the ex-vessel price (2009 dollars) per gutted pound of black sea bass peaked in 2007 at $2.87 ($2.44 per pound whole weight) and declined thereafter, averaging $2.62 ($2.20 per pound whole weight). From 2005 to 2009, the ex-vessel revenues (2009 dollars) received for black sea bass varied around an average value of $1.01 million, with higher prices in some years offset by lower landings.

Table P-5. Number of vessels, dealers, and trips landing black sea bass, by state, 2005-2009.

Vessels							**Average**
	Gear:	**2005**	**2006**	**2007**	**2008**	**2,009**	**2005-2009**
FL and GA	**Trap and Other**	82	51	60	60	88	68
NC	**Other**	100	99	129	134	136	120
	Trap	30	31	29	27	35	30
SC	**Other**	48	56	58	50	49	52
	Trap	15	16	21	20	21	19
Dealers							**Average**
		2005	**2006**	**2007**	**2008**	**2,009**	**2005-2009**
FL and GA		31	27	36	30	38	32
NC		56	70	80	76	68	70
SC		25	32	39	36	35	33
Trips							**Average**
	Gear:	**2005**	**2006**	**2007**	**2008**	**2,009**	**2005-2009**
FL and GA	**Trap and Other**	290	201	233	297	407	286
NC	**Other**	823	844	787	788	938	836
	Trap	454	632	430	377	488	476
SC	**Other**	383	390	356	335	346	362
	Trap	125	108	156	163	201	151
Total All States	**Other**	1,452	1,412	1,347	1,402	1,630	1,449
	Trap	603	763	615	558	750	658

Note: Florida (west) and Florida (east) were combined for confidentiality reasons.

Table P-6. Landings (gutted pounds), average annual ex-vessel prices, and ex-vessel revenues for black sea bass, 2005-2009.

		Year Landed					Average 2005-2009
		2005	2006	2007	2008	2009	
State Landed:		14,126	10,106	8,067	6,329	39,016	15,529
FL and GA	Pounds Gutted Weight						
	Deflated Price (2009 $) per Gutted Pound	2.08	2.47	2.41	2.18	2.13	2.25
	Deflated Price (2009 $) per Whole Pound	1.76	2.10	2.05	1.85	1.80	1.91
	Deflated Ex-Vessel Revenue (2009 $)	17,781	15,419	11,299	11,497	76,368	26,473
NC	Pounds Gutted Weight	274,451	356,339	229,358	232,388	330,887	284,685
	Deflated Price (2009 $) per Gutted Pound	2.50	2.77	3.09	2.80	2.69	2.77
	Deflated Price (2009 $) per Whole Pound	2.12	2.35	2.63	2.38	2.28	2.35
	Deflated Ex-Vessel Revenue (2009 $)	686,510	986,890	707,670	651,457	890,041	784,514
SC	Pounds Gutted Weight	101,561	79,505	109,556	132,860	159,218	116,540
	Deflated Price (2009 $) per Gutted Pound	2.15	2.47	2.53	2.28	2.54	2.39
	Deflated Price (2009 $) per Whole Pound	1.83	2.10	2.15	1.93	2.15	2.03
	Deflated Ex-Vessel Revenue (2009 $)	218,137	196,430	277,448	302,871	403,879	279,753
All States Combined	Pounds Gutted Weight	390,137	445,951	346,981	371,577	529,120	416,753
	Deflated Price (2009 $) per Gutted Pound	2.37	2.68	2.87	2.59	2.57	2.62
	Deflated Price (2009 $) per Whole Pound	2.01	2.27	2.44	2.19	2.18	2.22
	Deflated Ex-Vessel Revenue (2009 $)	922,441	1,198,738	996,422	965,825	1,370,290	1,090,739

Golden Tilefish

Golden tilefish are landed primarily on the east coast of Florida. Landings of this species varied around an average value of 305,000 pounds gutted weight per year from 2005 to 2009. On average over this period, 63 vessels landed golden tilefish, making 405 trips. Ex-vessel price per gutted pound varied around an average of $2.60 from 2005 to 2009. Ex-vessel revenues peaked in 2007 at $737,000 and declined to around $700,000 in 2009 due to somewhat lower ex-vessel prices.

Table P-7. Number of vessels, dealers, and trips landing golden tilefish, by state, 2005-2009.

Vessels							**Average**
	Gear:	**2005**	**2006**	**2007**	**2008**	**2009**	**2005-2009**
FL(east) and GA	Longline	8	7	14	11	10	10
	Other	33	29	35	31	28	31
FL(west)	Other	11	13	15	8	4	10
NC & SC	Longline and Other	15	17	8	9	7	12
Dealers							**Average**
	Gear:	**2005**	**2006**	**2007**	**2008**	**2009**	**2005-2009**
FL(east) and GA	Longline	3	4	7	8	9	6
	Other	19	15	20	18	17	18
FL(west)	Other	9	10	13	4	4	8
NC & SC	Longline and Other	12	14	6	9	7	10
Trips							**Average**
	Gear:	**2005**	**2006**	**2007**	**2008**	**2009**	**2005-2009**
FL(east) and GA	Longline	79	100	264	189	244	175
	Other	202	131	261	135	104	167
FL(west)	Other	25	26	43	9	6	22
NC & SC	Longline and Other	48	74	27	33	29	42
Total All States	Longline and Other	354	331	595	366	383	405

Note: Gears were combined in some circumstances to prevent confidentiality issues.

Table P-8. Landings (gutted pounds), average annual ex-vessel prices, and ex-vessel revenues for golden tilefish, 2005-2009.

		Year Landed					Average 2005-2009
		2005	2006	2007	2008	2009	
State Landed:		203,836	253,010	258,395	276,322	279,723	254,257
FL (east coast) and GA	**Pounds Gutted Weight**						
	Deflated Price (2009 $) per Gutted Pound	2.76	2.70	2.83	2.59	2.49	2.67
	Deflated Ex-Vessel Revenue (2009 $)	563,390	682,662	730,664	716,143	695,499	677,672
FL (west coast)	**Pounds Gutted Weight**	3,426	2,055	1,313	481	212	1,497
	Deflated Price (2009 $) per Gutted Pound	2.05	1.85	1.92	1.85	1.56	1.85
	Deflated Ex-Vessel Revenue (2009 $)	7,011	3,806	2,519	888	331	2,911
NC & SC	**Pounds Gutted Weight**	56,340	111,130	25,678	23,092	24,768	48,202
	Deflated Price (2009 $) per Gutted Pound	1.91	2.30	2.92	1.21	2.72	2.21
	Deflated Ex-Vessel Revenue (2009 $)	1,312	4,224	4,034	6,875	5,373	4,364
All States Combined	**Pounds Gutted Weight**	263,602	366,194	285,385	299,895	304,703	303,956
	Deflated Price (2009 $) per Gutted Pound	2.67	2.59	2.76	2.49	2.48	2.60
	Deflated Ex-Vessel Revenue (2009 $)	571,714	690,692	737,217	723,906	701,203	684,946

Snowy Grouper

Snowy grouper are landed throughout the South Atlantic region. Landings peaked in 2006 at 219,000 gutted pounds but decreased to 65,000 pounds by 2009, averaging 133,000 pounds from 2005 to 2009. On average, 152 vessels made a total of 985 trips per year landing snowy grouper. Ex-vessel price per gutted pound peaked in 2007 at $3.69 but decreased to $3.41 by 2009, averaging $3.42 from 2005 to 2009. Annual ex-vessel revenues peaked in 2006 at $714,000 but averaged $441,000 over the five-year period.

Table P-9. Number of vessels, dealers, and trips landing snowy grouper, by state, 2005-2009.

Vessels						**Average**
	2005	**2006**	**2007**	**2008**	**2009**	**2005-2009**
FL(east) and GA	53	36	46	46	39	44
FL(west)	46	35	38	29	28	35
NC	37	32	30	45	54	40
SC	31	32	35	35	32	33
Dealers						**Average**
	2005	**2006**	**2007**	**2008**	**2009**	**2005-2009**
FL(east) and GA	21	19	27	30	24	24
FL(west)	22	18	21	16	21	20
NC	21	22	18	26	24	22
SC	10	12	12	11	11	11
Trips						**Average**
	2005	**2006**	**2007**	**2008**	**2009**	**2005-2009**
FL(east) and GA	209	149	219	223	233	207
FL(west)	305	213	344	271	270	281
NC	292	268	340	311	349	312
SC	170	193	189	181	194	185
Total All States	976	823	1,092	986	1,046	985

Table P-10. Landings (gutted pounds), average annual ex-vessel prices, and ex-vessel revenues for snowy grouper, 2005-2009.

		Year Landed					Average 2005-2009
		2005	2006	2007	2008	2009	
State Landed:		24,091	14,729	14,581	12,121	12,603	15,625
FL (east coast) and GA	Pounds Gutted Weight						
	Deflated Price (2009 $) per Gutted Pound	3.40	3.58	3.61	3.78	3.75	3.62
	Deflated Ex-Vessel Revenue (2009 $)	75,153	46,659	53,092	44,629	45,296	52,966
FL (west coast)	Pounds Gutted Weight	43,818	46,761	39,639	21,026	18,597	33,968
	Deflated Price (2009 $) per Gutted Pound	2.96	3.08	3.49	3.12	2.85	3.10
	Deflated Ex-Vessel Revenue (2009 $)	129,734	143,844	138,354	65,519	53,046	106,099
NC	Pounds Gutted Weight	68,736	77,006	39,712	19,978	23,838	45,854
	Deflated Price (2009 $) per Gutted Pound	2.99	3.13	3.86	3.56	3.37	3.38
	Deflated Ex-Vessel Revenue (2009 $)	205,854	241,384	153,178	71,176	80,287	150,376
SC	Pounds Gutted Weight	72,954	80,739	10,783	11,687	10,006	37,234
	Deflated Price (2009 $) per Gutted Pound	3.38	3.49	3.85	4.08	3.90	3.74
	Deflated Ex-Vessel Revenue (2009 $)	246,388	281,955	41,465	47,675	39,070	131,311
All States Combined	Pounds Gutted Weight	209,599	219,235	104,716	64,813	65,044	132,681
	Deflated Price (2009 $) per Gutted Pound	3.13	3.27	3.69	3.58	3.41	3.42
	Deflated Ex-Vessel Revenue (2009 $)	657,129	713,842	386,089	228,999	217,698	440,751

Red Snapper

Red snapper are landed from North Carolina to Florida, with about 80% of landings occurring in Florida. After reaching a low of 73,000 pounds gutted weight in 2006, red snapper landings steadily increased by more than four-fold reaching 313,000 pounds in 2009. The number of vessels landing red snapper increased by 30% from 2006 to 2009, reaching 276 vessels in 2009, with steady increases in both North Carolina and Florida. The number of trips landing red snapper increased by 73% from 2006 to 2009, reaching 1,994 trips in 2009. Ex-vessel price per gutted pound (2009 dollars) remained relatively stable from 2005 to 2009, averaging $3.94. Ex-vessel revenues increased from a low of $262,000 in 2006 to a high of $1.1 million in 2009 reflecting increasing landings.

Table P-11. Number of vessels, dealers, and trips landing red snapper, by state, 2005-2009.

Vessels						**Average**
	2005	**2006**	**2007**	**2008**	**2009**	**2005-2009**
FL(east) and GA	108	88	96	100	126	104
FL(west)	16	18	14	16	16	16
NC	53	59	64	73	84	67
SC	44	46	57	45	50	48
Dealers						**Average**
	2005	**2006**	**2007**	**2008**	**2009**	**2005-2009**
FL(east) and GA	42	40	41	41	43	41
FL(west)	12	13	11	12	11	12
NC	27	28	27	35	39	31
SC	12	15	18	15	22	16
Trips						**Average**
	2005	**2006**	**2007**	**2008**	**2009**	**2005-2009**
FL(east) and GA	611	548	725	897	1,224	801
FL(west)	28	36	26	22	35	29
NC	264	215	204	336	392	282
SC	439	355	371	375	343	377
Total All States	1,342	1,154	1,326	1,630	1,994	1,489

Table P-12. Landings (gutted pounds), average annual ex-vessel prices, and ex-vessel revenues for red snapper, 2005-2009.

		Year Landed					Average 2005-2009
		2005	2006	2007	2008	2009	
State Landed:		62,566	45,821	69,899	185,542	280,267	128,819
FL (east coast) and GA	**Pounds Gutted Weight**						
	Deflated Price (2009 $) per Gutted Pound	3.65	3.93	4.00	4.04	3.96	3.92
	Deflated Ex-Vessel Revenue (2009 $)	187,838	153,497	278,970	557,847	995,552	434,741
FL (west coast)	**Pounds Gutted Weight**	1,776	3,380	707	804	3,278	1,989
	Deflated Price (2009 $) per Gutted Pound	3.49	3.62	3.83	3.84	3.84	3.72
	Deflated Ex-Vessel Revenue (2009 $)	6,193	12,242	2,708	3,087	12,574	7,361
NC	**Pounds Gutted Weight**	6,632	5,363	4,098	7,379	9,259	6,546
	Deflated Price (2009 $) per Gutted Pound	3.59	3.69	3.67	3.85	3.83	3.73
	Deflated Ex-Vessel Revenue (2009 $)	23,784	19,798	15,033	28,405	35,471	24,498
SC	**Pounds Gutted Weight**	34,512	18,294	23,351	19,704	19,796	23,131
	Deflated Price (2009 $) per Gutted Pound	3.76	4.16	4.23	4.37	4.37	4.18
	Deflated Ex-Vessel Revenue (2009 $)	129,900	76,109	98,821	86,202	86,431	95,493
All States Combined	**Pounds Gutted Weight**	105,486	72,858	98,054	213,429	312,600	160,485
	Deflated Price (2009 $) per Gutted Pound	3.67	3.95	4.01	4.08	4.00	3.94
	Deflated Ex-Vessel Revenue (2009 $)	347,715	261,647	395,531	675,541	1,130,028	562,092

Appendix O

Species groupings for management of the South Atlantic Fishery Management Council Snapper-Grouper Fishery Management Unit

Nicholas A. Farmer[1], Nikhil K. Mehta[1], Marcel J.M. Reichert[2], Jessica A. Stephen[2]

[1]NOAA Fisheries Service
Southeast Regional Office
263 13th Avenue South
Saint Petersburg, Florida 33701

[2]South Carolina Department of Natural Resources
217 Fort Johnson Rd.
Charleston, SC 29412

Corresponding Author: N.A. Farmer (Nick.Farmer@noaa.gov)

Abstract

The Magnuson-Stevens Reauthorization Act of 2006 requires regional fishery management councils to implement annual catch limits and accountability measures for all stocks under Federal management by 2011, to ensure overfishing does not occur. Many species are data-limited and have no formal stock assessment. One possible approach to managing these unassessed species is to assign them to assemblages that would be managed as units. The utility of this approach was evaluated using fishery-dependent and fishery-independent data from the United States southern Atlantic Ocean. Multivariate statistical analyses revealed several consistent assemblages among the members of the South Atlantic Fishery Management Council's Snapper-Grouper Fishery Management Unit. Identified stock complexes and sub-complexes may be useful for fisheries management, as a management measure implemented for any member of a complex might be expected to result in a similar trajectory of fishing mortality rate (F) for other members of the complex. Productivity-Susceptibility Analysis and life history were also considered, as differences in productivity, vulnerability, life history, and other population dynamic parameters for species within complexes might imply different population responses to a similar change in F. Identified linkages between species also provide guidance for ecosystem-based management considerations such as the impacts of regulations upon multi-species fisheries.

Introduction

The Magnuson-Stevens Reauthorization Act (MSRA 2006) requires regional fishery management councils to implement annual catch limits (ACLs) and accountability measures (AMs) to ensure overfishing does not occur. ACLs and AMs are required for all stocks under federal management, except stocks with annual life cycles and those managed by international

agreement in which the United States participates. These ACL/AM provisions must be implemented in 2010 or earlier for stocks subject to overfishing, and in 2011 or earlier for all other federally-managed stocks. The South Atlantic Fisheries Management Council (SAFMC) currently manages 73 finfish species under its Snapper-Grouper Fishery Management Plan (FMP). Formally establishing ACLs for many of these species will be accomplished via the SAFMC's Comprehensive ACL Amendment. In June 2010, the SAFMC selected preferred alternatives whereby species with greater than 80% of landings in state waters and species covered by the State of Florida Marine Life Rule were removed from the Fishery Management Unit (FMU). Species with average annual landings (2005-2008) of less than 10,000 lbs whole weight were designated as "Ecosystem Component Species." In December 2010, the SAFMC selected preferred alternatives whereby species with greater than 80% of landings in state waters, species covered by the Florida Marine Life Rule, and species with average annual landings (2005-2008) of less than 20,000 lbs whole weight were removed from the FMU, with the exception of Nassau grouper, goliath grouper, wreckfish, warsaw grouper, speckled hind, cubera snapper, and lesser amberjack. These actions reduced the number of Snapper-Grouper FMU species requiring an ACL to 38. Management measures are traditionally implemented based upon species-specific stock assessment results. However, only 12 of these 38 species will have been assessed through a formal Southeast Data Assessment and Review (SEDAR) stock assessment by 2011 (e.g., black sea bass, gag, red porgy, red snapper, vermilion snapper, tilefish, snowy grouper, greater amberjack, black grouper, red grouper, goliath grouper, and yellowtail snapper).

One possible approach for developing ACLs for unassessed species would be to assign them to assemblages that would be managed as units. The NOAA Fisheries Service ACL Final Rule states that "…the vulnerability of stocks to the fishery should be evaluated when determining if a particular stock complex should be established or reorganized, or if a particular stock should be included in a complex" (50 CFR 600.310(b)(8) in 74 FR 3205). National Standard 3 for fishery conservation and management (MSRA §301) states that "to the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination." A stock complex, as defined by the recently amended National Standard 1 guidance, is "a group of stocks that are sufficiently similar in geographic distribution, life history, and vulnerabilities to the fishery such that the impact of management actions on the stocks is similar" (74 FR 3178). Stocks may be grouped into complexes if: 1) they cannot be targeted independently of one another in a multispecies fishery; 2) there is not sufficient data to measure their status relative to established status determination criteria; or 3) when it is not feasible for fishermen to distinguish individual stocks among their catch (50 CFR 600.310(b)(8) in 74 FR 3178). A management unit is defined as "a fishery or that portion of a fishery identified in a FMP as relevant to the FMP's management objectives" (50 CFR 600.320(d)). Management units may be organized based on biological, geographic, economic, technical, social, or ecological considerations (50 CFR 600.320(d)(1)).

The objectives of this paper are twofold: (1) To determine whether species assemblages can be identified in the U.S. southern Atlantic Ocean among Snapper-Grouper FMP species, and (2) To determine if these assemblages are consistent between commercial and recreational fisheries.

The results of these analyses should provide guidance for the SAFMC in setting ACLs for reef fish species in the Comprehensive ACL Amendment. Analyses were conducted on the 35 species requiring an ACL under the SAFMC June 2010 preferred alternatives, but suggested groupings for additional species from the December 2010 preferred alternatives are discussed.

Methods

Commercial logbook, commercial observer, headboat logbook, recreational survey, and fishery-independent Marine Resources Monitoring, Assessment and Prediction (MARMAP) data were used to evaluate similarities in spatial and temporal patterns of fisheries exploitation in the southeastern U.S. Atlantic Ocean for species in the SAFMC Snapper-Grouper FMP requiring an ACL under the Council's June 2010 Preferred Alternative. Following Lee and Sampson (2000), multiple analytical approaches were used to identify species assemblages: (1) species life history and depth of occurrence, (2) percent records by dataset, (3) dimension reduction and hierarchical cluster analyses based on life history; abundance; and presence-absence, (4) weighted mean cluster association indices, and (5) maps of species distributions. The results of the dimension reduction and hierarchical cluster analyses were synthesized across analyses using a weighted mean cluster association index to develop potential species complexes for ACL management sufficiently similar in geographic distribution, life history, and vulnerabilities to the fishery such that the impact of management actions on the stocks would be similar.

Life History

Life history parameters were assembled from peer-reviewed literature (see Appendices), SEDAR reports, NOAA Fisheries Service Panama City Laboratory, Stock Assessment and Fishery Evaluation (SAFE) reports, and FishBase (Froese & Pauly 2009). Data from the U.S. south Atlantic was used whenever possible. Depth of occurrence records were assimilated from FishBase (Froese & Pauly 2009), with minimum and maximum depths of occurrence recorded. Pearson correlation was used to examine correlations amongst parameters.

Hierarchical cluster analyses were conducted using PASW V17.0.3 (SPSS Inc., Chicago, Illinois). Hierarchical cluster analysis identifies relatively homogeneous groups of cases (or variables) based on selected characteristics. It is an agglomerative method which optimizes a route between individual entities to the entire set of entities through progressive fusion (Boesch 1977).

Life history parameters in Tables 1 and 2, plus a categorical variable denoting Genus, were clustered using Ward's minimum-variance linkage method (Sneath & Sokal 1973) with a Euclidean distance measure and a Z-score transformation by variable. Ward's minimum-variance linkage method minimizes within-group dispersion. This method agglomerates clusters when the increase in variance is less than it would be if either of the two clusters were joined with any other cluster (Sneath & Sokal 1973). Minimum-variance fusion is similar to average-linkage fusion, except that it minimizes a squared distance weighted by cluster size.

Minimum-variance linkage is a space-dilating strategy because penalty by squared-distance results in tighter clusters than average-linkage. An additional cluster was performed following this methodology but dropping the 'Genus' dummy variable from the analysis.

The Euclidean distance (*ED*) measure is the square root of the sum of the squared differences between two entities (*j* and *k*) based on *P* variables:

$$ED_{jk} = \sqrt{\sum_{i=1}^{P}(x_{ij} - x_{ik})^2} \quad (1)$$

The Z-score transformation normalized the data by parameter, facilitating comparisons between species.

Fishery Data

Through the SEFSC Logbook program (SEFSC Logbook, accessed 6 May 2010), commercial fishermen self-report landings on a trip level, providing species-specific landings (in lbs), primary gear used, and primary area and depth of capture. Analyses of commercial logbook data were restricted to 2005-2009, because depth of capture, reported from 2005 onward, is an important consideration when evaluating similarities in fisheries vulnerability. A single depth of fishing is reported in the commercial logbooks for each species per trip, although they may be encountered at numerous depths during multiple sets, and even within a single drifting longline set.

For the purposes of these analyses, commercial logbook landings were binned by species, year, month, geartype, statistical area, and depth of capture. Year and month were defined by the date the fish were landed. Vertical line (e.g., handline and electric rig) and longline geartypes were evaluated separately. Landings were aggregated by month to maximize the variety of species landed while still capturing temporal trends in abundance. Fishermen will typically make multiple sets on a trip, sometimes in geographically distant areas, targeting different species. Aggregating landings by area and depth reduced the probability of grouping species caught during the same time period that would likely not co-occur during any given set due to disparate geographic distributions. Area fished was based on reported 1° longitude by 1° latitude commercial logbook statistical areas. Depth of capture was aggregated into atmospheric pressure bins (e.g., 33 ft = 2 atm, 66 ft = 3 atm, etc.). Reporting of depth of capture has improved through time. Records with no reported depth or area of capture were removed from consideration; these represented approximately 6% of the total available records for both the longline and vertical line clusters. Overall, 2,047 commercial longline (CLL) and 136,005 commercial vertical line (CVL) logbook records from 2005-2009 were evaluated.

The CLL dataset suffers from potential bias because possession is limited to the recreational bag limit for species other than snowy grouper, warsaw grouper, yellowedge grouper, misty grouper, golden tilefish, blueline tilefish, and sand tilefish (50 CFR 622.41(6)). Both the CVL and CLL datasets also suffer from bias as the landings are expressed in weight rather than numbers;

thus cluster-weighting would be biased towards heavier species. As such, presence-absence clusters for the CVL and CLL datasets are probably more representative of stock assemblages than clusters weighted by catch.

In July 2006, NOAA Fisheries Service implemented a mandatory reef fish observer program (RFOP) to characterize the reef fish fishery operating in the U.S. Gulf of Mexico. The mandatory RFOP provides general fishery landing and bycatch characterization, estimates managed finfish discard levels; dispositions; and size distributions, and provides observations of protected species takes. In the southern U.S. Atlantic Ocean, the RFOP has been voluntary and primarily associated with special projects. As such, it suffers from spatial and sampling biases; however, it does provide accurate species identification at the gear set-level for species encountered using bottom longline, electric (bandit) reel, and handlines. Overall, 18,268 records representing encounters (e.g., landings plus discards) in numbers by species for 2,084 observed sets in the U.S. southern Atlantic Ocean from 2006-2009 were evaluated.

The recreational headboat sector of the reef fish fishery was evaluated using headboat survey (HBS) logbook data (Southeast Region Headboat Survey data, accessed 19 April 2010) reported by headboat operators. Headboats are large, for-hire vessels that typically accommodate 20 or more anglers on half- or full-day trips. HBS records are arranged similar to commercial logbook records, and contain trip-level information on number of anglers, trip duration, date, area fished, landings (number of fish), and releases (number of fish) of each species. Headboat landings and encounters (landings plus releases) were summarized by species, year, month, trip duration, and area fished. Trip duration was considered the best proxy for depth fished, as trips of longer duration are more likely to go farther offshore. Area fished was aggregated at the most common reporting level (1° latitude by 1° longitude). As with the commercial fishery data, area fished is self-reported and this introduces error into the analysis. Additionally, vessels fishing in multiple areas during a trip would be constrained by the current data form to select one area fished for the trip, which limits the spatial precision of the analysis. Records with no geographic area reported (~9%) were removed from consideration. Overall, 170,475 headboat records from 2004-2009 were evaluated.

The private, rental, and for-hire charter sectors were evaluated using data from the Marine Recreational Fisheries Statistics Survey (MRFSS) dockside intercept records. MRFSS intercepts collect data on port agent observed landings (‘A’ catch), angler reported landings (‘B1’ catch) and discards (‘B2’ catch). Data are reported in numbers by species, two-month wave (e.g., Wave 1 = Jan/Feb, … Wave 6 = Nov/Dec), area fished (inland, state, and federal waters), mode of fishing (charter, private/rental, shore), and state (east Florida, Georgia, South Carolina, and North Carolina). As designated ACLs will apply to catch from both state and federal waters, no areas fished were excluded from the analyses. MRFSS intercepts from the U.S. southern Atlantic Ocean from 2000-2009 were aggregated by state, year, wave, mode, and area fished; computing a catch-per-angler-per-trip (CPAT) by species for the whole catch (e.g., ‘A’+’B1’+’B2’ catch). Overall, 93,911 dockside intercept records from 2000-2009 were evaluated.

For over thirty years, the Marine Resources Research Institute at the South Carolina Department of Natural Resources, through the Marine Resources Monitoring, Assessment and Prediction (MARMAP) program, has conducted fisheries-independent research on groundfish, reef fish, ichthyoplankton, and coastal pelagic fishes within the region between Cape Lookout, North Carolina, and Ft. Pierce, Florida. The overall mission of the program has been to determine distribution, relative abundance, and critical habitat of economically and ecologically important fishes of the southeastern U.S., and to relate these features to environmental factors and exploitation activities. MARMAP survey work has provided a monitoring program that has allowed the standardized sampling of fish populations over time and development of an historical base for future comparisons of long-term trends. The gears (e.g., chevron trap, bottom longlines) and methodologies used have been consistent over the years to allow for long term analysis and comparisons. Historically, sampling effort for reef fish has been concentrated off South Carolina using various trap gears. MARMAP samples accurately identify fish to species and also collect valuable information on undersized fish. MARMAP data was aggregated by individual gear (i.e., a single trap, or a single line), at the set level. Overall, 25,304 records of managed reef fish landings from 1978-2009 were evaluated, comprised of 70% Chevron trap, 16% blackfish trap, 11% Florida Antillean trap, 2% short bottom long line, and 1% long bottom longline samples.

Each data set was formatted as a matrix, with columns representing species (*i*) and rows representing aggregation bins (*j*). Aggregation bins represented the highest resolution of data available for the dataset. For commercial fisheries, aggregation bins were *year-month-area-depth* combinations, resulting in 636 CLL bins (0 empty) and 9036 CVL (4 empty) bins. For the RFOP, aggregation bins were *set-level*, resulting in 2084 bins (0 empty). For headboat fisheries, aggregation bins were *year-month-area-trip duration* combinations, resulting in 2217 bins (2 empty). For MRFSS, aggregation bins were *year-wave-state-mode-area* combinations, resulting in 1384 bins (20 empty). For MARMAP, aggregation bins were *set-level*, resulting in 10,780 bins (2154 empty). Each element of the matrix (c_{ij}) quantified the amount (in units of pounds of fish for commercial and number of fish for all other sources) of a species (*i*) landed in a specific bin (*j*). Whenever possible (i.e., RFOP, HBS, and MRFSS), discards were included in the aggregated catch, as they provide valuable information when determining species associations.

Dimension reduction and hierarchical cluster analyses were performed upon the fishery datasets (i.e., CVL, CLL, RFOP, HBS, MRFSS, and MARMAP). Initially, species were excluded from analyses if they appeared in <1% of bins, following Shertzer and Williams (2008). This filtering criterion removed the following percentages of species from subsequent clustering: 13% CVL, 44% CLL, 25% RFOP, 6% HBS, 6% MRFSS, 42% MARMAP, 0% Life History. Rare species may distort inferred patterns (Koch 1987, Mueter and Norcross 2000). Qualitative examination suggested the inclusion of rare species did not impact inferred patterns in most cluster analyses; thus all species were included in the final analyses.

Dimension reduction was conducted using PROC VARCLUS in SAS V9.2 (SAS Institute Inc., Cary, NC). PROC VARCLUS is a dimension reduction tool that clusters variables with the greatest correlation and minimized correlations with other clusters. The algorithm used by PROC

VARCLUS is binary and divisive - all variables start in one cluster. A cluster is chosen for splitting and split into two clusters by performing an orthoblique rotation on the first two principal components. Each variable is assigned to the rotated component with which it has the higher squared correlation. The procedure is nonhierarchical; variables are iteratively reassigned to clusters to maximize the variance accounted for by the cluster components. Clusters are split until all variance is explained (i.e., 'proportion=1').

Prior to dimension reduction or hierarchical clustering, data were transformed with a root-root transformation to moderate the influence of abundant species upon the resultant clusters:

$$c_{ij}^{*} = \sqrt[4]{c_{ij}} \tag{2}$$

This transformation is recommended for density and biomass data (Field et al. 1982) and was applied in a similar clustering approach described by Shertzer and Williams (2008).

Hierarchical cluster analysis of root-root transformed fishery data proceeded as follows. After root-root transformation of landings in numbers or pounds, a matrix of dissimilarities between two species (*a*, *b*) was computed using a Chi-square (χ^2) measure of distance:

$$\chi^2 = \sqrt{\frac{\sum_{i=1}^{A}\left(a_i - E(a_i)\right)^2}{E(a_i)} + \frac{\sum_{i=1}^{B}\left(b_i - E(b_i)\right)^2}{E(b_i)}} \tag{3}$$

The Chi-square measure is based on the chi-square test of equality for two sets of frequencies, and is the default measure in PASW for count (e.g., abundance or landings) data. The magnitude of this dissimilarity measure depends on the total frequencies of the two cases or variables whose dissimilarity is computed. Expected values (*E*) are from the model of independence of species *a* and *b*. The resultant dissimilarity matrix was clustered using Ward's minimum-variance linkage method.

Because the fishing effort that generates the landings data does not represent a consistent sampling program, reported landings data might not be quantitatively comparable between collections. Additionally, many species are heavily targeted, whereas the catch of others is incidental. Boesch (1977) suggested a binary index (e.g., 'presence-absence') may be a more appropriate measure of similarity with fisheries-dependent data. A binary index also reduces distortions caused by super-abundant (headboat and commercial) and heavier (commercial) species. For analyses of presence-absence data, landings data matrices were converted to binary, where a '1' was assigned to positive data elements (c_{ij}) and data elements with no landings was assigned a '0'.

Dimension reduction of presence-absence matrices proceeded identically to dimension reduction of root-root transformed data. Presence-absence of species in the commercial longline, commercial vertical line, and headboat fisheries were hierarchically clustered using average linkage between groups with a Sørenson measure of dissimilarity:

$$D_{ih} = \sum_{j=1}^{J} \frac{\left|c'_{ij} - c'_{hj}\right|}{\left|c'_{ij} - c'_{hj}\right|} \quad (4)$$

where D_{ih} is the distance between species *i* and *h*, and *j* is the number of rows (bins). The Sørenson (e.g. 'Dice', 'Bray-Curtis', 'Czekanowski') measure is an index in which joint absences are excluded from consideration, and matches are weighted double. The Sørenson measure has been found more robust in ecological studies (Beals 1973, Field et al. 1982, Faith et al. 1987). It is commonly used in studies of fish assemblages (e.g., Mueter & Norcross 2000, Gomes et al. 2001, Williams and Ralston 2002, Shertzer & Williams 2008, Shertzer et al. 2009).

The average linkage clustering function specifies the distance between two clusters as the average distance between objects from the first cluster and objects from the second cluster. Averaging is performed over all pairs (x, y) of objects, where x is an object from the first cluster and y is an object from the second cluster. The average linkage function is expressed as follows:

$$D(X,Y) = \frac{1}{N_X * N_Y} \sum_{i=1}^{N_X} \sum_{j=1}^{N_Y} d(x_i, y_i); \quad (5)$$
$$x_i \in X, y_i \in Y$$

where *d(x, y)* is the distance between objects $x \in X$ and $y \in Y$; *X* and *Y* are two sets of objects (clusters), and N_X and N_Y are the numbers of objects in clusters *X* and *Y*, respectively. Average-link clustering is less sensitive to outliers than complete-link clustering, and less likely to form long chains than single-link clustering. This method is also known as the 'unweighted pair-group method using arithmetic averages' (UPGMA), and is widely used in ecology (see Boesch 1977, McGarigal et al. 2000). This method is a space-conserving strategy that introduces little distortion to the relationships expressed in the similarity matrix (Boesch 1977).
In total, two life history and 24 fishery-data clusters were generated. For the life history data, a Ward's cluster was performed with and without a dummy variable for genus (two clusters). For each of the five fishery-dependent datasets (e.g., CLL, CVL, RFOP, HBS, MRFSS) and the fishery-independent dataset (i.e., MARMAP), a dimension reduction and a Ward's cluster were generated on root-root transformed landings, and a dimension reduction and a UPGMA cluster were generated on presence-absence (5x4 + 1x4 = 24 clusters). Dendrograms were generated for each cluster, based upon the agglomeration schedule. The dendrogram is read from left to right, with vertical lines indicating joined clusters. The position of the line on the scale indicates the distance at which clusters are joined. In SPSS, observed distances are rescaled to fall into the range of 1 to 25; the ratio of the rescaled distances within the dendrogram is the same as the ratio of the original distances. In SAS, Proc TREE was used to plot the dimension reductions with the proportion of variability explained as the height variable. Species joined closer to the left of the dendrogram would be considered more associated.

Maps of Stock Distributions

The RFOP and MARMAP surveys provide spatially-explicit information regarding encounters with managed species in the U.S. southern Atlantic Ocean. These datasets were imported into ArcGIS (ESRI Inc., Redlands, CA) and displayed for presence-absence on bathymetric maps. Trends in species distributions were used to explain inconsistencies between cluster analyses and to evaluate the MSRA '[similar] geographic distribution' requirement for stock complexes.

Weighted Mean Cluster Association Index

A weighted mean cluster association (WMCA) index was developed to synthesize results across the two life history and 24 fishery-data clusters (see Appendices: Figures A1-A26). The goal of the method was to provide a quantitative measure of cluster association across multiple dendrograms. Figure 1 illustrates a hypothetical cluster and cluster association table. The cluster association matrix for each dendrogram was completed on a species by species basis. For a given species on row *r*, the association level (α) with species in column *c* was computed as:

$$\alpha_{r\to c} = \frac{1}{\sum \eta_r} \quad , \tag{6}$$

where η is the number of species lower than the species on row *r* on the branches of the dendrogram. For example, species D and E are both clustered to the left of species F on the same branch; thus $\alpha_{F\to D} = 0.5$ and $\alpha_{F\to E} = 0.5$ in the association matrix.

Unique cluster association matrices were assembled for each of the 24 fishery-data and 2 life history dendrograms (see Appendices and Figures 2-12). A weighted mean cluster association index matrix was computed from these cluster association matrices. For a given species on row *r*, the weighted mean association level ($\overline{\alpha_{r\to c}}$) with species in column *c* was computed as:

$$\overline{\alpha_{r\to c}} = \frac{\sum_{D=1}^{6}\left(\omega_D \sum_{m=1}^{4} \alpha_{Dm(r\to c)}\right)}{\sum_{D=1}^{6}\sum_{m=1}^{4} \omega_D}, \tag{7}$$

where D is the dataset under examination, m is the clustering method, and w_D is the weighting term for the dataset. Weighting terms were computed by dataset, and were based upon the proportional representation of species within bins, and were scaled to 1 as a proportion of the maximum representation of that species across the 7 datasets, with life history given the maximal default value of 1 (Table 5). For example, if a species appeared in 80% of bins in the CLL and 40% of bins in the other datasets, its weighting term would be 1.0 for life history, 0.8 for CLL (e.g., ω_{CLL}=1.0) and 0.4 for the other datasets. This weighted mean approach was employed for two reasons: (1) clusters are generally considered more reliable for species that frequently appear in the bins (Koch 1987, Mueter and Norcross 2000), and (2) management measures implemented in the future upon a species complex would be expected to have a higher proportional impact upon the sector that encounters the species most frequently. For example, the CLL encounters golden tilefish with a much higher frequency than the HBS; therefore, the placement of golden tilefish relative to the CLL dataset is functionally more

important to management than its placement relative to the HBS. Sensitivity runs were conducted on weighting factors where life history was removed, and where the highest bin value for fishery data was re-scaled to 1.0 (equal to life history). For example, if a species appeared in 80% of bins in the CLL and 40% of bins for the other datasets, its weighting terms would be 1.0 for CLL and 0.5 for the other datasets (see Appendices).

Finally, a table was generated to synthesize the results of all the analyses for ACL management of the SAFMC Snapper-Grouper FMU. All species requiring ACL management were listed down the rows, with the top 5 most associated species per the WMCA index listed in the columns. The species in the rows were then sorted to get each species as close to its most associated species. Next, the table was color-coded to denote groups with several associated species. Dashed lines were used to denote substantial life history differences between associated species. Vulnerabilities were expressed as 'Overall Risk Scores' from the MRAG Americas Productivity-Susceptibility Analyses (PSA) for the SAFMC Snapper-Grouper FMU (MRAG Americas 2009a,b). The PSA approach is based on the assumption that the overall risk of overfishing for a stock depends on: (1) the productivity of the unit, which will determine the rate at which the unit can sustain fishing pressure or recover from depletion or other impacts due to the fishery; and (2) the susceptibility of the unit to fishing activities. The PSA analysis essentially measures the relative risk or the vulnerability of the resource to the potential for fishery impacts (MRAG Americas 2009a,b).

Results

Life History Data

Table 1 provides life history parameters for managed SAFMC reef fish species. It should be noted that life history may be influenced by time (Shertzer et al. 2009), geography, habitat (Hoss & Engel 1996), exploitation (Hughes 1994), and climate (Holbrook et al. 1997); therefore these point estimates for species may not accurately express the life history dynamics of the unexploited population or of all stock subpopulations. Additionally, life history data may be less reliable for data-poor species, lending uncertainty to the resultant clusters.

Table 2 provides ranges for depth of occurrence (in ft) for managed species. For visualization purposes, species were placed into 'shallow', 'shallow/mid', 'mid', and 'deep' groups, based upon median depth of occurrence. Red grouper and gag grouper have a broader depth range of occurrence than most other groupers (Table 2). Banded rudderfish and almaco jack have a more constricted depth range than greater amberjack (Table 2). Red snapper, silk snapper, vermilion snapper, lane snapper, and gray triggerfish all occur in mid-to-deep water (Table 2). Blueline tilefish have a shallower range than golden tilefish (Table 2). The data in Tables 1 and 2 are clustered in Figure 2.

Not surprisingly, a hierarchical cluster analysis of the life history and depth of occurrence parameters in Tables 1 and 2 showed clustering by genus, depth of occurrence, and maximum

size (Figure 2). All of these variables are highly inter-correlated ($p < 0.05$). Additionally, von Bertalanffy growth parameters (l_∞, W_∞, a_λ, l_m, a_m) were significantly correlated ($p < 0.05$).

A cursory examination of Tables 1 and 2 and Figure 2 supports many general trends observed in fisheries. Species of the same genus often exhibit similar growth patterns. Larger organisms tend to live longer and grow more slowly (e.g., 'K-selected' species), as do organisms that live in deeper water. Many species live up to 25-30 years, and some live to be older than 50.

Fishery Data

In general, dimension reduction and hierarchical cluster analysis outputs should be considered more reliable for species that are more prevalent in the input data matrices (Table 3). For example, deep-water grouper, and tilefish were well-represented in the CLL matrix. The CVL, HBS, and MRFSS datasets contained records for many species in relatively high abundance (Table 4). The CLL most commonly encountered deep-water grouper and tilefish (Table 3). The CVL most commonly encountered shallow-water grouper, greater amberjack, and mid-depth snapper and triggerfish (Table 3). The RFOP most commonly encountered red porgy, vermilion snapper, and scamp (Table 3). The HBS and MRFSS most commonly encountered gray triggerfish, gag, black sea bass, vermilion snapper, and white grunt (Table 3). MARMAP survey most commonly encountered black sea bass, red porgy, and tomtate (Table 3). The broad representation of species in the CVL, HBS, and MRFSS are probably attributable to the high levels of effort and broad geographic coverage of their associated fisheries.

The MARMAP survey was the only fishery-independent dataset examined. Unfortunately, the biased spatial distribution of the sampling and the selectivity of the predominant gears led to proportionally low encounter rates with most managed Snapper-Grouper species (Tables 4-5). Only black sea bass, red porgy, tomtate, vermilion snapper, gray triggerfish, white grunt, knobbed porgy, and scamp were encountered in >5% of sets. However, MARMAP's set-level data also led to substantially more aggregated bins than any other dataset.

Commercial longline landings in excess of the bag limit for anything other than deep-water species (snowy grouper, warsaw grouper, yellowedge grouper, misty grouper, golden tilefish, blueline tilefish, and sand tilefish) are prohibited; therefore landings of other species are extremely rare. Due to this prohibition, the binary-transformed CLL data matrix cluster is presented in Figures 3-4; as presence-absence would be more meaningful than landings totals given this management restriction. Tight clusters appeared between three deep-water species (blueline tilefish, yellowedge grouper, and snowy grouper), three shallow-water snapper species (lane snapper, yellowtail snapper, and gray snapper), and two shallow-water grouper species (red grouper and black grouper).

As commercial data are logged in weight units rather than numbers, the CVL dataset clusters are presented in terms of presence-absence to reduce the skewing of the data towards heavier species. The CVL landings data matrices produced clusters (Figures 5-6) of two shallow-water grouper (red grouper and scamp), two mid-depth species (vermilion snapper and gray

triggerfish), two porgies and hinds (rock hind and jolthead porgy), two shallow-water snapper (gray snapper and yellowtail snapper), and two deep-water species (snowy grouper and blueline tilefish).

As a voluntary program, the U.S. southern Atlantic RFOP represents a spatially-biased, but high-resolution sub-sample of the CLL and CVL datasets (Figure 7). Clusters were apparent between white grunt and red grouper, between vermilion snapper and tomtate, and between red hind, yellowfin grouper, and rock hind. Additional clusters were apparent between red porgy and gray triggerfish, between scamp and speckled hind, and between snowy grouper, blueline tilefish, and sand tilefish.

Cluster analyses of landed catch (in numbers) reported to the SEFSC HBS (Figures 8-9) provided similar results to the CLL and CVL. Lane snapper and gray snapper again clustered together, along with black grouper and yellowtail snapper. White grunt, and jolthead porgy formed a cluster. Red hind and rock hind clustered together, as did almaco jack and greater amberjack. Vermilion snapper and gray triggerfish formed a distinct cluster, as did scamp and red porgy. Two deep-water species (blueline tilefish and snowy grouper) also formed a cluster.

Cluster analysis of species presence-absence in MRFSS-reported landings (Figures 10-11) identified several apparent groups. Apparent clusters were identified between five deep-water species (snowy grouper, blueline tilefish, golden tilefish, silk snapper, and yellowedge grouper), three jacks and one porgy (almaco jack, greater amberjack, banded rudderfish, and whitebone porgy), and three shallow-water snapper (yellowtail snapper, lane snapper, and gray snapper).

Cluster analysis of species presence-absence in the MARMAP survey identified a few apparent groups (Figure 12). Two jacks formed a cluster (greater amberjack and almaco jack), as did three deep-water species (blueline tilefish, snowy grouper, and yellowedge grouper). Finally, vermilion snapper and gray triggerfish again appeared in the same cluster.

Maps of Stock Distributions

Maps of the distribution of observed MARMAP and RFOP interactions with managed South Atlantic Snapper-Grouper species provided some insights into the outcomes of the cluster analyses described above, although these sources do not cover the entire range of all the species plotted. To reduce the complexity of these figures, they were broken out roughly according to life history (Table 1) and depth distributions (Table 2). As the images only show presence-absence, there is substantial overlap in distributions.

Figure 13A depicts the distribution of ‘deep-water’ stocks. Blueline tilefish and snowy grouper appear to have somewhat overlapping distributions, which periodically overlap with yellowedge grouper. Golden tilefish appears in somewhat deeper water in a relatively spatially restricted area, possibly due to availability of softer sediments. Silk snapper and warsaw grouper appear rare, but seem to overlap with snowy grouper where they occur. There is some hint of a latitudinal gradient in tilefish stocks, with golden tilefish off the GA/SC border, blueline tilefish

off northern SC, and sand tilefish off NC. Blueline tilefish are often landed off North Carolina and in the Florida Keys and golden tilefish are often landed off central Florida; however, these trends are not captured by the spatially-biased sampling the MARMAP or the RFOP (J. McGovern, pers. comm.).

Figure 13B depicts the distribution of many grunt, hind, and porgy stocks. Tomtate and white grunt, especially, appear ubiquitously distributed across depths out to the shelf break. Red hind and rock hind appear rare, but seem to have overlapping distributions. Knobbed porgy appears more commonly encountered along the shelf break. Tomtate were the most commonly observed species off Florida.

Figure 14A depicts the distribution of jack stocks (greater amberjack, almaco jack, and banded rudderfish), which were encountered somewhat ubiquitously, but were most common near the shelf break. The distributions of the jacks were overlapping, although greater amberjack appears to have a broader depth distribution than almaco jack or banded rudderfish.

Figure 14B depicts the distribution of 'mid-depth' stocks (gray triggerfish, red snapper, red porgy, and vermilion snapper). Of these, red porgy are more common northward; whereas red snapper are more common off northeast Florida and Georgia. Vermilion snapper appear to have distinct areas of high concentration, and these zones appear to overlap heavily with the other species. The distribution of gray triggerfish appears to extend somewhat further north than the other stocks.

Figure 15A depicts the distribution of 'shallow-water' grouper, sea bass, and hind stocks. Black sea bass is distinctly separated from the rest, with a distribution much further inshore. Red grouper is common off of Florida and North Carolina, but rare off Georgia and South Carolina. Yellowfin grouper is common along the shelf edge off North Carolina. Gag, scamp and speckled hind are common from Georgia northward, and their distributions overlap (Matheson and Huntsman 1984; Collins et al. 1987; Harris et al. 2002), although gag also occurs inshore, perhaps due to the well-documented ontogenetic migration of this species (Collins et al. 1987; Van Sant et al. 1994; McGovern et al. 1998; McGovern et al. 2005). An outlier for scamp appears well offshore and is probably misreported.

Figure 15B depicts the distribution of 'shallow-water' snapper stocks. These primarily southeastern Florida stocks are clearly not well-captured by the sampling of the RFOP and MARMAP.

Weighted Mean Cluster Association Index

The WCMA index (Table 6) provided a quantitative approach to synthesizing information contained in the 26 unique cluster analyses performed (see Appendix). The matrix is not symmetric; Table 6 is interpreted as the association of the species on the row with the species in the column. This matrix was used to determine the top five most associated species with each species requiring ACL management (Table 7). Stocks were then arranged by association

and vulnerability to provide ACL stock complex guidance. Among the 35 species analyzed, 13 major 'catch/life history' groups were identified, with some potential sub-groups due to differences in life history. Average association values between species placed into major 'catch/life history' groups ranged from 0.12-0.46 (mean = 0.24). The strongest overall association was observed between gray, lane, and yellowtail snapper. The weakest associations within a 'catch/life history' group were between greater amberjack, banded rudderfish, and almaco jack. The results presented in Table 7 are explored further in the Discussion.

Discussion

The MSRA requires fishery management plans to "…establish a mechanism for specifying annual catch limits…at a level such that overfishing does not occur in the fishery" (MSRA §303(a)(15)). Traditionally, a formal stock assessment, such as those conducted by the SEDAR process, will specify an overfishing limit (OFL) corresponding with yield at the maximum fishing mortality threshold (MFMT) or the fishing mortality rate that will allow the stock to rebuild by a target year ($F_{rebuild}$). Next, the Council's Scientific and Statistical Committee (SSC) sets an acceptable biological catch level (ABC) that cannot be set higher than OFL, as it accounts for scientific uncertainty in the estimate of OFL. Finally, an ACL is set by the Council. The ACL is the level of annual catch of the stock or stock complex that serves as the basis for invoking AMs. The ACL cannot be set higher than ABC, as it accounts for management uncertainty in ABC.

Under their preferred alternative from December 2010, the SAFMC will need to establish ACLs for 38 Snapper-Grouper stocks by 2011, 24 of which are unassessed. Setting stock-specific ACLs for many of these stocks may be unrealistic due to inadequate data to determine stock status relative to established status determination criteria (SDC). Many of these stocks are 'data-poor' and suffer from issues with species identification and/or extreme fluctuations in relative landings through time due to large year classes, rarity, inadequate data collection procedures, or lack of targeted fishing effort. Thus, specifying a single-species ACL based on average catch for these stocks might result in periodic overages that would require AM implementation, creating additional burdens on science and enforcement. Grouping unassessed stocks into complexes may help avoid implementing AMs for species whose landings fluctuate due to rarity or species identification issues. It is important here to distinguish rarity from depleted status due to historical overharvesting; an overharvested stock would require more focused management.

The primary goal of a stock complex in the context of the SAFMC Comprehensive ACL Amendment is to determine how to best aggregate stocks in order to establish an ACL. Unfortunately, many stocks are rarely caught due to rarity or lack of targeting. Their rarity presents statistical challenges for clustering approaches; however, an approach towards grouping them seems necessary, as these stocks will likely never have sufficient data to determine stock status. National Standard 1 recommends species complexes that are "…sufficiently similar in geographic distribution, life history, and vulnerabilities to the fishery such that the impact of management actions on the stocks is similar." Although this paper fully evaluated and demonstrated the feasibility of grouping species into complexes based on catch,

life history, geographic distribution, vulnerability, and fishery-independent data, it did not fully evaluate the trajectories of stocks and stock complexes in response to management actions. Traditionally, this approach would be accomplished by evaluating indices of abundance for similar trends in catch-per-unit effort (CPUE) in response to management actions. A simple approach to ACL management incorporating these CPUE trends would designate assessed stocks as indicators for unassessed stocks.

Indicator species have been used in management of both terrestrial and marine systems (Simberloff 1998, Zacharias & Roff 2001). The National Standard Guidelines of U.S. Federal fishery management state that "MSY may be specified on the basis of one or more species as an indicator for the mixed stock as a whole or for the fishery as a whole" (50 CFR 600.310(c)(1)(iii). An implicit assumption of the use of an indicator species for management is that population trends of the indicator species reflect those of others in the assemblage. As such, assemblages should account for interspecies similarities in the context of biological characteristics, fisheries exploitation patterns, and stock dynamics. Biological assemblages may be defined by similarities in life history, trophic behavior, and geographic distribution. For fisheries management purposes, species that are caught together should be grouped, so that regulations similarly influence all assemblage members.

For an assessed stock to be an appropriate indicator stock for a stock complex, assessed stocks and unassessed stocks in the complex should show similar trends in population abundance in response to environmental forcing, fishing pressure, and fisheries management regulations. Unfortunately, it is extremely difficult to separate out these signals, and would require a formal process analogous to SEDAR. Fishery-independent data is preferable for inferring patterns of biodiversity and trends in population abundance (e.g., Jay 1996, Collie et al. 2008), but is extremely limited for the majority of the stocks managed by the SAFMC. The MARMAP program is well-designed to sample certain stocks but is not intended to provide representative sampling for all members of the Snapper-Grouper FMU. Indeed, gear selectivities and other sampling design attributes make it a poor representative for many species. Using fishery-dependent data as a proxy for trends in population abundance introduces several layers of bias (e.g. gear, spatial, temporal, depth) into any evaluation of indices of abundance. These biases might generate spurious correlations that would be difficult to separate out from actual population trends.

In a resource-limited environment, niche theory (May & MacArthur 1972, Landres et al. 1988, Leibold 1995) predicts that coexisting species would differ in their life history (e.g., reproductive dynamics, foraging behavior, habitat requirements) and population dynamics (e.g., responses to competition, predation, disease, and environmental variation). If these differences are substantial enough, population trends for one stock may not coincide with others in the complex (e.g, Niemi et al. 1997, Shaul et al. 2007, Shertzer & Williams 2008). The use of indicator species is not recommended unless supported by strong evidence that it represents the assemblage as a whole (Landres et al. 1988, Niemi et al. 1997). Even closely related species may have dissimilarities in their population structures and dispersal patterns that lead to different responses to exploitation (Bird et al. 2007). The use of indicator species in the SAFMC

Snapper-Grouper FMU is not supported by this paper, as concerns remain that using an assessed stock as an indicator may not facilitate detection of changes in the status of less abundant or less studied species, and may not prevent overfishing of more vulnerable stocks in the complex (Brown & Parrack 1985, Fahrig 1993, Shertzer & Williams 2008).
In the absence of a fully-resolved analysis of indices of abundance that adequately controls for confounding variability introduced by environmental forcing, fishing pressure, and fisheries management regulations, a comprehensive understanding of co-occurrence in the catch across sectors is critical to simplify ACL/AM management. This paper heavily emphasizes the use of fishery-dependent data, which may be preferable, as fishery-dependent data best captures the actual trends of concurrent exploitation of various stocks. A myriad of statistical approaches were used in this study to evaluate exploitation patterns across many sectors of the Snapper-Grouper fishery. Overall, a relatively consistent story emerged regarding what stocks might be impacted by similar management measures. By considering some fishery and ecosystem variables such as life history, vulnerability, sector, gear, area, and depth fished, these analyses provide insights that may facilitate multispecies or ecosystem-based management.

Stock complexes for ACL/AM management "may be comprised of: (1) one or more indicator stocks, each of which has SDC and ACLs, and several other stocks; (2) several stocks without an indicator stock, with SDC and an ACL for the complex as a whole; or (3) one of more indicator stocks, each of which has SDC and management objectives, with an ACL for the complex as a whole…" (50 CFR 600.310(b)(8) in 74 FR 3205). In the absence of sufficient analyses to support the use of indicator species, it is important to note that setting an ACL for a stock complex containing a highly productive, targeted species might expose more vulnerable species to overfishing. A multi-faceted approach to ACL management might mitigate this risk. In this multi-faceted approach, managers would: (1) set species-specific ACLs for productive stocks; (2) set sub-complex ACLs for sub-complexes of related, less productive stocks; and (3) set complex ACLs that aggregate the single-species and sub-complex ACLs. This approach provides multiple handles of control in the AMs, reducing the risk of overfishing of all species in the complex. If the single-species ACLs (e.g., '1') were slightly exceeded, AMs would be implemented for that stock without necessarily impacting the stocks in the sub-complex (e.g., '2'), allowing the fishery to obtain optimum yield (OY) for the productive stock. Most productive stocks in the SAFMC Snapper-Grouper FMU have OY recommendations from a stock assessment. If the sub-complex ACLs (e.g., '2') were exceeded, AMs would be implemented for the sub-complex without necessarily impacting the most productive stock (e.g., '1'). Finally, if the ACL for the targeted stock (e.g., '1') were grossly exceeded, the complex ACL (e.g., '3') might also be exceeded, resulting in implementation of AMs for the whole complex.

The proposed multi-faceted ACL management approach promotes attaining OY for the productive stocks while providing two mechanisms to prevent overfishing of the less productive—often more vulnerable—stocks. The use of an ACL for an overall complex containing one or more productive stocks plus other less productive stocks from the sub-complex helps protect the sub-complex stocks from overfishing because even if their sub-complex ACL is not exceeded according to the existent data collection program, undetected

overfishing of these stocks may be taking place during overharvesting of a productive stock that is often incidentally or directly harvested.

A simpler approach would be to manage targeted stocks with separate ACLs (e.g., '1') and manage indirectly-harvested stocks with complex ACLs (e.g., similar to '2'). This approach promotes achievement of OY for productive stocks while still setting a relatively lower ACL threshold for less targeted stocks to reduce risk of overfishing. Aggregation of unassessed stocks that are caught together does not expose these stocks to an increased risk of overfishing provided fishermen do not increasingly target any one stock in the complex. If this emerges as a concern, it could be addressed through an assessment and subsequent designation of a species-specific ACL for the stock. Grouping less productive, more vulnerable, and/or data-poor stocks into sub-complexes provides numerous benefits: (1) helps mitigate uncertainty in individual landings histories, (2) mitigates issues with species identification, (3) provides buffers against the unnecessary implementation of AMs, and (4) simplifies ACL management through reduced burdens on quota monitoring and enforcement. In this study, vulnerabilities were expressed using MRAG Americas (2010) PSA 'Overall Risk' scores. As a general suggestion, species with very different 'Overall Risk' scores should not be placed into a complex together, as the more vulnerable species may be far more susceptible to overfishing under the same management regime.

Of the cluster analysis input variables, depth appeared the most important, with apparent shallow-water, mid-depth, and deep-water assemblages frequently appearing in most analyses. A similar approach by Bortone et al. (1979) also found community association was influenced predominantly by depth, and to a lesser extent by substrate, latitude, and season. Species composition varied by dataset. Headboats are less likely to catch deep-water stocks because deep-water stocks are farther offshore and not often targeted by limited duration headboat trips. Commercial bottom longliners are less likely to catch non-deep-water stocks because reef fish longline fishing is prohibited within 50 fathoms and possession is limited to recreational bag limit for species other than snowy grouper, warsaw grouper, yellowedge grouper, misty grouper, golden tilefish, blueline tilefish, and sand tilefish (50 CFR 622.41(6)). Genus and life history were also important factors in the clustering; for example, snappers and groupers were often separated. This is possibly due to differences in vulnerability to gears and fishing methods as well as differences in geographic and depth distributions.

A latitudinal gradient in stock distribution was an underlying factor in the cluster analyses as well, with biogeographic boundaries near Cape Canaveral, Florida and Cape Hatteras, North Carolina (Wells and Gray 1959, Shertzer and Williams 2008, Shertzer et al. 2009). The influence of this gradient was profound when examining the 73 members of the Snapper-Grouper FMU, but was less influential when the analyses were restricted to 35 species requiring an ACL (SAFMC June 2010 Preferred Alternatives). Of these, 31 were likely to be reported in the commercial vertical line dataset (e.g., excluding black seabass, goliath grouper, Nassau grouper, and wreckfish). All of these 31 species were encountered south of Hatteras and south of Canaveral; however, only 22 were encountered north of Hatteras. No landings were reported for banded rudderfish, bar jack, gray snapper, lane snapper, sand tilefish, tomtate, warsaw

grouper, and whitebone porgy north of Hatteras. Higher resolution in the cluster analyses might have been obtained by separating out this biogeographic region, but it is unclear how this biogeographic stratification would then be applied for ACL/AM management.
Although many of the cluster analyses were based upon susceptibilities to selective fishing gear, the major controlling factors included season, area, and depth; thus, some aspects of life history were *de facto* included in the analyses. The weighted mean cluster association matrix provided a unique way to quantitatively combine the results from disparate cluster analyses from different datasets. Weighting terms for fishery-dependent data were based upon percent occurrence in data matrix bins. A variety of relative weighting terms for the life history clusters were explored, effectively placing more or less emphasis upon life history similarities in the resultant association matrices. In general, the outcomes were robust to these sensitivity analyses. Of the 38 Snapper-Grouper species requiring an ACL per the SAFMC December 2010 Preferred Alternative, 32 were analyzed by this study. Groupings for the remaining species (i.e., lesser amberjack, blue runner, Atlantic spadefish, hogfish, mutton snapper, and cubera snapper) are suggested based upon life history.

The variety of statistical analyses explored mostly supported a 'deep-water grouper' assemblage of yellowedge grouper, snowy grouper, and warsaw grouper (Table 7). Due to their distance from shore and the specialized gears required to capture these 'deep-water' stocks, there was a low relative percentage of encounters of these species in all datasets save commercial longline (Table 3). There was substantial clustering and geographic overlap between these stocks and managed tilefish species (Table 7, Figure 13A). It should be noted that yellowedge grouper is extremely long-lived and highly productive relative to the other members of this complex (Table 3), although its life history is similar (Figure 2). Warsaw grouper is the most vulnerable member of this complex, and was most highly associated with snowy grouper (Table 7).

The high levels of association between tilefish and 'deep-water' groupers suggested management regulations upon stocks in either assemblage might impact stocks in the other (Table 7). The weighted mean cluster association index matrix suggested moderate levels of association between all the tilefish species (Table 7). Golden tilefish occurs at similar depths as yellowedge grouper and is occasionally caught on the same set, but is less structure-affiliated than the grouper, preferring soft bottom habitats on the upper continental slope (Harris et al. 2001, Sedberry et al. 2006). Blueline tilefish frequently clustered with snowy grouper, along with other 'deep-water' stocks (Table 7). Blueline tilefish are distributed further inshore along the shelf than the other 'deep-water' tilefish (Figure 13A). Blueline tilefish prefers irregular, rocky bottom from the outer shelf edge to the upper slope (Struhsaker 1969, Ross 1978, Ross and Huntsman 1982, Parker and Mays 1998). Silk snapper and wreckfish also associated with deep-water grouper and tilefish. Life history and vulnerability differences between these associated species may necessitate the management of several complexes or subcomplexes. Overall, identified deep-water grouper and tilefish complexes were consistent with results presented by Shertzer and Williams (2008).

The three managed jack species (e.g., greater amberjack, banded rudderfish, and almaco jack), were most frequently encountered by the HBS and CVL sectors (Table 3). In the HBS, almaco jack and greater amberjack clustered tightly with each other (Figures 8-9). In the CVL, no strong associations between jacks were observed (Figures 5-6). Data from trained observers in the RFOP suggested some association between banded rudderfish and almaco jack (Figure 7). A cluster of the MRFSS data suggested associations between all the jack species (Figure 10-11). Table 6 suggests moderate levels of cluster association between the jack species. SEDAR 15 (2009) concluded that almaco jack were correctly identified in most instances, but smaller greater amberjack and banded rudderfish were often misidentified. Issues with misidentification might lead to issues computing single-species ACLs for these species unless the rate of misidentification is quantifiable or has been (and remains) constant through time. The use of a 'Jacks' complex would mitigate issues with species identification by regulating misidentified species together. These findings are reasonably consistent with Shertzer and Williams (2008); using hierarchical cluster analysis, they identified a complex including banded rudderfish and almaco jack in the HBS, and greater amberjack and almaco jack in the commercial sector. Lesser amberjack, which was added to the list of species requiring an ACL in December 2010, would fit well into the banded rudderfish and almaco jack complex. Atlantic spadefish and blue runner are probably best-suited to individual management, given the unique angling techniques to pursue these stocks.

Although there was some overlap with some of the more broadly distributed 'shallow-water' grouper species such as gag and scamp, several species occurring at moderate depths (e.g., 'mid-depth') were highly associated, including gray triggerfish, red porgy, vermilion and red snapper (Table 7). These species were most consistently encountered in the HBS data (Table 3). Nearly all clusters indicated a strong association between gray triggerfish and vermilion snapper. Although gray triggerfish clustered with 'mid-depth' snapper species, it may be desirable to manage it separately due to differences in life history (Table 1). As all of these species except gray triggerfish have been assessed, it may be desirable to manage them individually. Shertzer and Williams (2008) identified clusters in both sectors using both *k*-medioids and hierarchical clustering methods that included black sea bass, gag, gray triggerfish, red porgy, red snapper, scamp, vermilion snapper, and white grunt. Anecdotal evidence suggests that gray triggerfish and red snapper tend to occur on reef habitats, vermilion snapper tend to occur higher in the water column above reef habitats, and red porgy tend to occur slightly off the reef and are highly aggressive (J. McGovern, pers. comm.).

Our analyses partially supported two 'shallow-water grouper' complexes; one comprised of red grouper, gag, and scamp, and a second comprised of yellowfin grouper and speckled hind (Table 7). All of these species were most commonly encountered by the HBS. Scamp clustered most strongly with red porgy in the HBS and MRFSS (Figure 8, 10-11). Given that red grouper and gag both have recent assessments, it may be desirable to manage them individually. Given the relatively poor association between these 'shallow-water grouper' complexes, it may be desirable to manage all these species individually, if possible. Shertzer and Williams (2008) found high similarity between gag and red snapper in the HBS, and between red grouper and white grunt in the commercial sector.

The weighted mean cluster association index method showed a fair level of association between several grunt, hind, and porgy species (Table 7). The majority of these species were most common in either the HBS or MRFSS data matrices. Within the HBS, red hind and rock hind clustered tightly, as did jolthead porgy and white grunt, and tomtate and white porgy (Figure 8). These species are most likely incidentally caught by recreational fishermen in pursuit of larger species, particularly red grouper. These results were relatively inconsistent with the results of Shertzer and Williams (2008), probably due to both differences in the data sets used and the relative weakness of the associations between these non-targeted stocks.

The clustering for 'shallow-water' snappers (e.g., gray, lane, and yellowtail snapper) was very tight (Table 7). In the U.S. southern Atlantic Ocean, these stocks are primarily distributed in Southeast Florida. All were most common in the HBS and MRFSS data matrices, but clustered tight for nearly all datasets. The gray snapper has a substantial fishery in Florida state waters, especially in the Florida Keys. Yellowtail snapper are more likely than gray and lane snapper to take bait at the surface; they may be a good candidate for a species-specific ACL. Shertzer and Williams (2008) also identified clusters in both sectors that included gray snapper, lane snapper, and yellowtail snapper. Based on their life history and fishery patterns (SERO-LAPP-2009-03), mutton snapper and cubera snapper would fit well within the 'shallow-water snapper' complex. Hogfish are predominantly targeted by spearfishers, and as such would be most effectively managed under an individual ACL.

ACL management using stock complexes may be the best management option when formal stock assessments are unavailable, and the data requirements (e.g., stable catch for several years, reliable estimate of natural mortality) of other methods such as Depletion-Adjusted Average Catch (MacCall 2007) are not met. Using stock complexes for ACL/AM management reduces management burden for quota monitoring, and may help mitigate the impacts of uncertainty in landings data or species identification by pooling data-poor species. Additionally, the unnecessary implementation of AMs may be avoided by setting ACLs for complexes rather than rarely-encountered single species.

Although ecosystem-based or single-species ACLs may be desirable for many species, stock complexes may provide a temporary solution for setting ACLs for species lacking stock assessments. In establishing stock complexes, managers should consider the geographic and depth distribution of species, life history characteristics, exploitation patterns, and vulnerabilities. Managers could then adapt their management strategies as new information and understanding of species linkages and complexes arises. This will allow for proactive management that accounts for ecosystem-based management considerations such as temporal fluctuations in stock abundance due to environmental forcing or multispecies interactions, as well as comprehensive assessments of the impacts of regulations on associated species. For this approach to succeed, data collection will need to be targeted at gaining a high-resolution map of the biogeographic distribution of fish stocks and the spatial distribution of fishing effort, as well as improved estimation of life history parameters and trophic linkages between species. This approach is especially relevant given that community structure may change through time

(Shertzer et al. 2009) due to heavy exploitation (Hughes 1994, McClenachan 2009), invasive species (Albins & Hixon 2008), habitat degradation (Hoss & Engel 1996, Anderson et al. 2008), and climate change (Holbrook et al. 1997, Attrill & Power 2002, Genner et al. 2004, Perry et al. 2005, Collie et al. 2008). Similarly, the structure of stock complexes may change through time if the fishery begins operating more heavily in different areas, using different gears, or targeting different species.

Acknowledgements

The authors are grateful for comments from A. Strelcheck, J. Walter III, J. Quinlan, C. Porch, S. Calay, R. Malinowski, J. McGovern, S. Branstetter, J. Kimmel, C. Simmons, L. Barbieri, and S. Atran. We are also grateful to K. Shertzer and E. Williams, who provided input and suggestions on clustering methods. These analyses would not have been possible without the greatly appreciated efforts of the commercial fishermen and headboat operators who submitted logbook data, and the recreational anglers and charterboat captains participating in MRFSS. MARMAP and SC-DNR staff is thanked for their efforts in collecting and processing fishery independent information. We also thank the Southeast Fisheries Science Center's K. Brennan, K. McCarthy, S. Turner, V. Matter, J. Bennett, W. Ingram, and L. Scott-Denton for providing data used in this work.

Citations

Able, K.W., Twichell, D.C., Grimes, C.B., and R.S. Jones. 1987. Tilefishes of the genus *Caulolatilus* construct burrows on the seafloor. Bulletin of Marine Science, 40(1): 1-10.

Albins, M.A. and M.A. Hixon. 2008. Invasive Indo-Pacific lionfish *Pterois volitans* reduce recruitment of Atlantic coral-reef fishes. Marine Ecology Progress Series, 367: 233-238.

Anderson, D.M., Burkholder, J.M., Cochlan, W.P., Glibert, P.M., Gobler, C.J., Heil, C.A., Kudela, R.M., Parsons, M.L., Jack Rensel, J.E., Townsend, D.W., Trainer, V.L., and G.A. Vargo. 2008. Harmful algal blooms and eutrophication: Examining linkages from selected coastal regions of the United States. Harmful Algae, 8: 39–53.

Attrill, M.J. and M. Power. 2002. Climatic influence on a marine fish assemblage. Nature, 417: 275–278.

Beals, E. W. 1973. Mathematical elegance and ecological naiveté. Journal of Ecology, 61: 23–35.

Bjørnstad, O. N., R. A. Ims, and X. Lambin. 1999. Spatial population dynamics: analyzing patterns and processes of population synchrony. Trends in Ecology and Evolution, 14: 427–432.

Boesch, D.F. 1977. Application of numerical classification in ecological investigations of water pollution. Special Scientific Report No. 77, Virginia Institute of Marine Science, EPA-600/3-77-033.

Bortone, S.A., Shipp, R.L., Mayer, G.F., and J. L. Oglesby. 1979. Taxometric analysis of a demersal fish fauna. Ambio Special Report, No. 6, The Deep Sea: Ecology and Exploitation, pp. 83-85.

Brown, B. E. and M. Parrack. 1985. Status of the Atlantic bluefin tuna resource. *In*: Stroud, R.H. (Ed.), World angling resources and challenges, proceedings of the first world angling conference. International Game Fish Association, Fort Lauderdale, Florida, pp. 279-289.

Collie, J.S., Wood, A.D., and H.P. Jeffries. 2008. Long-term shifts in the species composition of a coastal fish community. Canadian Journal of Fisheries and Aquatic Sciences, 65: 1352–1365.

Collins, M.R., C.A. Waltz, W.A. Roumillat, and D.L. Stubbs. 1987. Contribution to the life history and reproductive biology of gag, *Mycteroperca phenax*, (Serranidae), in the South Atlantic Bight. Fisheries Bulletin. 85: 648-653.

Fahrig, L. 1993. Effect of fish movement and fleet spatial behaviour on management of fish substocks. Natural Resource Modeling 7: 37-56.

Faith, D. P., P. R. Minchin, and L. Belbin. 1987. Compositional dissimilarity as a robust measure of ecological distance. Plant Ecology, 69: 57–68.

Field, J. G., K. R. Clarke, and R. M. Warwick. 1982. A practical strategy for analysing multispecies distribution patterns. Marine Ecology Progress Series, 8: 37–52.

Froese, R. and D. Pauly. Editors. 2009. FishBase. World Wide Web electronic publication. www.fishbase.org, version (10/2009).

Genner, M.J., Sims, D.W., Wearmouth, V.J., Southall, E.J., Southward, A.J., Henderson, P.A., and S.J. Hawkins. 2004.Regional climatic warming drives long-term community changes of British marine fish. Proceedings of the Royal Society of London B, 271: 655–661.

Gomes, M. C., E. Serrão, and M. F. Borges. 2001. Spatial patterns of groundfish assemblages on the continental shelf of Portugal. ICES Journal of Marine Science, 58: 633–647.

Harris, P.J., D.M. Wyanski, D. B. White, and J.L. Moore. 2002. Age, growth and reproduction of scamp, *Mycteroperca phenax*, in the southwestern North Atlantic 1979-1997. Bulletin of Marine Science. 70:113-132.

Harris, P.J., Wyanski, D.M., and P.T. Powers Mikell. 2004. Age, growth, and reproductive biology of blueline tilefish along the southeastern coast of the United States. Transactions of the American Fisheries Society, 133: 1190-1204.

Holbrook, S.J., Schmitt, R.J., Stephens Jr., J.S., 1997. Changes in an assemblage of temperate reef fishes associated with a climate shift. Ecological Applications, 74: 1299–1310.

Hoss, D.E. and D.W. Engel. 1996. Sustainable development in the southeastern coastal zone: environmental impacts on fisheries. In: Vernberg, F.J., Vernberg, W.B., Siewicki, T. (Eds.), Sustainable Development in the Southeastern Coastal Zone. University of South Carolina Press, Columbia, South Carolina, pp. 171–186.

Hughes, T.P., 1994. Catastrophes, phase shifts, and large-scale degradation of a Caribbean Coral reef. Science 265, 1547–1551.

Matheson, R.H. III. and G.R. Huntsman. 1984. Growth, mortality, and yield-per-recruit models fo speckled hind and snowy grouper from the United States South Atlantic Bight. Transactions of the American Fisheries Society. 113: 607-616.

Jay, C.V., 1996. Distribution of bottom-trawl fish assemblages over the continental shelf and upper slope of the U.S. west coast, 1977–1992. Canadian Journal of Fisheries and Aquatic Sciences, 53: 1203–1225.

Koch, C. F. 1987. Prediction of sample size effects on the measured temporal and geographic distribution patterns of species. Paleobiology, 13: 100–107.

Lambert, J.M. and Williams, W.T. 1962. Multivariate methods in plant ecology. IV. Nodal analysis. Journal of Ecology, 50: 775-802.

Lampert, D. 1992. Zero-inflated poisson regression, with an application to defects in manufacturing. Technometrics, 34: 1-14.

Landres, P. B., J. Verner, and J. W. Thomas. 1988. Ecological uses of vertebrate indicator species: A critique. Conservation Biology, 2: 316–328.

Lee, Y., and B. Sampson. 2000. Spatial and temporal stability of commercial groundfish assemblages off Oregon and Washington as inferred from Oregon trawl logbooks. Canadian Journal of Fisheries and Aquatic Sciences, 57: 2443–2454.

Leibold, M. A. 1995. The niche concept revisited: mechanistic models and community context. Ecology 76: 1371–1382.

MacCall, A. 2007. Depletion-adjusted average catch. pp. 27-31 *In*: Rosenberg, A., Agnew, D., Babcock, E., Mogensen, C., O'Boyle, R., Powers, J., Stefansson, G., Swasey, J. 2007. Setting annual catch limits for U.S. fisheries: An expert working group report. Lenfest Ocean Program, 1025 F Street NW, Suite 900, Washington, D.C.

Manooch III, C.S., Potts, J.C., Burton, M.L., and P.J. Harris. 1998. Population Assessment of the Scamp, Mycteroperca phenax, from the Southeastern United States. NOAA tech Memo, NMFS-SEFSC-410, 61 pp.

May, R. M., and R. H. MacArthur. 1972. Niche overlap as a function of environmental variability. Proceedings of the National Academy of Sciences, 1109–1113.

McClenachan, L. 2009. Documenting loss of large trophy fish from the Florida Keys with historical photographs. Conservation Biology, 23(3): 636-643.

McCune, B., Grace, J.B., 2002. Analysis of ecological communities. MjM Software Design, Gleneden Beach, Oregon.

McGarigal, K., Cushman, S., and S.G. Stafford. 2000. Multivariate statistics for wildlife and ecology research. University of Chicago Press, Chicago, IL. 283 pp.

McGovern, J.C., Wyanski, D.M., Pashuk, O., Manooch III, C.S., and Sedberry. 1998. Changes in the sex ratio and size at maturity of gag, *Myceterperca microlepis*, from the Atlantic coast of the southeastern United States during 1976-1995. Fishery Bulletin, 96: 797-807.

McGovern, J.C., Sedberry, G.R., Meister, H.S., Westendorff, T.M., Wyanski, D.M., and Harris, P.J. 2005. A tag and recapture study of gag, *Myceterperca microlepis*, off the southeastern U.S. Bulletin of Marine Science, 76(1): 47-59.

MRAG Americas. 2009a. Productivity-Susceptibility Analyses: Gulf of Mexico. Available at www.mragamericas.com. 6 p.

MRAG Americas. 2009b. Productivity-Susceptibility Analyses: South Atlantic. Available at www.mragamericas.com. 6 p.

MSRA (Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006). 2006. Publication L. no. 109-479, 120 Stat. 3575.

Mueter, F. J., and B. L. Norcross. 2000. Changes in species composition of the demersal fish community in nearshore waters of Kodiak Island, Alaska. Canadian Journal of Fisheries and Aquatic Sciences, 57: 1169–1180.

Niemi, J. G., J. M. Hanowski, A. R. Lima, T. Nicholls, and N. Weiland. 1997. A critical analysis on the use of indicator species in management. Journal of Wildlife Management, 61: 1240–1252.

Parker, R.O., Jr. and J.L. Ross. 1986. Observing reef fishes from submersibles off North Carolina. Northeast Gulf Science, 8: 31-49.

Perry, A.L., Low, P.J., Ellis, J.R., and J.D. Reynolds. 2005. Climate change and distribution shifts in marine fishes. Science, 308: 1912–1915.

Reed, J.K., Pomponi, S.A., Weaver, D., Paull, C.K., and A.E. Wright. 2005. Deep-water sinkholes and bioherms of South Florida and the Pourtalés terrace – habitat and fauna. Bulletin of Marine Science, 77(2): 267-296.

Ross, J.L. 1978. Life history aspects of the gray tilefish *Caulolatilus microps* (Goode and Bean, 1878). Master's Thesis, College of William and Mary, Williamsburg, VA.

Ross, J.L. and G.R. Huntsman. 1982. Age, growth, and mortality of blueline tilefish from North Carolina and South Carolina. Transactions of the American Fisheries Scoiety, 111: 585-592.

SEDAR 15-SAR1. 2008. South Atlantic red snapper. SEDAR Charleston, South Carolina. (http://www.sefsc.noaa.gov/sedar/). 511 p.

SEDAR 15-SAR2. 2008. South Atlantic greater amberjack. SEDAR Charleston, South Carolina. (http://www.sefsc.noaa.gov/sedar/). 379 p.

SEDAR 24. 2010. Pre-review Stock Assessment Report, South Atlantic Red Snapper. SEDAR Charleston, South Carolina. 488 p.

Sedberry, G.R., Pashuk, O., Wyanski, D.M., Stephen, J.A., and P. Weinbach. 2006. Spawning locations for Atlantic reef fishes off the southeastern U.S. GCFI, 57: 463-514.

Farmer, N.A., Malinowski, R.P., and M.K. McGovern. Species groupings for management of the Gulf of Mexico Reef Fish Fishery. SERO-LAPP-2010-03. 90 p.

Shaul, L., L. Weitkamp, K. Simpson, and J. Sawada. 2007. Trends in abundance and size of coho salmon in the Pacific Rim. North Pacific Anadromous Fish Commission Bulletin, 4: 93–104.

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

Shertzer, K.W., Williams, E.H., and J.C. Taylor. 2009. Spatial structure and temporal patterns in a large marine ecosystem: Exploited reef fishes of the southeast United States. Fisheries Research, 100: 126-133.

Simberloff, D. 1998. Flagships, umbrellas, and keystones: Is single-species management passé in the landscape era? Biological Conservation, 83: 247–257.

Sneath, P.H.A. and R.R. Sokal. 1973. Numerical taxonomy. The principles and practice of numerical classification. Freeman, San Francisco. 573 p.

South Atlantic Fishery Independent Monitoring Program Workshop" Final Report. Nov. 17-20, 2009. Beaufort, NC.

Southeast Data Assessment and Review (SEDAR) 10: SAR2. 2006. Gulf of Mexico gag grouper. Charleston, SC. 250 p. Available online at www.sefsc.noaa.gov/sedar/.

Struhsaker, P. 1969. Demersal fish resources: composition, distribution, and commercial potential of the continental shelf stocks off the southeastern United States. Fishery Industrial Research, 4: 261-300.

Van Sant, S.B., M.R. Collins, and G.R. Sedberry. 1994. Preliminary evidence form a tagging study for a gag (*Myceterperca microlepis*) spawning migration, with notes on the use of oxytetracycline for chemical tagging. Proceedings of the Gulf and Caribbean Fisheries Institute. 43: 417-428.

Wells, H.W. and L.E. Gray. 1959. Summer upwelling off the northeast coast of North Carolina. Limnol. Oceanogr. 5, 108.

Williams, E.H. and S. Ralston. 2002. Distribution and co-occurrence of rockfishes (family: Sebastidae) over trawlable shelf and slope habitats of California and southern Oregon. Fishery Bulletin, 100: 836-855.

Williams, W.T. and J.M. Lambert. 1961. Nodal analysis of associated populations. Nature, 191: 202.

Zacharias, M. A., and J.C. Roff. C. 2001. Use of focal species in marine conservation and management: a review and critique. Aquatic Conservation of Marine and Freshwater Ecosystems, 11: 59–76.

Table 1. Life history parameters for managed reef fish species in U.S. south Atlantic (see Table A9 for references).

Common Name	*Scientific Name*	a_λ (yr)	K	L_{inf} (cm)	$a_\circ$ (yr)	W_{inf} (kg)	L_m (cm)	a_m (mo)	Min Depth	Max Depth	Ref #
Bar jack	*Carangoides ruber*	20.5	0.14	70.0	-0.97	8	37.9	55	0	35	19, 52
Jolthead porgy	*Calamus bajonado*	19.2	0.15	78.5	-0.77	10.1	42.0	52	3	200	19, 52
Knobbed porgy	*Calamus nodosus*	21.0	0.17	51.2	-0.86	1.7	28.6	48	7	90	19, 52, 71
Red porgy	*Pagrus pagrus*	13.0	0.21	51.0	-1.32	7.7	28.9	18	0	250	3, 12, 19, 22
Sand tilefish	*Malacanthus plumieri*	22.0	0.13	72.4	-1.04	2.1	39.1	59	10	153	13, 34
Tomtate	*Haemulon aurolineatum*	9.0	0.21	32.5	-0.79	0.70	19.0	41	9	55	19, 34, 52
White grunt (Carolinas)	*Haemulon plumierii*	27.0	0.43	32.8	-0.20	4.4	16.7	12	3	40	37, 46
White grunt (Florida)	*Haemulon plumierii*	15.0	0.19	32.7	-4.21	2.5	22.0	36	3	40	18, 50
Whitebone porgy	*Calamus leucosteus*	12.0	0.23	36.8	-0.69	0.5	21.0	37	10	100	19, 52, 77
Gag	*Mycteroperca microlepis*	26.0	0.20	118.4	-1.34	36.5	64.3	38	40	152	19, 21, 27, 51
Red Grouper	*Epinephelus morio*	26.0	0.21	84.8	-0.66	23.0	48.8	34	5	330	60
Black Grouper	*Mycteroperca bonaci*	33.0	0.14	133.4	-0.90	36.5	85.6	69	6	33	19, 27, 60
Black Sea Bass (Female)	*Centropristis striata*	10.0	0.16	54.5	-1.16	3.6	13.5	33	20	60	41, 67
Black Sea Bass (Male)	*Centropristis striata*	10.0	0.16	54.5	-1.16	3.6	27.3	38	20	60	19, 41, 67
Snowy Grouper	*Epinephelus niveatus*	29.0	0.12	111.7	-1.41	30.0	54.1	60	30	525	19, 27, 68, 80
Speckled Hind	*Epinephelus drummondhayi*	25.0	0.13	96.7	-1.01	30.0	49.7	56	25	183	19, 27, 38, 68
Warsaw Grouper	*Epinephelus nigritus*	41.0	0.05	239.4	-3.62	82.1	81.0	49	55	525	19, 27, 33
Red Snapper	*Lutjanus campechanus*	54.0	0.25	90.2	-0.03	26.0	37.0	22	10	190	42, 66, 79
Vermilion Snapper	*Rhomboplites aurorubens*	19.0	0.12	50.6	-3.50	3.2	15.0	12	40	300	1, 19, 59, 81
Golden Tilefish (female)	*Lopholatilus chamaeleonticeps*	32.0	0.10	77.7	-5.72	30.0	42.9	72	80	540	13, 15, 19, 47, 68
Golden Tilefish (male)	*Lopholatilus chamaeleonticeps*	32.0	0.14	96.7	-0.44	30.0	45.0	60	80	540	13, 15, 19, 47, 68
Wreckfish	*Polyprion americanus*	30.0	0.03	163.8	-16.56	15.0	83.8	96	40	600	70, 76
Rock Hind	*Epinephelus adscensionis*	12.0	0.16	49.9	-0.93	4.1	28.0	73	1	120	19, 27, 49
Red Hind	*Epinephelus guttatus*	11.0	0.20	47.1	-0.75	25.0	26.6	41	2	100	19, 27, 49
Scamp	*Mycteroperca phenax*	30.0	0.09	108.0	-1.36	12.6	35.3	15	30	100	19, 23, 27
Yellowfin Grouper	*Mycteroperca venenosa*	15.0	0.09	89.5	-0.75	18.5	54.0	44	2	137	19, 27, 44, 69, 74
Yellowedge Grouper	*Epinephelus flavolimbatus*	85.0	0.06	100.5	-4.75	18.6	54.7	96	64	275	10, 11, 19
Nassau Grouper	*Epinephelus striatus*	29.0	0.13	76.0	-1.12	27.0	40.0	60	1	90	19, 56
Goliath Grouper	*Epinephelus itajara*	37.0	0.13	200.6	-0.49	455.0	120.0	72	1	100	5, 53, 65
Yellowtail Snapper	*Ocyurus chrysurus*	13.0	0.17	60.8	-1.88	4.1	20.9	20	1	180	1, 19, 20, 61, 63
Gray Snapper	*Lutjanus griseus*	24.0	0.17	71.7	-0.03	8.0	23.0	24	5	180	6, 53, 56, 73
Silk Snapper	*Lutjnaus vivanus*	29.0	0.10	81.2	-1.32	8.3	43.4	63	90	242	19, 56
Lane Snapper	*Lutjanus syngaris*	10.0	0.10	61.8	-1.73	3.0	20.5	12	10	400	19, 56
Gray Triggerfish	*Balistes capriscus*	8.8	0.18	65.6	-1.58	6.2	32.8	12	1	360	19, 29, 30, 64
Greater Amberjack	*Seriola dumerilli*	17.0	0.28	124.2	-1.56	80.6	82.2	16	1	360	19, 25, 58, 64, 72
Banded Rudderfish	*Seriola zonata*	10.3	0.28	77.5	-0.46	5.2	41.5	27	30	130	19, 56
Almaco Jack	*Seriola rivoliana*	22.2	0.13	163.3	-0.83	60.0	81.1	53	5	160	19, 56
Blueline Tilefish (female)	*Caulolatilus microps*	43.0	0.11	63.4	-4.54	5.6	33.8	54	30	236	24, 54, 55, 68
Blueline Tilefish (male)	*Caulolatilus microps*	43.0	0.10	75.8	-5.40	7.0	51.3	72	30	236	13, 14, 19, 24, 54, 55, 68

Note: a_λ denotes maximum age in years, K denotes Brody growth coefficient, L_{inf} denotes asymptotic length coefficient for von Bertalanffy growth equation, $a_\circ$ denotes theoretical age at length zero scaling parameter for von Bertlanffy growth equation, W_{inf} denotes theoretical maximum weight in kilograms, L_m denotes length (in cm) at maturity, a_m denotes age (in months) at maturity, depths expressed in feet.

Table 2. Depth of occurrence (ft) for managed reef fish species in southeastern U.S. Atlantic Ocean (Source: Fishbase). Colors denote categorizations of 'shallow' (yellow), 'shalllow/mid' (pale orange), 'mid' (pale red), and 'deep-water' (blue). White lines denote median depth of occurrence.

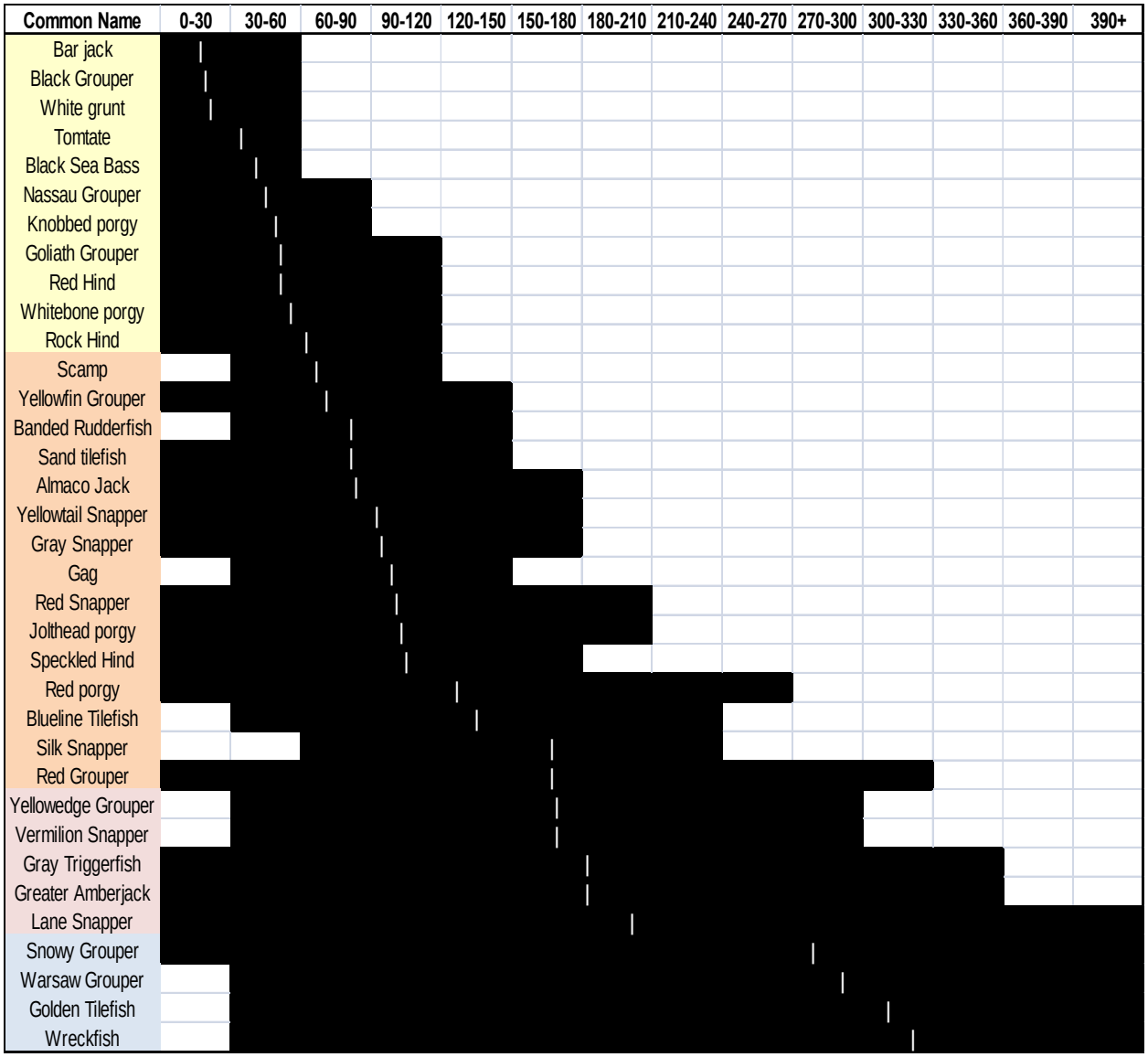


Table 3. Percent of commercial bottom longline (CLL), vertical line (CVL), reef fish observer (RFOP), headboat (HBS), Marine Recreational Fisheries Statistics Survey (MRFSS), Marine Resources Monitoring, Assessment and Prediction (MARMAP), and life history (LH) data matrix bins with records of SAFMC Snapper-Grouper FMU species.

COMMON NAME	CVL	CLL	RFOP	HBS	MRFSS	MARMAP	LH
almaco jack	25%	0%	13%	34%	14%	1%	100%
banded rudderfish	10%	0%	3%	29%	11%	0%	100%
bar jack	1%	0%	0%	5%	6%	0%	100%
black grouper	20%	2%	1%	19%	12%	0%	100%
black sea bass	0%	0%	0%	72%	85%	58%	100%
blueline tilefish	18%	29%	0%	3%	4%	1%	100%
gag	30%	4%	16%	73%	38%	1%	100%
goliath grouper	0%	0%	0%	2%	7%	0%	100%
gray snapper	20%	1%	0%	48%	33%	0%	100%
gray triggerfish	32%	1%	27%	80%	41%	21%	100%
greater amberjack	35%	3%	8%	48%	28%	1%	100%
jolthead porgy	16%	0%	0%	33%	12%	0%	100%
knobbed porgy	7%	0%	7%	26%	9%	10%	100%
lane snapper	7%	0%	0%	42%	24%	0%	100%
nassau grouper	0%	0%	0%	0%	2%	0%	100%
red grouper	36%	4%	24%	53%	24%	3%	100%
red hind	12%	0%	4%	13%	6%	0%	100%
red porgy	22%	0%	43%	39%	19%	42%	100%
red snapper	28%	1%	8%	51%	25%	2%	100%
rock hind	14%	0%	6%	24%	6%	0%	100%
sand tilefish	2%	0%	2%	9%	12%	0%	100%
scamp	30%	0%	34%	47%	17%	9%	100%
silk snapper	5%	0%	0%	6%	2%	0%	100%
snowy grouper	26%	35%	2%	8%	5%	3%	100%
speckled hind	3%	0%	9%	11%	3%	2%	100%
tilefish	6%	65%	0%	0%	3%	0%	100%
tomtate	0%	0%	6%	47%	24%	41%	100%
vermilion snapper	35%	0%	33%	67%	33%	25%	100%
warsaw grouper	0%	0%	1%	8%	3%	0%	100%
white grunt	17%	0%	12%	57%	41%	11%	100%
whitebone porgy	4%	0%	1%	40%	12%	2%	100%
wreckfish	0%	0%	0%	0%	0%	0%	100%
yellowedge grouper	4%	16%	1%	1%	1%	0%	100%
yellowfin grouper	2%	0%	1%	3%	0%	0%	100%
yellowtail snapper	20%	0%	1%	40%	25%	0%	100%

Table 4. Number of SAFMC managed Snapper-Grouper species in binned commercial vertical line (CVL), longline (CLL), reef fish observer (RFOP), headboat (HBS), Marine Recreational Fisheries Statistics Survey (MRFSS), and Marine Resources Monitoring, Assessment and Prediction (MARMAP), and life history (LH) datasets.

PERCENT OF BINS	CVL	CLL	RFOP	HBS	MRFSS	MARMAP	LH
>0%	**32**	**18**	**28**	**33**	**34**	**26**	**35**
>1%	28	10	21	31	32	15	35
>5%	22	4	14	28	26	8	35

Table 5. Weighting terms for mean cluster strength matrix for commercial vertical line (CVL), longline (CLL), reef fish observer (RFOP), headboat (HBS), Marine Recreational Fisheries Statistics Survey (MRFSS), and Marine Resources Monitoring, Assessment and Prediction (MARMAP), and life history (LH).

COMMON NAME	CVL	CLL	RFOP	HBS	MRFSS	MARMAP	LH
almaco jack	0.25	0.00	0.13	0.34	0.14	0.01	1.00
banded rudderfish	0.10	0.00	0.03	0.29	0.11	0.00	1.00
bar jack	0.01	0.00	0.00	0.05	0.06	0.00	1.00
black grouper	0.20	0.02	0.01	0.19	0.12	0.00	1.00
black sea bass	0.00	0.00	0.00	0.72	0.85	0.58	1.00
blueline tilefish	0.18	0.29	0.00	0.03	0.04	0.01	1.00
gag	0.30	0.04	0.16	0.73	0.38	0.01	1.00
goliath grouper	0.00	0.00	0.00	0.02	0.07	0.00	1.00
gray snapper	0.20	0.01	0.00	0.48	0.33	0.00	1.00
gray triggerfish	0.32	0.01	0.27	0.80	0.41	0.21	1.00
greater amberjack	0.35	0.03	0.08	0.48	0.28	0.01	1.00
jolthead porgy	0.16	0.00	0.00	0.33	0.12	0.00	1.00
knobbed porgy	0.07	0.00	0.07	0.26	0.09	0.10	1.00
lane snapper	0.07	0.00	0.00	0.42	0.24	0.00	1.00
nassau grouper	0.00	0.00	0.00	0.00	0.02	0.00	1.00
red grouper	0.36	0.04	0.24	0.53	0.24	0.03	1.00
red hind	0.12	0.00	0.04	0.13	0.06	0.00	1.00
red porgy	0.22	0.00	0.43	0.39	0.19	0.42	1.00
red snapper	0.28	0.01	0.08	0.51	0.25	0.02	1.00
rock hind	0.14	0.00	0.06	0.24	0.06	0.00	1.00
sand tilefish	0.02	0.00	0.02	0.09	0.12	0.00	1.00
scamp	0.30	0.00	0.34	0.47	0.17	0.09	1.00
silk snapper	0.05	0.00	0.00	0.06	0.02	0.00	1.00
snowy grouper	0.26	0.35	0.02	0.08	0.05	0.03	1.00
speckled hind	0.03	0.00	0.09	0.11	0.03	0.02	1.00
tilefish	0.06	0.65	0.00	0.00	0.03	0.00	1.00
tomtate	0.00	0.00	0.06	0.47	0.24	0.41	1.00
vermilion snapper	0.35	0.00	0.33	0.67	0.33	0.25	1.00
warsaw grouper	0.00	0.00	0.01	0.08	0.03	0.00	1.00
white grunt	0.17	0.00	0.12	0.57	0.41	0.11	1.00
whitebone porgy	0.04	0.00	0.01	0.40	0.12	0.02	1.00
wreckfish	0.00	0.00	0.00	0.00	0.00	0.00	1.00
yellowedge grouper	0.04	0.16	0.01	0.01	0.01	0.00	1.00
yellowfin grouper	0.02	0.00	0.01	0.03	0.00	0.00	1.00
yellowtail snapper	0.20	0.00	0.01	0.40	0.25	0.00	1.00

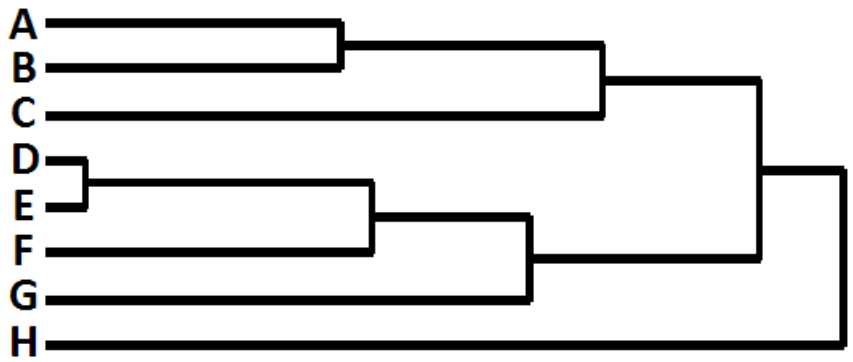
Table 6. Weighted mean cluster association matrix generated from 20 fishery-dependent, 4 fishery-independent, and 2 life history clusters (see Appendix). Darker red shading denotes higher levels of association between species on row with species in column.

	almaco jack	banded rudderfish	bar jack	black grouper	black sea bass	blueline tilefish	gag	goliath grouper	gray snapper	gray triggerfish	greater amberjack	jolthead porgy	knobbed porgy	lane snapper	nassau grouper	red grouper	red hind	red porgy	red snapper	rock hind	sand tilefish	scamp	silk snapper	snowy grouper	speckled hind	tilefish	tomtate	vermilion snapper	warsaw grouper	white grunt	whitebone porgy	wreckfish	yellowedge grouper	yellowfin grouper	yellowtail snapper
almaco jack		0.14	0.00	0.36	0.00	0.00	0.01	0.05	0.00	0.07	0.10	0.00	0.03	0.00	0.00	0.03	0.00	0.03	0.01	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.02	0.00	0.00	0.00	0.00
banded rudderfish	0.20		0.00	0.00	0.00	0.00	0.06	0.00	0.08	0.00	0.10	0.02	0.05	0.00	0.00	0.07	0.01	0.12	0.06	0.01	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.00	0.00	0.00	0.08
bar jack	0.00	0.00		0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.31	0.30	0.01	0.11	0.01	0.02	0.00	0.00	0.01	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
black grouper	0.48	0.00	0.00		0.04	0.00	0.00	0.03	0.09	0.00	0.00	0.01	0.00	0.04	0.00	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.03	0.16
black sea bass	0.02	0.02	0.00	0.09		0.00	0.04	0.02	0.02	0.04	0.02	0.00	0.12	0.02	0.00	0.01	0.05	0.05	0.02	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.20	0.08	0.00	0.06	0.10	0.00	0.00	0.00	0.02
blueline tilefish	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.24	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00
gag	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.29	0.00	0.08	0.22	0.00	0.00	0.05	0.00	0.00	0.02	0.01	0.00	0.02	0.00	0.09	0.00	0.00	0.00	0.00	0.00
goliath grouper	0.00	0.00	0.00	0.05	0.00	0.00	0.00		0.02	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.00	0.07	0.00	0.00	0.21	0.00	0.00	0.21	0.21	0.00	0.01
gray snapper	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.48	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.43
gray triggerfish	0.01	0.01	0.00	0.00	0.01	0.00	0.20	0.00	0.00		0.01	0.00	0.02	0.15	0.00	0.00	0.00	0.10	0.04	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.03	0.38	0.00	0.05	0.01	0.00	0.00	0.00	0.00
greater amberjack	0.17	0.07	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.07		0.00	0.02	0.00	0.00	0.05	0.01	0.02	0.17	0.01	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.05	0.00	0.00	0.00	0.00
jolthead porgy	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.19	0.00	0.06	0.02	0.12	0.00	0.00	0.13	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.01
knobbed porgy	0.03	0.02	0.17	0.00	0.04	0.00	0.01	0.01	0.00	0.00	0.00	0.24		0.00	0.06	0.02	0.04	0.00	0.00	0.17	0.06	0.05	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00
lane snapper	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	0.31	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.02	0.00	0.00	0.00	0.09
nassau grouper	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.12	0.00		0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.24	0.00
red grouper	0.00	0.00	0.00	0.02	0.00	0.00	0.29	0.00	0.09	0.00	0.00	0.04	0.02	0.09	0.00		0.06	0.02	0.00	0.02	0.03	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.07
red hind	0.01	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.08	0.01	0.00	0.00	0.05		0.01	0.01	0.12	0.01	0.01	0.00	0.00	0.00	0.00	0.29	0.01	0.00	0.01	0.29	0.00	0.00	0.04	0.01
red porgy	0.01	0.01	0.00	0.00	0.01	0.00	0.06	0.00	0.12	0.20	0.01	0.00	0.00	0.00	0.00	0.02	0.00		0.01	0.00	0.00	0.16	0.00	0.00	0.00	0.05	0.07	0.15	0.00	0.00	0.01	0.00	0.00	0.00	0.12
red snapper	0.02	0.05	0.00	0.00	0.02	0.00	0.30	0.00	0.00	0.05	0.21	0.00	0.00	0.00	0.00	0.05	0.00	0.07		0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.02	0.11	0.00	0.01	0.01	0.00	0.00	0.00	0.00
rock hind	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.26	0.00	0.04	0.01	0.17	0.00	0.00		0.04	0.00	0.00	0.00	0.04	0.00	0.01	0.00	0.00	0.03	0.00	0.00	0.00	0.05	0.00
sand tilefish	0.00	0.01	0.15	0.00	0.00	0.34	0.00	0.00	0.00	0.00	0.00	0.21	0.09	0.00	0.09	0.00	0.01	0.00	0.00	0.01		0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.04
scamp	0.02	0.02	0.00	0.00	0.01	0.13	0.10	0.00	0.00	0.02	0.15	0.00	0.04	0.00	0.00	0.15	0.00	0.17	0.00	0.00	0.00		0.00	0.04	0.10	0.00	0.00	0.02	0.00	0.00	0.02	0.00	0.00	0.00	0.00
silk snapper	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.21	0.00	0.60	0.00	0.00	0.01	0.00	0.01	0.02	0.01	0.08	0.00
snowy grouper	0.00	0.00	0.00	0.00	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10		0.00	0.11	0.00	0.00	0.20	0.00	0.00	0.00	0.17	0.00	0.00
speckled hind	0.01	0.01	0.05	0.00	0.01	0.00	0.02	0.00	0.00	0.01	0.01	0.05	0.06	0.00	0.21	0.00	0.00	0.01	0.01	0.06	0.05	0.08	0.01	0.00		0.00	0.01	0.01	0.05	0.00	0.00	0.00	0.01	0.24	0.00
tilefish	0.00	0.00	0.00	0.00	0.00	0.09	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.20	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00
tomtate	0.00	0.00	0.00	0.00	0.07	0.00	0.02	0.00	0.00	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.15	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.28	0.00	0.02	0.40	0.00	0.00	0.00	0.00
vermilion snapper	0.01	0.01	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.45	0.01	0.00	0.00	0.10	0.00	0.00	0.00	0.13	0.03	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.17		0.00	0.00	0.01	0.00	0.00	0.00	0.00
warsaw grouper	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.14	0.14	0.05	0.14	0.01	0.00		0.00	0.01	0.00	0.41	0.01	0.00
white grunt	0.00	0.00	0.00	0.00	0.07	0.00	0.08	0.00	0.00	0.09	0.00	0.20	0.08	0.00	0.00	0.12	0.11	0.00	0.00	0.06	0.00	0.01	0.00	0.00	0.00	0.00	0.07	0.03	0.00		0.07	0.00	0.00	0.00	0.00
whitebone porgy	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.05	0.00	0.01	0.02	0.00	0.00	0.23	0.00	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.53	0.00	0.00	0.00		0.00	0.00	0.00	0.01
wreckfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.00	0.10	0.00	0.00	0.35	0.00	0.00		0.35	0.00	0.00
yellowedge grouper	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.24	0.00	0.10	0.00	0.00	0.44	0.00	0.00	0.00		0.01	0.00
yellowfin grouper	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.06	0.00	0.29	0.00	0.02	0.00	0.00	0.06	0.06	0.00	0.04	0.00	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01		0.00
yellowtail snapper	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.52	0.00	0.00	0.02	0.00	0.15	0.00	0.00	0.00	0.09	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Table 7. Table of SAFMC Snapper-Grouper FMU species, indicating species with completed or pending assessments and top five most associated species, by species, per weighted mean cluster association index. Productivity-Susceptibility Analysis (PSA) scores of overall risk from MRAG Americas South Atlantic Final Report provided when available (MRAG 2009a,b). Color-coding denotes associations; dashed lines denote distinct life histories between associated species.

COMMON NAME	1	2	3	4	5	ASSESSED?	PSA
wreckfish	warsaw grouper	yellowedge grouper	silk snapper	tilefish	snowy grouper	Vaughan et al. 2001	3.64
warsaw grouper	yellowedge grouper	silk snapper	snowy grouper	tilefish	speckled hind		3.83
yellowedge grouper	warsaw grouper	snowy grouper	tilefish	blueline tilefish	silk snapper		3.52
snowy grouper	blueline tilefish	warsaw grouper	yellowedge grouper	tilefish	silk snapper	SEDAR 4 (2004)	3.45
silk snapper	tilefish	snowy grouper	yellowfin grouper	wreckfish	warsaw grouper		3.52
blueline tilefish	snowy grouper	sand tilefish	scamp	yellowedge grouper	tilefish		3.4
sand tilefish	blueline tilefish	jolthead porgy	bar jack	knobbed porgy	nassau grouper		3.37
tilefish	silk snapper	gag	snowy grouper	yellowedge grouper	blueline tilefish	SEDAR 4 (2004)	3.4
goliath grouper	yellowedge grouper	warsaw grouper	wreckfish	silk snapper	snowy grouper	SEDAR 23 (2010)	3.42*
nassau grouper	yellowfin grouper	speckled hind	bar jack	jolthead porgy	knobbed porgy		3.3
speckled hind	yellowfin grouper	nassau grouper	scamp	knobbed porgy	rock hind		3.42
yellowfin grouper	speckled hind	nassau grouper	bar jack	sand tilefish	knobbed porgy		3.39
gag	red grouper	red snapper	gray triggerfish	white grunt	red porgy	SEDAR 10 (2006)	3.52
red grouper	gag	scamp	white grunt	gray snapper	lane snapper	SEDAR 19 (2010)	3.28
scamp	red porgy	red grouper	greater amberjack	blueline tilefish	speckled hind	Manooch et al. (1998)	3.25
black grouper	almaco jack	yellowtail snapper	gray snapper	black sea bass	lane snapper	SEDAR 19 (2010)	3.36
banded rudderfish	almaco jack	red porgy	greater amberjack	gray snapper	yellowtail snapper		3.26
greater amberjack	scamp	red snapper	almaco jack	vermilion snapper	banded rudderfish	SEDAR 15 (2008)	3.07
almaco jack	black grouper	banded rudderfish	greater amberjack	vermilion snapper	gray triggerfish		3.35
red porgy	gray triggerfish	scamp	vermilion snapper	gray snapper	yellowtail snapper	SEDAR 1 Update (2006)	2.93
gray triggerfish	vermilion snapper	gag	lane snapper	red porgy	white grunt		2.46
vermilion snapper	gray triggerfish	tomtate	red porgy	lane snapper	gag	SEDAR 17 (2008)	3.14
red snapper	gag	greater amberjack	vermilion snapper	red porgy	scamp	SEDAR 24 (2010)	3.14
black sea bass	tomtate	knobbed porgy	whitebone porgy	black grouper	vermilion snapper	SEDAR 2 Update (2005)	3.02
red hind	whitebone porgy	tomtate	rock hind	jolthead porgy	red grouper	Potts & Manooch (1995)	3.18
rock hind	knobbed porgy	jolthead porgy	red hind	bar jack	yellowfin grouper	Potts & Manooch (1995)	3.23
knobbed porgy	jolthead porgy	bar jack	rock hind	white grunt	nassau grouper		3.14
whitebone porgy	tomtate	red hind	almaco jack	greater amberjack	banded rudderfish		3.51
jolthead porgy	knobbed porgy	bar jack	sand tilefish	white grunt	rock hind		3.18
tomtate	whitebone porgy	vermilion snapper	red hind	black sea bass	gray triggerfish		2.63
white grunt	jolthead porgy	red grouper	red hind	gray triggerfish	knobbed porgy		2.78
bar jack	jolthead porgy	knobbed porgy	sand tilefish	nassau grouper	red hind		3.33
gray snapper	lane snapper	yellowtail snapper	red porgy	warsaw grouper	silk snapper		3.24
lane snapper	gray snapper	gray triggerfish	vermilion snapper	yellowtail snapper	whitebone porgy		2.92
yellowtail snapper	gray snapper	black grouper	lane snapper	red porgy	sand tilefish	SEDAR 3 (2003)	2.84*

(*) = from MRAG Gulf of Mexico Final Report.



	A	B	C	D	E	F	G	H
A		1	0	0	0	0	0	0
B	1		0	0	0	0	0	0
C	0.5	0.5		0	0	0	0	0
D	0	0	0		1	0	0	0
E	0	0	0	1		0	0	0
F	0	0	0	0.5	0.5		0	0
G	0	0	0	0.33	0.33	0.33		0
H	0.14	0.14	0.14	0.14	0.14	0.14	0.14	

Figure 1. Example dendrogram and cluster association matrix.

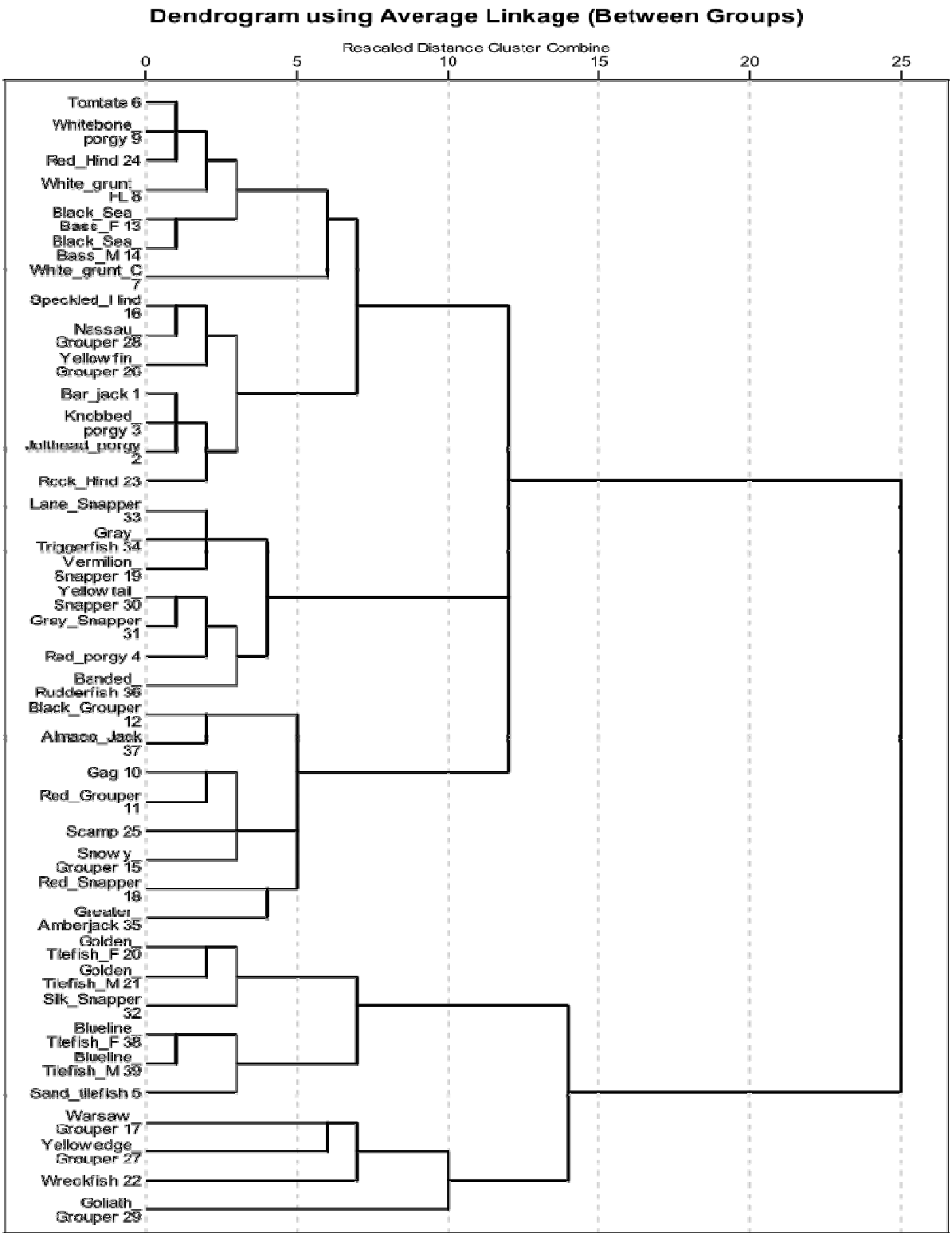


Figure 2. Hierarchical cluster analysis of life history parameters for SAFMC Snapper-Grouper species with dummy variable for genus (Linkage Method: Ward's, Dissimilarity Measure: Euclidean Distance, Transformation: Z-Score by Variable). Note 'F' denotes female, 'FL' denotes Florida population. Numbers denote case numbers.

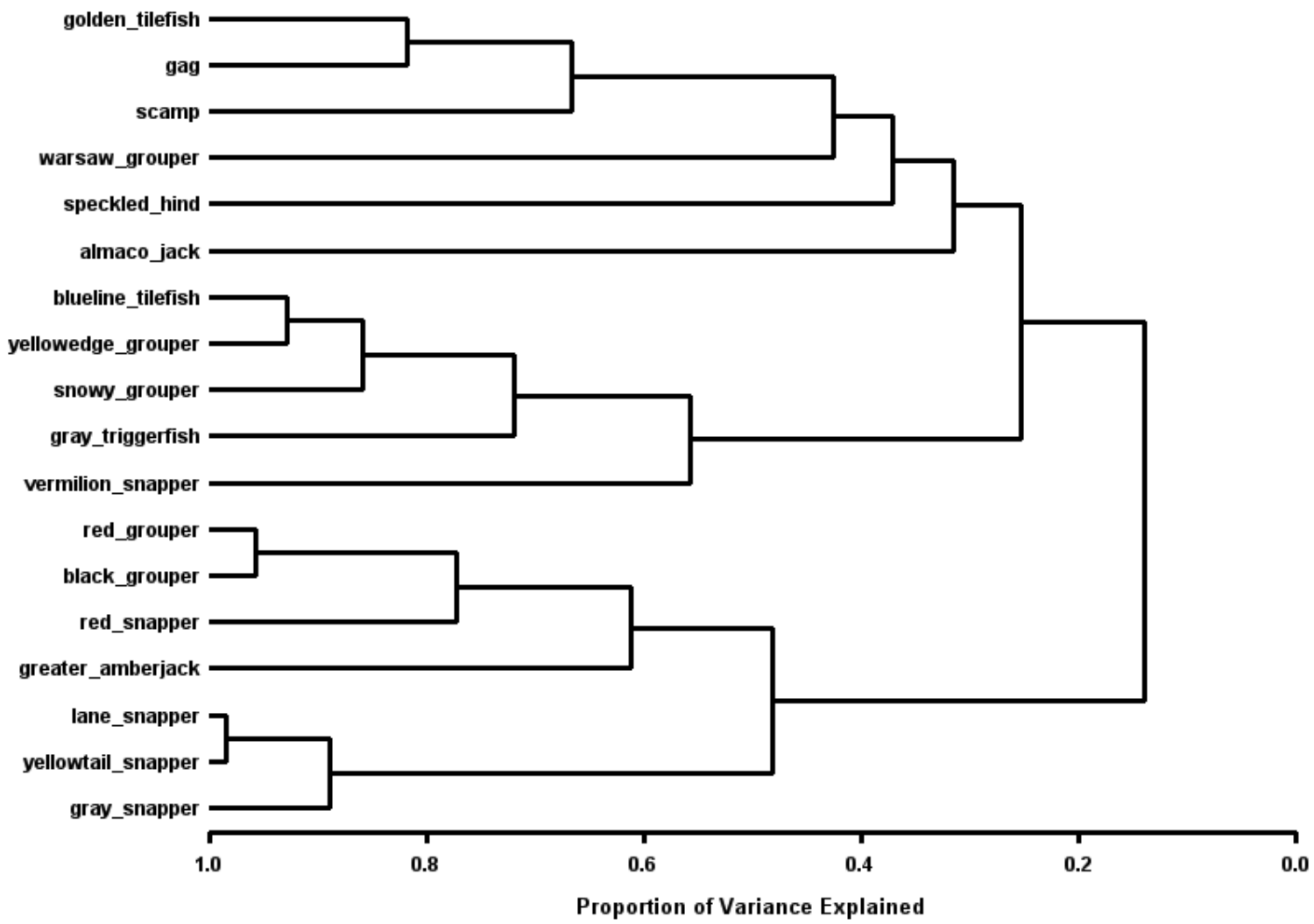


Figure 3. Dimension reduction cluster of presence-absence in SAFMC Snapper-Grouper commercial longline landings (2005-2009) aggregated by year, month, area, and depth (Linkage Method: VARCLUS, Height Measure: Proportion of Variance Explained, Transformation: Binary).

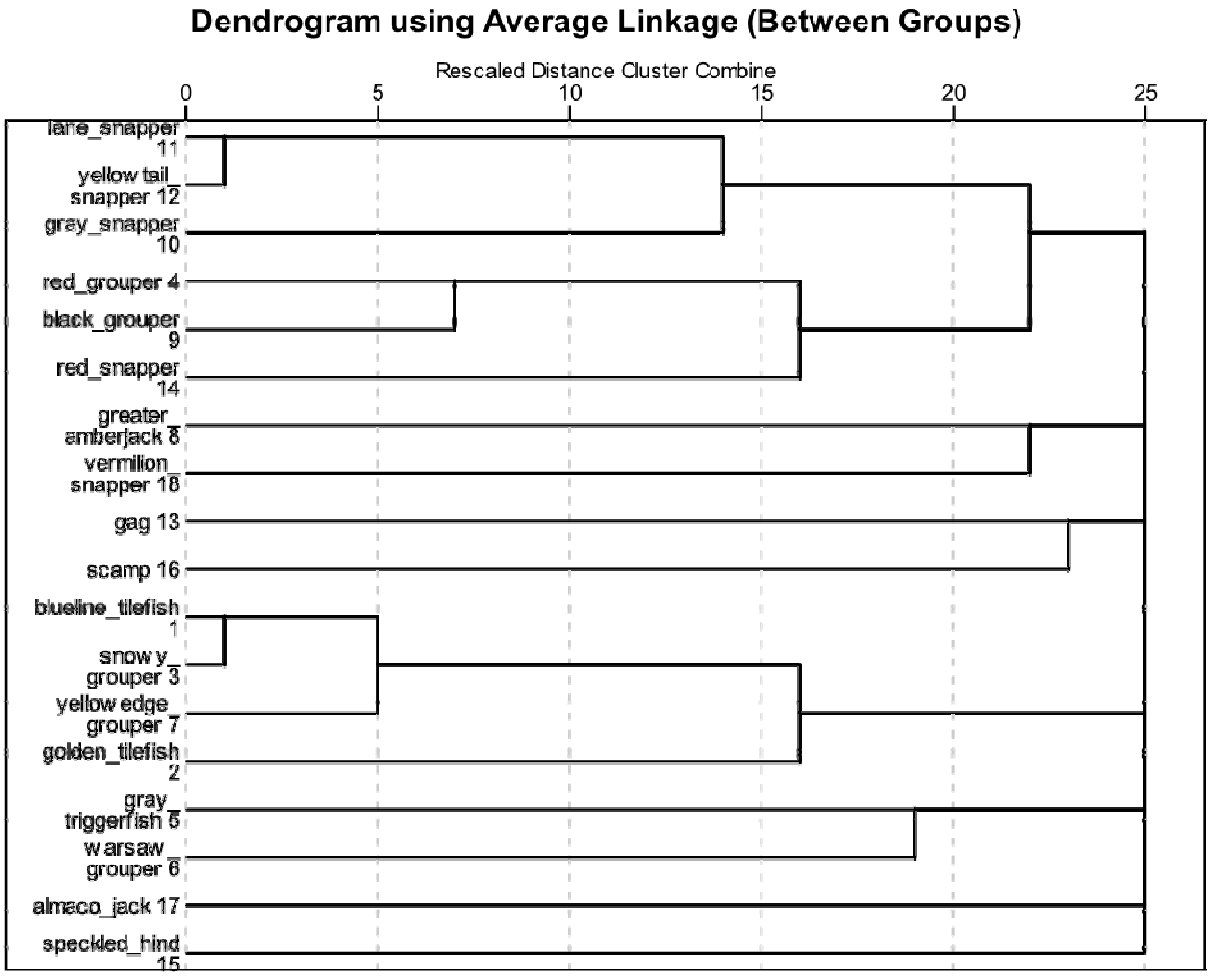


Figure 4. Hierarchical cluster analysis of species presence-absence in SAFMC Snapper-Grouper commercial longline landings (2005-2009) aggregated by year, month, area, and depth (Linkage Method: Between (Average), Dissimilarity Measure: Sørenson (Binary)). Numbers denote case numbers.

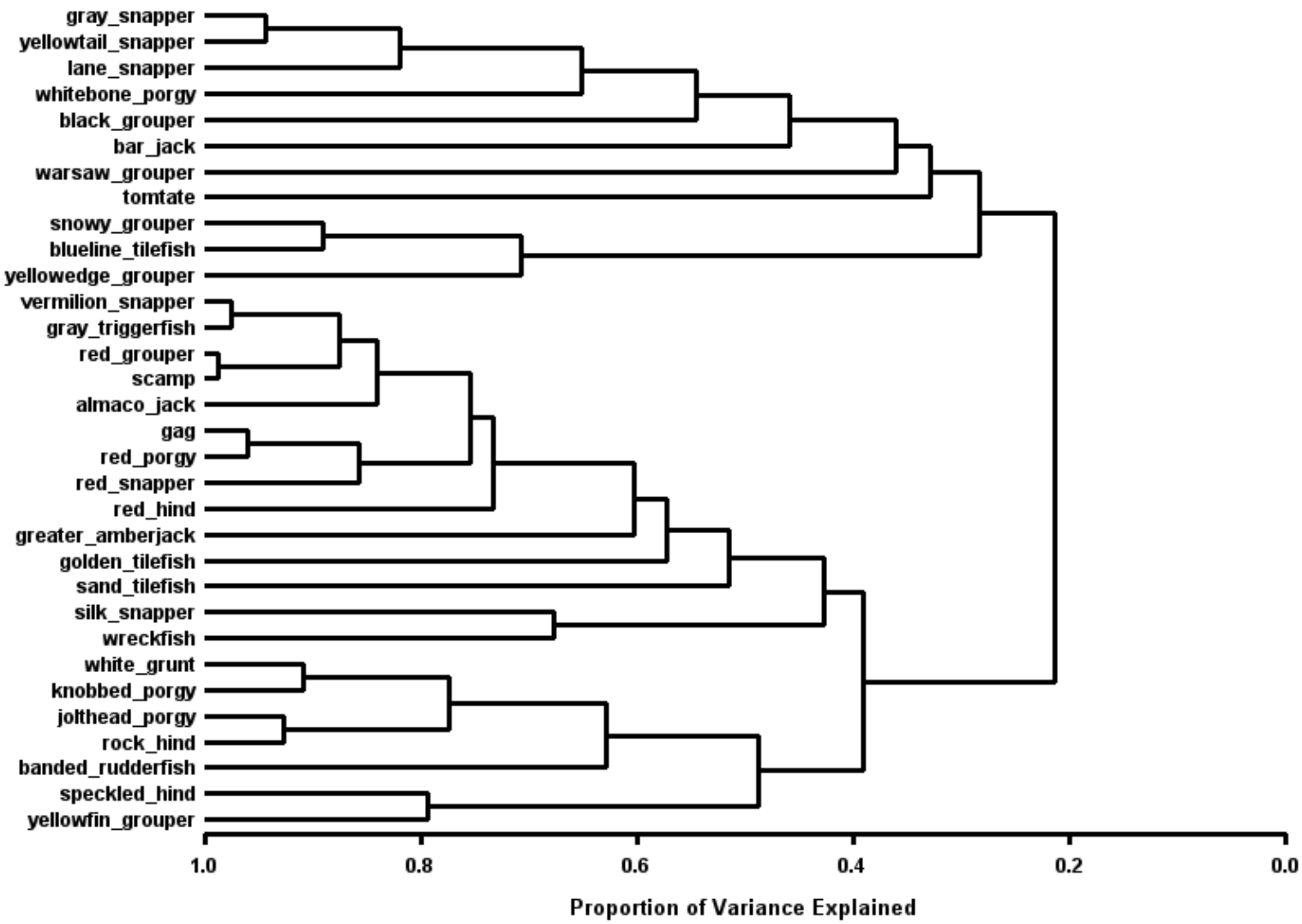


Figure 5. Dimension reduction cluster of SAFMC Snapper-Grouper commercial vertical line landings (2005-2009) aggregated by year, month, area, and depth (Linkage Method: VARCLUS, Height Measure: Proportion of Variance Explained, Transformation: Binary).

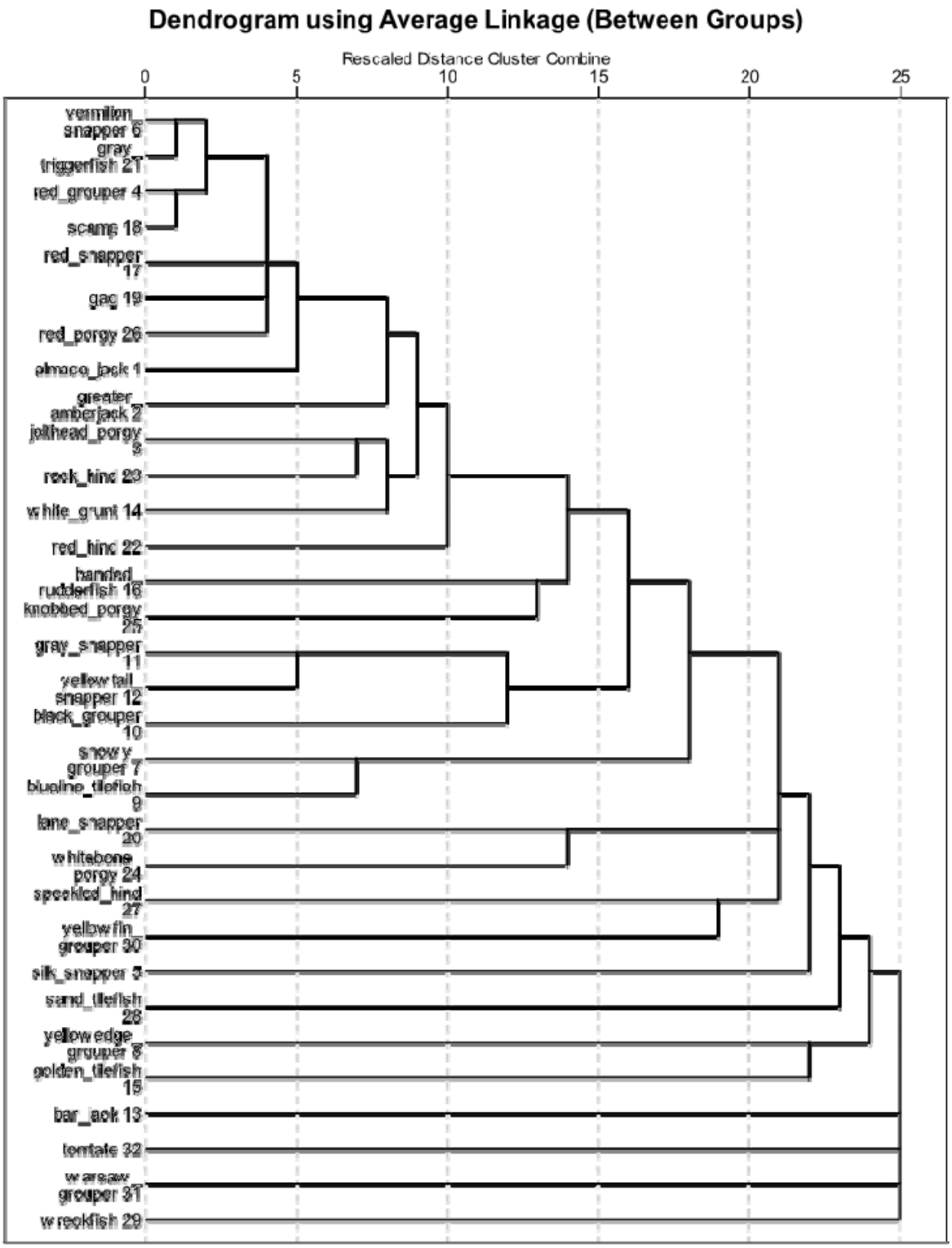


Figure 6. Hierarchical cluster analysis of species presence-absence in SAFMC Snapper-Grouper commercial vertical line landings aggregated by year, month, area, and depth (Linkage Method: Between (Average), Dissimilarity Measure: Sørenson (Binary)). Numbers denote case numbers.

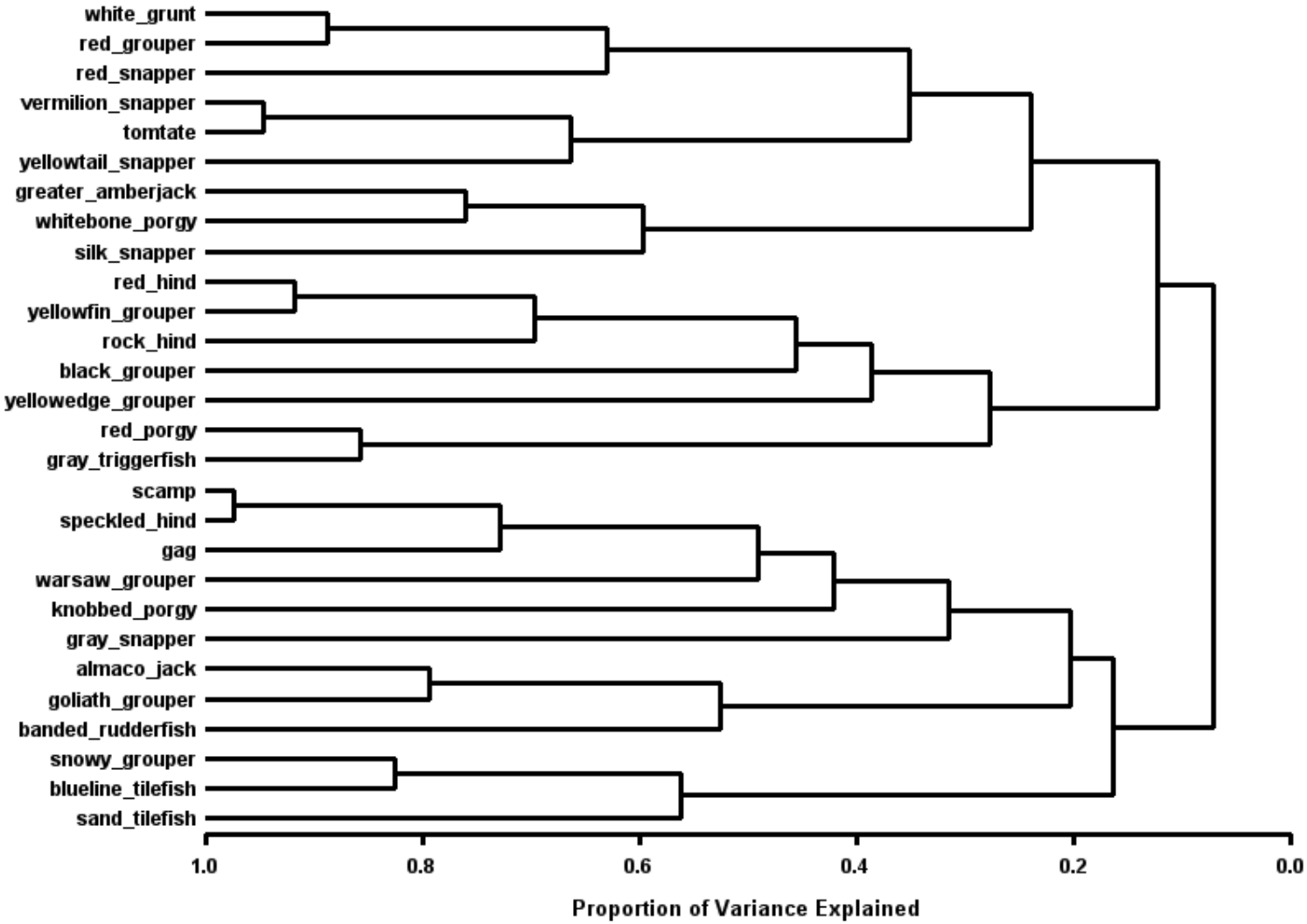


Figure 7. Dimension reduction cluster of species presence-absence in SAFMC Snapper-Grouper reef fish observer program landings aggregated at the individual set level (Linkage Method: VARCLUS, Measure: Proportion of Variance Explained, Transformation: Binary).

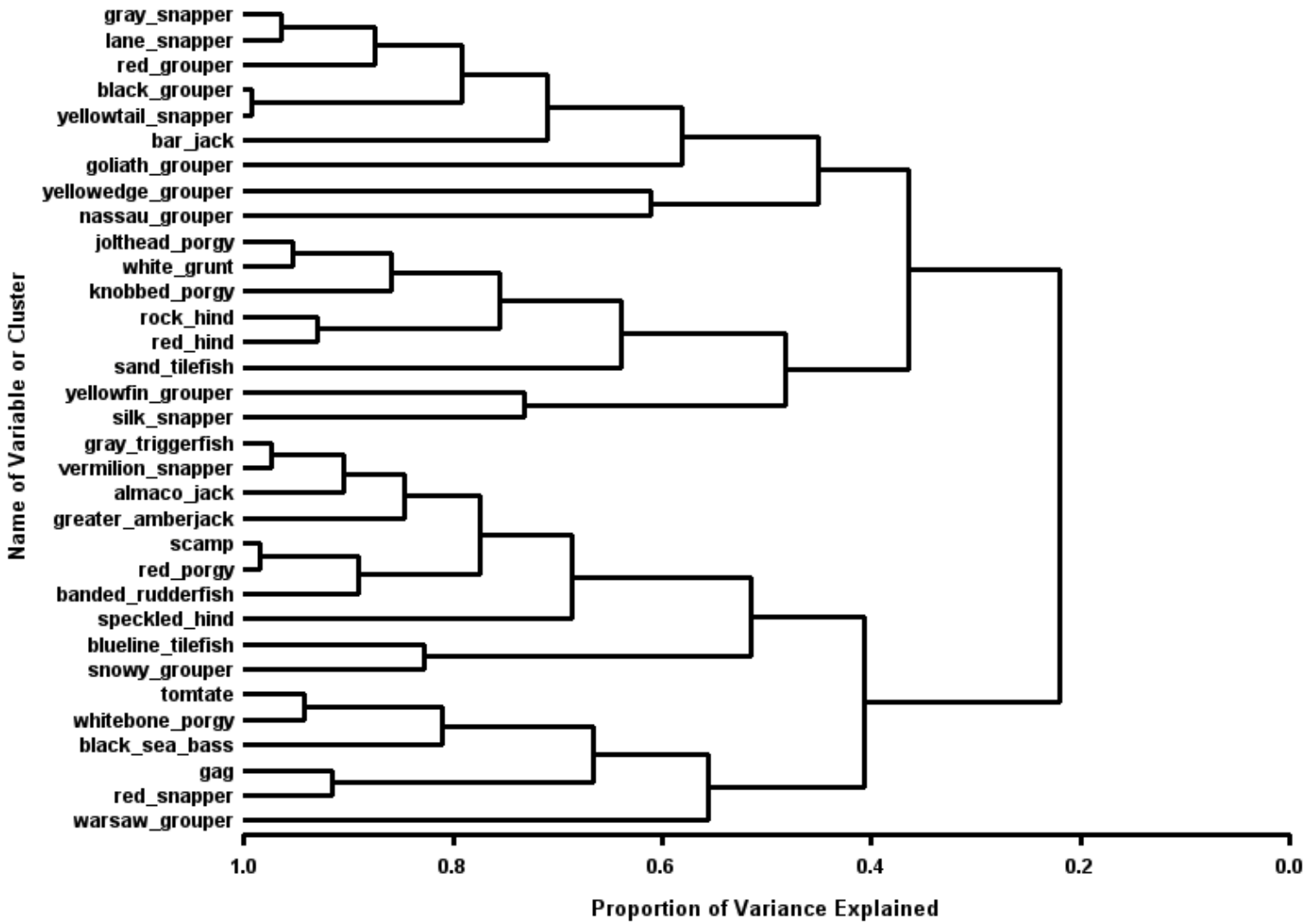


Figure 8. Dimension reduction cluster of landed catch (in numbers) of SAFMC Snapper-Grouper by recreational headboat aggregated by year, month, area, and trip duration (Linkage Method: VARCLUS, Height Measure: Proportion of Variance Explained, Transformation: Root-Root).

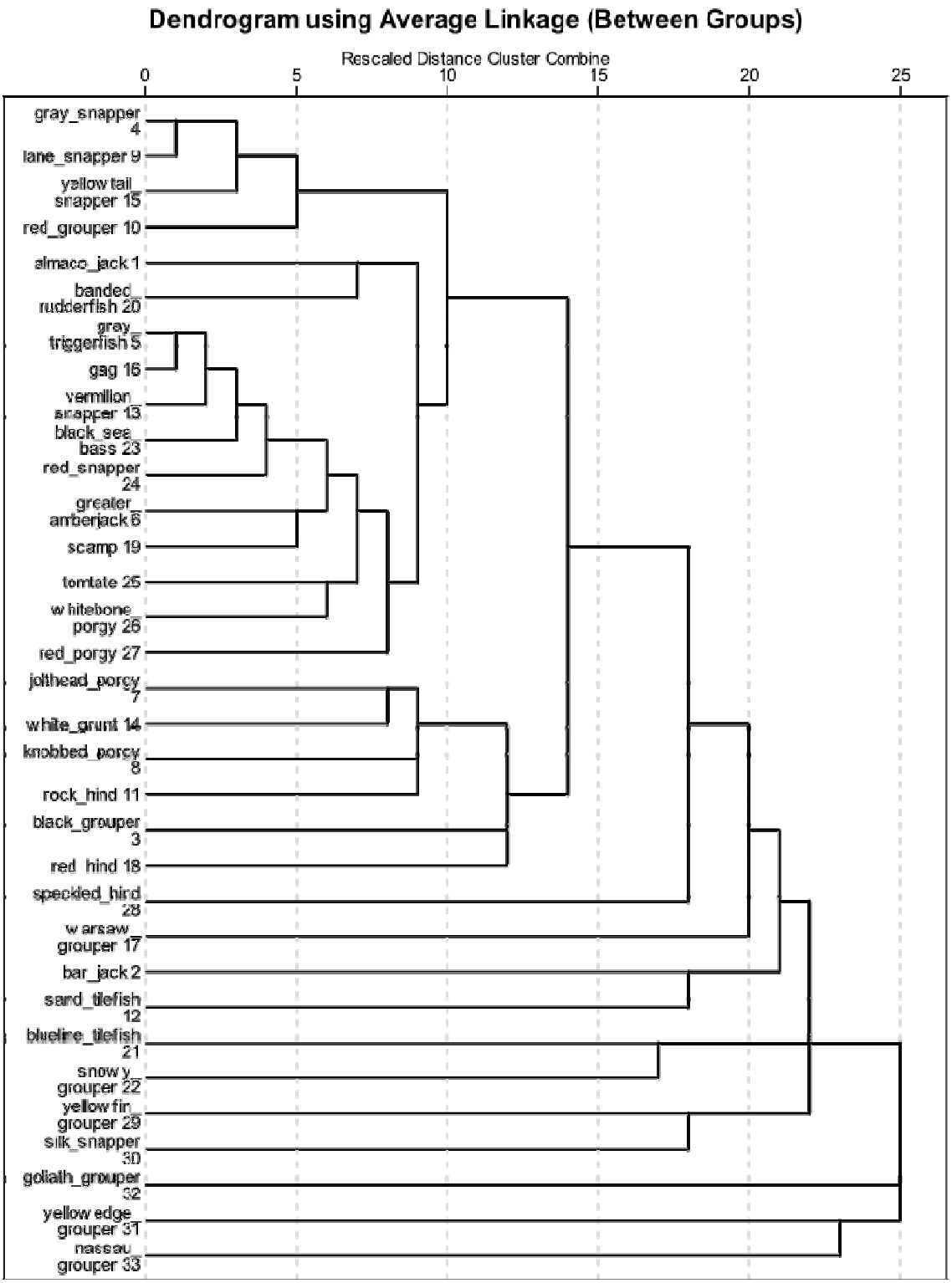


Figure 9. Hierarchical cluster analysis of presence-absence of SAFMC Snapper-Grouper by recreational headboat aggregated by year, month, area, and trip duration (Linkage Method: Between Groups Average, Dissimilarity Measure: Sørenson, Transformation: Binary). Numbers denote case numbers.

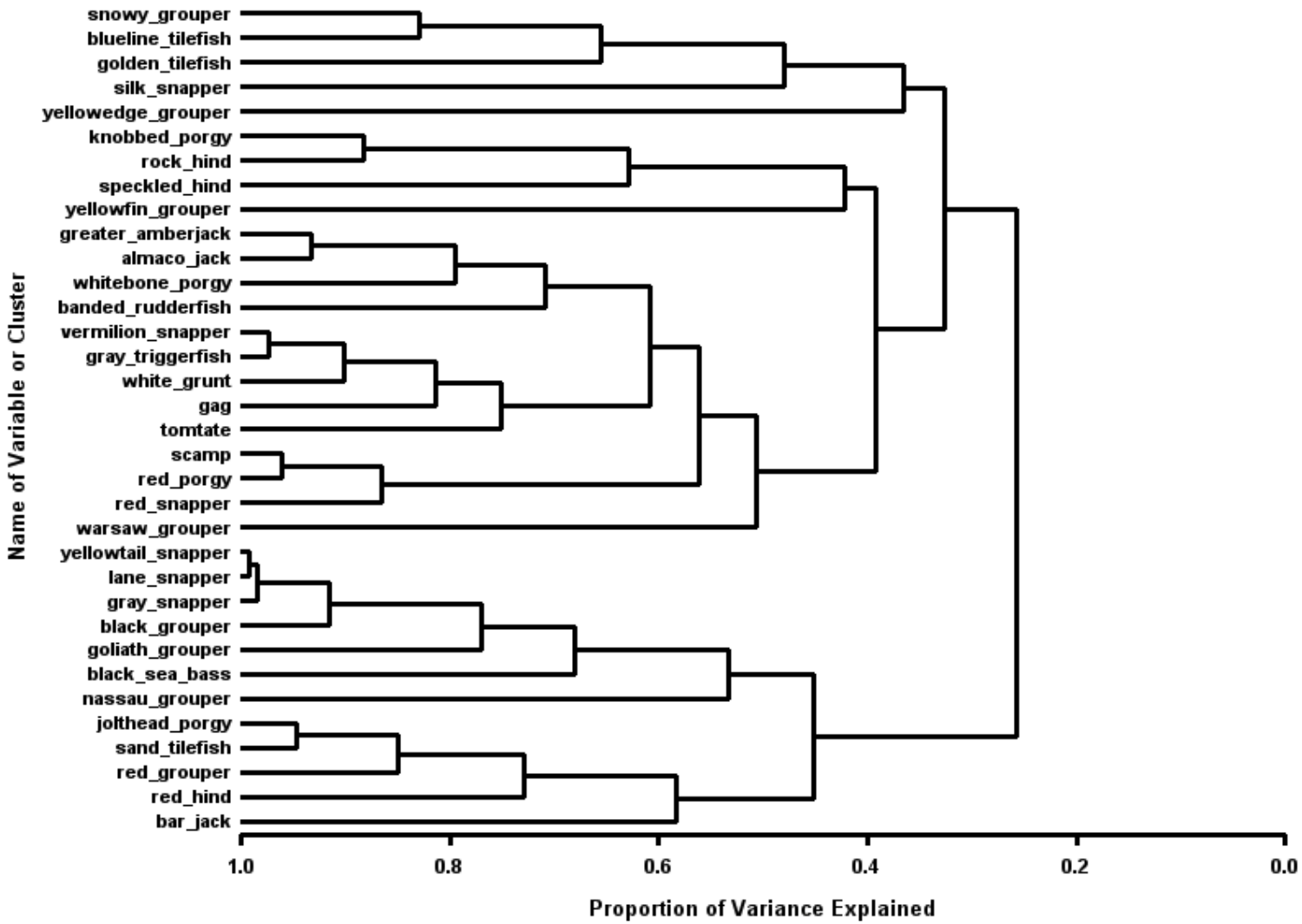


Figure 10. Dimension reduction cluster of species presence-absence in SAFMC Snapper-Grouper recreational MRFSS-reported landings aggregated by state, year, wave, mode of fishing, and area fished (Linkage Method: VARCLUS, Height Measure: Proportion of Variance Explained, Transformation: Binary).

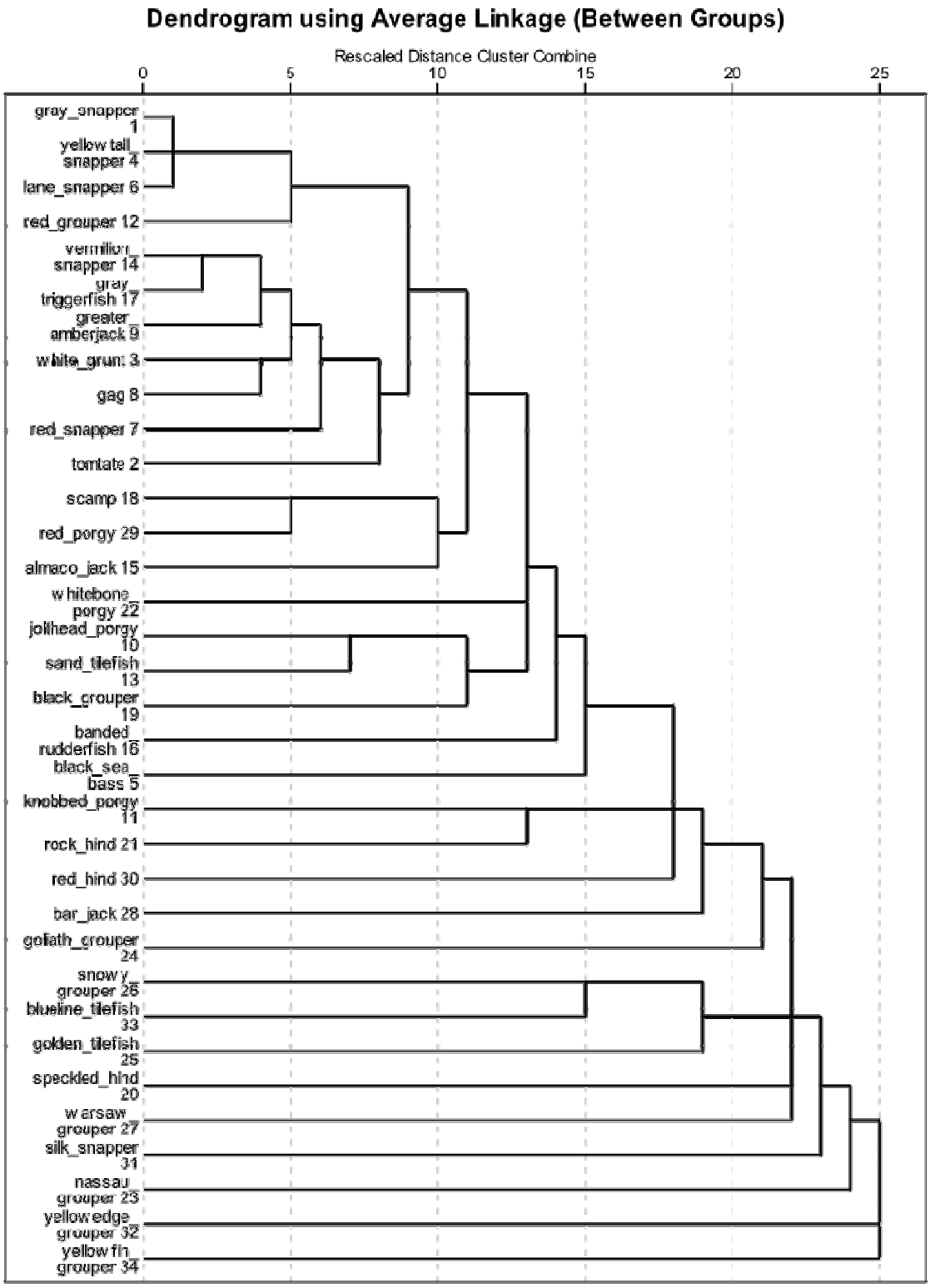


Figure 11. Hierarchical cluster analysis of species presence-absence in MRFSS-reported landings aggregated by state, year, wave, mode of fishing, and area fished (Linkage Method: Between Groups Average, Dissimilarity Measure: Sørenson, Transformation: Binary). Numbers denote case numbers.

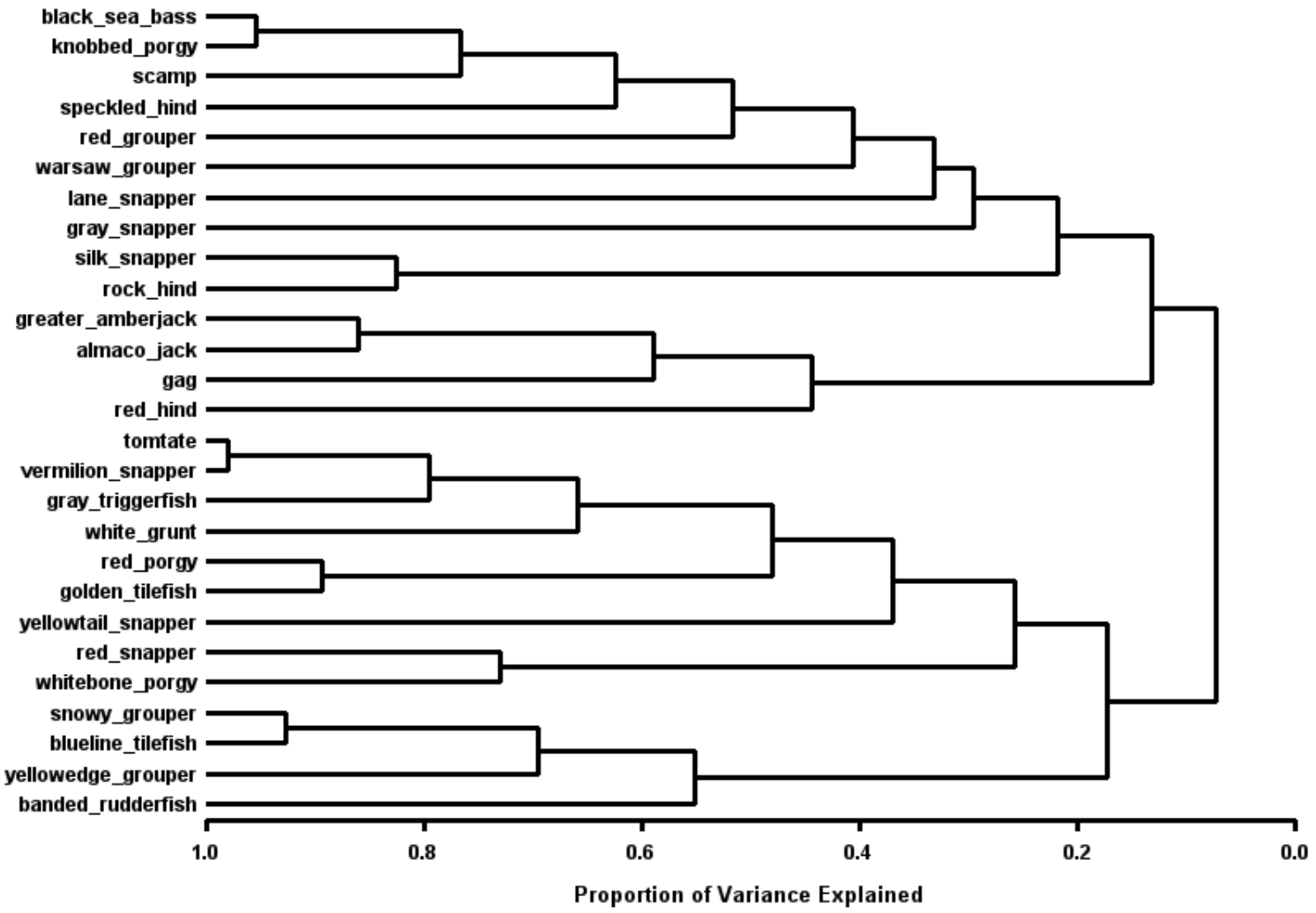
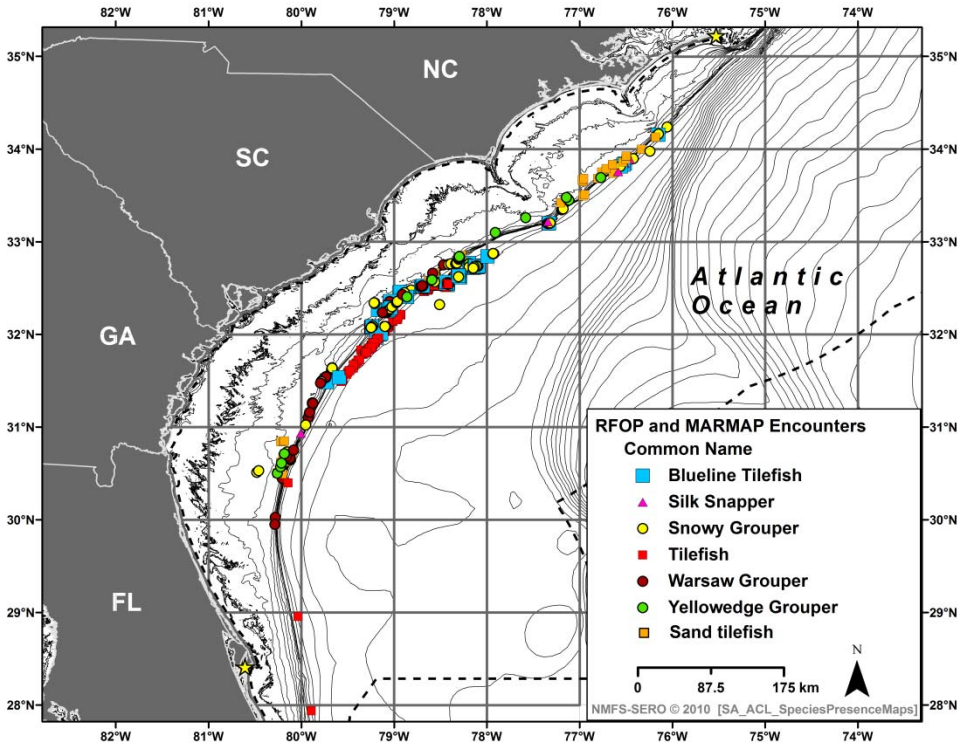
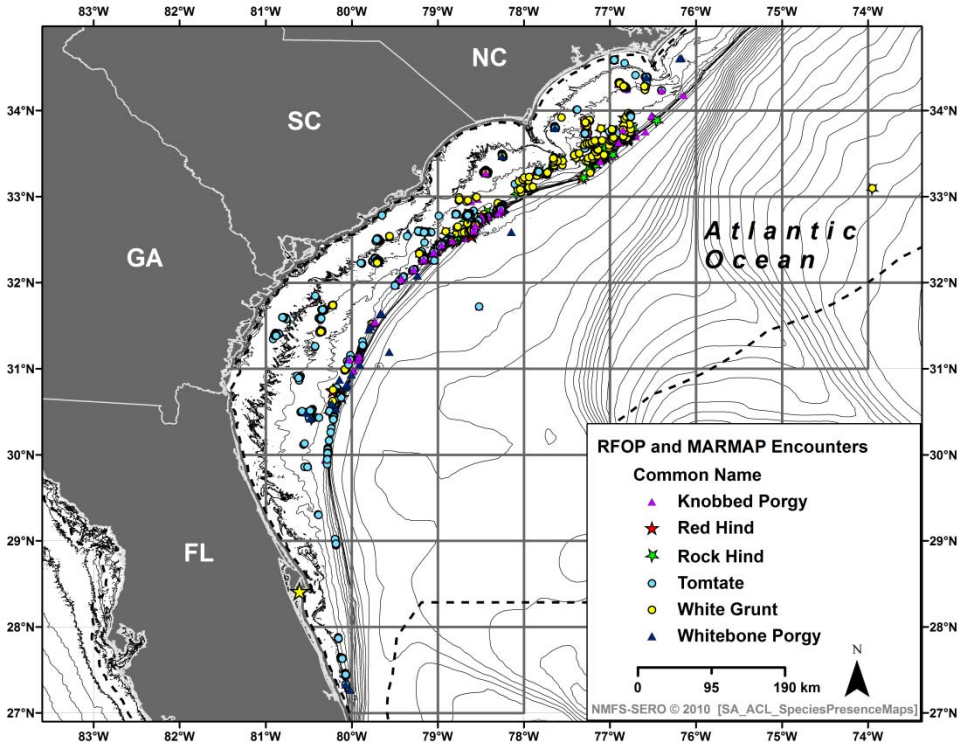


Figure 12. Hierarchical cluster analysis of species presence-absence in MARMAP scientific sample catch aggregated by gear and set (Linkage Method: VARCLUS, Height Measure: Proportion of variance explained, Transformation: Binary).

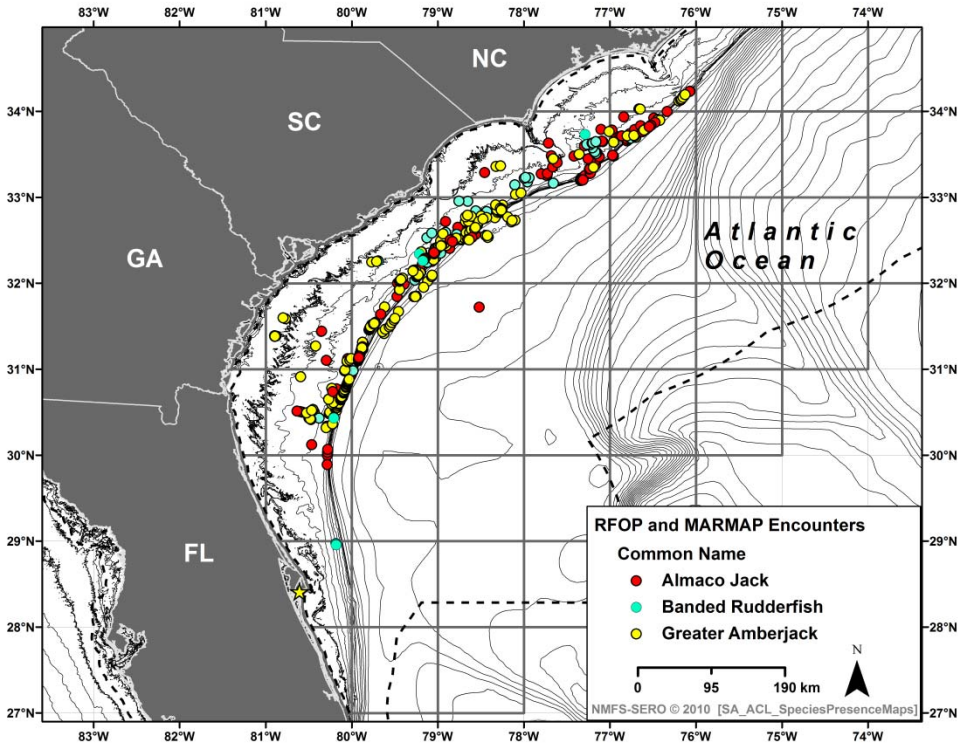


A)

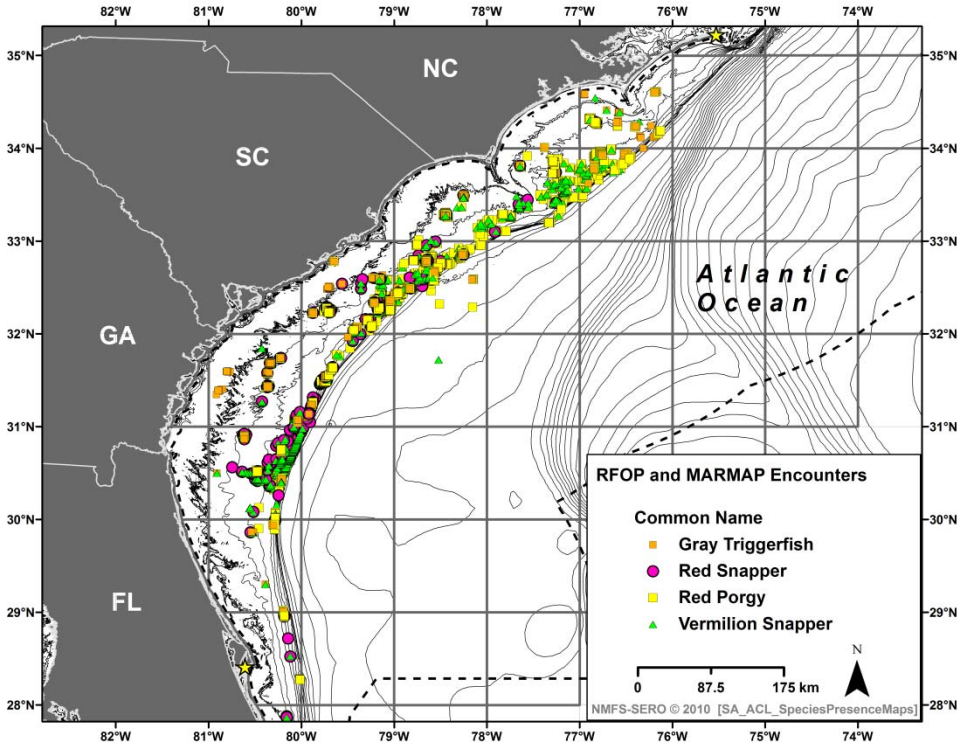


B)

Figure 13. Map of A) deep-water grouper and tilefish and B) porgy, hind, and grunt observations from aggregated MARMAP and Reef Fish Observer Program datasets relative to bathymetry and commercial fishery statistical reporting areas in U.S. southern Atlantic Ocean (Port Canaveral, FL denoted by star).

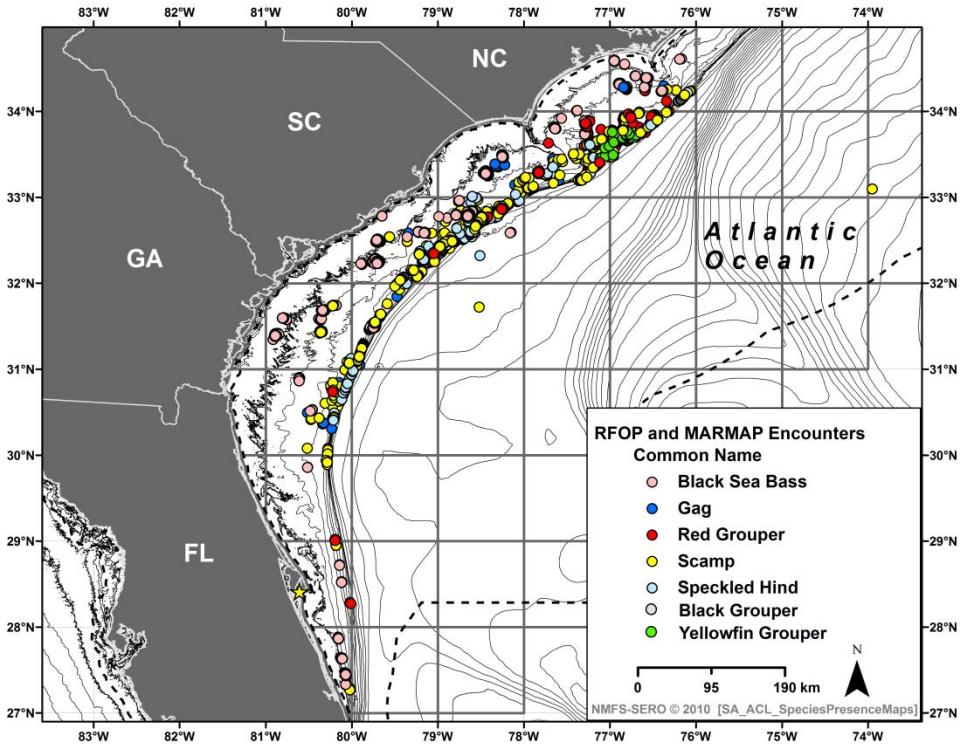


A)

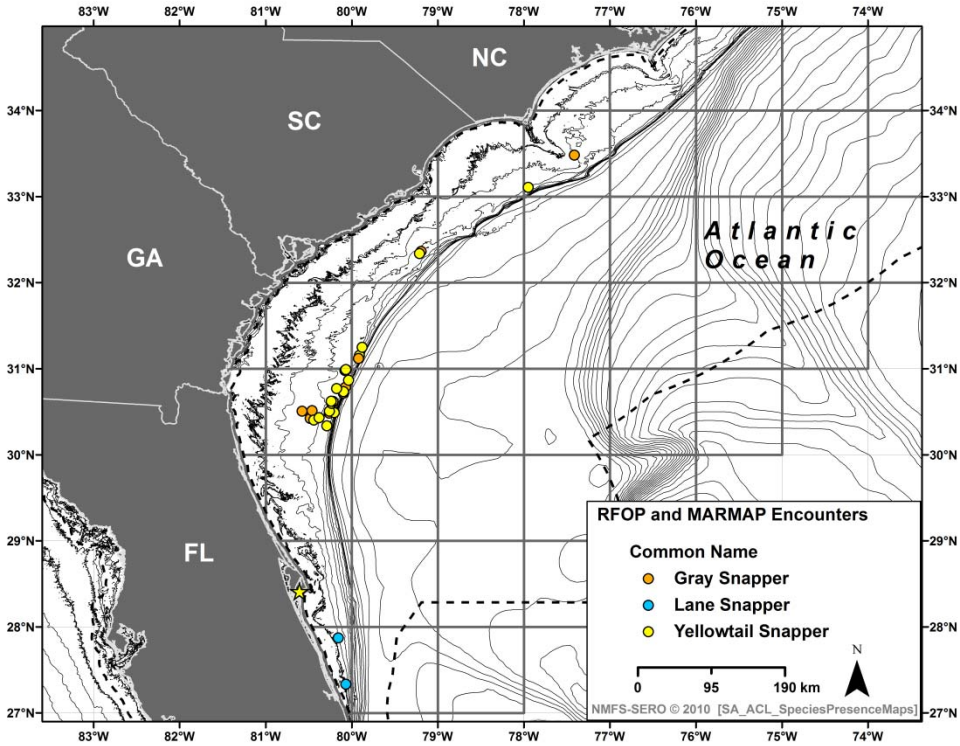


B)

Figure 14. Map of A) jacks and B) mid-depth species observations from aggregated MARMAP and Reef Fish Observer Program datasets relative to bathymetry and commercial fishery statistical reporting areas in U.S. southern Atlantic Ocean (Port Canaveral, FL denoted by star).



A)



B)

Figure 15. Map of A) shallow-water grouper and B) shallow-water snapper observations from aggregated MARMAP and Reef Fish Observer Program datasets relative to bathymetry and commercial fishery statistical reporting areas in U.S. southern Atlantic Ocean (Port Canaveral, FL denoted by star).

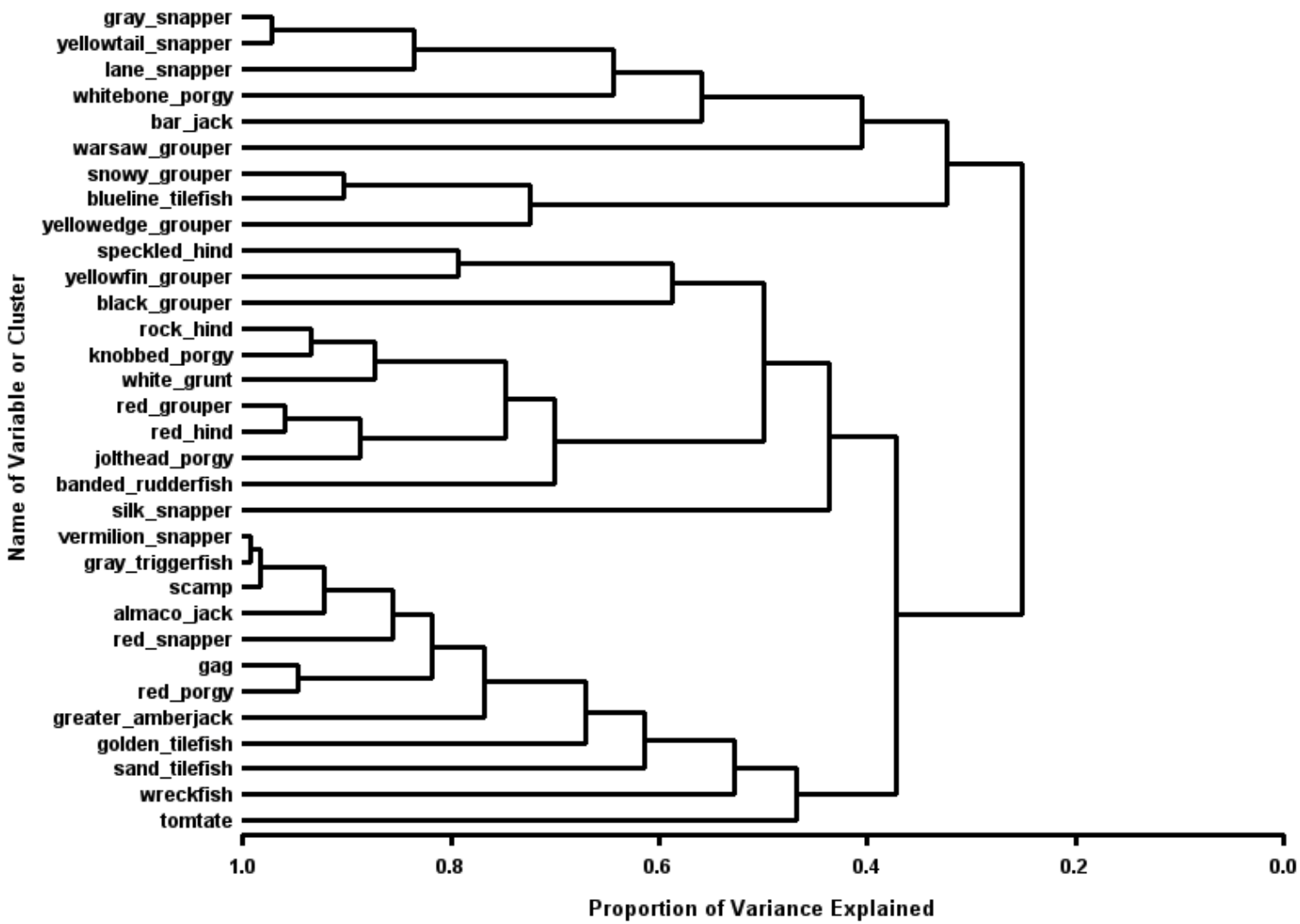


Figure A1. Commercial vertical line dimension reduction dendrogram (Transformation: Root-Root).

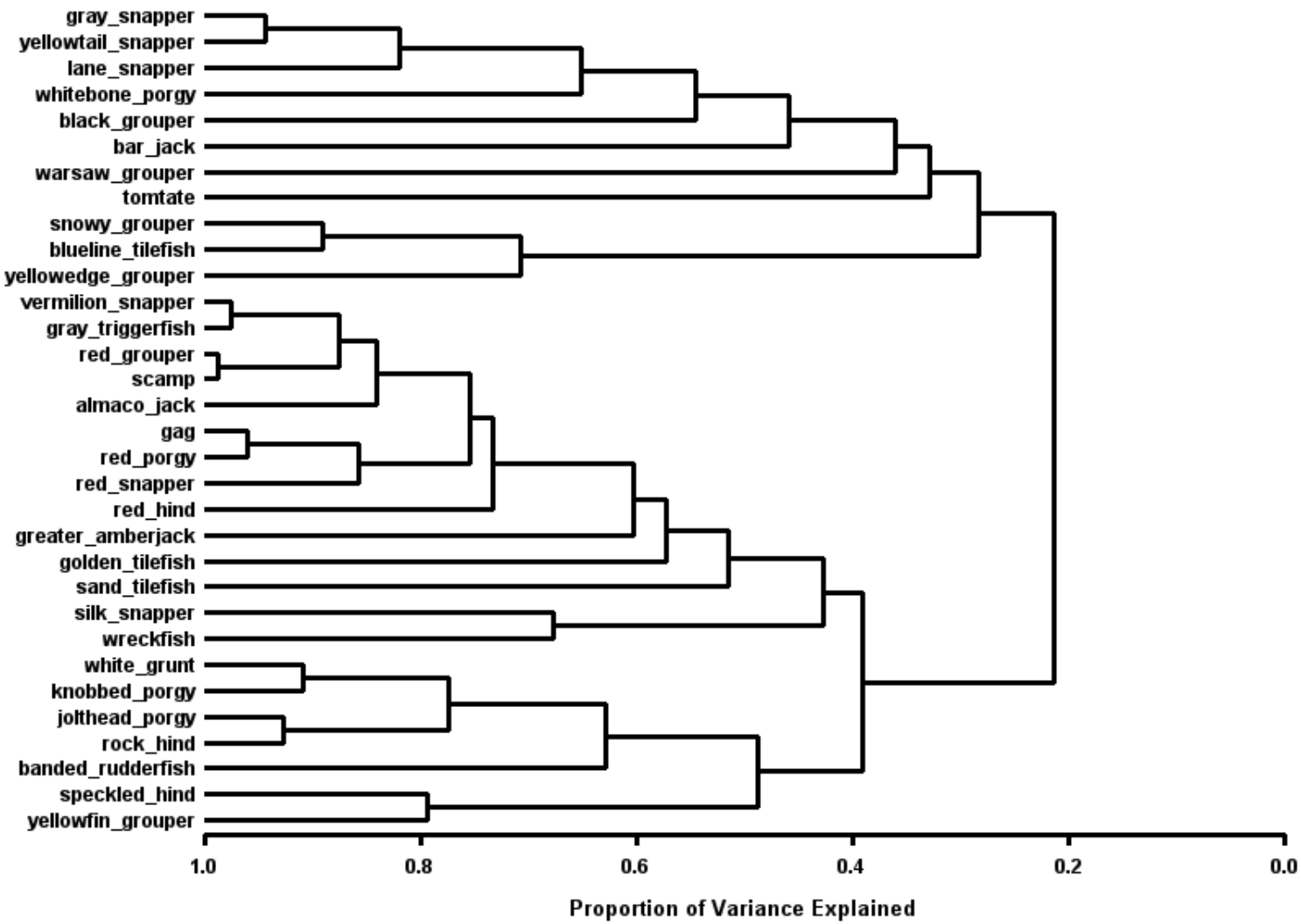


Figure A2. Commercial vertical line dimension reduction dendrogram (Transformation: Binary).

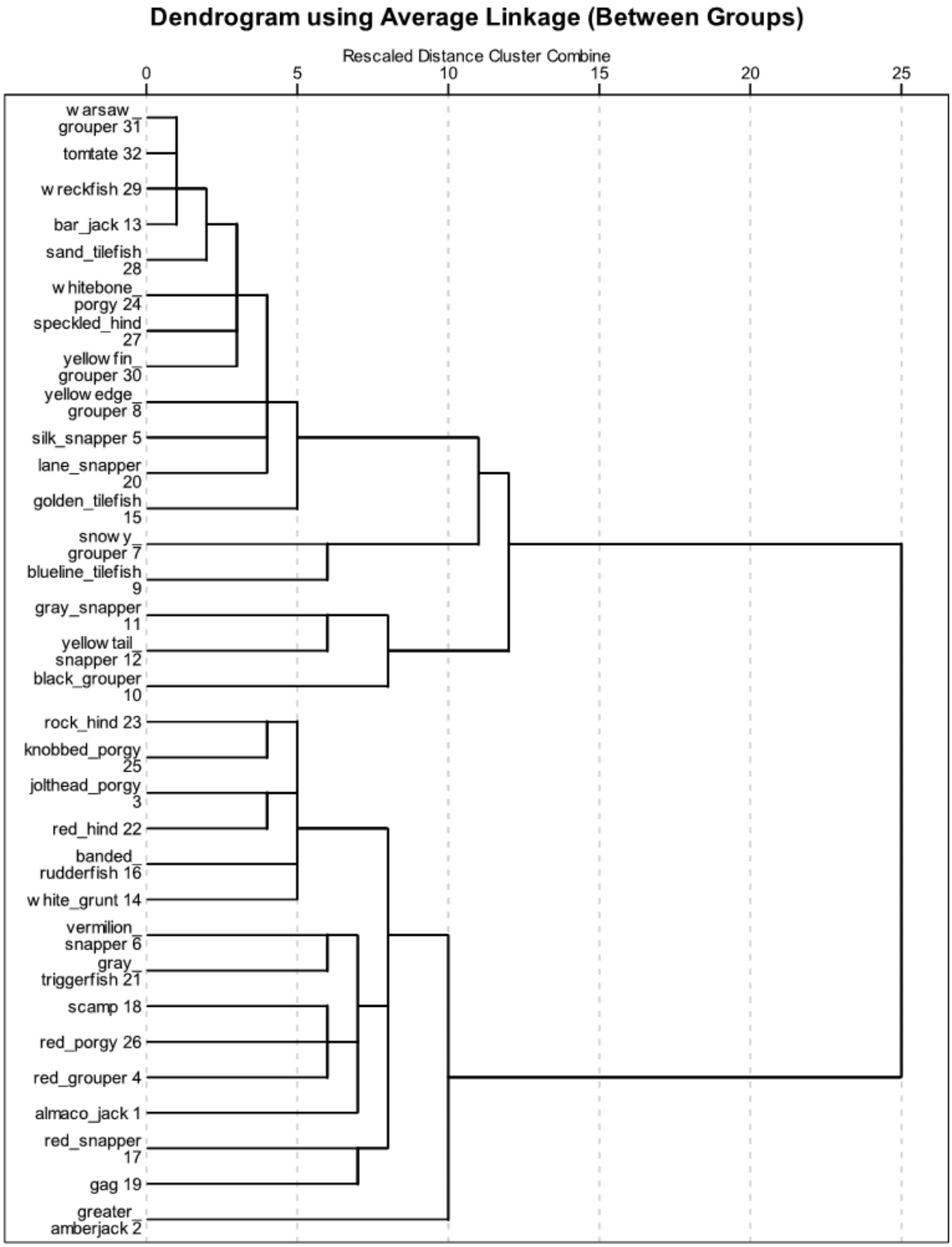


Figure A3. Commercial vertical line hierarchical cluster analysis dendrogram (Linkage: Ward, Measure: Chi-Square, Transformation: Root-Root).

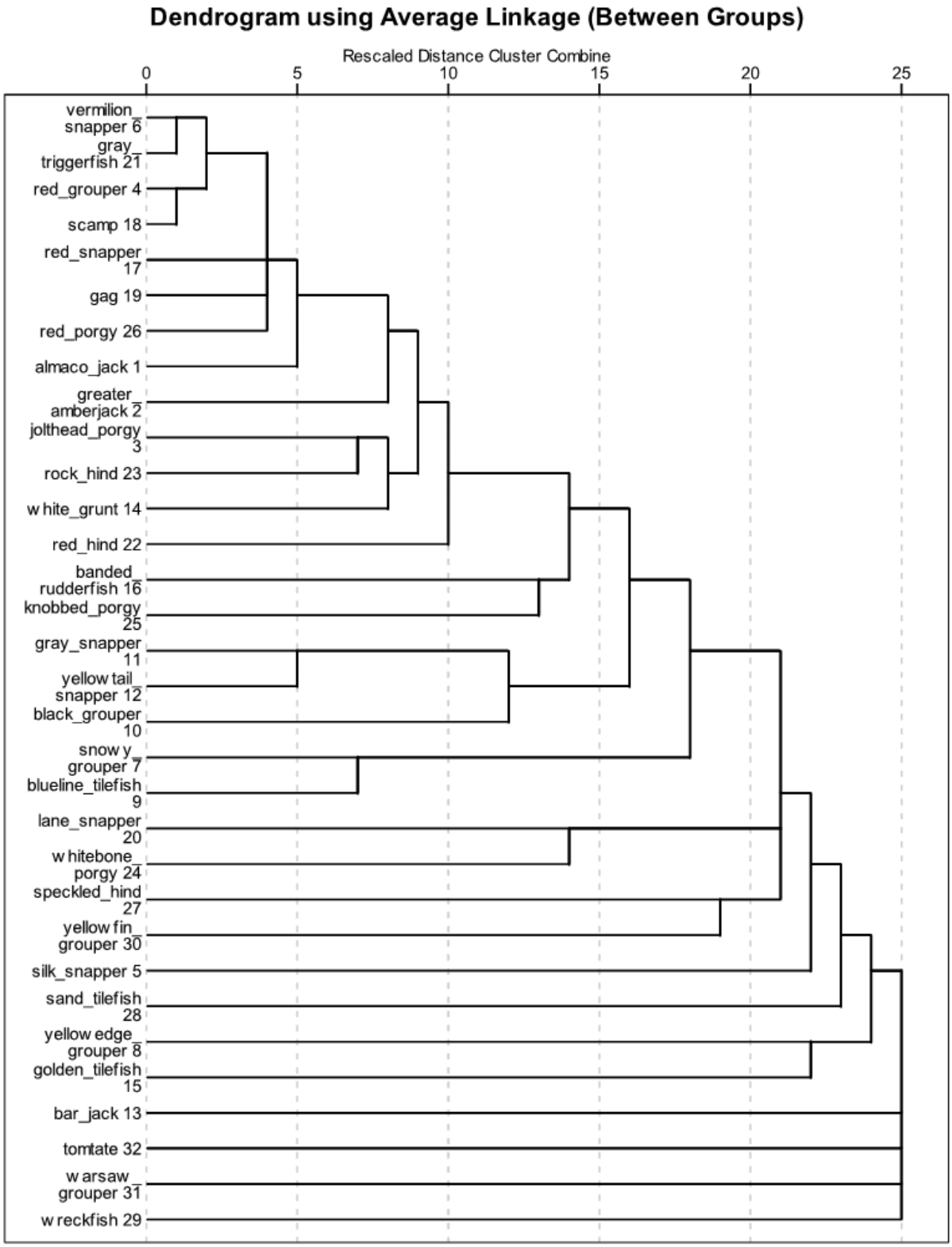


Figure A4. Commercial vertical line hierarchical cluster analysis dendrogram (Linkage: Average, Measure: Sorenson, Transformation: Binary).

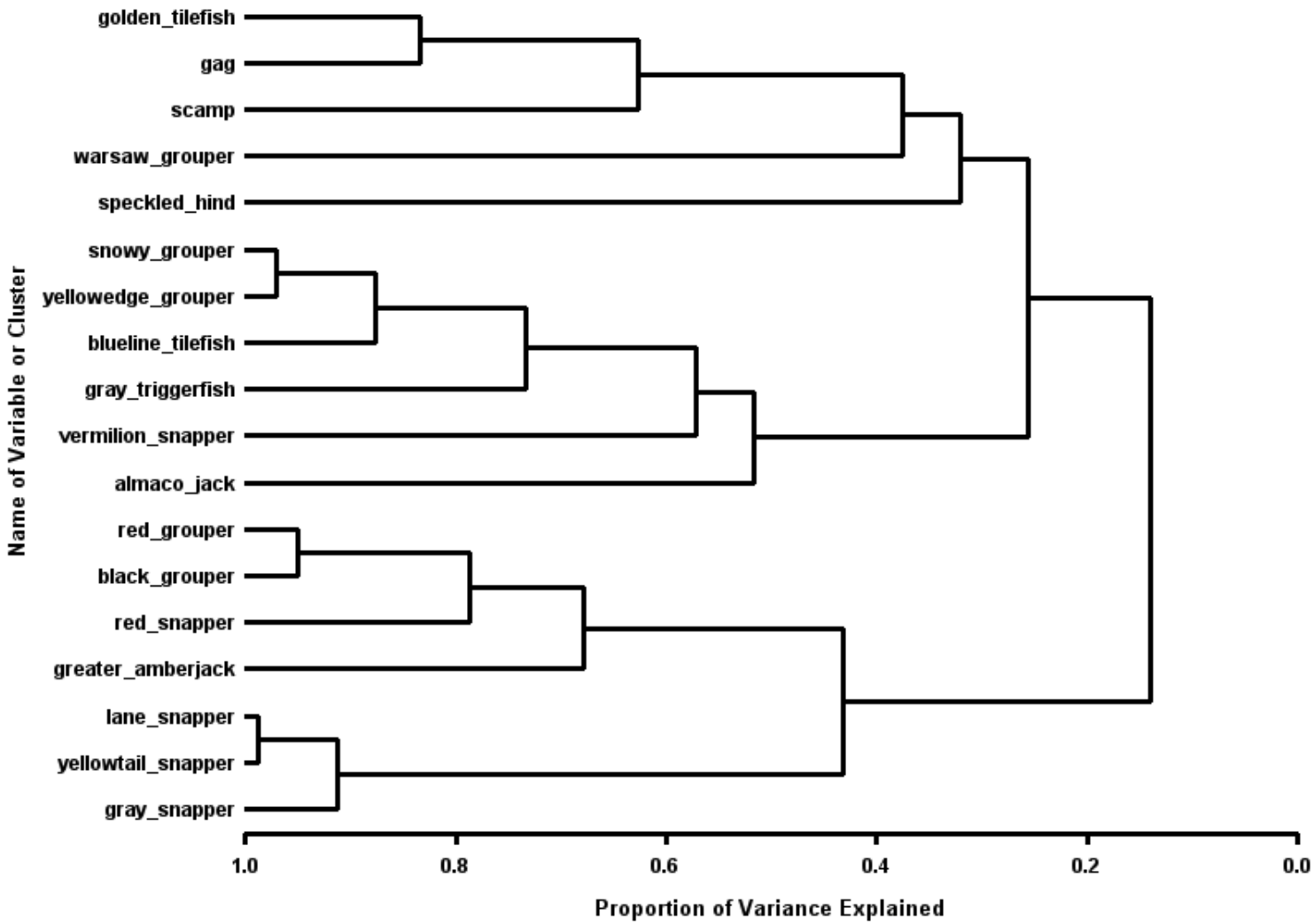


Figure A5. Commercial longline dimension reduction dendrogram (Transformation: Root-Root).

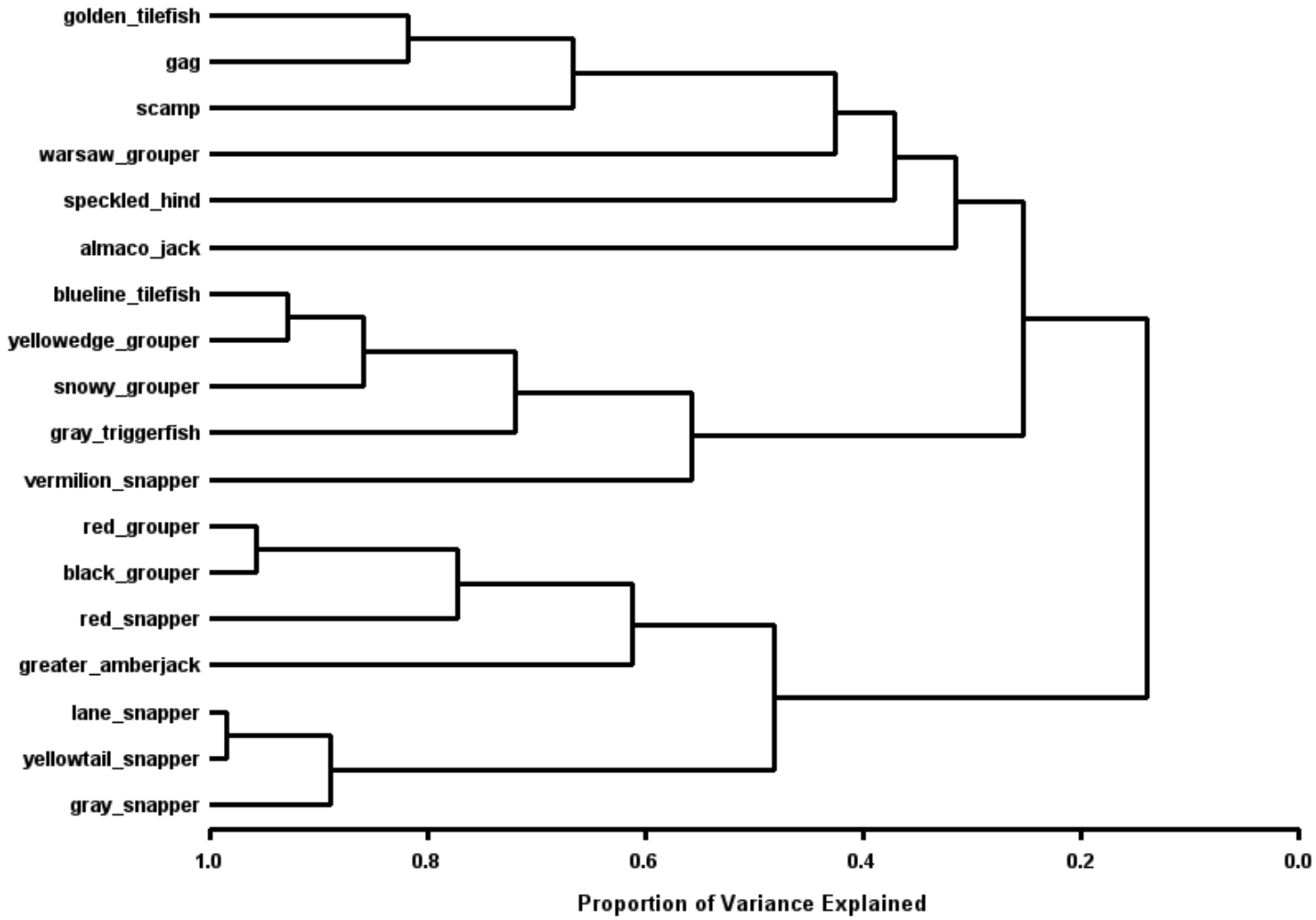


Figure A6. Commercial longline dimension reduction dendrogram (Transformation: Binary).

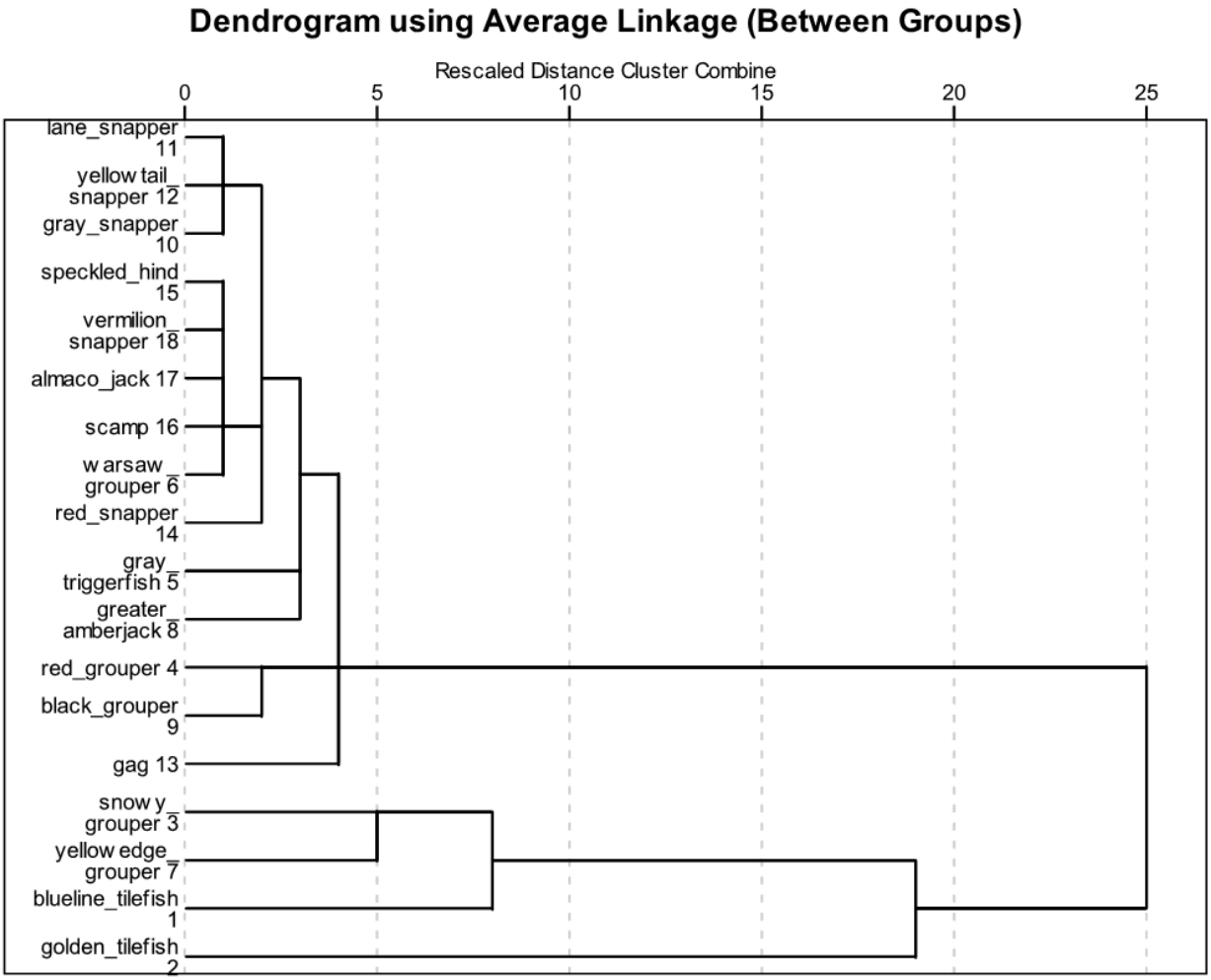


Figure A7. Commercial longline hierarchical cluster analysis dendrogram (Linkage: Ward, Measure: Chi-Square, Transformation: Root-Root).

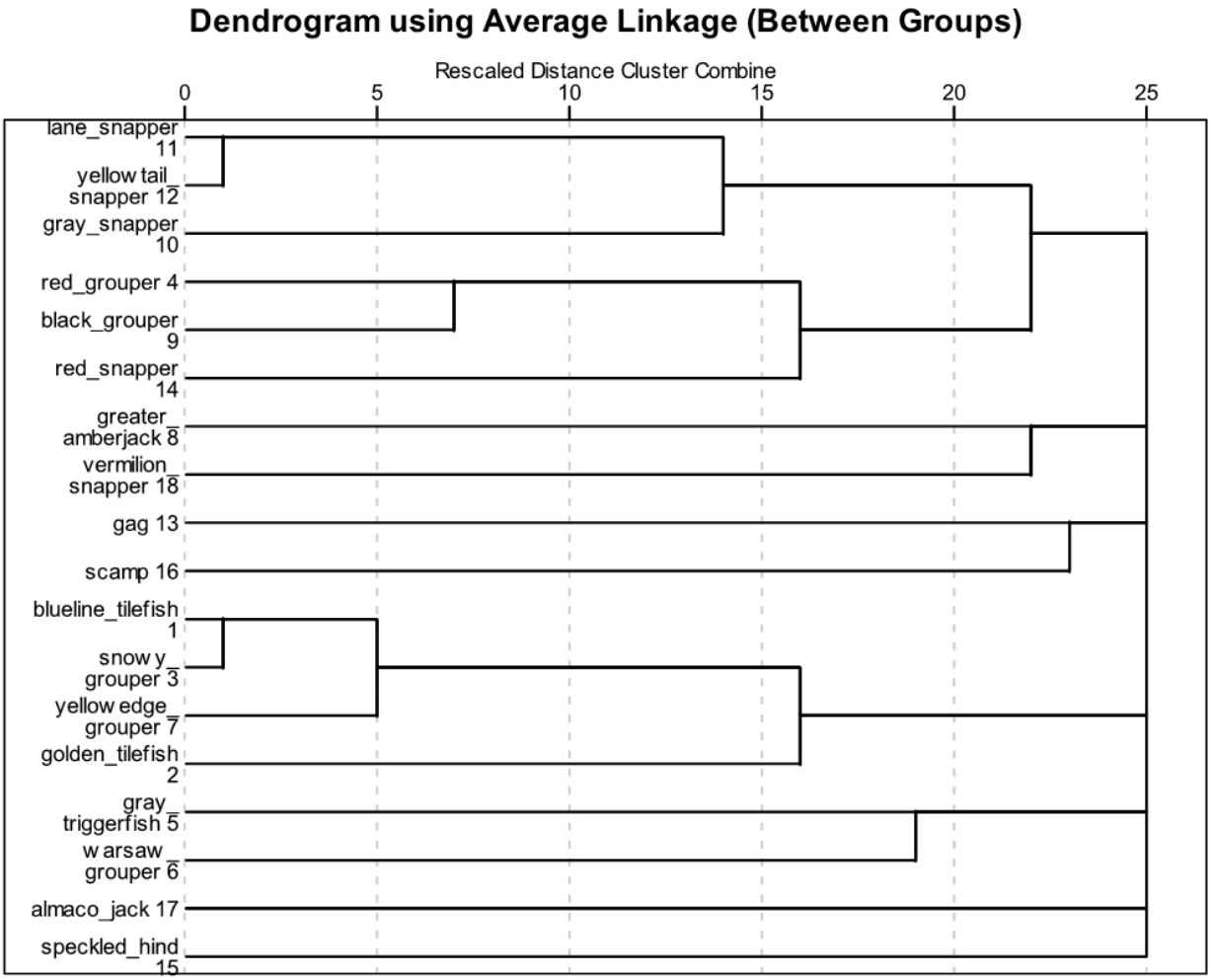


Figure A8. Commercial longline hierarchical cluster analysis dendrogram (Linkage: Average, Measure: Sorenson, Transformation: Binary).

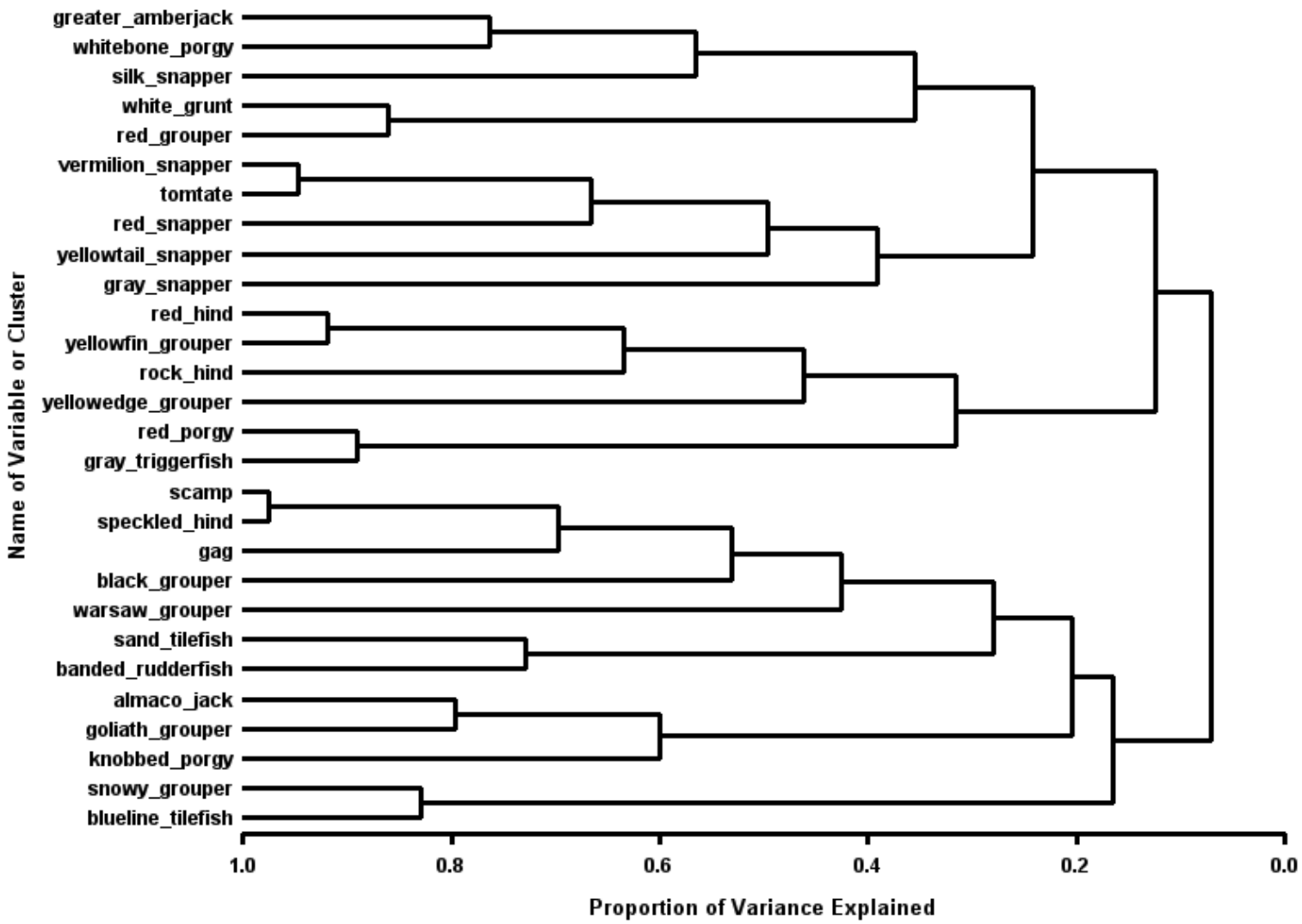


Figure A9. Commercial RFOP dimension reduction dendrogram (Transformation: Root-Root).

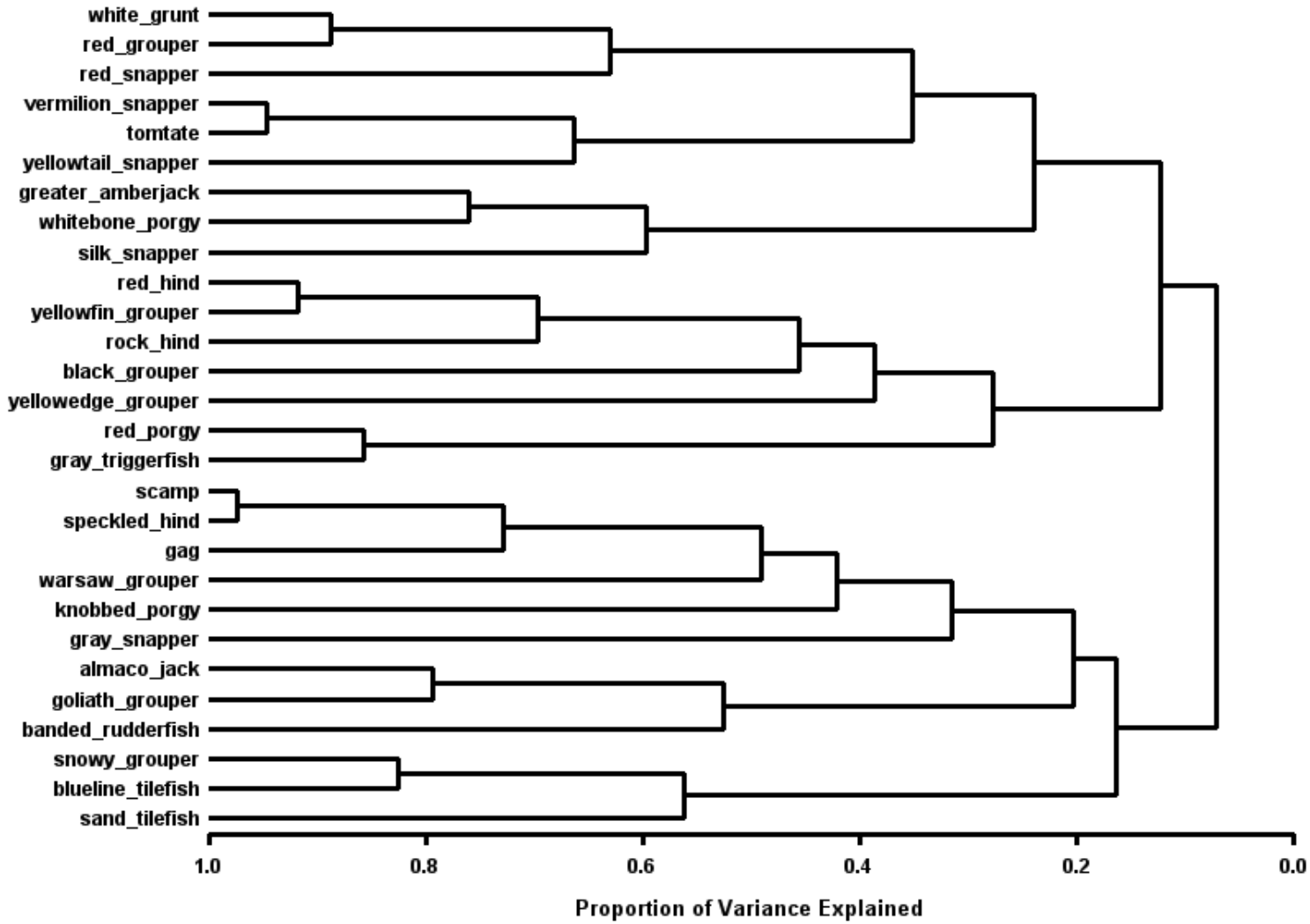


Figure A10. Commercial RFOP dimension reduction dendrogram (Transformation: Binary).

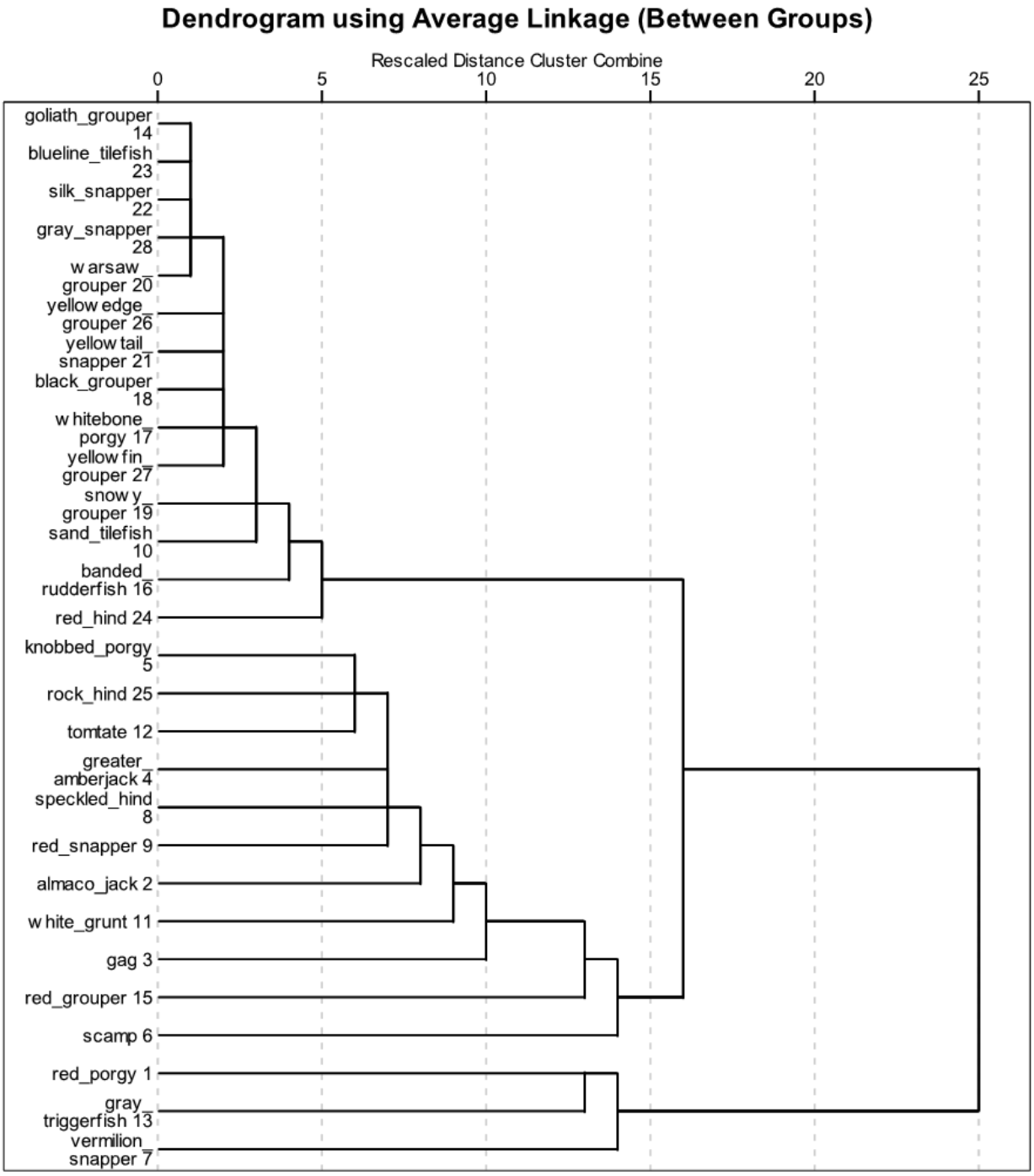


Figure A11. Commercial RFOP hierarchical cluster analysis dendrogram (Linkage: Ward, Measure: Chi-Square, Transformation: Root-Root).

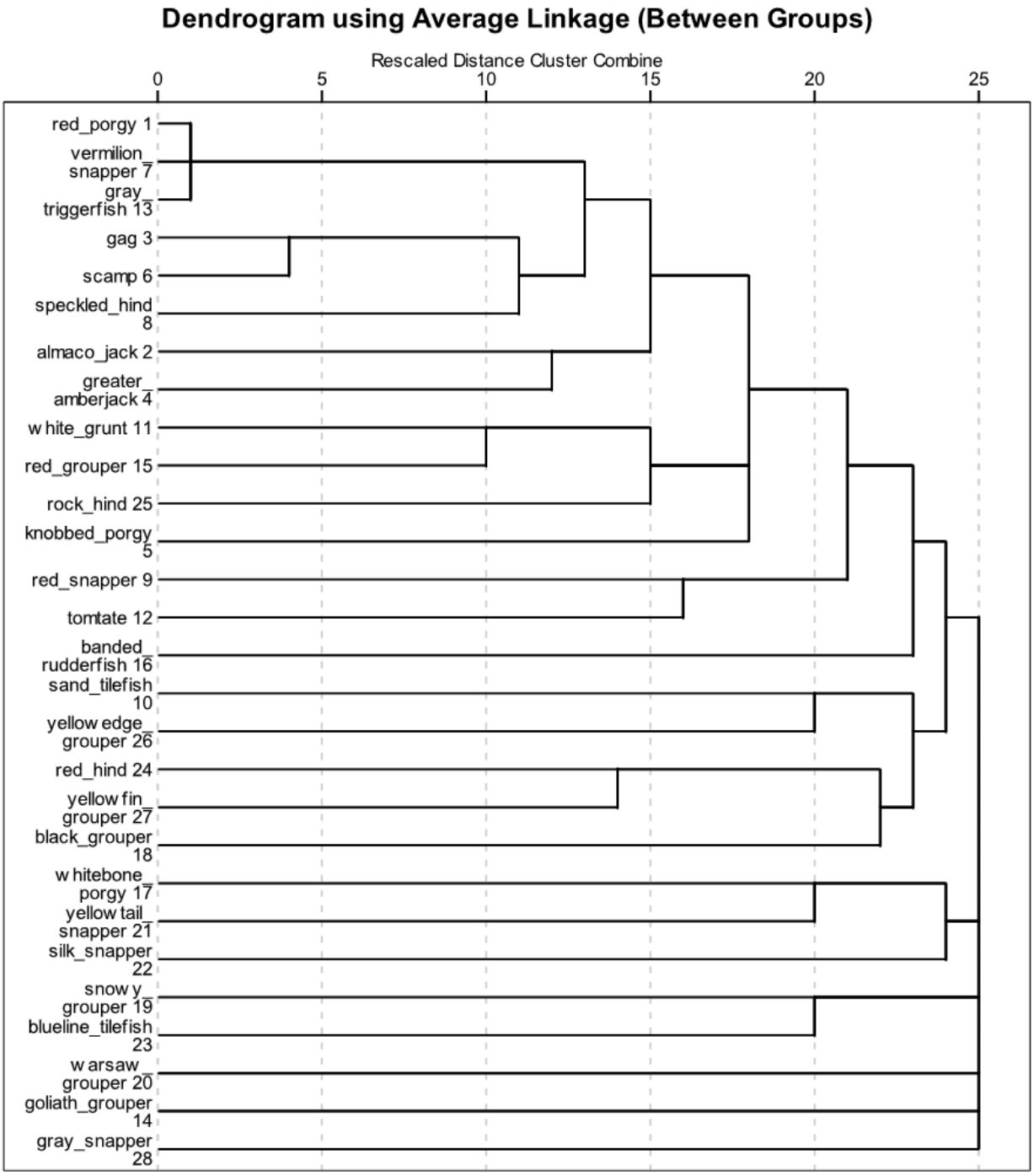


Figure A12. Commercial reef fish observer hierarchical cluster analysis dendrogram (Linkage: Average, Measure: Sorenson, Transformation: Binary).

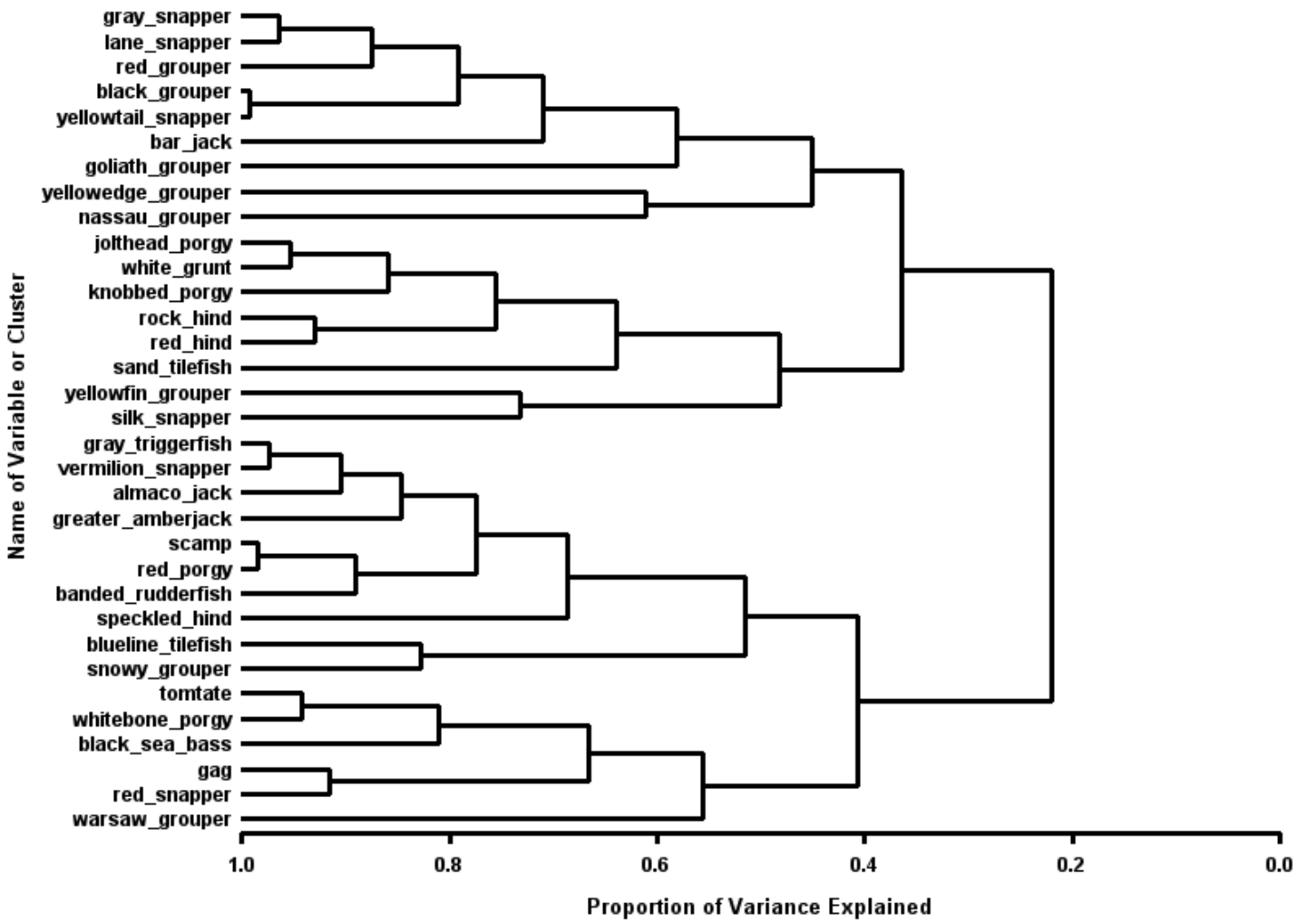


Figure A13. Headboat dimension reduction dendrogram (Transformation: Root-Root).

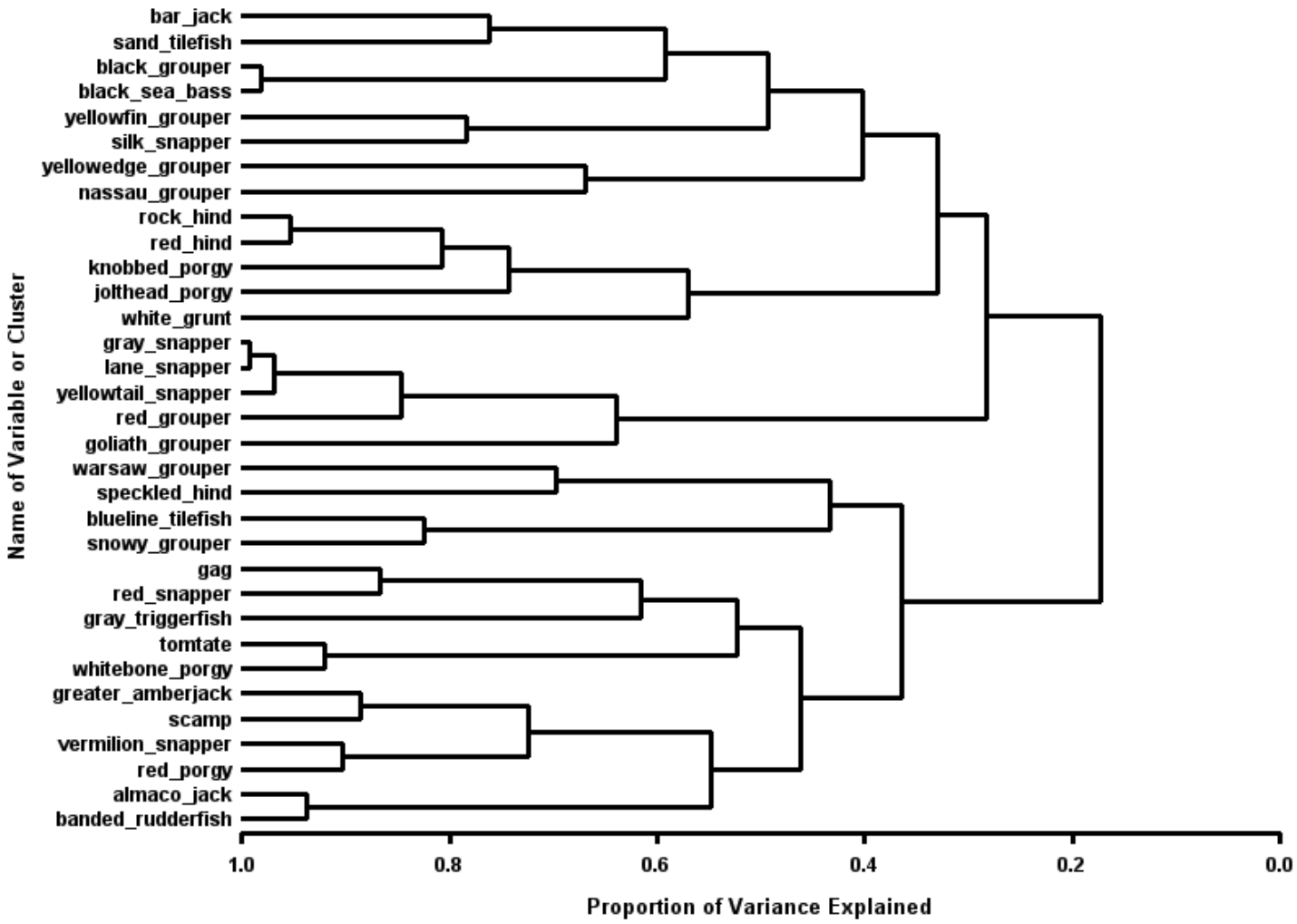


Figure A14. Headboat dimension reduction dendrogram (Transformation: Binary).

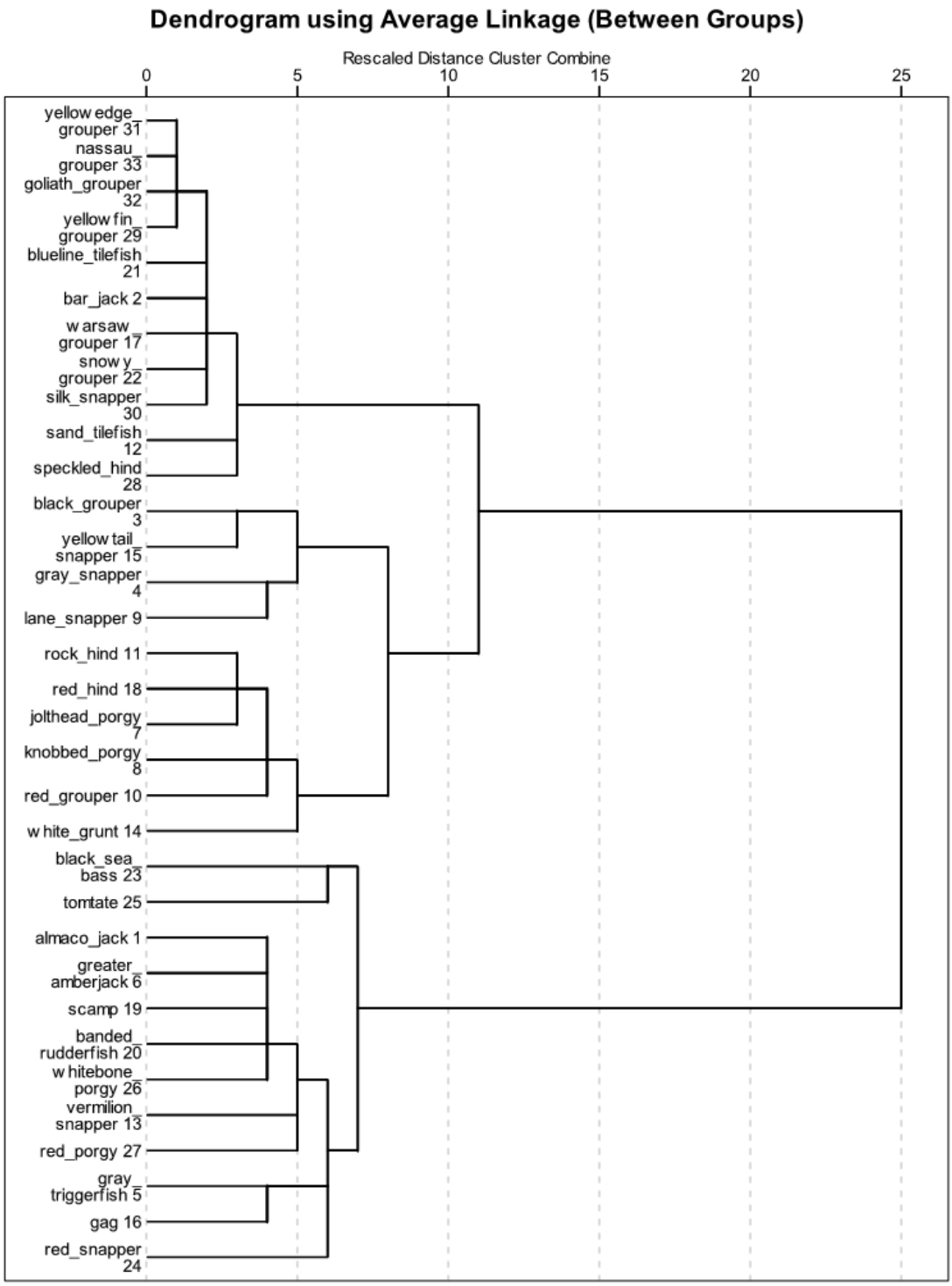


Figure A15. Headboat hierarchical cluster analysis dendrogram (Linkage: Ward, Measure: Chi-Square, Transformation: Root-Root).

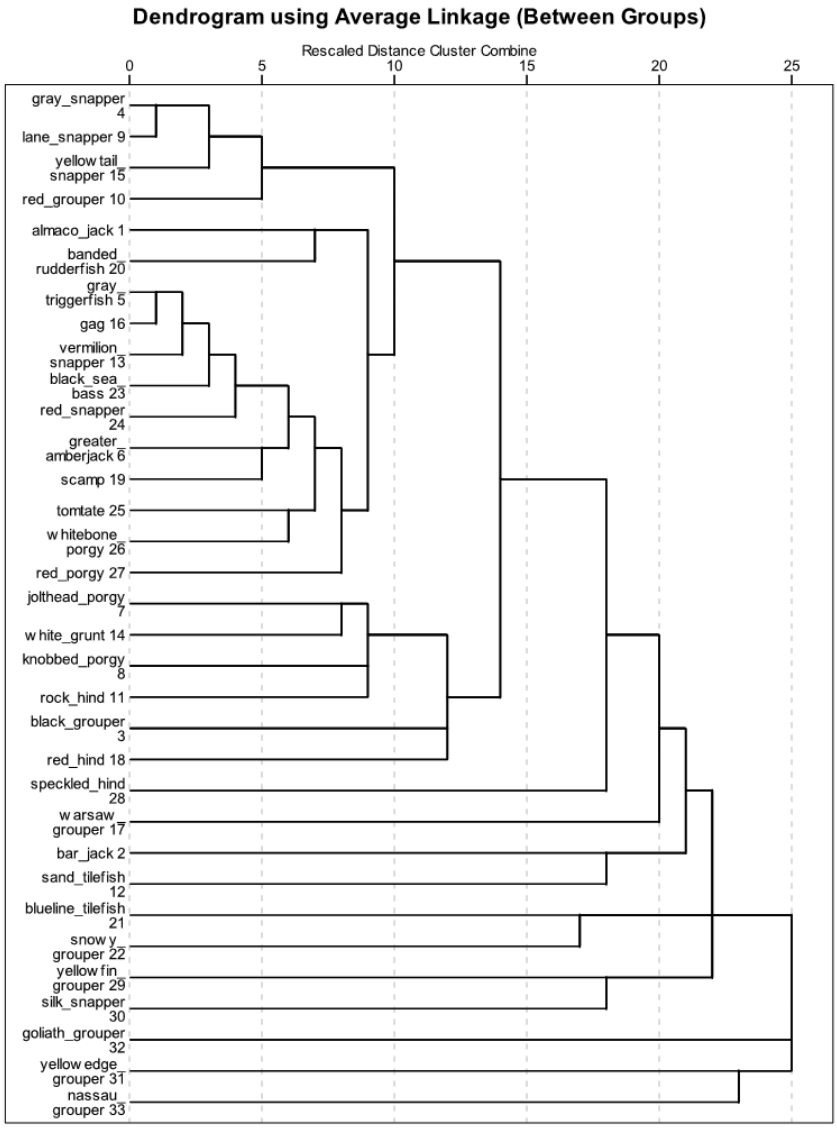


Figure A16. Recreational headboat hierarchical cluster analysis dendrogram (Linkage: Average, Measure: Sorenson, Transformation: Binary).

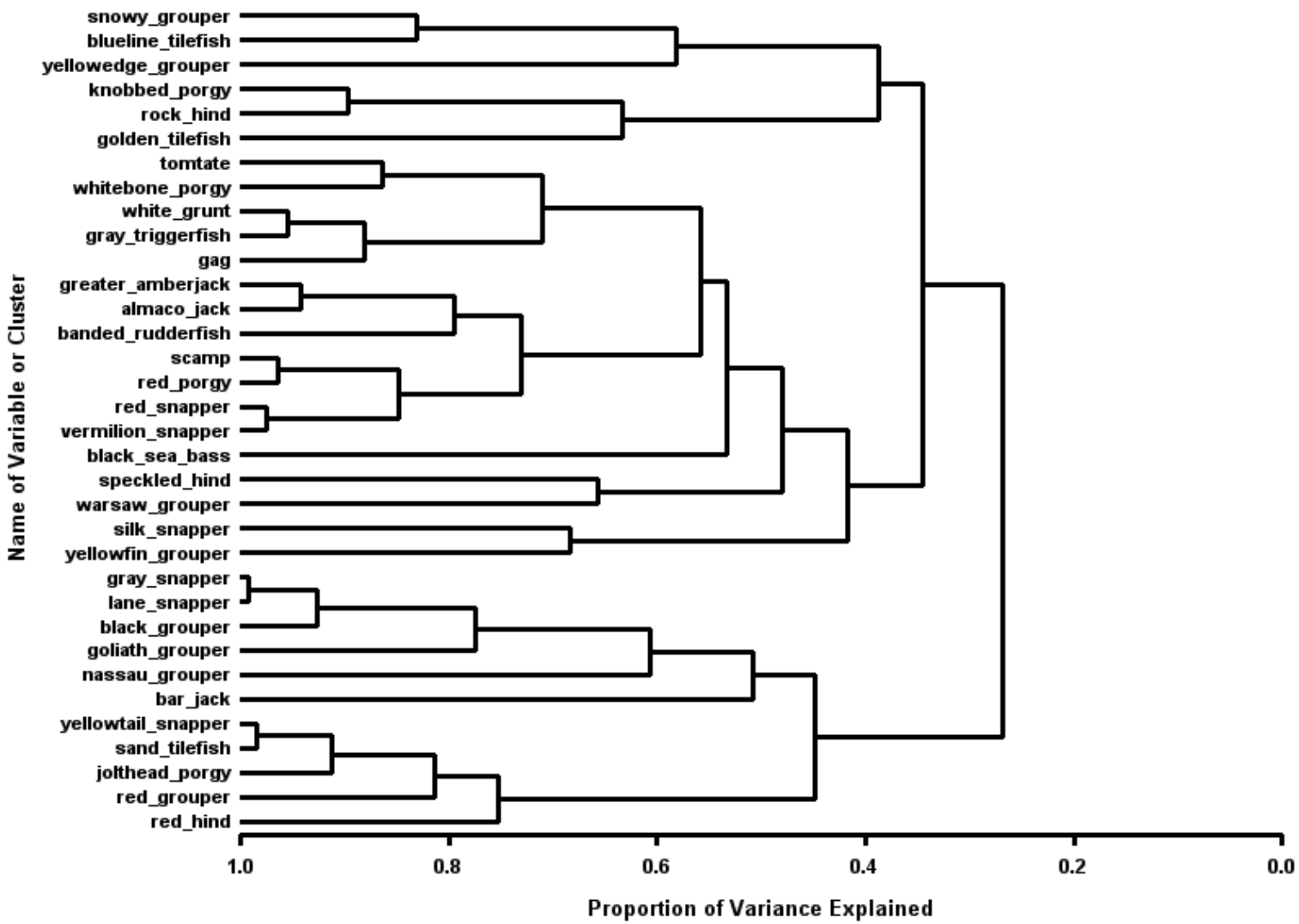


Figure A17. MRFSS dimension reduction dendrogram (Transformation: Root-Root).

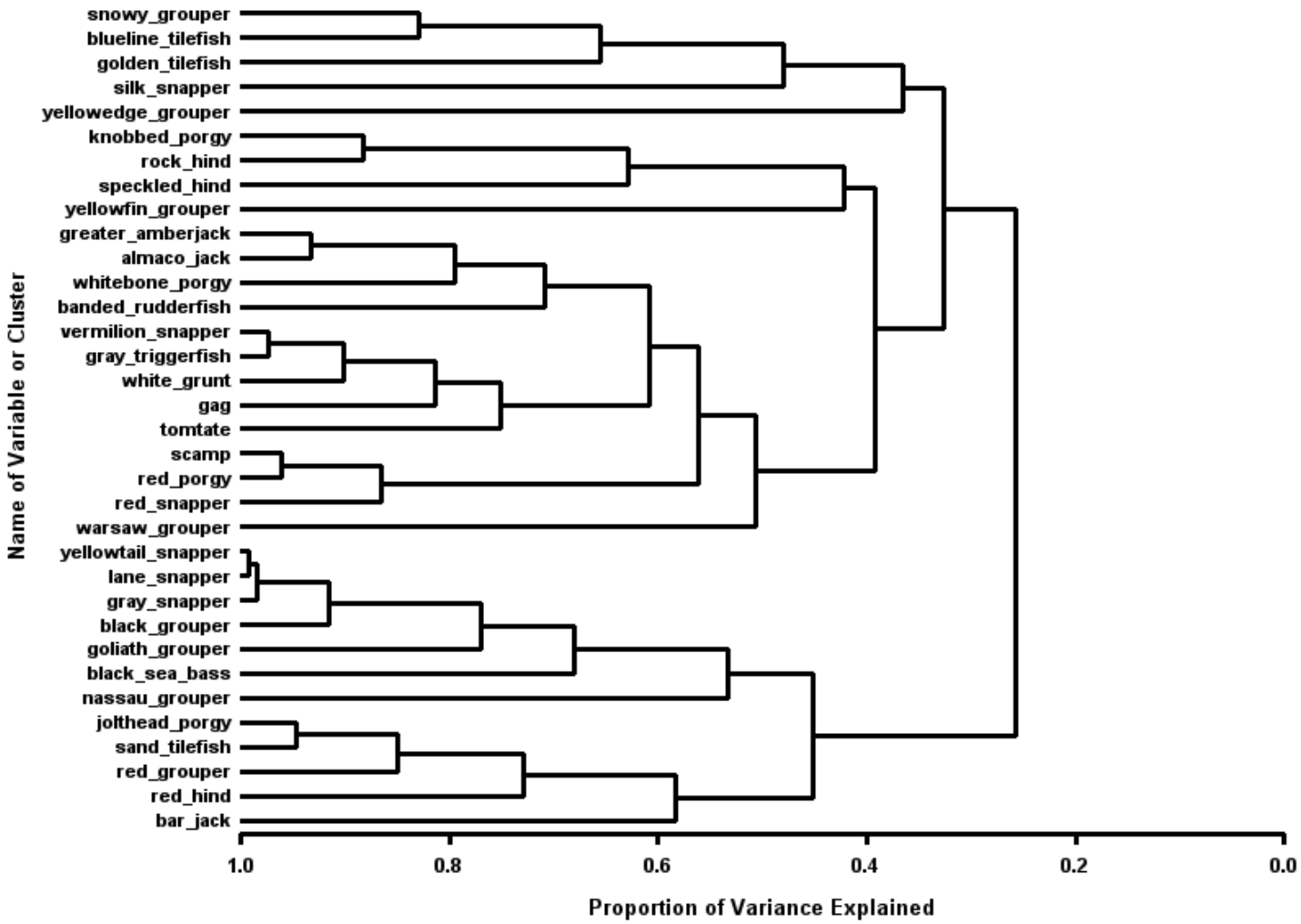


Figure A18. MRFSS dimension reduction dendrogram (Transformation: Binary).

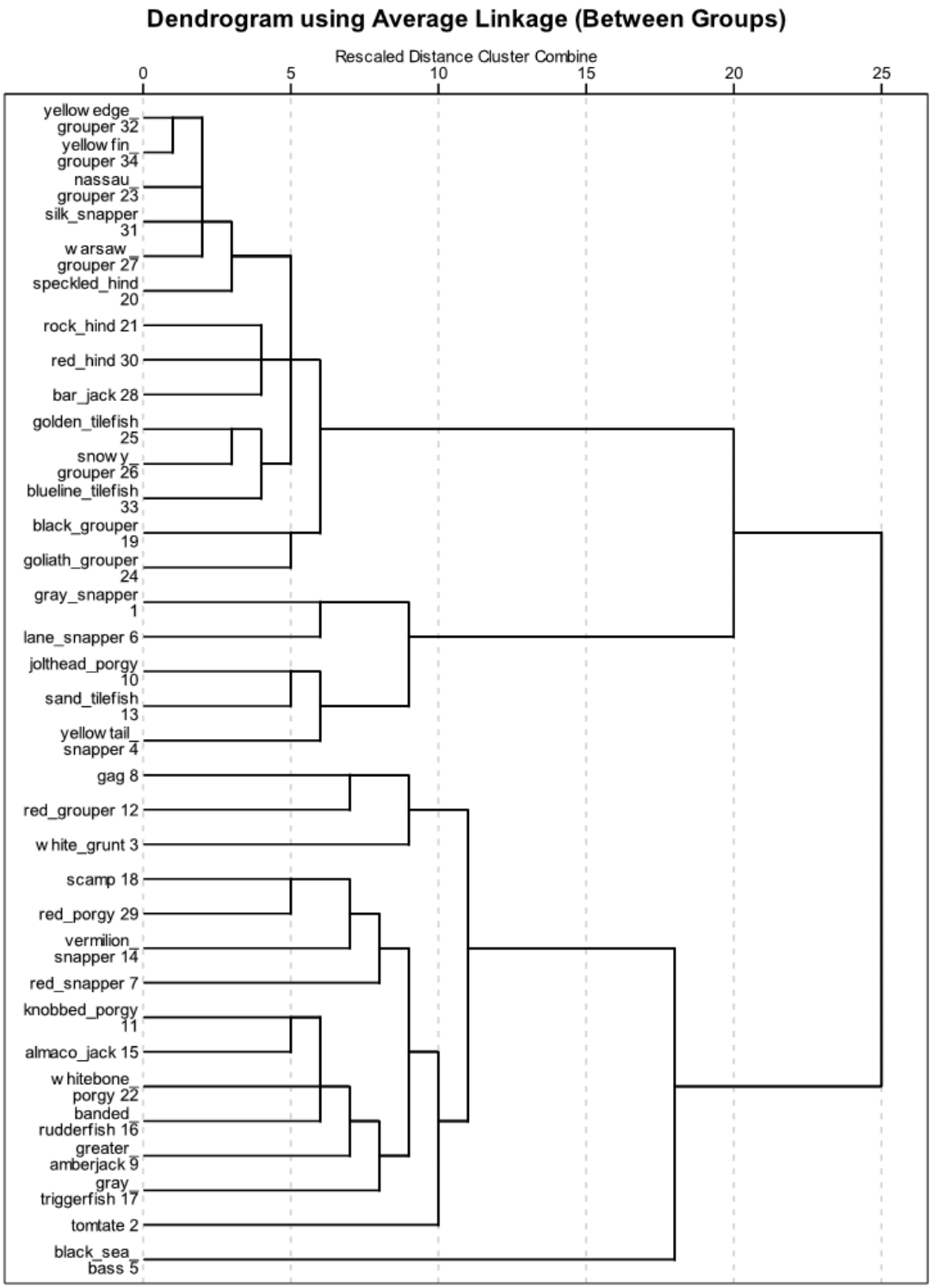


Figure A19. MRFSS hierarchical cluster analysis dendrogram (Linkage: Ward, Measure: Chi-Square, Transformation: Root-Root).

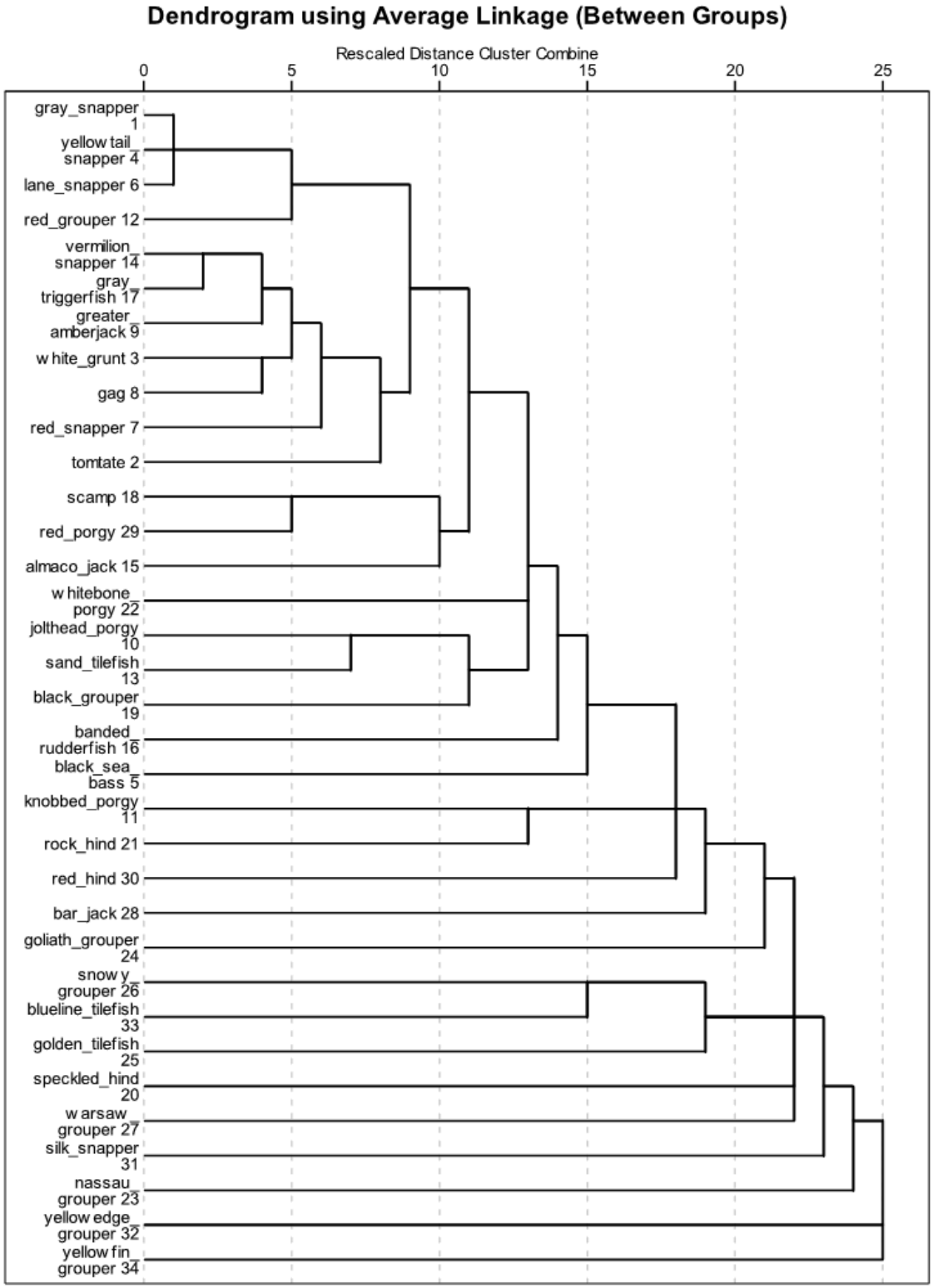


Figure A20. MRFSS hierarchical cluster analysis dendrogram (Linkage: Average, Measure: Sorenson, Transformation: Binary).

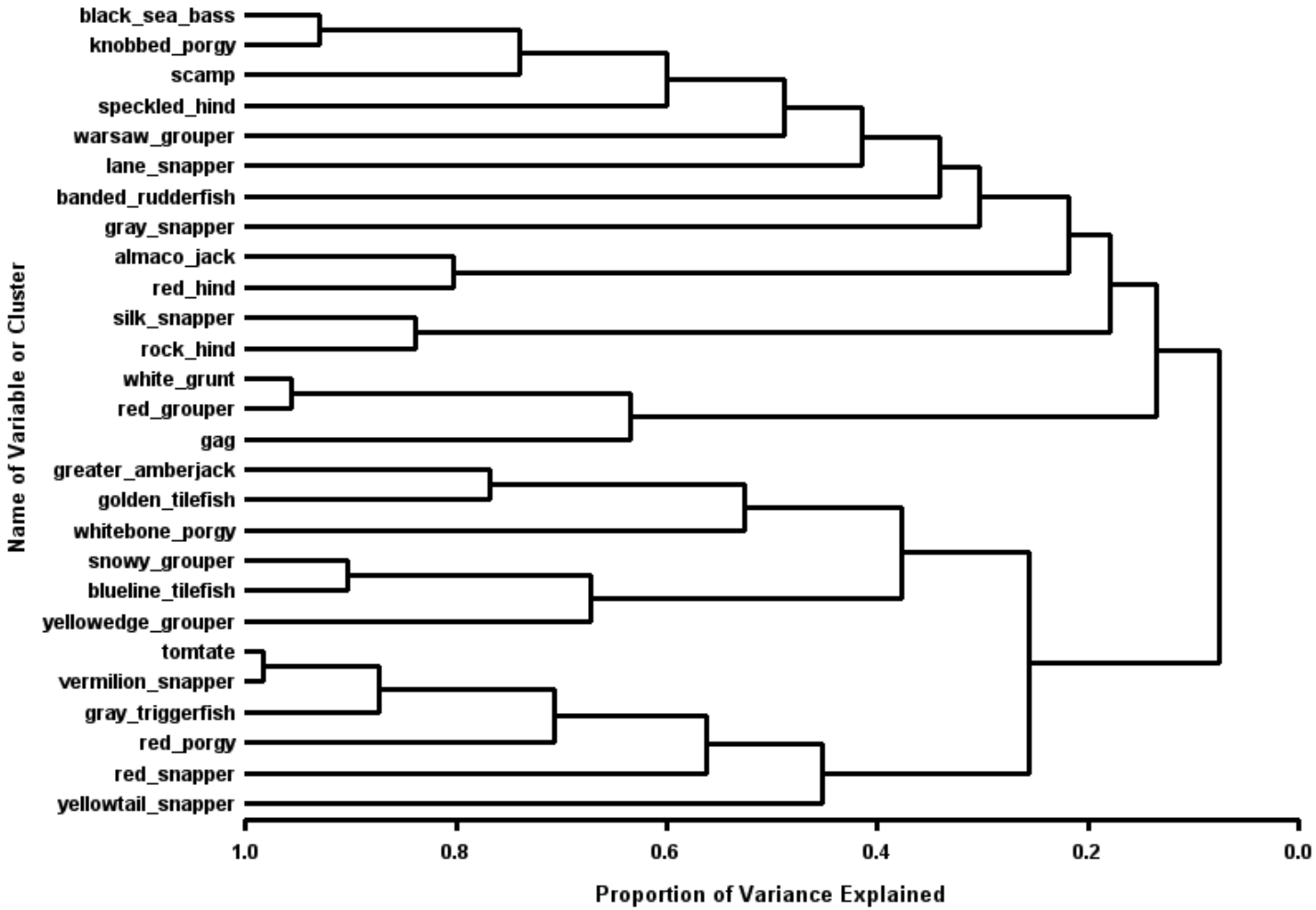


Figure A21. MARMAP dimension reduction dendrogram (Transformation: Root-Root).

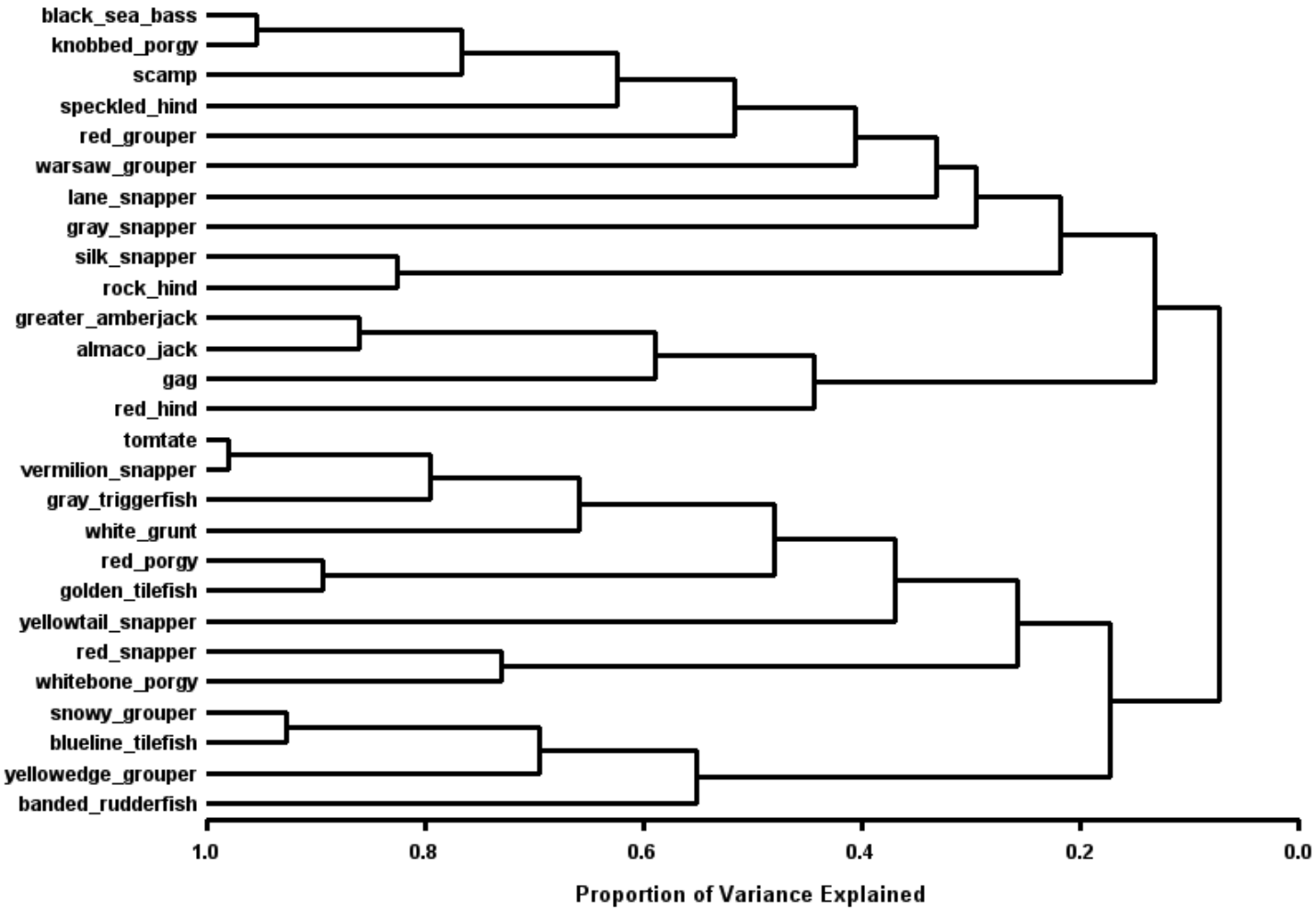


Figure A22. MARMAP dimension reduction dendrogram (Transformation: Binary).

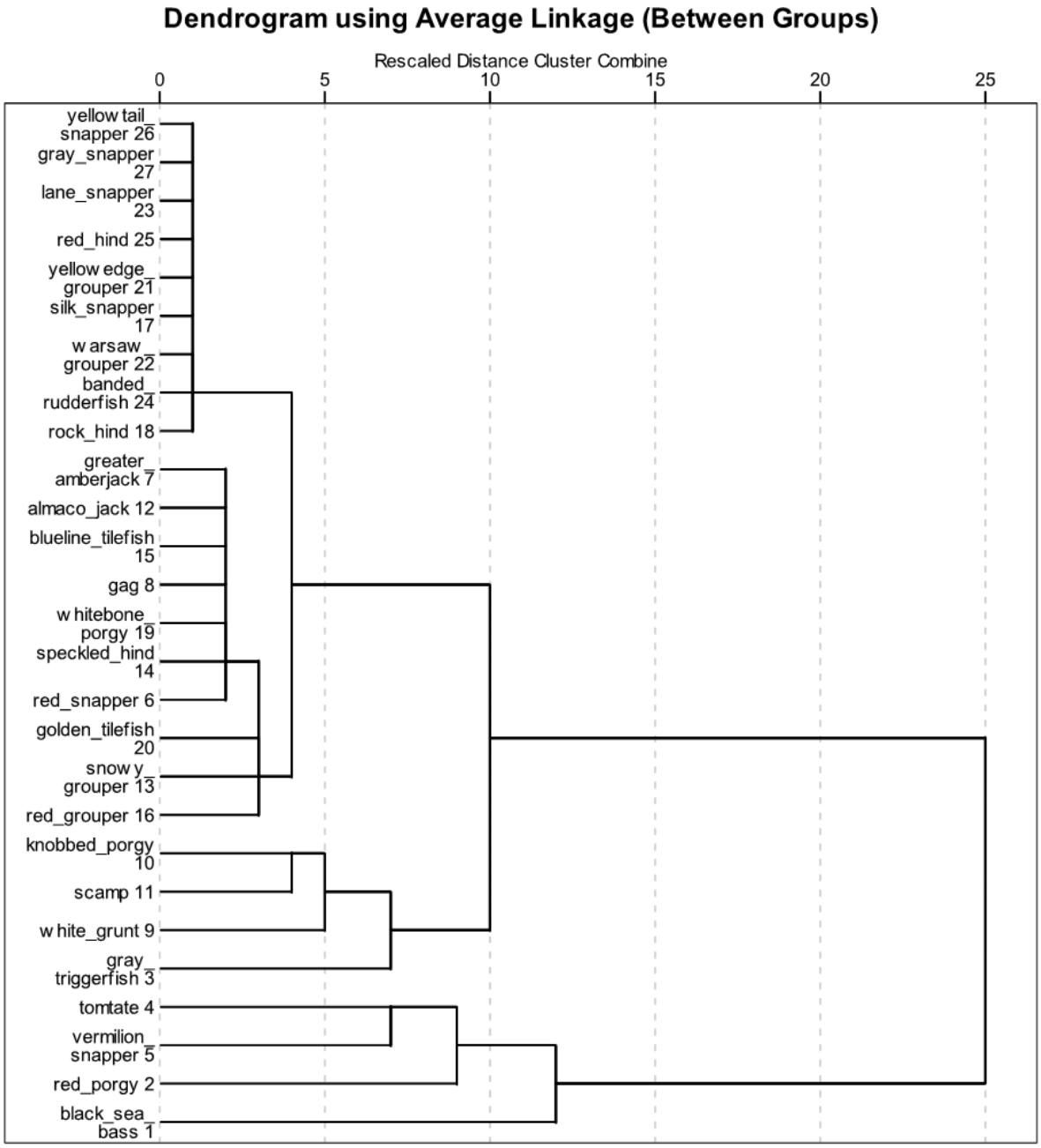


Figure A23. MARMAP hierarchical cluster analysis dendrogram (Linkage: Ward, Measure: Chi-Square, Transformation: Root-Root).

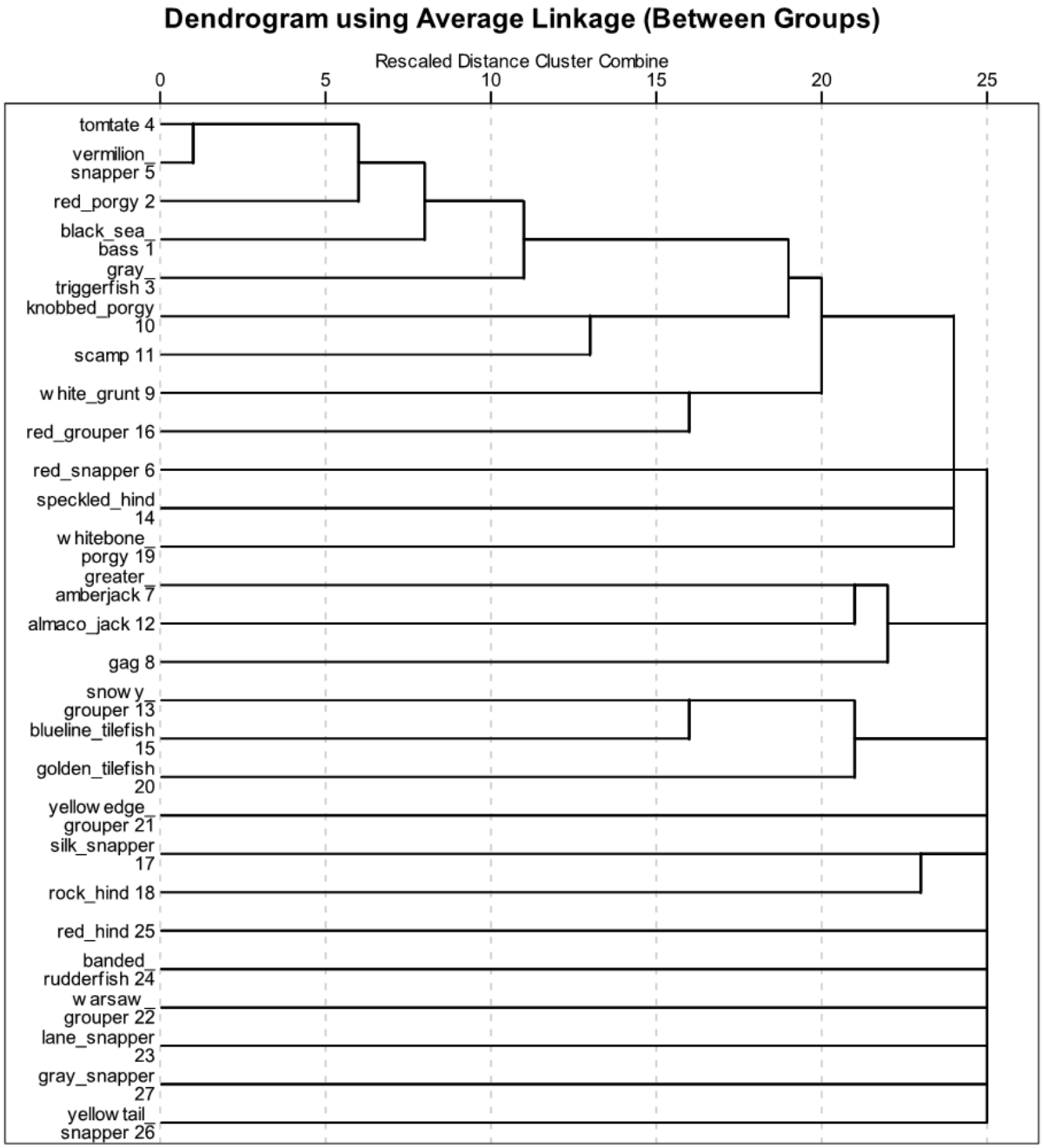


Figure A24. MARMAP hierarchical cluster analysis dendrogram (Linkage: Average, Measure: Sorenson, Transformation: Binary).

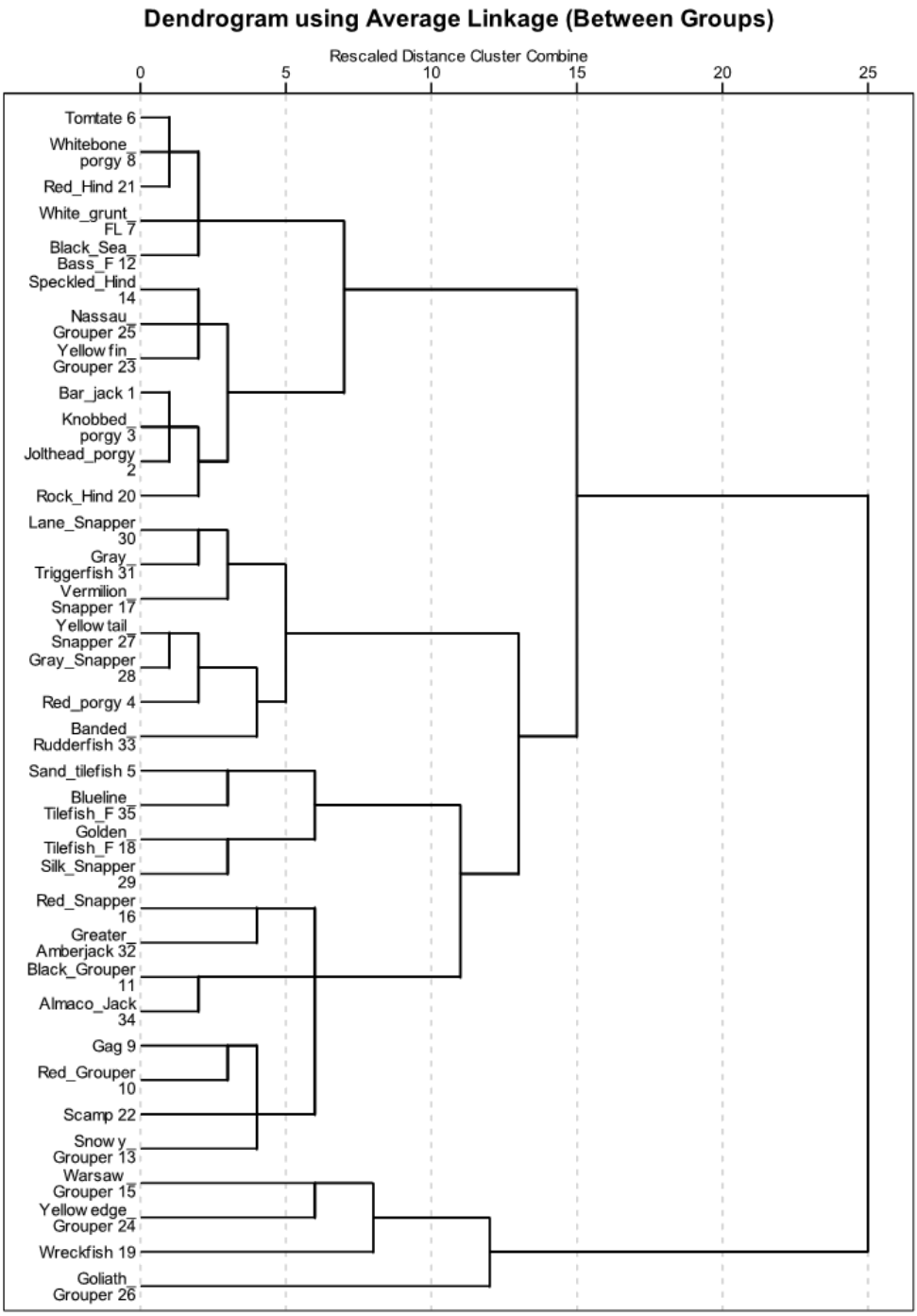


Figure A25. MARMAP hierarchical cluster analysis dendrogram (Linkage: Ward, Measure: Chi-Square, Transformation: Root-Root).

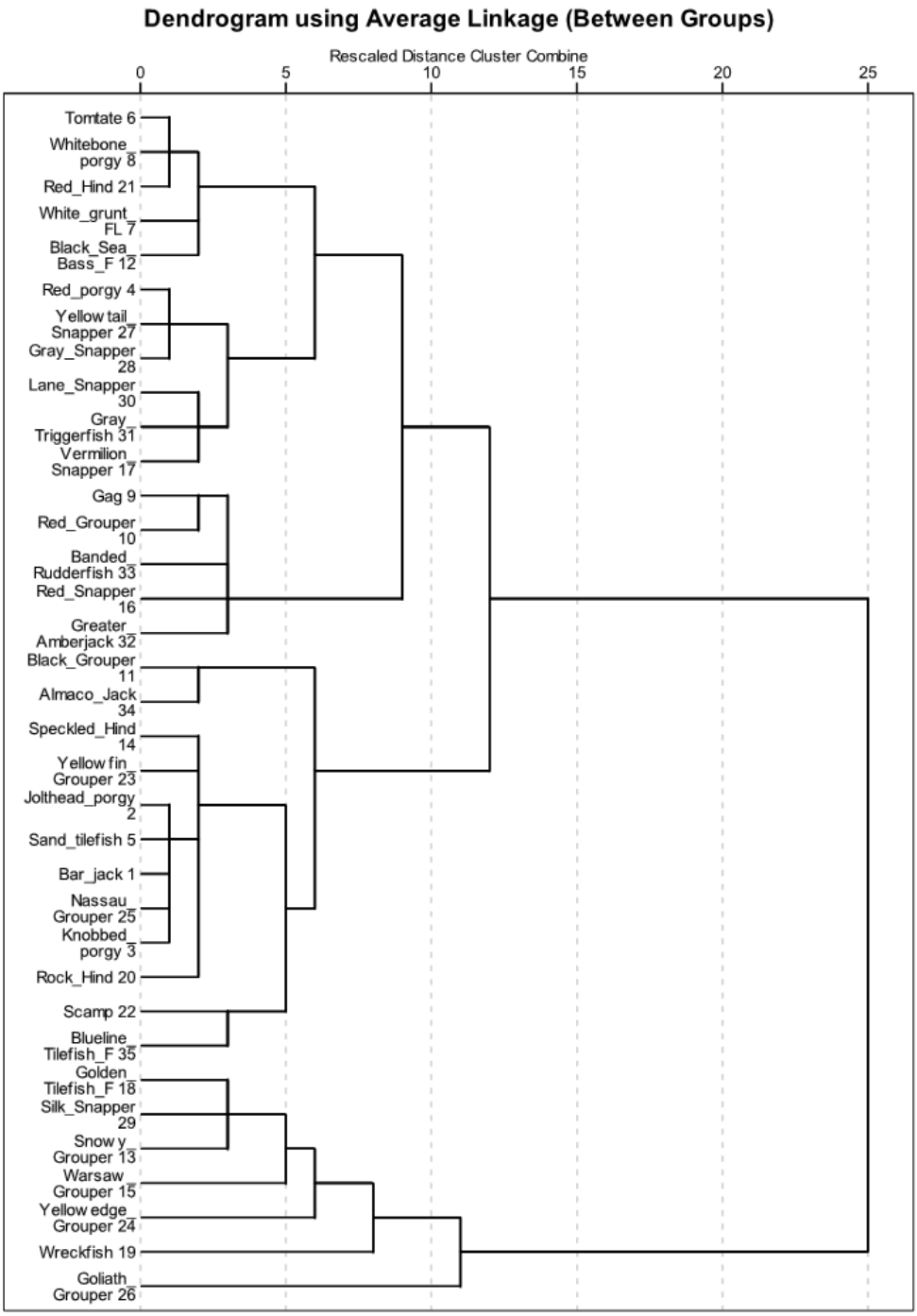


Figure A26. MARMAP hierarchical cluster analysis dendrogram (Linkage: Ward, Measure: Chi-Square, Transformation: Root-Root).

Table A1. Weighting terms for the cluster association matrix with no weighting for life history.

COMMON NAME	CVL	CLL	RFOP	HBS	MRFSS	MARMAP	LH
almaco jack	0.75	0.01	0.37	1.00	0.43	0.02	0.00
banded rudderfish	0.33	0.00	0.11	1.00	0.37	0.00	0.00
bar jack	0.12	0.00	0.00	0.92	1.00	0.00	0.00
black grouper	1.00	0.09	0.05	0.91	0.57	0.00	0.00
black sea bass	0.00	0.00	0.00	0.84	1.00	0.69	0.00
blueline tilefish	0.62	1.00	0.01	0.11	0.12	0.03	0.00
gag	0.41	0.06	0.22	1.00	0.52	0.02	0.00
goliath grouper	0.00	0.00	0.03	0.22	1.00	0.00	0.00
gray snapper	0.41	0.02	0.01	1.00	0.69	0.00	0.00
gray triggerfish	0.41	0.02	0.33	1.00	0.51	0.26	0.00
greater amberjack	0.73	0.06	0.17	1.00	0.59	0.02	0.00
jolthead porgy	0.47	0.00	0.00	1.00	0.36	0.00	0.00
knobbed porgy	0.29	0.00	0.26	1.00	0.35	0.38	0.00
lane snapper	0.17	0.00	0.00	1.00	0.56	0.00	0.00
nassau grouper	0.00	0.00	0.00	0.14	1.00	0.00	0.00
red grouper	0.68	0.07	0.45	1.00	0.45	0.06	0.00
red hind	0.91	0.00	0.30	1.00	0.47	0.00	0.00
red porgy	0.51	0.00	1.00	0.90	0.43	0.97	0.00
red snapper	0.54	0.03	0.15	1.00	0.49	0.03	0.00
rock hind	0.58	0.00	0.24	1.00	0.25	0.01	0.00
sand tilefish	0.14	0.00	0.18	0.79	1.00	0.00	0.00
scamp	0.63	0.01	0.72	1.00	0.35	0.18	0.00
silk snapper	0.81	0.00	0.08	1.00	0.35	0.01	0.00
snowy grouper	0.76	1.00	0.05	0.23	0.15	0.10	0.00
speckled hind	0.28	0.03	0.79	1.00	0.25	0.15	0.00
tilefish	0.09	1.00	0.00	0.00	0.05	0.00	0.00
tomtate	0.00	0.00	0.12	1.00	0.52	0.86	0.00
vermilion snapper	0.52	0.00	0.50	1.00	0.49	0.38	0.00
warsaw grouper	0.00	0.06	0.08	1.00	0.32	0.01	0.00
white grunt	0.31	0.00	0.21	1.00	0.72	0.19	0.00
whitebone porgy	0.11	0.00	0.03	1.00	0.30	0.04	0.00
wreckfish	1.00	0.00	0.00	0.00	0.00	0.00	0.00
yellowedge grouper	0.25	1.00	0.06	0.04	0.04	0.00	0.00
yellowfin grouper	0.89	0.00	0.45	1.00	0.13	0.00	0.00
yellowtail snapper	0.49	0.01	0.02	1.00	0.64	0.00	0.00

Table A2. Cluster association matrix with no weighting for life history.

	almaco jack	banded rudderfish	bar jack	black grouper	black sea bass	blueline tilefish	gag	goliath grouper	gray snapper	gray triggerfish	greater amberjack	jolthead porgy	knobbed porgy	lane snapper	nassau grouper	red grouper	red hind	red porgy	red snapper	rock hind	sand tilefish	scamp	silk snapper	snowy grouper	speckled hind	tilefish	tomtate	vermilion snapper	warsaw grouper	white grunt	whitebone porgy	wreckfish	yellowedge grouper	yellowfin grouper	yellowtail snapper
almaco jack		0.22	0.00	0.00	0.00	0.00	0.01	0.07	0.00	0.12	0.15	0.00	0.05	0.00	0.00	0.04	0.00	0.05	0.02	0.01	0.00	0.11	0.00	0.00	0.01	0.00	0.01	0.12	0.00	0.00	0.02	0.00	0.00	0.00	0.00
banded rudderfish	0.38		0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.08	0.03	0.09	0.00	0.00	0.01	0.02	0.07	0.00	0.03	0.02	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.07	0.00	0.00	0.00	0.00
bar jack	0.01	0.01		0.06	0.01	0.01	0.01	0.04	0.06	0.01	0.01	0.04	0.01	0.06	0.04	0.06	0.10	0.01	0.01	0.07	0.26	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.03
black grouper	0.00	0.00	0.00		0.09	0.00	0.00	0.05	0.17	0.00	0.00	0.03	0.00	0.07	0.00	0.04	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.05	0.31
black sea bass	0.02	0.02	0.00	0.11		0.00	0.05	0.02	0.02	0.05	0.02	0.01	0.14	0.02	0.00	0.01	0.00	0.07	0.02	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.19	0.09	0.00	0.02	0.06	0.00	0.00	0.00	0.02
blueline tilefish	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00
gag	0.01	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.28	0.01	0.00	0.00	0.00	0.00	0.07	0.00	0.10	0.28	0.00	0.00	0.06	0.00	0.00	0.03	0.01	0.00	0.03	0.00	0.11	0.00	0.00	0.00	0.00	0.00
goliath grouper	0.02	0.01	0.02	0.33	0.01	0.00	0.01		0.15	0.01	0.01	0.01	0.01	0.15	0.02	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.02	0.02	0.08
gray snapper	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28
gray triggerfish	0.01	0.01	0.00	0.00	0.01	0.00	0.25	0.00	0.00		0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.12	0.05	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.03	0.41	0.00	0.06	0.01	0.00	0.00	0.00	0.00
greater amberjack	0.24	0.04	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.09		0.01	0.02	0.00	0.00	0.03	0.01	0.03	0.04	0.01	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.01	0.07	0.00	0.00	0.00	0.00
jolthead porgy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.05	0.00	0.00	0.03	0.21	0.00	0.00	0.24	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.00	0.00	0.02
knobbed porgy	0.06	0.03	0.00	0.00	0.08	0.00	0.01	0.01	0.00	0.00	0.00	0.12		0.00	0.00	0.03	0.08	0.00	0.00	0.31	0.00	0.09	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.13	0.00	0.00	0.00	0.00	0.00
lane snapper	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.15
nassau grouper	0.01	0.01	0.01	0.10	0.04	0.01	0.01	0.11	0.10	0.01	0.01	0.01	0.01	0.10		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.06	0.01	0.01	0.01	0.01	0.01	0.06	0.01	0.01	0.00	0.16	0.07	0.04
red grouper	0.01	0.00	0.00	0.03	0.00	0.00	0.05	0.00	0.12	0.00	0.01	0.06	0.03	0.12	0.00		0.09	0.03	0.01	0.03	0.03	0.16	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.09
red hind	0.02	0.00	0.02	0.02	0.00	0.00	0.02	0.00	0.00	0.02	0.01	0.18	0.02	0.00	0.00	0.13		0.02	0.02	0.28	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.03	0.00	0.00	0.00	0.09	0.01
red porgy	0.01	0.01	0.00	0.00	0.01	0.00	0.08	0.00	0.00	0.26	0.02	0.00	0.00	0.00	0.00	0.02	0.00		0.01	0.00	0.00	0.21	0.00	0.00	0.00	0.06	0.09	0.20	0.00	0.00	0.02	0.00	0.00	0.00	0.00
red snapper	0.03	0.01	0.00	0.00	0.03	0.00	0.37	0.00	0.00	0.08	0.03	0.00	0.00	0.00	0.00	0.02	0.00	0.10		0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.03	0.16	0.00	0.02	0.02	0.00	0.00	0.00	0.00
rock hind	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.28	0.00	0.00	0.01	0.34	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.05	0.00	0.00	0.00	0.03	0.00
sand tilefish	0.00	0.02	0.20	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.37	0.02	0.00	0.01	0.00	0.02	0.00	0.00	0.02		0.00	0.01	0.02	0.01	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.03	0.01	0.12
scamp	0.03	0.02	0.00	0.00	0.02	0.00	0.07	0.00	0.00	0.03	0.20	0.00	0.05	0.00	0.00	0.14	0.00	0.24	0.01	0.01	0.00		0.00	0.00	0.13	0.00	0.01	0.03	0.00	0.01	0.02	0.00	0.00	0.00	0.00
silk snapper	0.01	0.01	0.02	0.01	0.00	0.03	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.02	0.01	0.01		0.03	0.02	0.01	0.01	0.01	0.04	0.01	0.03	0.10	0.03	0.42	0.01
snowy grouper	0.00	0.00	0.00	0.00	0.00	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00
speckled hind	0.02	0.02	0.01	0.01	0.02	0.01	0.05	0.01	0.01	0.02	0.04	0.01	0.05	0.01	0.02	0.01	0.01	0.02	0.03	0.03	0.01	0.23	0.02	0.01		0.00	0.03	0.02	0.15	0.01	0.01	0.00	0.02	0.10	0.01
tilefish	0.00	0.00	0.00	0.00	0.00	0.16	0.44	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.17	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00
tomtate	0.01	0.01	0.00	0.00	0.10	0.00	0.02	0.00	0.00	0.03	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.03	0.01	0.00	0.01	0.00	0.00	0.00	0.00		0.39	0.00	0.02	0.36	0.00	0.00	0.00	0.00
vermilion snapper	0.01	0.01	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.44	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.04	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.22		0.00	0.00	0.01	0.00	0.00	0.00	0.00
warsaw grouper	0.02	0.01	0.02	0.01	0.04	0.03	0.06	0.03	0.01	0.02	0.01	0.01	0.01	0.01	0.04	0.01	0.01	0.01	0.05	0.01	0.00	0.03	0.04	0.02	0.25	0.01	0.05	0.02		0.01	0.05	0.00	0.04	0.04	0.01
white grunt	0.00	0.01	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.12	0.00	0.27	0.11	0.00	0.00	0.16	0.05	0.00	0.00	0.09	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.04	0.00		0.00	0.00	0.00	0.00	0.00
whitebone porgy	0.09	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.08	0.00	0.02	0.03	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.05	0.00	0.00	0.00	0.00	0.56	0.00	0.00	0.00		0.00	0.00	0.00	0.02
wreckfish	0.03	0.01	0.09	0.01	0.00	0.01	0.03	0.00	0.01	0.03	0.03	0.01	0.01	0.01	0.00	0.01	0.01	0.03	0.03	0.01	0.03	0.03	0.26	0.01	0.01	0.03	0.09	0.03	0.09	0.01	0.01		0.01	0.01	0.01
yellowedge grouper	0.00	0.00	0.00	0.00	0.00	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.01	0.02	0.00	0.01	0.50	0.00	0.05	0.00	0.00	0.01	0.00	0.01	0.00		0.02	0.00
yellowfin grouper	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.14	0.00	0.00	0.00	0.01	0.00	0.32	0.00	0.29	0.00	0.01	0.00	0.02	0.00	0.02	0.01	0.05		0.01
yellowtail snapper	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.38	0.00	0.00	0.04	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Table A3. Top 5 associated species under cluster association matrix with no life history.

COMMON NAME	1	2	3	4	5	ASSESSED?	PSA
wreckfish	silk snapper	bar jack	tomtate	warsaw grouper	almaco jack	Vaughan et al. 2001	3.64
yellowedge grouper	snowy grouper	blueline tilefish	tilefish	nassau grouper	yellowfin grouper		3.52
snowy grouper	blueline tilefish	yellowedge grouper	tilefish	goliath grouper	silk snapper	SEDAR 4 (2004)	3.45
blueline tilefish	snowy grouper	yellowedge grouper	tilefish	goliath grouper	silk snapper		3.4
sand tilefish	jolthead porgy	bar jack	yellowtail snapper	yellowedge grouper	blueline tilefish		3.37
tilefish	gag	snowy grouper	yellowedge grouper	blueline tilefish	knobbed porgy	SEDAR 4 (2004)	3.4
silk snapper	yellowfin grouper	wreckfish	warsaw grouper	blueline tilefish	yellowedge grouper		3.52
warsaw grouper	speckled hind	gag	whitebone porgy	tomtate	red snapper		3.83
speckled hind	scamp	warsaw grouper	yellowfin grouper	gag	knobbed porgy		3.42
yellowfin grouper	silk snapper	speckled hind	red hind	yellowedge grouper	goliath grouper		3.39
gag	red snapper	gray triggerfish	white grunt	red porgy	red grouper	SEDAR 10 (2006)	3.52
red grouper	scamp	white grunt	gray snapper	lane snapper	yellowtail snapper	SEDAR 19 (2010)	3.28
scamp	red porgy	greater amberjack	red grouper	speckled hind	gag		3.25
black grouper	yellowtail snapper	gray snapper	black sea bass	lane snapper	goliath grouper	SEDAR 19 (2010)	3.36
goliath grouper	black grouper	gray snapper	lane snapper	yellowtail snapper	red grouper	SEDAR 23 (2010)	3.42*
nassau grouper	yellowedge grouper	goliath grouper	black grouper	gray snapper	lane snapper		3.3
banded rudderfish	almaco jack	scamp	knobbed porgy	greater amberjack	red porgy		3.26
greater amberjack	scamp	almaco jack	vermilion snapper	gray triggerfish	whitebone porgy	SEDAR 15 (2008)	3.07
almaco jack	banded rudderfish	greater amberjack	vermilion snapper	gray triggerfish	scamp		3.35
red porgy	gray triggerfish	scamp	vermilion snapper	tomtate	gag	SEDAR 1 Update (2006)	2.93
gray triggerfish	vermilion snapper	gag	red porgy	white grunt	red snapper		2.46
vermilion snapper	gray triggerfish	tomtate	red porgy	gag	red snapper	SEDAR 17 (2008)	3.14
red snapper	gag	vermilion snapper	red porgy	scamp	gray triggerfish	SEDAR 24 (2010)	3.14
black sea bass	tomtate	knobbed porgy	black grouper	vermilion snapper	red porgy	SEDAR 2 Update (2005)	3.02
red hind	rock hind	jolthead porgy	red grouper	yellowfin grouper	sand tilefish	Potts & Manooch (1995)	3.18
rock hind	red hind	knobbed porgy	jolthead porgy	white grunt	yellowfin grouper	Potts & Manooch (1995)	3.23
knobbed porgy	rock hind	white grunt	jolthead porgy	scamp	black sea bass		3.14
whitebone porgy	tomtate	almaco jack	greater amberjack	banded rudderfish	scamp		3.51
jolthead porgy	white grunt	rock hind	red hind	sand tilefish	knobbed porgy		3.18
tomtate	vermilion snapper	whitebone porgy	black sea bass	gray triggerfish	red snapper		2.63
white grunt	jolthead porgy	red grouper	gray triggerfish	knobbed porgy	gag		2.78
bar jack	sand tilefish	red hind	rock hind	gray snapper	lane snapper		3.33
gray snapper	lane snapper	yellowtail snapper	warsaw grouper	silk snapper	blueline tilefish		3.24
lane snapper	gray snapper	yellowtail snapper	whitebone porgy	warsaw grouper	speckled hind		2.92
yellowtail snapper	gray snapper	black grouper	lane snapper	sand tilefish	jolthead porgy	SEDAR 3 (2003)	2.84*

Table A4. Weighting terms for cluster association matrix with life history weighted equal to highest weighting term from fishery-dependent data.

COMMON NAME	CVL	CLL	RFOP	HBS	MRFSS	MARMAP	LH
almaco jack	0.75	0.01	0.37	1.00	0.43	0.02	1.00
banded rudderfish	0.33	0.00	0.11	1.00	0.37	0.00	1.00
bar jack	0.12	0.00	0.00	0.92	1.00	0.00	1.00
black grouper	1.00	0.09	0.05	0.91	0.57	0.00	1.00
black sea bass	0.00	0.00	0.00	0.84	1.00	0.69	1.00
blueline tilefish	0.62	1.00	0.01	0.11	0.12	0.03	1.00
gag	0.41	0.06	0.22	1.00	0.52	0.02	1.00
goliath grouper	0.00	0.00	0.03	0.22	1.00	0.00	1.00
gray snapper	0.41	0.02	0.01	1.00	0.69	0.00	1.00
gray triggerfish	0.41	0.02	0.33	1.00	0.51	0.26	1.00
greater amberjack	0.73	0.06	0.17	1.00	0.59	0.02	1.00
jolthead porgy	0.47	0.00	0.00	1.00	0.36	0.00	1.00
knobbed porgy	0.29	0.00	0.26	1.00	0.35	0.38	1.00
lane snapper	0.17	0.00	0.00	1.00	0.56	0.00	1.00
nassau grouper	0.00	0.00	0.00	0.14	1.00	0.00	1.00
red grouper	0.68	0.07	0.45	1.00	0.45	0.06	1.00
red hind	0.91	0.00	0.30	1.00	0.47	0.00	1.00
red porgy	0.51	0.00	1.00	0.90	0.43	0.97	1.00
red snapper	0.54	0.03	0.15	1.00	0.49	0.03	1.00
rock hind	0.58	0.00	0.24	1.00	0.25	0.01	1.00
sand tilefish	0.14	0.00	0.18	0.79	1.00	0.00	1.00
scamp	0.63	0.01	0.72	1.00	0.35	0.18	1.00
silk snapper	0.81	0.00	0.08	1.00	0.35	0.01	1.00
snowy grouper	0.76	1.00	0.05	0.23	0.15	0.10	1.00
speckled hind	0.28	0.03	0.79	1.00	0.25	0.15	1.00
tilefish	0.09	1.00	0.00	0.00	0.05	0.00	1.00
tomtate	0.00	0.00	0.12	1.00	0.52	0.86	1.00
vermilion snapper	0.52	0.00	0.50	1.00	0.49	0.38	1.00
warsaw grouper	0.00	0.06	0.08	1.00	0.32	0.01	1.00
white grunt	0.31	0.00	0.21	1.00	0.72	0.19	1.00
whitebone porgy	0.11	0.00	0.03	1.00	0.30	0.04	1.00
wreckfish	1.00	0.00	0.00	0.00	0.00	0.00	1.00
yellowedge grouper	0.25	1.00	0.06	0.04	0.04	0.00	1.00
yellowfin grouper	0.89	0.00	0.45	1.00	0.13	0.00	1.00
yellowtail snapper	0.49	0.01	0.02	1.00	0.64	0.00	1.00

Table A5. Weighted mean cluster association matrix with life history weighted equal to highest weighting term from fishery-dependent data.

	almaco jack	banded rudderfish	bar jack	black grouper	black sea bass	blueline tilefish	gag	goliath grouper	gray snapper	gray triggerfish	greater amberjack	jolthead porgy	knobbed porgy	lane snapper	nassau grouper	red grouper	red hind	red porgy	red snapper	rock hind	sand tilefish	scamp	silk snapper	snowy grouper	speckled hind	tilefish	tomtate	vermilion snapper	warsaw grouper	white grunt	whitebone porgy	wreckfish	yellowedge grouper	yellowfin grouper	yellowtail snapper
almaco jack		0.18	0.00	0.16	0.00	0.00	0.01	0.06	0.00	0.10	0.13	0.00	0.04	0.00	0.00	0.04	0.00	0.04	0.01	0.01	0.00	0.09	0.00	0.00	0.01	0.00	0.01	0.10	0.00	0.00	0.02	0.00	0.00	0.00	0.00
banded rudderfish	0.30		0.00	0.00	0.00	0.00	0.03	0.01	0.04	0.00	0.09	0.02	0.07	0.00	0.00	0.04	0.01	0.09	0.03	0.02	0.01	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.06	0.00	0.00	0.00	0.04
bar jack	0.00	0.00		0.04	0.00	0.01	0.00	0.03	0.05	0.00	0.00	0.10	0.08	0.05	0.06	0.05	0.08	0.00	0.00	0.05	0.24	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.02	0.00	0.01	0.00	0.01	0.01	0.03
black grouper	0.16	0.00	0.00		0.07	0.00	0.00	0.05	0.14	0.00	0.00	0.02	0.00	0.06	0.00	0.03	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.04	0.26
black sea bass	0.02	0.02	0.00	0.09		0.00	0.04	0.02	0.02	0.04	0.02	0.00	0.12	0.02	0.00	0.01	0.04	0.05	0.02	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.20	0.08	0.00	0.06	0.09	0.00	0.00	0.00	0.02
blueline tilefish	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.00	0.56	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.00	0.00
gag	0.01	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.23	0.01	0.00	0.00	0.00	0.00	0.24	0.00	0.08	0.23	0.00	0.00	0.05	0.00	0.00	0.02	0.01	0.00	0.02	0.00	0.09	0.00	0.00	0.00	0.00	0.00
goliath grouper	0.01	0.01	0.01	0.24	0.01	0.00	0.01		0.10	0.01	0.01	0.01	0.01	0.10	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.02	0.00	0.02	0.01	0.01	0.07	0.01	0.01	0.07	0.08	0.01	0.06
gray snapper	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.58	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37
gray triggerfish	0.01	0.01	0.00	0.00	0.01	0.00	0.21	0.00	0.00		0.01	0.00	0.02	0.12	0.00	0.00	0.00	0.10	0.04	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.03	0.38	0.00	0.05	0.01	0.00	0.00	0.00	0.00
greater amberjack	0.20	0.06	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.08		0.00	0.02	0.00	0.00	0.04	0.01	0.03	0.11	0.01	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.06	0.00	0.00	0.00	0.00
jolthead porgy	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.12	0.00	0.03	0.03	0.17	0.00	0.00	0.19	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.02
knobbed porgy	0.05	0.03	0.07	0.00	0.07	0.00	0.01	0.01	0.00	0.00	0.00	0.17		0.00	0.02	0.02	0.07	0.00	0.00	0.26	0.02	0.08	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.10	0.00	0.00	0.00	0.00	0.00
lane snapper	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.17	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.02	0.00	0.00	0.00	0.11
nassau grouper	0.00	0.00	0.04	0.07	0.03	0.00	0.00	0.08	0.07	0.00	0.00	0.04	0.04	0.07		0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.04	0.00	0.08	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.11	0.12	0.03
red grouper	0.00	0.00	0.00	0.02	0.00	0.00	0.20	0.00	0.10	0.00	0.00	0.05	0.02	0.10	0.00		0.07	0.03	0.00	0.02	0.03	0.13	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.08
red hind	0.02	0.00	0.02	0.02	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.15	0.02	0.00	0.00	0.11		0.01	0.01	0.24	0.02	0.01	0.00	0.00	0.00	0.00	0.08	0.01	0.00	0.02	0.08	0.00	0.00	0.07	0.01
red porgy	0.01	0.01	0.00	0.00	0.01	0.00	0.07	0.00	0.06	0.23	0.01	0.00	0.00	0.00	0.00	0.02	0.00		0.01	0.00	0.00	0.19	0.00	0.00	0.00	0.06	0.08	0.18	0.00	0.00	0.01	0.00	0.00	0.00	0.06
red snapper	0.02	0.03	0.00	0.00	0.02	0.00	0.33	0.00	0.00	0.06	0.14	0.00	0.00	0.00	0.00	0.04	0.00	0.08		0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.02	0.13	0.00	0.02	0.01	0.00	0.00	0.00	0.00
rock hind	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.27	0.00	0.01	0.01	0.28	0.00	0.00		0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.04	0.00	0.00	0.00	0.04	0.00
sand tilefish	0.00	0.02	0.19	0.00	0.00	0.11	0.00	0.01	0.00	0.00	0.00	0.33	0.04	0.00	0.03	0.00	0.02	0.00	0.00	0.02		0.00	0.01	0.02	0.01	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.03	0.01	0.10
scamp	0.02	0.02	0.00	0.00	0.01	0.07	0.08	0.00	0.00	0.02	0.17	0.00	0.05	0.00	0.00	0.15	0.00	0.20	0.01	0.01	0.00		0.00	0.02	0.11	0.00	0.01	0.02	0.00	0.01	0.02	0.00	0.00	0.00	0.00
silk snapper	0.00	0.01	0.02	0.01	0.00	0.03	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.00	0.00	0.01	0.01	0.00		0.07	0.02	0.15	0.01	0.00	0.03	0.01	0.02	0.08	0.03	0.34	0.01
snowy grouper	0.00	0.00	0.00	0.00	0.00	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05		0.00	0.06	0.00	0.00	0.09	0.00	0.00	0.00	0.23	0.00	0.00
speckled hind	0.02	0.02	0.02	0.00	0.01	0.01	0.04	0.01	0.00	0.02	0.03	0.02	0.05	0.00	0.07	0.01	0.00	0.02	0.02	0.04	0.02	0.19	0.01	0.01		0.00	0.02	0.02	0.12	0.01	0.01	0.00	0.01	0.14	0.00
tilefish	0.00	0.00	0.00	0.00	0.00	0.11	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.19	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00
tomtate	0.00	0.00	0.00	0.00	0.08	0.00	0.02	0.00	0.00	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.08	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00		0.33	0.00	0.02	0.38	0.00	0.00	0.00	0.00
vermilion snapper	0.01	0.01	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.45	0.01	0.00	0.00	0.07	0.00	0.00	0.00	0.14	0.04	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.18		0.00	0.00	0.01	0.00	0.00	0.00	0.00
warsaw grouper	0.01	0.01	0.02	0.01	0.03	0.02	0.05	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.01	0.04	0.01	0.00	0.02	0.07	0.06	0.18	0.05	0.04	0.01		0.01	0.04	0.00	0.15	0.03	0.01
white grunt	0.00	0.01	0.00	0.00	0.04	0.00	0.09	0.00	0.00	0.10	0.00	0.23	0.09	0.00	0.00	0.13	0.09	0.00	0.00	0.07	0.00	0.01	0.00	0.00	0.00	0.00	0.05	0.04	0.00		0.04	0.00	0.00	0.00	0.00
whitebone porgy	0.07	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.06	0.00	0.01	0.03	0.00	0.00	0.13	0.00	0.01	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.55	0.00	0.00	0.00		0.00	0.00	0.00	0.02
wreckfish	0.02	0.01	0.06	0.01	0.00	0.01	0.02	0.00	0.01	0.02	0.02	0.01	0.01	0.01	0.00	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.21	0.04	0.01	0.06	0.06	0.02	0.18	0.01	0.01		0.12	0.01	0.01
yellowedge grouper	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.04	0.40	0.00	0.07	0.00	0.00	0.17	0.00	0.00	0.00		0.02	0.00
yellowfin grouper	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.01	0.02	0.00	0.08	0.00	0.11	0.00	0.00	0.02	0.02	0.00	0.27	0.00	0.29	0.00	0.01	0.00	0.02	0.00	0.02	0.01	0.04		0.00
yellowtail snapper	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.45	0.00	0.00	0.03	0.00	0.19	0.00	0.00	0.00	0.05	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Table A6. Top 5 associated species from cluster association matrix with life history weighted equal to maximum from fishery data.

COMMON NAME	1	2	3	4	5	ASSESSED?	PSA
yellowedge grouper	snowy grouper	blueline tilefish	warsaw grouper	tilefish	silk snapper		3.52
snowy grouper	blueline tilefish	yellowedge grouper	warsaw grouper	tilefish	silk snapper	SEDAR 4 (2004)	3.45
blueline tilefish	snowy grouper	yellowedge grouper	sand tilefish	scamp	tilefish		3.4
tilefish	gag	silk snapper	snowy grouper	yellowedge grouper	blueline tilefish	SEDAR 4 (2004)	3.4
wreckfish	silk snapper	warsaw grouper	yellowedge grouper	bar jack	tomtate	Vaughan et al. 2001	3.64
silk snapper	yellowfin grouper	tilefish	wreckfish	snowy grouper	warsaw grouper		3.52
warsaw grouper	speckled hind	yellowedge grouper	silk snapper	snowy grouper	tilefish		3.83
speckled hind	scamp	yellowfin grouper	warsaw grouper	nassau grouper	knobbed porgy		3.42
yellowfin grouper	speckled hind	silk snapper	red hind	nassau grouper	yellowedge grouper		3.39
nassau grouper	yellowfin grouper	yellowedge grouper	speckled hind	goliath grouper	black grouper		3.3
gag	red grouper	red snapper	gray triggerfish	white grunt	red porgy	SEDAR 10 (2006)	3.52
red grouper	gag	scamp	white grunt	gray snapper	lane snapper	SEDAR 19 (2010)	3.28
scamp	red porgy	greater amberjack	red grouper	speckled hind	gag	Manooch et al. (1998)	3.25
black grouper	yellowtail snapper	almaco jack	gray snapper	black sea bass	lane snapper	SEDAR 19 (2010)	3.36
goliath grouper	black grouper	gray snapper	lane snapper	yellowedge grouper	warsaw grouper	SEDAR 23 (2010)	3.42*
banded rudderfish	almaco jack	red porgy	greater amberjack	scamp	knobbed porgy		3.26
greater amberjack	scamp	almaco jack	red snapper	vermilion snapper	gray triggerfish	SEDAR 15 (2008)	3.07
almaco jack	banded rudderfish	black grouper	greater amberjack	vermilion snapper	gray triggerfish		3.35
red porgy	gray triggerfish	scamp	vermilion snapper	tomtate	gag	SEDAR 1 Update (2006)	2.93
gray triggerfish	vermilion snapper	gag	lane snapper	red porgy	white grunt		2.46
vermilion snapper	gray triggerfish	tomtate	red porgy	lane snapper	gag	SEDAR 17 (2008)	3.14
red snapper	gag	greater amberjack	vermilion snapper	red porgy	scamp	SEDAR 24 (2010)	3.14
black sea bass	tomtate	knobbed porgy	whitebone porgy	black grouper	vermilion snapper	SEDAR 2 Update (2005)	3.02
red hind	rock hind	jolthead porgy	red grouper	whitebone porgy	tomtate	Potts & Manooch (1995)	3.18
rock hind	red hind	knobbed porgy	jolthead porgy	bar jack	white grunt	Potts & Manooch (1995)	3.23
knobbed porgy	rock hind	jolthead porgy	white grunt	scamp	black sea bass		3.14
whitebone porgy	tomtate	red hind	almaco jack	greater amberjack	banded rudderfish		3.51
jolthead porgy	white grunt	rock hind	red hind	sand tilefish	knobbed porgy		3.18
tomtate	whitebone porgy	vermilion snapper	red hind	black sea bass	gray triggerfish		2.63
white grunt	jolthead porgy	red grouper	gray triggerfish	knobbed porgy	gag		2.78
sand tilefish	jolthead porgy	bar jack	blueline tilefish	yellowtail snapper	knobbed porgy		3.37
bar jack	sand tilefish	jolthead porgy	knobbed porgy	#N/A	nassau grouper		3.33
gray snapper	lane snapper	yellowtail snapper	red porgy	warsaw grouper	silk snapper		3.24
lane snapper	gray snapper	gray triggerfish	yellowtail snapper	vermilion snapper	whitebone porgy		2.92
yellowtail snapper	gray snapper	black grouper	lane snapper	sand tilefish	red porgy	SEDAR 3 (2003)	2.84*

Table A7. Complexes (dark gray), sub-complexes (light gray), and individual ACLs (white) for snapper grouper species under the Alternative 2 species grouping approach

Deep-Water Grouper & Tilefish Complex	Subcomplexes	'Snappers' Complex	Subcomplexes
Yellowedge grouper$_2$	Yellowedge grouper$_2$	Gray snapper$_2$	Gray snapper$_2$
Blueline tilefish	Blueline tilefish	Lane snapper	Lane snapper
Silk Snapper$_2$	Silk Snapper$_2$	Cubera snapper	Cubera snapper
Snowy grouper$_1$	Snowy grouper$_1$	Yellowtail snapper$_1$	Yellowtail snapper$_1$
Golden tilefish$_1$	Golden tilefish$_1$	Mutton snapper$_1$	Mutton snapper$_1$
Shallow Water Grouper Complex	**Subcomplexes**	**Porgies, Grunts & Hinds Complex**	
Scamp	Scamp	Whitebone porgy	
Gag$_{1,2}$	Gag$_{1,2}$	Knobbed porgy	
Red grouper$_1$	Red grouper$_1$	Jolthead porgy	
Black grouper$_1$	Black grouper$_1$	Red hind	
'Jacks' Complex	**Subcomplexes**	Rock hind	
Almaco jack$_2$	Almaco jack$_2$	Tomtate	
Banded rudderfish	Banded rudderfish	White grunt	
Lesser amberjack	Lesser amberjack		
Greater amberjack$_1$	Greater amberjack$_1$		
Individual ACLs Not Affiliated With A Complex			
Red snapper$_1$	Vermilion snapper$_1$	Wreckfish	Warsaw grouper$_3$
Red porgy$_1$	Goliath grouper$_{1,3}$	Hogfish$_1$	Speckled hind$_3$
Blue runner	Atlantic spadefish	Nassau grouper$_3$	Black sea bass$_1$
Gray triggerfish			

1 = Assessed species; 2 = Most vulnerable species in complex (PSA analysis); 3 = Prohibited (ACL = 0).

Table A8. Complexes (gray) and individual ACLs (white) for snapper grouper species under the Alternative 4 grouping approach.

Deep-Water Grouper & Tilefish Complex	Individual ACLs
Yellowedge grouper$_2$	Atlantic spadefish
Blueline tilefish	Greater amberjack$_1$
Silk Snapper$_2$	Blue runner
Jacks Complex	Gray triggerfish
Almaco jack$_2$	Snowy grouper$_1$
Banded rudderfish	Golden tilefish$_1$
Lesser amberjack	Warsaw grouper$_3$
Snappers Complex	Wreckfish
Gray snapper$_2$	Scamp
Lane snapper	Gag$_1$
Cubera snapper	Red grouper$_1$
Porgies, Grunts & Hinds Complex	Goliath grouper$_{1,3}$
Whitebone porgy$_2$	Nassau grouper$_3$
Knobbed porgy	Black sea bass$_1$
Jolthead porgy	Black grouper$_1$
Red hind	Speckled hind$_3$
Rock hind	Red porgy$_1$
Tomtate	Hogfish$_1$
White grunt	Yellowtail snapper$_1$
	Mutton snapper$_1$
	Red snapper$_1$
	Vermilion snapper$_1$

1 = Assessed species; 2 = Most vulnerable species in complex (PSA analysis); 3 = Prohibited (ACL = 0).

Table A9. References from Table 1.

Ref #	Reference
1	Allen, G.R. 1985. FAO species catalogue. Vol. 6. Snappers of the world. An annotated and illustrated catalogue of lutjanid species known to date. FAO Fish. Synop. 6(125):208 p.
2	Ault, J.S., Smith,S.G., Diaz, G.A., and Franklin, E. 2003. Florida hogfish fishery stock assessment. In SEDAR6 SAR2, 2004.
3	Bauchot, M.-L. and J.C. Hureau. 1990. Sparidae. Pp. 790-812. In J.C. Quero, J.C. Hureau, C. Karrer, A. Post, and L. Saldanha (eds.) Check-list of the fishes of the eastern tropical Atlantic (CLOFETA). JNICT, Lisbon; SEI, Paris; and UNESCO, Paris. Vol. 2.
4	Bullock, L.H. and M.D. Murphy. 1994. Aspects of the life history of the yellowmouth grouper, Mycteroperca interstitialis, in the eastern Gulf of Mexico. Bull. Mar. Sci. 55(1):30-45.
5	Bullock, L.H., Murphy, M.D., Godcharles, M.F., and Mitchell, M.E. 1992. Age, growth, and reproduction of jewfish Epinephelus itajara in the eastern Gulf of Mexico. Fish. Bull. 90:243-249.
6	Burton, M.L. 2001. Age, growth, and mortality of gray snapper, Lutjanus griseus, from the east coast of Florida. Fish. Bull. 99: 254-265.
7	Cervigón, F. 1993 Los peces marinos de Venezuela. Volume 2. Fundación Científica Los Roques, Caracas,Venezuela. 497 p.
8	Cervigón, F., R. Cipriani, W. Fischer, L. Garibaldi, M. Hendrick, A.J. Lemus, R. Márquez, J.M. Poutiers, G. Robaina and B. Rodriguez. 1992. Fichas FAO de identificación de especies para los fines de la pesca. Guía de campo de las especies comerciales marinas y de aquas salobres de la costa septentrional de Sur América.. FAO, Rome. 513 p. Preparado con el financiamento de la Comisión de Comunidades Europeas y de NORAD.
9	Claro, R. 1994 Características generales de la ictiofauna. p. 55-70. In R. Claro (ed.) Ecología de los peces marinos de Cuba. Instituto de Oceanología Academia de Ciencias de Cuba and Centro de Investigaciones de Quintana Roo.
10	Cook, M. and Hendon, M. 2010. Yellowedge grouper (Epinephelus flavolimbatus) age, growth, and reproduction from the northern Gulf of Mexico. Draft working document for SEDAR 22-DW-08
11	Craig, M.T. and P.A, Hastings 2007 A molecular phylogeny of the groupers of the subfamily Epinephelinae (Serranidae) with revised classification of the epinephelini. Ichthyol. Res. 54:1-17.
12	Daniel, E.A. 2003. Sexual maturity, spawning dynamics, and fecundity in red porgy, Pagrus pagrus, off the southeastern United States. M.S. Thesis, College of Charleston. 78pp.
13	Dooley, J.K. 1978 Systematics and biology of the tilefishes (Perciformes: Branchiostegidae and Malacanthidae) with descriptions of two new species. NOAA Tech. Rep. NMFS Circ. No. 411:1-78

14	Dooley, J.K. 1978. Branchiostegidae. In W. Fischer (ed.) FAO species identification sheets for fishery purposes. West Atlantic (Fishing Area 31). Volume 1. FAO, Rome.
15	Erickson, D. L., and G. D. Grossman. 1986. Reproductive demography of tilefish from the South Atlantic Bight with a test for the presence of protogynous hermaphroditism. Trans. Amer. Fish. Soc. 115:279-285.
16	Figuerola, F.M. and W. Torrez Ruiz. 2000. Reproduccíon en el mero mantequilla
17	(Cephalopholis fulva) y evaluación preliminary de la veda durante las agregaciones de desove del mero cabrilla (Epinephelus guttatus) en el oeste de Puerto Rico. Laboratorio de Investigaciones Pesqueras, Puerto Rico Departamento de Recursos Naturales y Ambientales. Marzo.
18	FL Museum of Natual History; http://www.flmnh.ufl.edu/fish/gallery/Descript/WhiteGrunt/WhiteGrunt.html
19	Froese, R. and D. Pauly, Editors. 2003. FishBase. World Wide Web electronic publication. www.fishbase.org, version 24 September, 2003.
20	Garcia, E.R., Potts, J.C., Rulifson, R.A., and Manooch, III, C.S. 2003. Age and growth of yellowtail snapper, Ocyurus chrysurus, from the southeastern Unites States. Bull. Mar. Sci. 72(3): 909-921.
21	Harris, P.J. and M.R. Collins. 2000. A comparison of the age, growth, and age at maturity for gag, Mycteroperca microlepis, from the southeastern United States during 1976-1982 and 1994-1995. Bull. Mar. Sci. 66:105-117.
22	Harris, J.H. and McGovern, J.C. 1997. Changes in the llife history of red porgy, Pagrus pagrus, from the Southeastern United States, 1972-1994. Fish. Bull. 95:732-747.
23	Harris, P.J., D.M. Wyanski, D. B. White, and J.L. Moore. 2002. Age, growth and reproduction of scamp, Mycteroperca phenax, in the southwestern North Atlantic 1979-1997. Bull. Mar. Sci. 70:113-132.
24	Harris, P.J., Wyanski, D.M., and Powers Mikell, P.T. 2004. Age, growth, and reproductive biology of blueline tilefish along the southeastern coast of the United States, 1982-1999. Trans. Am. Fish. Soc. 133:1190-1204.
25	Harris, P.J., Wyanski, D.M., White, D.B., Mikell, P.P., and Eyo, P.B. 2008? Age, growth, and reproduction of greater amberjack, Seriola dumerili, off the Atlantic coast of the southeastern United States. In SEDAR 15-RD01.
26	Hayse, J.W. 1990 Feeding habits, age, growth, and reproduction of Atlantic spadefish *Chaetodipterus faber* (Pisces: Ephippidae) in South Carolina. Fish. Bull. 88(1):67-83.
27	Heemstra, P.C. and J.E. Randall 1993 FAO species catalogue. Vol. 16. Groupers of the world (family Serranidae, subfamily Epinephelinae). An annotated and illustrated catalogue of the grouper, rockcod, hind, coral grouper and lyretail species known to date. FAO Fish. Synop. 125(16):382 p.
28	Hoese, H.D. and R.H. Moore. 1977. Fishes of the Gulf of Mexico. Texas, Louisiana, and Adjacent Waters. Texas A&M University Press. 327 pp.

29	Hood, P.B. and A.K. Johnson. 1997. A study of the age structure, growth, maturity schedules and fecundity of gray triggerfish (Balistes capriscus), red porgy (Pagrus pagrus), and vermillion snapper (Rhomboplites aurorubens) from the eastern Gulf of Mexico. MARFIN Final Report.
30	IGFA 2001 Database of IGFA angling records until 2001. IGFA, Fort Lauderdale, USA.
31	Ingram, G.W. 2001. Stock structure of gray triggerfish, Ballistes capriscus, on multiple spatial scales in the Gulf of Mexico. PhD Dissertation, Department of Marine Sciences, University of South Alabama. 229pp.
32	MAFMC 1996. Amendment 8 to the summer flounder fishery management plan; FMP and FEIS for the Scup fishery. 367 pp.
33	Manooch III, C.S. and D.L. Mason. 1987. Age and growth of the warsaw grouper and black grouper from the southeast region of the United States. Northeast Gulf Science, 9(2): 65-75.
34	Manooch, C.S. III. And C.A.Barans. 1982. Distribution, abundance, and age and growth of the tomtate, Haemulon aurolineatum, along the southeastern United States coast. U.S. Fish. Bull. 80(1): 1-20.
35	Manooch, C.S., III, and J.C. Potts. 1997. Age, growth and mortality of greater
36	amberjack from the southeastern United States. Fish. Res. 30: 229-240.
37	MARMAP. 1997. Analytical Report
38	Matheson, R. H., and G. R. Huntsman. 1984. Growth, mortality, and yeild-per-recruit models for
39	speckled hind and snowy grouper from the United States South Atlantic Bight. Trans. Amer.
40	Fish. Soc. 113:607-616.
41	McGovern, J.C., Collins, M.R., Pashuk, O., and Meister, H.S. 2002. Temporal and spatial differences in life history parameters of black sea bass in the southeastern United States. N. Am. J. of Fish. Mngmt. 22:1151-1163.
42	McInerny, S.A. 2007. Age and growth of red snapper, Lutjanus campechanus, from the southeastern United States. M.S. Thesis. UNC Wilmington, NC. 99pp.
43	Mercer, L. P. 1989. Species profile: life histories and environmental requirements of coastal fishes and invertebrates (South Atlantic)-and U.S. Army Corps Engin., TR EL-82-4. 16 pp. Black sea bass. U.S. Fish Wildl. Servo BioI. Rep. 82(11.99);
44	Munro, J.L. and D. McB. Williams, 1985. Assessment and management of coral reef fisheries: biological, environmental and socio-economic aspects. pp. 543-578. In Proceedings of the Fifth International Coral Reef Congress, Tahiti, 27 May-1 June 1985. Vol. 4. Antenne Museum-EPHE, Moonea, French Polynesia.
45	O'Brien, L., J. Burnett, and R.K. Mayo. 1993. Maturation of nineteen species of finfish off the northeast coast of the United States, 1985-1990. NOAA Tech. Rep. NMFS 113. 66 p.

46	Padgett, S.M. 1997. Age, growth, and reproductive biology of the white grunt, Haemulon plumieri, along the southeast Atlantic coast of the United States. M.S. Thesis, University of Charleston. 61 pp.
47	Palmer, S.P., P.H. Harris, and P. Powers. 2004. Age, growth and reproduction of tilefish, Lopholatilus chamaeleonticeps, along the southeast Atlantic coast of the United States, 1980-87 and 1996-1998. SEDAR 4 working paper. SEDAR4-DW-18.
48	Potts, J.C. and C.S. Manooch III 1999 Observations on the age and growth of graysby and coney from the southeastern United States. Trans. Am. Fish. Soc. 128(4):751-757.
49	Potts, J.C. and C.S. Manooch, III. 1995. Age and growth of red hind and rock hind collected from North Carolina through the Dry Tortugas, Florida. Bull. Mar. Sci. 56:784-794.
50	Potts, J.C. and C.S. Manooch, III. 2001. Differences in the age and growth of white grunt (Haemulon plumieri) from North Carolina and South Carolina compared with Southeast Florida. Bull. Mar. Sci. 68:1-12.
51	Reichert, J.C.M and Wyanski, D.M. 2005. SEDAR 10-DW-15. Analytical Report on the age, growth, and reproductive biology of gag, Mycteroperca microlepis from the southeastern United States, 1996-2005.
52	Robins, C.R. and G.C. Ray 1986 A field guide to Atlantic coast fishes of North America. Houghton Mifflin Company, Boston, U.S.A. 354 p.
53	Robins, C.R., Ray, G.C., Douglass, J., and Freund, R. 1986. A field guide to Atlantic coast fishes of North America. Peterson Field Guide Ser. 32, Houghton Mifflin, Boston, 354 p.
54	Ross, J.L. and Huntsman, G.R. 1982. Age, growth, and mortality of blueline tilefish from North Carolina and South Carolina. Trans. Am. Fish. Soc. 111:585-592.
55	Ross, J.L. and Merriner, J.V. 1983. Reproductive biology of the blueline tilefish, Caulolatilus microps, off North Carolina and South Carolina. Fish. Bull. 81(3):553-568.
56	SAFE 2005. Stock Assessment and Fishery Evaluation Report for the Snapper Grouper Fishery of the South Atlantic. Final Report (11/1805). South Atlantic Fishery Management Council, 1 Southpark Cir., Suite 306, Charleston, S.C.
57	Schwartz, F.J. 1990. Length-weight, age and growth, and landings observations for sheepshead Archosargus probatocephalus from North Carolina. Fish. Bull., U.S. 88:829-832.
58	SEDAR 15A-SAR3. 2008. S. Atlantic and Gulf of Mexico Mutton Snapper. SEDAR, SAFMC, 4055 Faber Place #20, North Charleston, SC 29405
59	SEDAR 17, 2008. Stock Assessment Report. South Atlantic Vermilion Snapper. SEDAR, SAFMC, 4055 Faber Place #20, North Charleston, SC 29405
60	SEDAR 19. 2010. South Atlantic Red Grouper. 4055 Faber place drive, Suite 201, North Charleston, SC 29405
61	SEDAR 3. 2003. Complete stock assessment report of the yellowtail snapper in the southeastern United States. SEDAR 1 Southpark circle #306, Charleston, SC 29414
62	SEDAR 6. 2004. Complete stock assessment report 2 of hogfish snapper. SEDAR/SAFMC, 1 Southpark circle #306, Charleston, SC 29414

63	SEDAR 8. 2005. Caribbean yellowtail snapper stock assessment report. SEDAR, 1 Southpark circle #306, Charleston, SC 29414
64	SEDAR 9. 2006. Gulf of Mexico greater amberjack stock assessment report.
65	SEDAR 23. 2010 (in progress). Gulf of Mexico and South Atlantic Goliath Grouper Stock Assessment.
66	SEDAR24. 2010. Pre-Review Stock Assessment Report, South Atlantic Red Snapper. SEDAR 4055 Faber Place #201 North Charleston, SC 29405
67	SEDAR2-SAR3. 2005. Black sea bass assessment update. 4055 Faber place drive, Suite 201, North Charleston, SC 29405
68	SEDAR4-SAR1. 2004. Stock assessment of the deepwater snapper-grouper complex in the South Atlantic. SEDAR/SAFMC 1 Southpark circle #306, Charleston, SC 29414
69	SEDAR 14. 2007?. Caribbean yellowfin grouper stock assessment report. SEDAR 4055 Faber Place #201 North Charleston, SC 29405
70	Sedberry, G.R., G.F. Ulrich, and A.J. Applegate. 1994. Development and status of the fishery for wreckfish (Polyprion americanus) in the southeastern United States. Proc. Gulf Carib. Fish. Inst. 43:168-192.
71	Sharp, C.C. 2001. Age, growth and reproduction of knobbed porgy, Calamus nodosus, from the continental shelf of the U.S. MARMAP Analytical Report.
72	Smith-Vaniz, W.F. 1984 Carangidae. In W. Fischer and G. Bianchi (eds.) FAO species identification sheets for fishery purposes. Western Indian Ocean fishing area 51. Vol. 1. [pag. var.]. FAO, Rome.
73	Starck, W.A. II, 1971. The biology of the grey snapper, Lutjanus griseus (Linnaeus), in the Florida Keys. p. 11-150. In W.A. Starck, II and R.E. Schroeder. Investigations on the gray snapper, Lutjanus griseus. Studies in Tropical Oceanography No. 10, Rosenstiel School of Marine and Atmospheric Sciences, University of Miami Press, Florida
74	Taylor, R.G. and R.H. McMichael, Jr. 1983. The wire fish-trap fisheries in Monroe and Collier counties, Florida. Fla. Mar. Res. Publ., no. 39, FDNR, St. Petersburg, FL (USA), 19 pp.
75	Vaughan, D.S., M.R. Collins, and D.J. Schmidt. 1995. Population characteristics of the U.S. South Atlantic black sea bass Centropristis striata. Bull. Mar. Sci. 56:250-267.
76	Vaughan, D.S., Manooch III, C.S., and Potts, J.C. 2001. Assessment of the wreckfish fishery on the Blake Plateau. American Fisheries Society Symposium. 25:105-120.
77	Waltz, C.W., W.A. Roumillat and C.A. Wenner. 1982. Biology of the whitebone porgy, Calamus leucosteus, in the South Atlantic Bight. Fish. Bull. 80(3): 863-874.
78	White, D.B. and Palmer, S.M. 2004. Age, growth, and reproduction of the red snapper, Lutjanus campechanus, from the Atlantic waters of the southeastern U.S. Bull. Mar. Sci. 75(3): 335-360.
79	Wilson, C. A., A. L. Stanley, and D. L. Nieland. 2001. Age estimates from annuli in otoliths of red snapper, Lutjanus campechanus, from the northern Gulf of Mexico. Proceedings of the 52nd Gulf and Caribbean Fisheries Institute 52:48-62.

80	Wyanksi, D.M., White, B.D., and Barans, C.A. 2000. Growth, population age structure, and aspects of the reproductive biology of snowy grouper, Epinephelus niveatus, off North Carolina and South Carolina. Fish. Bull. 98:199-218.
81	Zhao, B. and McGovern, J.C. 1997. Temporal variation in sexual maturity and gear-specific sex ratio of the vermilion snapper, Rhomboplites aurorubens, in the South Atlantic Bight. Fish. Bull. 95:837-848.

Appendix P. Economic Models to Analyze Management Actions Proposed for the Commercial and Recreational Dolphin-Wahoo Fisheries in the Comprehensive Annual Catch Limit (ACL) Amendment for the South Atlantic Region

Introduction

The Magnuson-Stevens Reauthorization Act (MSRA) of 2006 mandates the specification of additional safeguard requirements to be applied in federal fisheries. These safeguard requirements include the establishment of overfishing limits (OFLs), annual catch limits (ACLs), annual catch targets (ACTs), and appropriate accountability measures (AMs). The MSRA requires that by 2011 Fishery Management Plans (FMPs) for all fisheries, except fisheries for species with annual life cycles, must establish a mechanism for specifying ACLs at a level that prevents overfishing and does not exceed the recommendations of a Fishery Management Council's Scientific and Statistical Committee's or other established peer review process. These FMPs also are required to establish measures to ensure accountability. AMs are management controls that ensure that the ACLs are not exceeded. The measures are intended to prevent overfishing and maximize optimum yield in the future while minimizing to the extent practicable adverse social and economic effects on fishery participants and their communities.

Although dolphin and wahoo species are not overfished and are not undergoing overfishing the South Atlantic Fishery Management Council (Council) is still required to meet the 2011 MSRA deadline for these species. As a result, the Council prepared the Comprehensive ACL Amendment for the south Atlantic region to specify ACLs and AMs. The Comprehensive ACL Amendment considers a wide range of management actions for a number of commercial and recreational fisheries. Actions 16-25 amend the Dolphin-Wahoo FMP which is the focus of this analysis. This report describes the economic models used to analyze proposed management

actions for the commercial and recreational Atlantic dolphin-wahoo fisheries in federal waters from the Florida Keys through Maine[1].

Data

Commercial Sector

Commercial fishers that participate in the south Atlantic dolphin-wahoo fishery are required to submit logbook reports within 7 days of the completion of each trip to either the Southeast Coastal Fisheries (SCF) Logbook Program or the Atlantic Highly Migratory Species (HMS) Logbook Program. The two most prevalent gear types that catch dolphin-wahoo are hook and line (i.e. handlines, rod and reel, and trolling lines) and pelagic longline. Typically, fishers using hook and line gear submit trip reports to the SCF Program which requires respondents to report the weight of all species landed. Fishers employing pelagic longlines tend to submit information about directed dolphin-wahoo trips to the SCF Program; however, when dolphin-wahoo are landed as bycatch on directed HMS trips these fishers usually report to the HMS Program. When reporting to the HMS Program fishers must fill out both trip and set summary forms. Additionally, the HMS Program requires respondents to report the number of fish kept rather than pounds landed.

Trips from the SCF logbook database that landed at least one pound of dolphin-wahoo species in south Atlantic waters from Monroe County, Florida to North Carolina during 2005-2009 were selected as inputs to the economic model. Additionally, sets from the HMS logbook

[1] Although the South Atlantic Council's jurisdiction extends northward only to North Carolina this analysis assumes that the entire Atlantic stock of dolphin and wahoo is of managerial concern to the South Atlantic Council since the majority of landings of these species occur in its jurisdiction.

database that kept at least one dolphin or wahoo caught in Atlantic waters during 2005-2009 were selected for the analysis[2].

The following steps were taken to merge the HMS logbook set-level data with the SCF logbook trip-level data. First, HMS logbook sets were aggregated by a trip schedule number to create a trip-level HMS logbook database. Next, pounds landed of dolphin-wahoo per trip were estimated[3]. We estimated pounds landed of dolphin and wahoo on HMS trips by subtracting the total pounds of each species reported annually to the SCF Program from the total pounds of each species reported annually to the NMFS Accumulated Landings Service (ALS) database in Atlantic waters from the Florida Keys through Maine[4]. The difference was divided by the number of dolphin or wahoo reported to the HMS Program to estimate an average weight per kept fish. The average weight, which was 15.0 pounds ww for dolphin and 47.4 pounds ww for wahoo, was multiplied by the number of dolphin and wahoo kept on HMS trips to derive an estimate of pounds landed per HMS trip. The newly created trip-level HMS logbook database and the original trip-level SCF logbook database were then merged into an aggregated logbook data set and used for the trip-level analysis in the simulation model.

The aggregated logbook data set includes information about landings by species, but does not include information about trip revenues. Therefore, average monthly prices were calculated from the NMFS ALS database and merged with logbook trip reports by year, month, species and

---

[2] HMS trips that reported landings in Puerto Rico or "Unknown State" were dropped from the analysis.

[3] Only pounds landed of dolphin-wahoo were used in the economic model. Other species landed such as swordfish and tunas may contribute significantly to the revenues generated on HMS trips; however, the regulatory analysis for the Comprehensive ACL Amendment only focuses on changes in revenues attributed to landings of dolphin-wahoo.

[4] Landings of dolphin-wahoo in state waters were grouped with HMS landings. State landings were less than 1% of total dolphin and wahoo landings reported to the ALS database and should not bias the estimate of pounds per whole fish by very much.

state. Ex-vessel revenue for each species was calculated as the product of average monthly prices and reported pounds per trip[5]. The analysis for the ACL Amendment focused only on marginal changes in single-species revenue depending on the Action being analyzed. Thus, for this analysis ex-vessel gross revenue for trip j in year t was calculated as trip revenues from the regulated species s (i.e. dolphin or wahoo), $TR_{j,t} = \sum R_{s,j,t}$. Revenues were adjusted to constant 2009 dollars with the consumer price index for all items and all urban consumers.[6]

Recreational Sector

The 2000 Marine Recreational Statistics Survey (MRFSS) southeast intercept data is combined with economic add-on data to characterize anglers and their spatial fishing choices (Hicks et al. 1999). Measures of fishing quality for individual species and aggregate species groups are calculated using the MRFSS creel data. In the dolphin and big game (e.g. wahoo) model, data are derived from dolphin and big game boat trips taken on the Atlantic coast of Florida. Data focus on shore, charter boat and private/rental boat hook-and-line day trip anglers. For a complete description of the data please see Haab et al. (2009).

Simulation Model – Commercial Sector

The general modeling approach was to hypothetically impose the proposed regulations on individual fishing trips as reported to the SCF and HMS logbook databases. Each reported trip was examined with regard to a combination of rules proposed in the Comprehensive ACL Amendment, and the effects of the rules on trip catches and revenues were calculated. A five-

[5] Previous applications of this model calculated changes in net operating revenue to measure the effects of proposed regulations. Cost data was not available for pelagic longline vessels reporting to the HMS logbook, so changes in ex-vessel revenues were used to calculate short-term regulatory impacts.

[6] The consumer price index for all urban consumers can be found at http://data.bls.gov. See series CUUR0000SAO, which was adjusted to a 2009 base period for this study.

year average was used to estimate the expected effects of proposed regulations so that anomalies that may have affected fishing success in any one year would be averaged out. Data for the five year period, 2005-2009, were used to simulate the fishery with the proposed management alternatives associated with dolphin and wahoo for the Comprehensive ACL Amendment.

Short-term economic losses were measured as the resulting reduction in trip gross revenues from landings of dolphin-wahoo species. If a regulatory alternative is predicted to close the dolphin or wahoo commercial fisheries then all revenues that would have been generated from dolphin or wahoo landings on trips after the closing date would be lost. Trips that targeted species other than dolphin-wahoo would continue but still would accumulate short-term economic losses equal to the foregone revenues associated with dolphin-wahoo landings. A shortcoming to this approach is the continuation of regulated trips that mainly land dolphin-wahoo along with a secondary amount of bycatch species. In reality, if the revenue generated from these bycatch species is relatively minor then the trip will likely not be taken. In this case, industry losses could be overstated since cost savings from not taking the trip do not enter into the calculation of short-term economic losses. All trips reported to the HMS logbook are assumed to continue as they are assumed to target dolphin-wahoo as bycatch species only.

Because of data limitations, only changes in ex-vessel revenues will be considered for the evaluation of the proposed regulatory actions. Rather than focusing on a single point estimate, we use a five year average. Ex-vessel gross revenues for the combination of proposed rules denoted by a in regulated year t, $GR_{a,t}$, were totaled for j trips within each logbook year, k, from 2005-2009, with annual totals averaged across all five years.

$$GR_{a,t} = \frac{\sum_{k=2005}^{k=2009} \sum_{j=trips} R_{a,j,k}}{5}$$

The five-year average is interpreted as the expected annual economic effect of the proposed combination of rules on industry gross revenues in management year t, $GR_{a,t}$. Each analysis was conducted for a single management year. In this analysis we assumed t = 2012. This approach can be interpreted as using historical averages over a lengthy time period to smooth out good fishing years and bad ones. We do not know exactly what conditions will prevail in 2012; therefore, we construct an average predicted outcome based on the five most recent years for which data are available.

The predicted outcome for rule-combination a is compared to the predicted outcome for no-action (*i.e.*, no additional management) to determine if the proposed alternatives are expected to generate net benefits or losses to commercial fishers. The fishery without additional management was evaluated by simulating the effects of rules implemented by the original Dolphin-Wahoo FMP which was published on May 27, 2004 with the historical logbook data from 2005-2009. Gross revenues are expected to accrue to the fishery if the predicted outcome for rule combination a exceeds the predicted outcome without additional regulation. Foregone (or lost) revenues would accrue if the predicted outcome for rule combination a is less than the predicted outcome for no additional management. Because the analysis is short-term for management year 2012 only, we expect it to estimate the short-term losses associated with implementation of rules proposed in the Comprehensive ACL Amendment.

Method of Modeling Management Alternatives

Commercial Sector

This section describes the method of modeling the effects of management actions on the commercial dolphin-wahoo fishery. Each type of regulation proposed for dolphin-wahoo species was modeled by restricting the ability to catch and/or keep fish that were reported in the aggregated logbook database. Appendix A presents a brief discussion of the strengths and weaknesses of the model.

Minimum size limits

Larger minimum size limits were modeled by assuming that an additional (when compared to the status quo) percentage, ρ_s^{msl}, of species s on each trip are undersized and must be culled from the catch and discarded.

$$q_{s,j,t} = h_{s,j,t}\,(1-\rho_s^{msl})$$

Variable $h_{s,j,t}$ represents quantity of species s caught on trip j in year t, and $q_{s,j,t}$ denotes quantity kept after accounting for the effects of the larger minimum size limit. Each trip is assumed to catch the same quantity of species s as without the size limit, but that undersized fish would be discarded and subject to release mortality. Revenues for species s on trip j, $R_{s,j,t} = p_{s,j,t}\, q_{s,j,t}$, are based on quantities kept, $q_{s,j,t}$, and price per pound, $p_{s,j,t}$. The harvest of other species on trip j, $h_{sp,j,t}$ for $sp \neq s$, is assumed not to be affected by the proposed minimum size limit for species s. After accounting for the proposed minimum size limit and other jointly-proposed rules, then the expected losses for trip j due to a minimum size limit were calculated as a reduction in trip revenues for species s, $p_{s,j,t}\,(q_{s,j,t} - h_{s,j,t})$.

The percentages that define the additional undersized fish associated with each proposed minimum size limit were held constant throughout the analysis and regardless of the alternatives proposed for other species in the fishery. When effective biologically, minimum size limits gradually change the age and size distribution of the resource and the percentage of undersized fish landed. However, this analysis does not include a biological component with which to endogenously determine changes in the proportion of undersized fish that would be landed each year.

These percentages refer to numbers of fish smaller than the proposed minimum size limits. However, the simulation model works with quantities of each species landed as reported on logbook trips rather than numbers of fish. Hence, this method of simulating the effect of minimum size limits is an approximation for the preferred method that would use numbers of fish, and is likely to overestimate the effect of the minimum size limit when the average weight per fish for species *s* exceeds 1 pound.

Trip limits

Trip limits for species *s* impose a maximum allowable catch per trip, and trips with catches of species *s* in excess of the trip limit, TL_s, were modeled by restricting their catches to the trip limit.

$$q_{s,j,t} = TL_s \qquad \text{when } h_{s,j,t} \geq TL_s$$

Losses attributable to the trip limit were measured as the value of the difference between catches for species *s* that would have occurred with and without the trip limit, $[TL_s - h_{s,j,t}]$. Please note that losses due to the trip limit would be equal to the difference between the trip limit and

reported catches only when there were no proposed minimum size limits. The quantity of species s in excess of the trip limit is assumed to have been caught, discarded, and subject to release mortality because the trip would continue in search of other species. In this event, trip costs would not change due to implementation of trip limits.

Trips with catches less than the trip limit, after accounting for the effects of minimum size limits if implemented conjunctively, would not incur additional losses due to the trip limit.

$$q_{s,j,t} = h_{s,j,t}(1-\rho_s^C) \qquad \textit{when } h_{s,j,t}(1-\rho_s^C) < TL_s$$

The simulation model includes a behavioral assumption about the effect of trip limits on the duration of trips. Trips are modeled to terminate after the trip limit is filled if the regulated species is the primary source of revenue on the trip. However, if the regulated species is not the primary source of revenue, then the trip is modeled to continue even if the trip limit is filled. In this event, fish caught in excess of the trip limit are presumed to be caught and discarded. Trip costs would not change.

Trip limits create an incentive for fishermen to take shorter, but more frequent fishing trips. However, this behavioral response has not been modeled for this analysis.

Quotas

The regulatory alternatives (other than Action 20) in the Comprehensive ACL Amendment associated with dolphin-wahoo can be viewed as annual quotas since the ACLs and AMs could close the commercial dolphin or wahoo fisheries before the end of the fishing year when compared to past years. Quotas may or may not result in fishery closures though. When quotas are filled, the closure dates vary annually depending on the speed at which the fishery

lands its quota for species s. The closure extends through the end of the fishing year once the quota is filled.

The model sets variable $open_s = 0$ to reflect a no-harvest rule resulting from fishery closures after the quota is filled. Otherwise, it sets $open_s = 1$ to indicate that the fishery for species s is open and that trips are unaffected by a quota closure.

$$q_{s,j,t} = h_{s,j,t}\, open_s$$

Variable $h_{s,j,t}$ represents quantity of species s caught on trip j in year t, and $q_{s,j,t}$ denotes quantity kept after accounting for the effects of a fishery closure. Please note that the dolphin and wahoo fisheries are not subject to a combined aggregate quota.

The model compares the accumulated fishery landings of species s with its quota to determine if and when the fishery would be closed. This is accomplished by sorting logbook trip reports by year, month and day landed, and then performing a chronological trip-by-trip accumulation of landings that likely would occur given the selected combination of proposed management alternatives. The model sets $open_s = 1$ at the beginning of each fishing year, and sets $open_s = 0$ as soon as accumulated landings exceed the quota for species s.

Quotas tend to promote a race for fish as fishers compete to maximize their shares of the overall catch before the fishery is closed. The model does not include the possibility that fishers might accelerate their trips in anticipation of a fishery closure, or that dockside prices might fall if market gluts occur due to the accelerated harvesting activity. More work is needed on these issues since they are two of the primary outcomes of quota management.

Recreational Sector

Haab et al. (2009) estimates conditional logit, nested logit, and mixed logit models using the dolphin and big game data described in the previous section to derive welfare estimates. The approach used for the recreational analysis for the ACL Amendment was to use willingness-to-pay values for one additional fish caught and kept to predict the aggregate economic value to the recreational sector from dolphin and wahoo trips under the different proposed regulatory scenarios.

First, estimates of the willingness-to-pay for one additional fish caught and kept were selected from the results of Haab et al. (2009) for dolphin over 20 inches fork length (i.e. big dolphin) and wahoo (i.e. big game). For dolphin, the mixed logit model yielded an estimate of $37 per fish per trip while the nested logit model yielded an estimate of $103 per fish per trip. For wahoo, the conditional logit model yielded an estimate of $40 per fish per trip while the nested logit model yielded an estimate of $81 per fish per trip.

Next, an estimate of the willingness-to-pay for one additional pound of fish caught and kept was derived by dividing the figures above by the average weight of a recreationally caught dolphin and wahoo, which was 8.2 lbs. ww and 22.6 lbs. ww, respectively. The average willingness-to-pay per pound of fish was then multiplied by the different annual harvests of recreationally caught fish that were implied by the various regulatory alternatives in the ACL Amendment to estimate the aggregate economic value to the recreational sector. The No Action Alternative was evaluated by multiplying the per pound willingness-to-pay estimates by the annual average harvest of recreationally caught dolphin and wahoo from 2005-2009.

References

Dumas, C.F., J.C. Whitehead, C.E. Landry, and J.H. Herstine. 2009. "Economic Impacts and Recreation Value of the North Carolina For-Hire Fishing Fleet." North Carolina Sea Grant FRG Grant Report 07-FEG-05.

Haab, T.C., R. Hicks, K. Schnier, and J.C. Whitehead. 2009. "Angler Heterogeneity and the Species-Specific Demand for Recreational Fishing in the Southeastern United States." Draft Final Report Submitted for MARFIN Grant #NA06NMF4330055.

Hicks, Rob, Scott Steinbeck, Amy Gautam, and Eric Thunberg. August 1999. "Volume II: The Economic Value of New England and Mid-Atlantic Sportfishing in 1994." NOAA Technical Memorandum NMFS-F/SPO-38.

Discussion of Model Strengths and Weaknesses

The logbook data used in this analysis reflect the full range of harvesting activities and outcomes for trips in the commercial dolphin-wahoo fishery, from targeted to incidental capture of various species, and included differences in fishing activities by area, gear, duration of trip, crew size, good luck and bad luck, and so forth. In this sense, this analysis is more realistic than conventional bioeconomic models, which specify homogeneous fishing activity within a few discrete fishing classes defined by vessel size, gear type, area fished, or scale of operation.

The use of logbook data to simulate the effects of proposed management actions is most appropriate in the short-term because logbooks report actual fishing behavior during a recent period of time. This type of simulation analysis assumes that fishing conditions in the near-future will be similar to conditions in the recent past, and that annual variations in model outcomes are associated with short-term anomalies rather than long-term trends in economic, biological or environmental conditions.

The use of logbook data becomes less reliable for longer-term analyses because fishing effort and catch rates may change in response to changes in economic, regulatory and environmental conditions. Dockside fish prices, fuel prices and other input costs, the abundance

of fish, regulation and other factors may change over time, and all interact to determine the profitability of fishing. Regulation tends to reduce the profitability of fishing, at least initially when first implemented, and fishing effort in the dolphin-wahoo fishery may decline if some boats switch to other gears and species (e.g. rod and reel targeting king mackerel in North Carolina). The simulation model does not account for more complex behavioral responses such as a redirection of fishing effort among different types of fishing as fishers react to minimize the adverse effects of management. This analysis also does not account for potential changes in fishing effort over time, and additional econometric analysis is needed to model this type of behavioral response to changes in resource abundance and regulation.

Appendix Q

Proposed South Atlantic Council ABC Control Rule

Report of the SAFMC SSC September 2009 Revised August 2010

Background

The SAMFC SSC first discussed acceptable biological catch (ABC) control rules in June 2008 in response to publication of a proposed rule addressing National Standards 1 (NS1) guidelines for the Magnuson-Stevens Reauthorization (MSRA). An issue paper outlining various alternative approaches to establishing ABC was provided to the Council in September 2008. The Council supported further developing a control rule approach which specified ABC as a function of yield at maximum sustainable yield (MSY) and assessment uncertainty. The Council further specified that ABC should be set at a level providing a 25% chance of overfishing, with a range of values corresponding to 10 to 50% chance of overfishing. The Council intends to specify ABC control rules in its comprehensive annual catch limit (ACL) amendment.

Although the approach suggested in September 2008 provides guidance for assessed stocks for which the probability of overfishing can be provided in terms of yield, it does not address those stocks that lack assessments. Therefore, the SSC requested a special meeting for March 2009 devoted solely to developing an ABC control rule that could be applied to all managed stocks. During that meeting, the SSC developed the control rule reflected in this document after much deliberation and discussion.

First, the group decided on general characteristics and components of the rule and developed a framework of dimensions and tiers. Dimensions reflect the critical characteristics to evaluate, including data and assessment information availability and life history traits. Tiers are objective levels within dimensions that reflect the range of information available. Each tier is assigned a score which contributes to the overall adjustment factor.

Once the general approach was established, a number of example stocks were put through the framework to ensure that it included adequate tiers to accommodate a variety of circumstances and appropriate dimensions to adequately address uncertainty. This exercise led to considerable further discussion that better defined the concepts and resulted in some tiers being combined to keep the rule as parsimonious as possible. The following sections of this document describe the tiers and summarize critical discussions that occurred during development.

An important caveat must be stated upfront. The approach described here is applicable when the OFL can be stated in weight and some measure of statistical uncertainty about the OFL can be estimated. Future discussions and development will focus on ways to apply this methodology in a consistent manner to stocks for which the OFL or its statistical uncertainty cannot be estimated.

Control Rule Concept

The SSC agreed that the ABC control rule should provide an objective means of determining the buffer, or amount of separation, between the overfishing level (typically MSY) and the ABC. The desired rule should evaluate multiple characteristics, accommodate varying data levels and assessment information, and incorporate productivity and susceptibility measures. Finally, the control rule should provide objective adjustments to the probability of overfishing according to key risk factors, with actual ABCs expressed as yield in mass obtained through a probability density distribution or a "P*" analysis.

Discussion of the general concept and approach led to creation of a system of dimensions composed of multiple tiers that are scored to provide a value that can be used to select the appropriate probability of overfishing for each stock. Each stock evaluated receives a single "adjustment factor", which is the sum of tier scores across dimensions and which ultimately determines the amount of buffer or separation between OFL and ABC. Adjustment factors are subtracted from the "base probability of overfishing" to provide the "critical probability". The base probability of overfishing is the value used to determine OFL. The critical probability is a probability of overfishing that is used to determine ABC in the same manner that the base probability is used to determine MSY and OFL. Through this process, tier scores equate to an adjustment in the probability of overfishing occurring, and do not represent, or necessarily correspond to, a specific poundage or percentage of the OFL. Recommended ABC values are derived from probability density functions that provide the probability of overfishing occurring for any particular yield.

Control Rule Characteristics

The SSC began deliberations by developing a list of desirable characteristics and principles for ABC control rules. These included:

Incorporate a tiered system based on data and assessment information availability

Include objective criteria with numerical scoring that can be applied to all stocks

Incorporate stock status

Reflect the degree to which uncertainty is characterized

Acknowledge the cumulative nature of uncertainty

Provide a means to incorporate vulnerability and life history traits, ideally through inclusion of productivity-susceptibility analyses (PSA) scores

Provide flexibility to accommodate a wide range of biological characteristics, assessment methods and information, data availability, and assessment age

Provide an objective means of incorporating potential changes in data and assessment information availability over time

Control Rule Dimensions

The SSC incorporated these general characteristics and principles into a series of tiers and dimensions that form the foundation of the control rule. Four dimensions are included in the proposed control rule framework: assessment information, characterization of uncertainty, stock status, and productivity/susceptibility of the stock. Each dimension contains multiple levels or tiers that can be evaluated for each stock to determine a numerical score for the dimension. The four dimensions and their tiers are described in detail in the following section and summarized in Table 1. Application to particular stocks is illustrated in Table 2.

Dimension 1. Assessment Information

The assessment information dimension reflects available data and assessment outputs. The five tiers within this dimension range from a full quantitative assessment which provides biomass, exploitation, and MSY-based reference points to the bottom tier for those stocks which lack reliable catch records.

The age or degree of reliability of an assessment can be incorporated when determining the scoring for an individual stock. For example, a stock having a pre-SEDAR assessment may be ranked at a lower tier despite that assessment having the required outputs for a higher tier, because the reliability of an output value cannot be determined or the method by which an output was obtained is not clearly documented. Estimates from an assessment may be considered unreliable or inapplicable when considered at a later date (e.g. assumed equilibrium conditions may have changed). Similarly, an age-aggregated assessment approach may provide an estimate of MSY, but in some instances such estimates may be considered less reliable than estimates from an age-structured approach. The intent is that tier rankings are based on the data and outputs considered reliable at the time the ranking is made. Scores for these tiers increase as the level of available information declines.

Assessment Information Tiers Scoring

1 Quantitative assessment provides estimates of exploitation and biomass; includes MSY-derived benchmarks. (0)

2 Quantitative assessment provides estimates of either exploitation or biomass, but not MSY benchmarks; requires proxy reference points. (-2.5)

3 Quantitative assessment that provides relative measures of exploitation or biomass; absolute measures of status are unavailable; references may be based on proxy. (-5)

4 Reliable catch history available (-7.5)

5 Scarce or unreliable catch records (-10)

Dimension 2. Characterization of Uncertainty

This dimension is considered critical because it specifically addresses language in the MSRA stating that ABC should be reduced from OFL to account for assessment uncertainty. Because accounting for uncertainty tends to be a cumulative process, an incomplete or partial accounting of know uncertainties will tend to underestimate the underlying uncertainty in the results. Tiers for this dimension reflect how well uncertainty is characterized, not the actual magnitude of the uncertainty. The magnitude is incorporated through the assessment and is reflected in the distribution of yield estimates. Adjustment scores for this tier increase as the degree and completeness of uncertainty characterizations decrease..

Uncertainty Tiers, Examples, and Scoring

1. Complete. This tier is for assessments providing a complete statistical (e.g. Bayesian re-sampling approach) treatment of major uncertainties, incorporating both observed data and environmental variability, which are carried forward into reference point calculations and stock projections. A key determinant of this level is that uncertainty in both assessment inputs and environmental conditions are included. (0)

Example: No currently assessed stocks meet this level.

2. High. This tier represents those assessments that include re-sampling (e.g. Bootstrap or Monte Carlo techniques) of important or critical inputs such as natural mortality, landings, discard rates, age and growth parameters. Such re-sampling is also carried forward and combined with recruitment uncertainty for projections and reference point calculations, including reference point distributions. . The key determinant for this level is that reference point estimates distributions reflect more than just uncertainty in future recruitment. (-2.5) Example: SEDAR 4, South Atlantic snowy grouper and tilefish.

3. Medium: This tier represents assessments in which key uncertainties are addressed via statistical techniques and sensitivities, but the full uncertainties are not carried forward into the projections and reference point calculations. Projections may, however, reflect uncertainty in recruitment and population abundance. Although outputs include distributions of F, F_{MSY} as in the 'High' category above, in this category fewer uncertainties are addressed in developing such distributions. One example for this level is a distribution of F_{MSY} which only reflects uncertainty in recruitment. (-5)

Examples: SEDAR 15, South Atlantic red snapper and greater amberjack; SEDAR 17, South Atlantic Spanish mackerel and vermilion snapper

4. Low. This tier represents those assessments lacking any statistical treatment of uncertainty. Sensitivity runs or explorations of multiple assessment models may be available. The key determinant for this level is that distributions for reference points are lacking. (-7.5) Example: SEDAR 2, South Atlantic black sea bass

5. None. This tier represents assessments that only provide single point estimates, with no sensitivities or other evaluation of uncertainties. (-10)

Example: None.

Dimension 3. Stock Status

Stock status is included among the dimensions so that an additional adjustment to ABC can be added for stocks that are overfished or overfishing. Five tiers are included, ranging from a high biomass and low exploitation level where no additional buffer is applied to the situation where either is unknown and the highest buffering is applied. With the exception of distinguishing between the top two tiers which both reflect stocks that are neither overfished nor experiencing overfishing, application of these tiers is straightforward and based directly on the final status determinations, independent of the sensitivity or uncertainty in that final determination. Scores for these tiers increase for decreasing and unknown stock status.

Stock Status Tiers and Scoring.

1 Neither overfished nor overfishing, and stock is at high biomass and low exploitation relative to benchmark values. (0)

2 Neither overfished nor overfishing, but stock may be in close proximity to benchmark values (-2.5)

3 Stock is either overfished or overfishing (-5)

4 Stock is both overfished and overfishing (-7.5)

5 Either status criterion is unknown. (-10)

Dimension 4. Productivity and Susceptibility Considerations

The final dimension addresses biological characteristics of the stock. This includes productivity, which reflects a population's reproductive potential, and susceptibility to overfishing, which reflects a stocks propensity to be harvested by various fishing gears. Efforts to quantify these characteristics, generally termed "PSA analyses", typically incorporate a variety of life history characteristics in a framework that distills many metrics into a single risk score. The two primary approaches currently available, one from NMFS and the other from MRAG, follow similar procedures, but incorporate slight differences in how characteristics are scored and how missing information is addressed. For example, the MRAG formulation incorporates a scoring value for parameter for which values are unknown into the overall score, whereas the NMFS formulation omits from scoring those parameters where the values are unknown.

After presentations on both approaches and considerable discussion on their differences, the SSC decided to incorporate the MRAG formulation of PSA into the SAFMC ABC control rule. The SSC believed this approach to be preferable based on the broad suite of attributes considered in the scoring and the inclusion of unknowns in the scoring. In general, it is believed that including unknowns in the scoring will provide stronger encouragement to address the unknown parameters since doing so will in many cases tend to moderate the buffer contributed by the PSA value. Further, because unknown information contributes to overall uncertainty, accounting for potential unknowns in the scoring is consistent with the underlying control rule framework.

PSA Tiers and Scoring

1 Low Risk. High productivity, low vulnerability and susceptibility, score <2.64[1] (0)

2 Moderate Risk. Moderate productivity, vulnerability, susceptibility, score 2.64-3.18[1] (-5)

3 High Risk. Low productivity, high vulnerability and susceptibility, score >3.18[1] (-10) [1]Scores as described in Hobday *et al.*, 2007

Determining Total Adjustment and Final ABC Recommendations

The uncertainty buffer, or difference between OFL and ABC, is expressed in terms of a reduction in the "probability of overfishing", or "P*". The adjustment score provided by the tiers and dimensions represents the amount by which P* is reduced to obtain the critical value for P*.Therefore, the key product of the control rule is the sum the scores for all the dimensions because that is the ABC adjustment factor that is used to calculate the critical value for P* from the base P*. The scoring of tiers within dimensions is designed to provide a maximum P* adjustment of 40% and a minimum of 0%. When applied to the base MSY specified at the 50% level, this range of possible adjustment results in a range of critical values for P* from 10% to 50%. These critical values are then used to determine the actual ABC using projection tables that provide the level of annual yield that corresponds to a particular P*.

The ABC adjustment factor is obtained by summing the scores across dimensions once the data are evaluated and tier assignments are made within each dimension. The scoring system is designed so that low values are assigned for the 'best' circumstances and the values increase as circumstances worsen. Considering dimension 1 for example, a stock which has an assessment providing estimates of biomass, exploitation, and MSY-based reference points would have a score of 0, while a stock which is unassessed and has unreliable catch records would receive a score of 10. Each stock will be categorized by tiers before the score is tallied so that categorizations are made independent of the final outcome.

The critical P* is expressed as a probability of overfishing and is derived by subtracting the ABC adjustment factor from 50%. For example, if the adjustment factor (sum of the dimension scores) is 20, the critical value for P* will be 30% (50%-20), and the ABC recommendation will be based on a 30% probability of overfishing occurring in the year for which the recommendation is made. Note that, due to varying shapes in the distribution of estimated yield, it is unlikely that the observed difference between MSY and ABC will equal the difference between the P* that defines MSY and the critical P*, and it is also unlikely the two stocks receiving identical critical P* values will reflect equal differences between ABC and OFL when such differences are compared in weight units.

Setting ABC equal to OFL implies a P* equal to 50%, where 50% represents the chance of overfishing occurring. Reducing P* will reduce ABC and provide a reduction in the probability of overfishing occurring. The relationship between the amount of reduction in P* and the resulting reduction in ABC is determined by the shape of the distribution of yield about the management parameters. For a given reduction in P*, broad distributions (suggesting higher uncertainty) will result in larger reductions in ABC whereas narrower distributions (suggesting lower uncertainty) will result in smaller reductions in ABC.

Using the ABC control rule described here, the range of P* that is considered acceptable is from 50% to 10%. This range was derived after considering Council guidance directing the SSC to consider ABCs based on probabilities of overfishing between 10% and 40%, general guidance under the MSA that management actions must have at least a 50% chance of success, and the common practice of specifying MSY based on the midpoint of a distribution of possible outcomes. The top tier in each dimension does not reduce P*, so the ABC recommendation for a stock receiving the top score across all dimensions would be the same as the OFL recommendation and there would be no buffer applied between ABC and OFL. While this may be perceived as potentially risk-prone, and inconsistent with some interpretations of the language describing ABC with regard to OFL, the only situation in which this would occur in this framework is for a stock with a complete assessment including full, probability-based uncertainty evaluations that is at low exploitation and high biomass, and is considered highly productive with low vulnerability and susceptibility. It should be noted that none of the stocks examined so far meet these criteria, and those stocks that have not been examined lack stock assessments and therefore they too will fail to meet these criteria.

The SSC considered whether each dimension should be equally scored and contribute the same relative weight to the final adjustment factor. After discussing various weighting schemes and approaches, the SSC determined that there was insufficient justification at this time to weight any particular dimension greater than another as all are considered important to objectively evaluating overall uncertainty. However, the SSC also recognizes that this could change and the ABC could be modified in the future if evidence develops that suggests one dimension should be more influential than the others.

The SSC is cognizant that ABCs, and the degree of separation between ABC and OFL, will be compared across stocks when recommendations are reviewed. The SSC also recognizes the importance of being consistent when evaluating the level of information for a wide range of stocks. In discussing ways of promoting consistency when multiple stocks must be evaluated, the SSC decided that tier assignments should be made within a single dimension for all stocks under consideration, as opposed to evaluating single stocks across all dimensions. This will help ensure that the data level for each stock is evaluated relative to and consistent with other stocks being considered. It is anticipated that approaching the process in this order will help avoid situations where stocks with similar conditions receive different tier ratings.

Overfished Stocks and Rebuilding Plan Selection

The adjustment factor can also be used to derive a probability of rebuilding success for selecting rebuilding schedules. The probability of rebuilding success is determined by subtracting the P* critical value from 100%, such that stocks with high P* values could be managed using a rebuilding schedule that approaches the 50% level commonly used now, and those with the lowest P* values will require rebuilding schedules with higher probability of success, up to a maximum of 90%.

The adjustment factor for stocks achieving the lowest scores across all dimension would be 0, resulting in a P* of 50% which would lead to recommendation of a rebuilding schedule with a 50% (100-50) probability of success by the end of the rebuilding period (Tmax), consistent with most current rebuilding schedules. The adjustment factor for stocks receiving the highest scores across all dimensions would be 40%, resulting in a critical P* of 10% (50 baseline

– 40 for buffer adjustment) and compelling a recommendation for rebuilding projections based on 90% probability of success by the end of the rebuilding period.

Values for the rebuilding success probability are provided for all stocks in Table 2 for illustration of the concept, although in application only stocks with status 'overfished' would require this parameter. Because the decisions required to develop the rebuilding plan are the same ones required to develop ABC, this framework allows estimation of both the rebuilding schedules and the final yield for a rebuilt stock from a single set of decisions. The only change required once a stock reaches the rebuilt status would be to calculate an updated adjustment factor reflecting the change in stock status from 'overfished' to 'not overfished and not overfishing'. Any such changes can be evaluated efficiently and quickly, and the system is essentially self-adjusting to critical events such as a change in stock status because the criteria and scorings are all determined in advance.

Using red porgy as an example, the total buffer adjustment factor of 15 results in a critical P* of 35% (50% baseline – buffer adjustment of 15) and a rebuilding probability of success of 65% (100% baseline – P* of 35). However, once the stock is rebuilt and the stock is neither overfished nor is overfishing occurring, scoring within the status dimension changes from tier 3 (adjustment value of 5) to tier 2 (adjustment value of 2.5) and the overall adjustment factor decreases by 2.5 to 12.5. The expected critical P* for the rebuilt stock becomes 37.5 and the expected ABC for the rebuilt stock can be determined from the probability distribution table of MSY at equilibrium or rebuilt conditions. In management terms, the resultant recommendations for red porgy would be to select a rebuilding plan with at least a 65% chance of achieving $SSB>SSB_{MSY}$ within the allotted rebuilding time period, followed by a recommendation to manage not to exceed a 37.5% chance of overfishing occurring once the stock is rebuilt.

Depletion Threshold

The NS1 guidelines state that an 'ABC control rule…may establish a stock abundance level below which fishing would not be allowed.' Currently the Pacific Fishery Management Council uses a 10% threshold. Specifically, if biomass is estimated below 10% of the virgin condition, then directed fishing is not allowed. The SAFMC SSC supports the concept of a depletion threshold and elimination of directed fishing when SSB falls below the threshold, and recommends that the threshold be established at 10% of unfished conditions. The SSC will recommend that directed fishing not be allowed if there is a reliable indication that current biomass is at or below 10% of the unfished biomass or, in cases where biomass estimates are considered unreliable, if SPR is at or below 10%.

Future Control Rule Modifications

The SSC began working on this ABC control rule in June 2008, following approval of the MSRA but before finalization of revised National Standard Guidelines and before finalization of implementation guidelines. The Final Rule on establishing ACL's became available during the period that the SSC discussed the control rule and helped direct this final version. Although the SSC believes the rule described herein is consistent with the language of the MSRA and ACL Final Rule, and that Council guidance as to the overall acceptable level of risk and base P* that determines MSY and OFL is considered and incorporated, the Committee recognizes that this rule may require modification in the future as final guidance on MSRA implementation becomes available. The Committee also recognizes that this document provides scientific advice to the Council, which will ultimately adopt the Control Rule and in so doing may make modifications.

Experience in applying the rule and future scientific advances may also trigger changes in the control rule. Although the SSC attempted to consider the full range of situations and scenarios expected across stocks managed by the South Atlantic Council, it is acknowledged that situations may arise that cause difficulties in actual application and interpretation the rule and hinder the resultant ABC recommendations. Changes in the dimensions, tiers, and scoring approach may be needed in the future as the rule is tested through application to the many stocks managed by the Council. Further development in methods of analyzing and expressing probabilities of overfishing could also lead to changes in how ABC is determined from the adjustment factor provided by the control rule. Finally, the eight SSCs of the eight Fishery Management Councils are all working along a similar path to develop ABC control rules. These SSCs include many of the top fisheries scientists in the Country and it is expected that many good ideas will emerge from this collective effort. Such ideas will be shared amongst all SSCs through the annual National SSC Meetings initiated in 2008, and the SAFMC SSC intends to take full advantage of the insights, shared experiences, and potential improvements to ABC control rules offered by such national collaboration.

Table 1. Hierarchy of dimensions and tiers within dimensions used to characterize uncertainty associated with stock assessments in the South Atlantic. Parenthetical values indicate (1) the maximum adjustment value for a dimension; and (2) the adjustment values for each tier within a dimension.

I. Assessment Information (10%)
1 Quantitative assessment provides estimates of exploitation and biomass; includes MSY-derived benchmarks. (0%)
2 Reliable measures of exploitation or biomass; no MSY benchmarks, proxy reference points. (2.5%)
3 Relative measures of exploitation or biomass, absolute measures of status unavailable. Proxy reference points. (5%)
4 Reliable catch history. (7.5%)
5 Scarce or unreliable catch records. (10%)

II. Uncertainty Characterization (10%)
1 **Complete**. Key Determinant – uncertainty in both assessment inputs and environmental conditions are included. (0%)
2 **High**. Key Determinant – reflects more than just uncertainty in future recruitment. (2.5%)
3 **Medium**. Uncertainties are addressed via statistical techniques and sensitivities, but full uncertainty is not carried forward in projections. (5%)
4 **Low**. Distributions of Fmsy and MSY are lacking. (7.5%)
5 **None**. Only single point estimates; no sensitivities or uncertainty evaluations. (10%)

III. Stock Status (10%)
1 Neither overfished nor overfishing. Stock is at high biomass and low exploitation relative to benchmark values. (0%)
2 Neither overfished nor overfishing. Stock may be in close proximity to benchmark values. (2.5%)
3 Stock is either overfished or overfishing. (5%)
4 Stock is both overfished and overfishing. (7.5%)
5 Either status criterion is unknown. (10%)

IV. Productivity and Susceptibility – Risk Analysis (10%)
1 **Low risk**. High productivity, low vulnerability, low susceptibility. (0%)
2 **Medium risk**. Moderate productivity, moderate vulnerability, moderate susceptibility. (5%)
3 **High risk**. Low productivity, high vulnerability, high susceptibility. (10%)

Table 2. Example of tier assignments, scores, adjustment factors, and critical probability values as applied to

Stock Golden Tilefish	Tier Within Dimension Score	I 1 0.0	Dimension II III 2 3 2.5 5.0		IV 3 10.0	Adjustment Factor (total score) 17.5	Critical P* 32.5	P(Successful Rebuild) 67.5
Snowy Grouper	Tier Within Dimension Score	1 0.0	2 2.5	4 7.5	3 10.0	20.0	30.0	70.0
Gag Grouper	Tier Within Dimension Score	1 0.0	3 5.0	3 5.0	3 10.0	20.0	30.0	70.0
Red Snapper	Tier Within Dimension Score	2 2.5	3 5.0	4 7.5	2 5.0	20.0	30.0	70.0
Vermilion Snapper	Tier Within Dimension Score	2 2.5	3 5.0	5 10.0	2 5.0	22.5	27.5	72.5
Black Sea Bass Red Porgy	Tier Within Dimension Penalty Tier Within Dimension Score	1 0.0 1 0.0	3 5.03 5.0	3 5.0 3 5.0	2 5.0 2 5.0	15.0 15.0	35.0 35.0	65.0 65.0
Yellowtail Snapper	Tier Within Dimension Score	1 0.0	3 5.0	2 2.5	2 5.0	12.5	37.5	62.5
Hogfish	Tier Within Dimension Score	4 7.5	5 10.0	5 10.0	3 10.0	37.5	12.5	88.5
Goliath Grouper	Tier Within Dimension Score	4 7.5	5 10.0	5 10.0	3 10.0	37.5	12.5	88.5
Mutton Snapper	Tier Within Dimension Score	1 0.0	3 5.0	2 2.5	3 10.0	17.5	32.5	67.5
Greater Amberjack	Tier Within Dimension Score	1 0.0	3 5.0	2 2.5	2 5.0	12.5	37.5	62.5
King Mackerel	Tier Within Dimension Score	3 5.0	3 5.0	2 2.5	3 10.0	22.5	27.5	72.5
Spanish Mackerel	Tier Within Dimension Score	3 5.0	3 5.0	5 10.0	2 5.0	25.0	25.0	75.0

assessed stocks in the South Atlantic.

Addenda.

South Atlantic SSC's Recommended Tiered Approach to Deriving OFL and ABC Values for Fisheries

August 2010

The SSC discussed control rules for unassessed stocks over several meetings in 2010. An initial approach was put forth in April and reviewed by the Council in June. The Council raised some concerns with the April proposal and provided guidance to the SSC along with a request for further consideration. In August 2010 the SSC discussed the Council's guidance and considered progress on this topic made in other regions, along with initial guidance provided through the National SSC workshop ad hoc workgroup on unassessed stocks control rules. These deliberations led to the rule described here.

Level 1 tier – Assessed - Whenever possible, ABC recommendations should conform to an ABC control rule that is based on the probability of overfishing(i.e., P* approach)

-Addressed with current control rule -Provides pdf of OFL. -Approach will be consistent.

Note: This tier is addressed in the preceding section

Level 2 tier - Depletion based stock reduction analysis (DBSRA) – (Dick and MacCall).

-If the information necessary to implement the Council's approved ABC control rule is not available (e.g., MSY reference points, projected stock size, distribution of OFL, etc.), then the basis of the ABC should be explicit about what aspects of the derivation were based on expert judgment.

-Requires full history of landings and other life history info for the stock

- Gives a pdf of OFL. Could apply P* or other risk/p level to derive ABC

Level 3 tier - depletion-corrected average catch (DCAC) (MacCall 2009). If components of the ABC control rule cannot be provided, a provisional ABC should be based on alternative approaches, but deviation from the control rule should be justified..

-Requires less data than 2nd tier

- Provides provisional ABC directly – OFL unknown

Level 4 tier- Catch only. ORCS ad hoc group is currently working on what to do when not enough data to perform DCAC. -Difficult to prescribe. -Requires judgment and careful consideration of all available sources, which may vary greatly between stocks falling in this tier

APPENDIX R.

RESPONSES TO COMMENTS

The following section satisfies National Environmental Policy Act's (NEPA) requirement for responding to comments on the draft environmental impact statement (DEIS). NEPA requires that a federal agency shall respond to comments on the DEIS by one or more of the following means: 1) Modify an existing alternative; 2) develop and analyze a new alternative; 3) supplement, improve, or modify the analyses; 4) make factual corrections; or 5) explain why the comments do not warrant further agency response, citing the sources, authorities, or reasons which support the agency's position. In an effort to satisfy the fifth requirement mentioned above, the following section responds to written comments generated during the comment period for the Fishery Management Plan (FMP) and DEIS, in addition to those received as verbal testimony during public hearings.

The first section summarizes and responds to comments on the DEIS from the Environmental Protection Agency (EPA), which received a "Lack of Objections" rating from that agency. The second section responds to comments from non-governmental organizations. The third section summarizes and responds to comments received from the sport-fishing industry and the public, during the DEIS comment period.

I. Environmental Protection Agency (EPA)

EPA comment 1 (Removal of species from the Snapper Grouper Fishery Management Unit (FMU)): *Explain how criteria for removal were developed. Clarification regarding data collection for removed species.*

Response: Currently, there are 73 species in the Snapper Grouper FMU. A total of 39 species were identified for removal from the FMU in the DEIS. At their August 9, 2011, meeting, the South Atlantic Fishery Management Council (South Atlantic Council) changed their preferred alternatives, which results in the removal of 13 species from the snapper grouper FMU. Criteria for retention or removal of species from the FMU are provided by NMFS guidelines, which specify that FMUs may be organized around biological, geographic, economic, technical, social, or ecological goals (50 CFR §600.320(d)(1)). NMFS guidelines for determining whether to include species in an FMU for purposes of federal conservation and management direct the Councils to consider the following seven factors (50 CFR §600.340(b)(2)): The importance of the fishery to the Nation and the regional economy; whether an FMP can improve the condition of the stock; the extent to which the fishery could be or already is adequately managed by states; whether an FMP can further the resolution of competing interests and conflicts; whether an FMP can produce more efficient utilization of the fishery; whether an FMP can foster orderly growth of a developing fishery; and costs of the FMP balanced against benefits. Ten of the 13 species chosen for removal from the snapper grouper FMU are almost entirely taken in state waters, and three of the species are managed under the Florida Marine Life Species Rule, which requires the use of non-lethal methods of harvest and that the fish, invertebrates, and plants so harvested, be maintained alive for

the maximum possible conservation and economic benefits. Additionally, two of the 13 species have zero landings. The South Atlantic Council concluded these 13 species are not in need of federal management since they could be or are already effectively managed by the states. Furthermore, the South Atlantic Council concluded that management of two species that have no commercial or recreational landings would have little importance to the Nation and regional economy. Therefore, federal management of the 13 species identified for removal from the FMU would not likely affect the condition of these stocks.

The South Atlantic Council intends to evaluate landings and other available information on species removed from the FMU every five years (e.g., SAFE reports) to determine whether they should be added back into the FMU or continue to be removed from the FMU and take action as appropriate. Ongoing monitoring and data collection will continue for all species that are sold to dealers or caught recreationally, regardless of whether or not they are in the FMU. If the South Atlantic Council determines that a removed species is in need of management, the species could be added back into the FMU.

EPA comment 2 (organization of the document)*: Multiple preferred alternatives should be combined into one preferred alternative for that specific action. A clear description is needed in the summary section for all alternatives considered, the preferred alternatives, and an analysis of the potential impacts to the biological, social, economic, and administrative environments as outlined in Amendment 10 to the Spiny Lobster FMP. Labels are missing for snapper grouper complex 2 and 4 in the summary section.*

Response: The Comprehensive Annual Catch Limit (ACL) Amendment, which amends four fishery management plans (FMPs), contains 33 actions and multiple alternatives for each action. The South Atlantic Council decided to choose multiple preferred alternatives because of the complex and comprehensive nature of this amendment. Due to the large number of actions and alternatives in the document, the summary section focuses on the preferred alternatives. NEPA guidelines encourage agencies not to exceed 15 pages in the summary of a document. To maintain a summary that is as concise as possible, the reader of the summary section is referred to Section 2 of the document, which provides a comparison of the effects for all alternatives for the actions considered.

Labels for snapper grouper complex 2 and 4 are now present in the summary in the final environmental impact statement (FEIS) and integrated Comprehensive ACL Amendment.

EPA comment 3 (Demographics/Social Vulnerability/Environmental Justice (EJ))*: Social impacts need to be adequately quantified regarding EJ fishers and communities. Real impact of regulatory change on fishing communities, especially the low-income/minority fishing communities, needs to be fully captured and explained.*

Response: The Council has attempted to place fishing communities within the context of social vulnerability, at present data have not been refined to the individual or vessel level within communities to allow analysis of the direct impacts upon minorities or low-

income communities. Because demographic data on fishermen that would allow the Council to identify those who live below the poverty level, or even those who are Hispanic (the only count would have to be those with Hispanic names) are not available, it is difficult to judge how those populations would be affected by actions within this amendment. While it is true that minorities and those below the poverty line do suffer more negative impacts from social disruption, it cannot be stated with certainty that they will be affected negatively from these actions. Therefore, an attempt was made to identify where vulnerable populations may be and it was hoped that through public comment, any specific issues that may be related to that vulnerability would have been identified and then could be addressed through South Atlantic Council action by way of bringing attention to where these populations may reside. The Council will continue to revise and refine analyses to address EJ populations in the future to ensure a more complete social impact assessment.

EPA comment 4 (Public Participation)*: There is no discussion in the scoping report related to EJ communities or strategies used to engage or provide outreach to minorities. The South Atlantic Council should target Hispanic communities with Spanish materials/translators. Appendix K needs to show how many public meetings were held and if EJ communities were present at the public meetings.*

Response: An effort to target EJ populations has been part of outreach for recent amendments. In the future, this kind of outreach will be continued further through translation of summary documents into Spanish where needed. With the recent addition of a social scientist to South Atlantic Council staff and NOAA Fisheries Service Southeast Regional Office, more attention to EJ populations will be possible and outreach to them will be an integral part of future plan development.

Appendix K has been revised to address the above concerns to the extent possible.

II. Comments from Non-Governmental Organizations

Comment 1*: The South Atlantic Council must demonstrate how the P* distribution for the scientific and statistical committee's (SSC) acceptable biological catch (ABC) control rule for assessed species is applied to each species. The amendment should call for a future performance evaluation of the ABC control rule to determine when and how it needs to be modified to achieve its goals.*

Response: The SSC's P* approach has been used in recent Southeast Data Assessment and Review (SEDAR) stock assessments for snapper grouper species that have been determined to not be overfished. For overfished species, the SSC stated at their April 2010 meeting that "… a rebuilding ABC must be set to reflect the annual catch that is consistent with the schedule of fishing mortality rates in the rebuilding plan." The SSC's ABC control rule has four dimensions included in the control rule framework: Assessment information; characterization of uncertainty; stock status; and productivity/susceptibility of the stock. Each dimension contains tiers that can be evaluated for each stock to determine a numerical score. The uncertainty buffer, or

difference between OFL and ABC, is expressed in terms of a reduction in the "probability of overfishing", or "P*". The adjustment score provided by the tiers and dimensions represents the amount by which P* is reduced to obtain the critical value for P*. The scoring provides a maximum P* adjustment of 40% and a minimum of 0% that results in critical values for P* ranging from 10% to 50%. These critical values are then used to determine the actual ABC from projection tables that provide the level of annual yield that corresponds to a particular P*. **Table 2** on page 13 of **Appendix Q** in the DEIS lists the P* distribution values applied as per the South Atlantic Council SSC's ABC control rule for most of the assessed species. The methodology used to compute the P* value is described in the appendix as well as the text of the document. Additionally, the South Atlantic Council SSC's reports from April 2010 and November 2010 address P* values to remaining assessed species. The South Atlantic Council and their SSC will be evaluating the performance of the ABC control rule and determining whether it needs to be modified.

***Comment 2**: Discard mortality should be incorporated into the ABC for all assessed species, and provide ABC for landings and discards separately. Bycatch should be included in the ACL setting mechanism and associated accountability measures (AMs). The monitoring needs to provide for a full account for monitoring all bycatch should be specified. An update on the current status of the standard bycatch monitoring methodology and any efforts to improve bycatch reporting and minimization in the South Atlantic should be provided.*

Response: SEDAR assessments provide ABCs that incorporate discards as well as ABCs based on landed catch. However, the South Atlantic Council's SSC has recommended ACLs not include bycatch and be based on landings only. Choosing an ACL based on total mortality rather than landed catch would require the Southeast Fisheries Science Center (SEFSC) to monitor discarded species in the commercial and recreational sectors. The South Atlantic Council's SSC expressed concerns about monitoring discards when discussing ACLs for speckled hind and warsaw grouper at their March 2009 meeting. The SSC was not only concerned about the accuracy of discard data from the recreational and commercial sector but also the possibility that some members of the fishing community might under-report discarded fish if they believed further restrictions might be imposed if levels of dead discards became elevated.

ACLs are based upon the ABCs determined by the SSC's ABC control rule. For assessed species, the SSC's ABC control rule includes four dimensions, one of which is a characterization of uncertainty from factors such as bycatch. For unassessed species, Level 4 of the South Atlantic Council's ABC control rule for un-assessed species (**Table 4-17** in the DEIS) includes bycatch issues in its ABC recommendation.

Bycatch of species addressed in the Comprehensive ACL Amendment is provided by the logbooks from commercial fishermen, the NMFS headboat survey, and the Marine Recreational Fisheries Statistics Survey. Amendment 18A to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region includes actions, which could improve reporting of bycatch data for snapper grouper species.

Comment 3: *The ABC for gray snapper and gray triggerfish is too high because it is above the landings level in 1991 when the stock was believed to be undergoing overfishing.*

Response: The overfishing and overfished status of gray snapper and gray triggerfish is unknown according to the 2010 U.S. Report to Congress on the Status of Stocks. Since there is no assessment information available for these species, the SSC's ABC control rule takes into consideration trends in landings to determine ABC (**Table 4-17** in the DEIS).. Both species were assigned an ABC value based on the 3rd highest landings from 1999-2008. For gray snapper, the SSC noted in their April 2011 report, which provided ABC recommendations, that the landings trend is relatively stable. For gray triggerfish, the SSC indicated in their April 2011 report that catch per unit effort trend in the fishery-independent index is relatively flat and mean length had been increasing since 1999, suggesting the catch rate is stable and the stock is not being negatively impacted by fishing pressure.

Comment 4: *The decision to remove species is based on desire to lessen administrative burden of dealing with ACLs.*

Response: A total of 39 species were identified for removal from the FMU in the DEIS. At their August 9, 2011, meeting, the South Atlantic Fishery Management Council (South Atlantic Council) changed their preferred alternatives, which results in removal of fewer species (13) from the snapper grouper FMU. NOAA Fisheries Service guidelines for determining whether to include species in an FMU for purposes of federal conservation and management direct the Councils to consider the following seven factors (50 CFR §600.340(b)(2)):

1. The importance of the fishery to the Nation and the regional economy;
2. Whether an FMP can improve the condition of the stock;
3. The extent to which the fishery could be or already is adequately managed by states;
4. Whether an FMP can further the resolution of competing interests and conflicts;
5. Whether an FMP can produce more efficient utilization of the fishery;
6. Whether an FMP can foster orderly growth of a developing fishery; and
7. Costs of the FMP balanced against benefits.

This decision to retain or remove species from the FMU considers these factors in evaluating whether all species currently included in the snapper grouper FMU are currently in need of federal conservation and management. The South Atlantic Council intends to review whether species meet these factors every five years (SAFE reports) to determine whether species should be added or removed from the FMU and take action as appropriate.

Comment 5: *The DEIS does not explain how overfishing would be prevented for species removed from FMU.*

Response: The South Atlantic Council has evaluated whether all species currently included in the snapper grouper FMU are in need of federal conservation and management according to the seven factors identified in 50 CFR §600.340(b)(2), and has determined 13 species should be removed from the FMU. Greater than 95% of the landings of ten species of these 13 species occur in state waters; three species are already subject to management by the Florida Marine Life Rule, and two of the 13 species have zero landings. Thus, these species could be or already are adequately managed by the states. In addition, two species identified for removal have no commercial or recreational landings. The South Atlantic Council intends to evaluate landings and other available information on species removed from the FMU every five years (SAFE reports) to determine whether they should be added back into the FMU or continue to be removed from the FMU and take action as appropriate. Ongoing monitoring and data collection will continue for all species that are sold to dealers or caught recreationally, regardless of whether or not they are in the FMU. If the South Atlantic Council determines that a removed species is in need of management, the species could be added back into the FMU.

Comment 6: *The DEIS presumes species proposed for removal would be effectively managed by the states. An evaluation of gaps in management should be provided once federal regulations no longer apply to species. A discussion of the specific state regulations is needed that would apply to removed species. The state's conservation measures are weak when compared to federal law. Allowing the states to manage the species could provide inadequate protection.*

Response: The Comprehensive ACL Amendment proposes to remove 13 snapper grouper species from the FMU rather than 39 originally identified in the DEIS. The South Atlantic Council concluded these species are not in need of federal management because these species are either predominantly (>95%) landed in state waters, or are already effectively managed by the states. Furthermore, two species have no commercial or recreational landings in either state or federal waters. Any species removed from the FMU would no longer be subject to federal regulations. Alternatives that remove species would not affect state regulations for these species, with the exception of South Carolina. Regulations in state waters of South Carolina (http://www.dnr.sc.gov/regulations.html) are currently structured to mirror those in federal waters for all species in the snapper grouper FMU. Therefore, any species that is no longer subject to federal regulations would no longer be subject to state regulations in South Carolina waters unless that state acted to re-institute such regulations. However, only two of the species identified for removal (sheepshead and crevalle jack) are taken from South Carolina state waters. Additionally, while federal-state compatibility is often desirable from a management standpoint, managing state fisheries is not and was never an intended goal of the Snapper Grouper FMP. The stated intent of the FMP was to manage snapper grouper species within its "area of authority" (SAFMC 1983), which includes federal waters from the North Carolina/Virginia border to the Atlantic side of the Florida Keys.

Comment 7: *Removal of species from the FMU should be reconsidered. For many species with landings below 20,000 lbs, unregulated catch in federal waters could push*

them above their overfishing limit. Removal criteria needs to be other than just landings. The South Atlantic Council should take a more comprehensive look at each species' circumstances before they are removed from the management unit, and that these species should be retained as ecosystem component species until this evaluation is taken. The potential for bycatch of major species as a result of removal must be analyzed.

Response: On August 9, 2011, the South Atlantic Council took a more comprehensive look at the species and determined whether or not they were in need of federal conservation. The South Atlantic Council concluded that 13 species, rather than 39, were not in need of federal management, and could be removed from the snapper grouper FMU. Furthermore, the South Atlantic Council chose a different preferred alternative and recommended six species be designated as ecosystem component species based on criteria specified in the NS1 guidelines. Criteria for retention or removal of species from the FMU are provided by NMFS guidelines, which specifies that FMUs may be organized around biological, geographic, economic, technical, social, or ecological goals (50 CFR §600.320(d)(1)). NMFS guidelines for determining whether to include species in an FMU for purposes of federal conservation and management direct the Councils to consider the following seven factors (50 CFR §600.340(b)(2)):

1. The importance of the fishery to the Nation and the regional economy;
2. Whether an FMP can improve the condition of the stock;
3. The extent to which the fishery could be or already is adequately managed by states;
4. Whether an FMP can further the resolution of competing interests and conflicts;
5. Whether an FMP can produce more efficient utilization of the fishery;
6. Whether an FMP can foster orderly growth of a developing fishery; and
7. Costs of the FMP balanced against benefits.

Based on these criteria, the South Atlantic Council determined at their August 2011 meeting that 13 species currently in the FMU were not in need of federal management in the FMP. The potential for bycatch resulting from the removal of the 13 species from the FMU has been analyzed.

Comment 8: *The South Atlantic Council needs to take a hard look at the environmental consequences of removal of species.*

Response: The South Atlantic Council changed their preferred alternatives for removal of species at their August 2011 meeting. The Comprehensive ACL Amendment now proposes to remove 13 species from the FMU rather than the 39 proposed in the DEIS. The environmental consequences of removing these species from the FMU are discussed in the Summary of Effects, Comparison of Alternatives (Section 2), and Environmental Impacts (Section 4). These sections discuss the pros and cons of choosing each alternative for all actions from biological, economic, social, and administrative perspectives. Furthermore, the Cumulative Effects section addresses the effects of this amendment, in conjunction with past and future actions in other amendments.

Comment 9*: A commercial ACT is needed that would give NMFS the authority to reduce trip limits when the ACT is projected to be met. AMs should be triggered when the ACTs (not the ACLs) are exceeded.*

Response: The performance standard that NMFS provided in the proposed rule for revisions to the NS1 Guidelines (73 FR 32526) stated that: "if catch exceeds the ACL for a given stock or stock complex more than once in the last four years, the system of ACLs and AMs should be re-evaluated, and modified if necessary, to improve its performance and effectiveness." The updated framework procedure included in Amendment 17B to the Snapper Grouper FMP (SAFMC 2010b) allows for the timely establishment and adjustment of ACTs (and ACLs) if the South Atlantic Council and NOAA Fisheries Service determine they are necessary. The South Atlantic Council will monitor how often ACLs are exceeded. If an evaluation concludes that the ACL is being chronically exceeded for any one species or species group, and post-season AMs are repeatedly needed to correct for ACL overages, adjustments to management measures would be made. In addition to adjustment of ACTs and ACLs, the updated framework procedure implemented through Amendment 17B (SAFMC 2010b) could be utilized to modify management measures such as bag limits, trip limits, seasonal closures, and gear prohibitions in a timely manner. Using the regulatory amendment process to implement such changes, if needed, is the most timely method of addressing issues associated with repeated ACL overages through permanent regulations. It is anticipated that this performance standard will be applied to all species and all systems of ACLs and AMs established in the Comprehensive ACL Amendment in accordance with NMFS guidelines.

Comment 10: *The system of three year averages of determining an ACL overage is overly complicated and could allow overfishing to occur.*

Response: At their June 2011 meeting, the South Atlantic Council changed their preferred alternative from monitoring the three year averages in determining an ACL overage to the following, "If the ACL is exceeded, the following year's 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 fishing season as necessary." This change in post-season AM, in combination with the other preferred alternatives (in the action regarding recreational AMs), such as a conservative recreational ACT and an in-season AM trigger, all work in conjunction to prevent overfishing.

Comment 11: *Include an alternative in which species in stock complexes will be evaluated if landings composition of stock complex members changes significantly. Stock complexes should be re-evaluated periodically to ensure species groupings are still appropriate.*

Response: The SEFSC collects information for all species caught by commercial and recreational fishermen. The South Atlantic Council will use these data to monitor landings of individual species within a complex. If landings of any species within a complex change significantly, the South Atlantic Council would establish more appropriate species groupings.

Comment 12: *Set the ACL below the ABC in order to account for management uncertainty and comply with NS1 guidelines.*

Response: The ABC control rule takes into account scientific uncertainty. The NS1 guidelines indicate an ACL may typically be set very close to the ABC. Setting a buffer between the ACL and ABC would be appropriate in situations where there is uncertainty in whether or not management measures are constraining fishing mortality to target levels. ACTs, which are not required, can also be set below the ACLs to account for management uncertainty and provide greater assurance overfishing does not occur. The Comprehensive ACL Amendment would establish an ACT for the recreational sector for species in the FMPs for snapper grouper and dolphin and wahoo. The NS1 guidelines recommend a performance standard by which the efficacy of any system of ACLs and AMs can be measured and evaluated. If an evaluation concludes that the ACL is being chronically exceeded for any one species or species group, and post-season AMs are repeatedly needed to correct for ACL overages, adjustments to management measures would be made. The updated framework procedure implemented through Amendment 17B (SAFMC 2010b) could be utilized to modify ACLs, ACTs, and management measures. Using the regulatory amendment process to implement such changes, if needed, is the most timely method of addressing issues associated with repeated ACL overages through permanent regulations. This performance standard would be applied to all species and all systems of ACLs and AMs established in the Comprehensive ACL Amendment in accordance with NS1 guidelines.

Comment 13: *The South Atlantic Council should analyze management uncertainty in the commercial fishery. A new alternative should be analyzed giving the RA the authority to close the commercial fishery in-season if the ACL is exceeded.*

Response: The NS1 guidelines state that setting ACTs is left at the discretion of each Council and should be based on the level of management uncertainty in each fishery. For the commercial snapper grouper fishery landings are monitored through the SEFSC's quota monitoring system. The SEFSC is moving towards weekly monitoring and computer entry of data by dealers. Therefore, with an enhanced quota monitoring program, the South Atlantic Council concluded there was not a need to establish a commercial ACT. Quota monitoring in the commercial fishery and the AMs that the South Atlantic Council is proposing to implement through this amendment are sufficient to account for management uncertainty. Furthermore, it is important to note that the new framework procedure for setting ACLs in the snapper grouper fishery in Amendment 17B (SAFMC 2010b), would allow for timely adjustments to be made to AMs, ACLs, and ACTs if the South Atlantic Council and NOAA Fisheries Service determine a change is needed. The preferred alternatives in the Comprehensive ACL Amendment provides that the RA shall close the commercial sector in-season if the ACL was projected to be met and if the stock was overfished.

III Sportfishing Industry and Public

Comment 1: *Document is difficult to read and understand. Socio-economic content is voluminous.*

Response: In order to comply with the Magnuson-Stevens Act with its ten national standards, NEPA, and the Administrative Procedures Act, a DEIS needs to fully analyze the "human" environment, which includes biological, economic, social, and administrative impacts of each action. Actions in the Comprehensive ACL Amendment include establishing ABC control rules, jurisdictional allocations involving the Gulf of Mexico Fishery Management Council and South Atlantic Council, sector allocations, establishing ACLs and AMs, and management measures. Each action has multiple alternatives. Hence, it is not possible to present the analysis in a short document. However, a concise Summary is provided in the beginning of the Comprehensive ACL Amendment, which guides the reader through all the actions in the comprehensive document.

Comment 2: *Removal of species that will allow for state management of species is supported as long as another entity has agreed to take over management.*

Response: The South Atlantic Council has evaluated whether all species originally included in the snapper grouper FMU are currently in need of federal conservation and management according to the seven factors identified in 50 CFR §600.340(b)(2), and has determined 13 species should be removed from the FMU. Greater than 95% of the landings of ten species of these 13 species occur in state waters; three species are already subject to management by the Florida Marine Life Rule, and two of the 13 species have zero landings. Thus, these species could be or already are adequately managed by the states. In addition, two species identified for removal have no commercial or recreational landings. The South Atlantic Council intends to evaluate landings and other available information on species removed from the FMU every five years (SAFE reports) to determine whether they should be added back into the FMU or continue to be removed from the FMU and take action as appropriate. Ongoing monitoring and data collection will continue for all species that are sold to dealers or caught recreationally, regardless of whether or not they are in the FMU. If the South Atlantic Council determines that a removed species is in need of management, the species could be added back into the FMU.

Comment 3: *The South Atlantic Council should consider lane snapper, gray snapper, rock hind, and white grunt as individual species.*

Response: The South Atlantic Council indicated in their action for species groupings that single species ACLs would be established for assessed and targeted species, species where ACL=0, and species that cannot be placed in a complex based on data associated with life history, catch statistics from commercial logbook and observer data, recreational headboat logbook and private/charter survey, and fishery-independent MARMAP data. The South Atlantic Council concluded that lane snapper, gray snapper, rock hind, and

white grunt did not meet the criteria for designation as species with individual ACLs. Rather, they met the criteria for species that could be managed better in complexes since they meet the following criteria: Stocks may be grouped into complexes if they cannot be targeted independently of one another in a multispecies fishery; there are not sufficient data to measure their status relative to established status determination criteria; or when it is feasible for fishermen to distinguish individual stocks among their catch (50 CFR 600.310 (b) (8) in 74 FR 3178).

Comment 4: *OFL and ABC are precautionary numbers and not strict values that should not be exceeded. The interpretation of the NS1 guidelines and Magnuson-Stevens Act is too strict.*

Response: According to the NS1 Guidelines, OFL is an annual amount of catch that would provide another method for measuring overfishing by allowing the comparison of a stock or stock complexes' annual catch to its OFL; if catch exceeds OFL, overfishing is occurring. The ABC is "a level of a stock or stock complex's annual catch that accounts for the scientific uncertainty in the estimate of OFL and should be specified based on the ABC control rule." NOAA Fisheries Service and the South Atlantic Council must follow the guidance closely in order to comply with new ACL and AM requirements specified in the Magnuson-Stevens Act for ending overfishing of fisheries managed by federal FMPs.

Comment 5: *Allocations based on historic landings is not an acceptable approach. There should not be a separate allocation for the for-hire sector. Sector allocations should not be based solely on landings without taking into account the economic factors associated with the industries.*

Response: The South Atlantic Council's Allocation Committee met several times in 2008 to address allocation issues for fisheries in the South Atlantic region. The Allocation Committee explored ways to model the economics associated with fisheries, but concluded that whereas fisheries managers have a fairly good handle on life histories and ecosystem interactions from the biological component, modeling economic value and economic impacts is more difficult. The South Atlantic Council concluded that the approach of balancing long-term catch history with recent catch history, now known as "Boyles' Law", is the most fair and equitable way to allocate fishery resources, and has chosen to apply it to many of its managed fisheries. Furthermore, the South Atlantic Council stated an additional benefit of this alternative was its inclusion of a transparent formula to specify allocations. The Snapper Grouper Advisory Panel supported the South Atlantic Council's preferred allocation alternative.

The current preferred alternative for sector allocations in the Comprehensive ACL Amendment does not consider a "for-hire" sector. The only two sectors considered are commercial and recreational.

Comment 6: *The ACLs for dolphin and wahoo could be too restrictive and it is anticipated that it will be easy for the recreational sector to exceed the specified values.*

Response: The South Atlantic Council's SSC recommended ABCs for dolphin and wahoo based on the 3rd highest landings from 1999-2008, which took into consideration that landings in the most recent time period are lower for both species. The South Atlantic Council set ACL equal to the ABC for dolphin and wahoo, which is less conservative than other alternatives in the respective actions. However, the South Atlantic Council concluded it was appropriate to set the ACL equal to the ABC for dolphin and wahoo, because the ABC control rule takes into account scientific uncertainty. The NS1 guidelines indicate ACL may typically be set very close to the ABC. Setting a buffer between the ACL and ABC would be appropriate in situations where there is uncertainty in whether or not management measures are constraining fishing mortality to target levels. ACTs, which are not required, can also be set below the ACLs to account for management uncertainty and provide greater assurance overfishing does not occur. The Comprehensive ACL Amendment would establish an ACT for the recreational sector. The NS1 guidelines recommend a performance standard by which the efficacy of any system of ACLs and AMs can be measured and evaluated. If an evaluation concludes that the ACL is being chronically exceeded for any one species or species group, and post-season AMs are repeatedly needed to correct for ACL overages, adjustments to management measures would be made. The updated framework procedure implemented through Amendment 17B (SAFMC 2010b) could be utilized to modify ACLs, ACTs, and management measures. Using the regulatory amendment process to implement such changes, if needed, is the most timely method of addressing issues associated with repeated ACL overages through permanent regulations. This performance standard would be applied to all species and all systems of ACLs and AMs established in the Comprehensive ACL Amendment in accordance with NS1 guidelines.

Comment 7: *The ACL and ACT should be equal. Multi-year averages should be used in determining if an ACL has been exceeded.*

Response: The South Atlantic Council chose not to establish an ACT for the commercial sector. The NS1 guidelines state that setting of ACTs is left to the discretion of each Council and should be based on the level of management uncertainty in each fishery. For the commercial sector fishery landings are monitored through the SEFSC's quota monitoring system. The SEFSC is moving towards weekly monitoring and computer entry of data by dealers. Therefore, with an enhanced quota monitoring program, the South Atlantic Council concluded there was no need to establish a commercial ACT. Quota monitoring in the commercial fishery and the AMs that the South Atlantic Council is proposing to implement through this amendment are sufficient to account for management uncertainty.

Unlike the commercial sector, where the quota is subject to regular monitoring through dealer reporting, recreational data are survey based and subject to delays in reporting. The South Atlantic Council reasoned that the level of management uncertainty for the recreational component of the snapper grouper fishery is currently high enough to warrant specification of an ACT. Therefore, the South Atlantic Council chose to specify a recreational ACT set below the ACL for snapper grouper species and dolphin and wahoo, which would act as a precautionary signal; the ACT would not trigger an AM.

The South Atlantic Council intends to use ACTs in the recreational sector as points of reference to assist with management decisions. ACTs would not limit landings nor trigger AMs, but would be used to gauge whether management action is likely to be necessary in a particular fishery.

The South Atlantic Council did not choose multi-year averages as the preferred alternative that specifies the AM trigger. While this approach might help address any anomalous highs and lows reflected in the landings data, if one of the multiple years was associated with an extremely large spike in landings, that spike would greatly influence the multi-year average for several years in the future. The large spike may or may not be attributable to an actual increase (or decrease) in harvest, or could be a result of some variability in sampling. Therefore, the multi-year average could create a lag, mask what is actually happening with the harvest, and could potentially result in the unnecessary triggering of harvest restrictions.

Comment 8*: Goliath grouper is responsible for many reef fish being listed as overfishing, not human population.*

Response: Revisions to the Magnuson-Stevens Act in 2006 require that by 2011, with few exceptions, FMPs must establish a mechanism for specifying ACLs for all managed species at a level that prevents overfishing and does not exceed the fishing level recommendations of the respective Council's SSC or other established peer review processes. These FMPs must also establish, within this timeframe, measures to ensure accountability. The intent of the Comprehensive ACL Amendment is to specify ACLs and AMs to ensure overfishing of managed species does not occur, as required by the Magnuson-Stevens Act. Species identified as experiencing overfishing in the South Atlantic include vermilion snapper, red snapper, red grouper, gag, black sea bass, golden tilefish, speckled hind, snowy grouper, and warsaw grouper. There is no evidence goliath grouper is responsible for species listed as undergoing overfishing.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

2011 AUG -4 PM 1:29

August 1, 2011

8/25/11 PA NEPA DRA OMI SRA SDRA Copy/ Orig/ Route F/SER1 M&B F/SER2 IT F/SER3 GRANTS F/SER4 CS/PERMITS Action FYI Date Return to FILE RECYCLE

Dr. Roy E. Crabtree
Regional Administrator
Southeast Regional Office
National Oceanic and Atmospheric Administration
263 13th Avenue South
St. Petersburg, Florida 33701

Subject: EPA NEPA Review Comments on NOAA's DEIS for "Comprehensive Annual Catch Limit (ACL) Amendment for the South Atlantic Regions: Amendment 2 to the Fishery Management Plan for the Dolphin Wahoo Fishery; Amendment 2 to the Fishery Management Plan for Pelagic Sargassum Habitat; Amendment 5 to the Fishery Management Plan for the Golden Crab Fishery and Amendment 25 to the Fishery Management Plan for the Snapper Grouper Fishery, South Atlantic Region"; CEQ #20110187

Dear Dr. Crabtree:

The U.S. Environmental Protection Agency (EPA) has reviewed the subject National Oceanic and Atmospheric Administration (NOAA) Draft Environmental Impact Statement (DEIS) in accordance with our responsibilities under Section 102(2)(C) of the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act. EPA understands that the purpose for the Comprehensive Annual Catch Limit Amendment (Comprehensive ACL) for the South Atlantic Region is to implement measures expected to prevent overfishing and achieve Optimum Yield (OY) while minimizing, to the extent practicable, adverse social and economic effects. Long-term measures include the implementation of the following items: 1) changes to the snapper grouper fishery management unit, including the removal of some species and the development of species groups; 2) establish acceptable biological catch (ABC) control rules; 3) ACLs and annual catch targets (ACTs); 4) sector allocations; 5) accountability measures (AMs); and 6) management measures necessary to ensure mortality is at or below the annual limits and targets. In addition, EPA understands that the need for this action is to specify overfishing limits (OFLs), ACLs, and AMs, where needed to comply with Magnuson-Stevens Act requirements (MSA).[1]

EPA has responsibility to review and comment on major Federal actions significantly affecting the quality of the human environment, including Fishery Management Plans (FMPs) and FMP Amendments (Amendments) as developed, approved, and implemented under the MSA where those Plans and Amendments are subject to the EIS requirement of

[1] p. IV

NEPA, but it should be clear that we defer to NOAA and the Councils as to the development of fishery statistics and the relative importance of the commercial and recreational fisheries for each species.

EPA appreciates that several alternatives for proposed actions were presented and that preferred alternatives were identified in the DEIS. In an effort to simplify our review we have organized our comments based on major actions being proposed, organization of the document, and Environmental Justice (EJ). Based on our review, we offer the following comments for the proposed actions covered within the DEIS.

Actions Being Proposed:

Removal of Species from the Snapper Grouper Fishery Management Unit (FMU)
Under the preferred alternative for Action 1 the Council proposes to remove species from the Snapper Grouper FMU. Currently, the Council manages 73 species in the Snapper Grouper FMU. Under the proposed action the Council would remove (39 or 40)[2] total species from this FMU. Multiple preferred alternatives are identified under Action 1. The preferred alternative would remove species based on certain criteria (Example – Criteria 1 - if 80% or greater of the landings are in state waters). First, it is somewhat unclear how these thresholds for removal of the species from the FMU were derived. EPA recommends that the FEIS better explain how these criteria for removal were developed. Second, EPA has expressed concern in past NEPA comment letters regarding the removal of species from FMUs, specifically by removing these species from the FMU, federal regulations and protections would no longer apply. It is EPA's understanding that once a species is removed from the FMU, data would no longer be collected on these species, yet the Council states that "Data collection would not be altered from current levels if species were removed from the FMU.[3]" EPA request clarification in the FEIS regarding data collection for species proposed for removal from the FMU. EPA also recommends that the Council include a discussion in the FEIS regarding the pros and cons of listing species proposed for removal from the FMU as ecosystem component species.

Reorganization of the Snapper Grouper Complex
EPA understands that under Action 2 the Council proposes to group species into four complexes. These groupings would be based on similarities in life history, catch statistics from commercial logbooks and observed data, recreational headboat logbooks and private/charter surveys, and fishery-independent MARMAP data. Complex ACLs would be developed for the grouped species and individual ACLs would be established for the remaining un-grouped species. EPA defers to the Council on organizing the Snapper Grouper complex into groupings for management.

Establishment of ABC, Allocations, ACLs, ACTs, and AMs for Snapper Grouper, Dolphin Wahoo, and Golden Crab

[2] In the summary table provided on page S-5 it appears that 39 species are being proposed for removal from the FMU, but the text on (p. 20) indicates that 40 species will be removed from the Snapper Grouper FMU. Please clarify in the FEIS.
[3] p. 20

EPA defers to the Council for setting the ABCs, Allocations, ACL, ACTs, and Accountability Measures for the Snapper Grouper Complex, Dolphin Wahoo, and the Golden Crab. As stated earlier, EPA generally defers to NOAA and the Councils as to the development of fishery statistics and the relative importance of the commercial and recreational fisheries for each species.

Organization of the Document:

EPA notes that the Council has selected multiple preferred alternatives for several of the proposed actions and several of the alternatives have multiple sub-alternatives. This structure, when used to describe the potential impact of alternatives, proves to be very difficult to decipher and understand what the Council is proposing and what has been identified as the preferred alternative. As EPA has noted in past NEPA comment letters, we recommend that when multiple preferred alternatives are being proposed and it is the intention of the Council that all of them will be selected, then the multiple preferred alternatives should be combined into one preferred alternative for that specific action.

The DEIS main document discusses 31 actions associated with the Snapper Grouper, Dolphin Wahoo, and Golden Crab FMPs, yet the summary section (p. S-1 thru S-22) is structured around the preferred alternatives and proposed changes to Species Compositions, Acceptable Biological Catch, Allocations, Annual Catch Limits, Annual Catch Targets, and Accountability Measures. EPA understands that both the main document and summary section are conveying the same information, but we are concerned that not using a consistent format is confusing to the reader. EPA recommends that either the summary section or main document be restructured in the FEIS following a consistent format (example: summary addressing each action individually). In a recent NOAA DEIS which EPA Region 4 reviewed, Amendment 10 Spiny Lobster FMP, the Council provided a clear description (in the summary section) of all proposed actions, all alternatives considered, the preferred alternatives, and an analysis of the potential impacts to the biological, social, economic, and administrative environments. This level of information is missing in the summary for the Comprehensive ACL DEIS. In addition, EPA notes that the Snapper Grouper complex 2 and 4 are not are not labeled in the summary section.

Demographics/Social Vulnerability:

EPA appreciates the Council's efforts to evaluate potential environmental justice issues posed by the actions presented under the Comprehensive ACL. The Council calculated a Social Vulnerability Index (SoVI) to better understand how places that are susceptible to coastal hazards might also exhibit vulnerabilities to social change or disruptions. EPA understands that the SoVI relies on census data from 2000.[4] Although it is stated that the SoVI can "be interpreted as a general measure of vulnerability to other social disruptions, such as adverse regulatory change or manamade hazards,"[5] EPA request clarification in the FEIS regarding how confident the Council is with respect to SoVI's ability to

[4] p. 241
[5] p. 241

measure the impact of regulatory change on impacted fishing communities. EPA continues to be concerned that the real impact of regulatory change on fishing communities, especially the low-income/minority fishing communities, is not being fully captured and explained. EPA applauds the Council's efforts to expand the SoVI to include fishing communities in the Southeast region, which may address our concerns.

Environmental Justice:

Even though the proposed Comprehensive ACL is being implemented for the sake of recovering the fishery, these actions can have societal effect on fishers. These affects can be equally or unequally distributed among fishers. It is stated in Section 3.8.8. that, "it is anticipated that the impacts of this amendment may affect communities with environmental justice concerns..."[6] It is then stated that the impacts "should not discriminate against any group."[7] While this may be true, EPA continues to be concerned that EJ fishers and communities may be impacted by these proposed actions and these impacts are not being adequately quantified. The Council has provided a process through the SoVI to identify vulnerable communities and potential EJ communities, but has not taken the analysis to the next step of identifying how the actions proposed under the Comprehensive ACL DEIS will impact these communities. EPA recommends future discussion and analysis be provided in the FEIS to discuss our concerns.

Public Participation:

It is important to incorporate and discuss the public participation activities related to EJ in the context of the proposed actions. There is no discussion in the scoping report related to EJ communities. Given that several coastal counties were identified as low-income and minority, the DEIS should include some discussion about the strategies used to meaningfully engage or provide outreach to these communities in the decision-making and assessment process. For example, EPA has recommended in past comment letters that the Council should target Hispanic communities with Spanish materials/translators during the public involvement process. In addition, it is unclear from the scoping report provided in Appendix K how many public meetings were held and if EJ communities were present at these public participation meetings. EPA recommends more EJ specific outreach efforts for these public participation opportunities

EPA DEIS Rating:

In summary, EPA's primary concerns are the proposed removal of species from the Snapper Grouper FMU, specifically how this will impact data collection for the removed species, and the Comprehensive ACL impact on EJ and low-income fishers. EPA generally supports NOAA and the Council on the Comprehensive ACL and gives deference to their fishery expertise. Therefore, EPA rates this DEIS as "LO" (Lack of Objections). Nevertheless, we request that NOAA and the Council directly respond to our comments in a dedicated section of the FEIS.

---

[6] p. 293
[7] p. 293

EPA appreciates the opportunity to review the DEIS. Should NOAA have questions regarding our comments on this DEIS, please feel free to contact Dan Holliman at 404/562-9531 or holliman.daniel@epa.gov and for EJ comments please contact Ntale Kajumba at 404/562-9620 or kajumba.ntale@epa.gov of my staff.

Sincerely,

Heinz J. Mueller
Chief, NEPA Program Office
Office of Policy and Management

Natural Resources Defense Council
40 West 20th Street
New York, NY 10011
Tel: (212) 727-2700
Fax: (212) 727-1773

Via Email and U.S. Mail

August 1, 2011

NOAA Fisheries
Southeast Regional Office
Sustainable Fisheries Division
263 13th Avenue South
St. Petersburg, FL 33701-5505

Re: Comments on the Comprehensive ACL Amendment DEIS (NOAA-NMFS-2011-0087)

To Whom It May Concern:

Please accept the following comments by the Natural Resources Defense Council (NRDC) on the Draft Environmental Impact Statement (DEIS) for the Comprehensive Annual Catch Limit (ACL) Amendment currently under consideration by the South Atlantic Fishery Management Council (SAFMC or Council) and NOAA Fisheries. NRDC is a national environmental advocacy organization that represents more than 1.3 million members and online activists across the country, including more than 130,000 people in Florida, Georgia, North Carolina, and South Carolina. NRDC's previous comments on the February and June 2011 drafts of the ACL Amendment are hereby incorporated by reference (Attachments A and B, respectively).

The current design of the ACL Amendment and DEIS fails to comply with the statutory requirements of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), 16 U.S.C. § 1801, *et seq.*, the Administrative Procedure Act (APA), 5 U.S.C. § 706, and the National Environmental Policy Act (NEPA), 42 U.S.C. § 4321, *et seq.* We are particularly concerned that the Council's proposed approach removes, rather than adds, protections for dozens of vulnerable species. The following comments focus on this issue, although we continue to be concerned about various other aspects of the draft.

As discussed in our previous comments, the ABC control rule, while a step in the right direction, still has many significant shortcomings. The ACL Amendment claims to have applied the Level 1 control rule to all assessed stocks, however there is no indication in the record that this has actually occurred. The Council must demonstrate how the risk policy (P*) and overfishing limit (OFL) probability distribution function (PDF) were calculated and applied to compute the ABCs for each species for which it claims this has been done.

The decision tree approach for unassessed species shows promise, but we believe the criteria for moving from one decision to the next should be more comprehensive and specific. As we demonstrated, the recommended ABCs for gray snapper and gray triggerfish – two species that were found to be in a documented state of overfishing in 1991 – are both at or above the landings level from 1991, while discards and landings have both increased significantly since that time. These and other factors must be taken into account when the scientific advisers are recommending ABCs for unassessed species.

We also remain troubled by the failure to include bycatch in the ACL-setting mechanism and associated AMs. We repeat our request for an update on the current status of the SBRM and any efforts to improve bycatch reporting and minimization in the South Atlantic, especially in light of the recent decision in *Oceana, Inc. v. Locke*, No. 10-5299 (D.C. Cir. July 19, 2011).

We appreciate the opportunity to participate in this important Fishery Management Plan (FMP) Amendment and hope that our input assists in constructing an ACL-setting mechanism that complies with legal requirements, including ending overfishing and attaining optimum yield.

DISCUSSION

Species Removal Violates the MSA, APA, and NEPA

The primary goal of the MSA is "...to conserve and manage the fishery resources found off the coasts of the United States...for the purposes of exploring, exploiting, conserving, and managing *all* fish within the exclusive economic zone..."[1] This goal requires adherence to the 10 National Standards found in the Act, as well as the statutorily-defined requirements for Fishery Management Plans (FMPs).[2] National Standard 1 requires that FMPs prevent overfishing and achieve optimum yield on a continuing basis, and National Standard 2 requires conservation and management measures be based on the best scientific information available.[3] For the reasons below, the Council's proposed action to remove 40[4] of 73 species from the Snapper-Grouper Fishery Management Unit (FMU) violates the abovementioned National Standards and fails to articulate a "rational connection between the facts found and the choice made," as required by the Administrative Procedure Act (APA).[5] The DEIS also violates NEPA for failing to take a "hard look" at whether the state regulatory regimes would adequately conserve and protect the removed species, among other things.

---

[1] 16 U.S.C. § 1801(b)(1).
[2] 16 U.S.C. § 1851(a).
[3] 16 U.S.C. § 1851(a)(1), (2).
[4] The Council voted in June not to remove mutton snapper from the FMU, although the species remains on the list to be removed under the preferred alternatives of the DEIS. If mutton snapper is kept in the FMU, that would leave 39 species proposed for removal.
[5] *See Bowen v. Am. Hosp. Ass'n*, 476 U.S. 610, 626 (1986) (interpreting the standard of review under the APA, 5 U.S.C. § 706(2)(A)); *see also* 16 U.S.C. § 1855(f) (providing for judicial review of MSA regulations pursuant to the APA).

1. *Removing Required Protections for Vulnerable Species Violates NS1 and the APA*

National Standard 1 requires that FMPs must contain conservation and management measures that are "necessary and appropriate" to prevent overfishing, including by setting ACLs and AMs for all stocks in the fishery.[6] Each FMP must also provide a description of the fishery, including a description of the species of fish involved in the fishery.[7] According to the National Standard 1 Guidelines, "all stocks in an FMP are considered to be 'in the fishery,'" unless they are identified as ecosystem component (EC) species.[8] ACLs and AMs are required for all stocks in the fishery, including "target" stocks and "non-target" stocks, the latter of which are caught incidentally while pursuing target stocks.[9] The MSA's requirement to set ACLs and AMs for all stocks in the fishery is designed to end overfishing and thus satisfy National Standard 1.[10]

The South Atlantic ACL Amendment's stated objective is "to implement measures expected to prevent overfishing and achieve OY."[11] The adoption of ACLs and AMs is at the heart of these measures.[12] However, rather than fulfill this statutorily prescribed purpose, the Council is attempting to evade compliance by simply dropping the species in question from federal management.[13] The record is quite clear that the decision to remove protections is based on a desire to "lessen the administrative burden [of]...implementing, monitoring, and enforcing ACLs and AMs for these species," and out of concern "that the requirement for ACLs and AMs could trigger common overages."[14] In other words, the FMP Amendment intended to implement ACLs and AMs and prevent overfishing is being used to achieve the opposite effect – obviating

---

[6] 16 U.S.C. §§ 1853(a)(1)(A), (a)(2), (a)(15).

[7] 16 U.S.C. § 1853(a)(2). A "fishery" is defined to include "stocks of fish which can be treated as a unit for purposes of conservation and management and which are identified on the basis of geographical, scientific, technical, recreational, and economic characteristics." 16 U.S.C. § 1802(13). A "stock of fish" is comprised of "a species, subspecies, geographical grouping, or other category of fish capable of management as a unit." *Id.* § 1802(42). A fishery management unit (FMU) is defined as "a fishery or that portion of a fishery identified in an FMP relevant to the FMP's management objectives." 50 C.F.R. § 600.310.

[8] 50 C.F.R. § 600.310(d)(1); *see also* "Preamble to NS1 Guidelines," 74 Fed. Reg. 3178, 3179 (Jan. 16, 2009) ("NMFS presumes that stocks or stock complexes currently listed in an FMP are "stocks in the fishery," unless the FMP is amended to explicitly indicate that the EC species category is being used.").

[9] 50 C.F.R. §§ 600.310(d)(3), (4); 600.310(h). The exceptions to the ACL requirement include species with annual life cycles less than one year and not subject to overfishing, as well as species subject to management under an international agreement. 50 C.F.R. § 600.310(h)(2).

[10] 16 U.S.C. §§ 1853(a)(15); 1851(a)(1).

[11] *See* SAFMC, *Comprehensive Annual Catch Limit (ACL) Amendment for the South Atlantic Region and Draft Environmental Impact Statement (ACL DEIS)*, at IV (June 2011) ("The purpose of this Comprehensive Annual Catch Limit Amendment (Comprehensive ACL Amendment) for the South Atlantic Region is to implement measures expected to prevent overfishing and achieve OY while minimizing, to the extent practicable, adverse social and economic effects.").

[12] *See id.*, at 3 (stating that ACLs and AMs are measures "which act to prevent overfishing.").

[13] *See id.*, at 310 ("If species are not removed from federal management, as would be the case under Alternative 1 (No Action), ACLs, AMs, and ACTs would need to be implemented and enforced for all 73 species within the FMU and their landings would need to be monitored on a regular basis.").

[14] *Id.*, at S5, 21.

the need for ACLs and AMs for these species, and all other federal protections in the process, by simply removing them from federal oversight.

According to the Council, the action to remove 40 species currently managed under the Snapper-Grouper FMP would have "the greatest negative biological effect...and pose the greatest risk of bycatch."[15] The proposed action "would enable fishermen to catch these species unrestricted and...be expected to have negative long-term economic impacts in that fish might be caught in volumes that endanger the sustainability of the stock and therefore future profitability."[16] Selecting a path with the greatest negative biological effects and negative long-term economic impacts that endanger the sustainability of the stock is contrary to NOAA's legal obligations to prevent overfishing.[17]

According to the Council's own evaluation, only 7 of the 40 species slated for removal are "*not* likely to become subject to overfishing or overfished."[18] This conclusion is based on the Council's interpretation of a Productivity and Susceptibility Analysis (PSA) conducted by MRAG Americas in 2009 (Attachment C).[19] According to MRAG's evaluation, 22 of the species proposed for removal are highly vulnerable to overfishing, 18 have medium vulnerability, and only two are considered to have low vulnerability (Attachment D).[20] In addition, eight of the 40 species slated for removal were "thought to be overfished" as far back as 1991.[21] (See Table 1 for a complete list of the species proposed for removal, their vulnerabilities, and the Council's determination as to their likelihoods for becoming overfished and subjected to overfishing). These vulnerabilities call for enhancing conservation measures, not eliminating them, yet they are not included in the ACL Amendment's discussion of which species to remove from federal management.

Removing management protections for species that are known to be vulnerable to overfishing, including some with a history of overfishing, in response to a mandate to strengthen conservation measures, conflicts with the Council's legal obligations to implement measures "necessary and appropriate...to prevent overfishing...and to protect, restore, and promote the long-term health and stability of the fishery."[22] The DEIS fails to explain how removing protections for species that are vulnerable to overfishing and/or thought to be overfished is "necessary or appropriate" to prevent overfishing or otherwise protective of the resource. As described in detail below, the lack of adequate state fishery management regulations for these species, and the Council's failure to analyze the same, demonstrates that the decision to

---

[15] SAFMC, *Draft ACL Amendment*, at 251 (February 2011).
[16] *Id.*
[17] 16 U.S.C. §§ 1851(a)(1), (8), (9).
[18] *Draft ACL Amendment*, at 255 (February 2011) (emphasis added).
[19] MRAG AMERICAS, "Use of Productivity-Susceptibility Analysis (PSA) in Setting Annual Catch Limits for U.S. Fisheries: A Workshop Report" (May 2009).
[20] MRAG AMERICAS, "South Atlantic PSA Results" (March 2009).
[21] The eight species believed to be overfished in 1991 include: blackfin snapper, dog snapper, mahogany snapper, misty grouper, queen snapper, yellowmouth grouper, schoolmaster snapper, and yellowfin grouper. SAFMC, *Snapper-Grouper FMP, Amendment 4,* at 4 (1991).
[22] 16 U.S.C. § 1853(a)(1)(A).

remove these species from federal management would leave them even more vulnerable to overfishing and becoming overfished.

Table 1: Species Proposed for Removal, Average Landings, and Vulnerability

Species	Basis for Removal[23]	Avg. Landings '05-'09 (lbs.)	Likely to Become Overfished/ Overfishing[24]	Vulnerability to Overfishing[25]	Likely Overfished[26]
bank sea bass	<20k	5,567	yes	Medium	unknown
bar jack	<20k	10,726	yes	high	unknown
black margate	80%	86,428	yes	high	unknown
black snapper	<20k	141	yes	high	unknown
blackfin snapper	<20k	2,087	yes	high	yes (no SSR)
blue striped grunt	80%	44,873	no	low	unknown
coney	<20k	2,453	yes	medium	unknown
cottonwick	<20k	6	no	medium	unknown
crevalle jack	80%	759,671	yes	medium	unknown
dog snapper	<20k	6,458	yes	high	yes (no SSR)
French grunt	<20k; 80%	1,142	no	medium	unknown
grass porgy	<20k; 80%	791	yes	high	unknown
graysby	<20k; 80%	14,648	no	medium	unknown
jolthead porgy	Alt8	40,966	yes	high	unknown
knobbed porgy	Alt8	37,618	yes	medium	unknown
longspine porgy	<20k	372	yes	high	unknown
mahogany snapper	<20k	467	yes	high	yes (no SSR)
margate	80%	22,342	yes	medium	unknown
misty grouper	<20k	1,834	yes	high	yes (no SSR)
mutton snapper	80%	561,549	yes	high	unknown
ocean triggerfish	<20k	10,962	yes	medium	unknown
porkfish	80%; ML	20,756	yes	high	unknown
puddingwife (wrasse)	<20k; 80%; ML	418	yes	medium	unknown
queen snapper	<20k	5,086	yes	medium	yes (no SSR)
queen triggerfish	<20k; ML	3,503	yes	medium	unknown
rock sea bass	<20k	2,325	yes	high	unknown
sailors choice	80%	19,239	yes	high	unknown
sand tilefish	<20k	11,168	yes	high	unknown
saucereye porgy	<20k; 80%	1,975	yes	high	unknown
schoolmaster snapper	<20k; 80%	5,423	yes	high	yes (no SSR)
scup	<20k	8,511	no	medium	unknown
sheepshead	80%	1,994,924	yes	medium	unknown
smallmouth grunt	<20k	0	no	medium	unknown
Spanish grunt	<20k; 80%	138	yes	high	unknown
tiger grouper	<20k	0	yes	high	unknown
tomtate	Alt8	66,671	no	low	unknown
whitebone porgy	Alt8	21,064	yes	high	unknown
yellow jack	80%	35,217	yes	medium	unknown
yellowfin grouper	20k	12,930	yes	high	yes (no SSR)
yellowmouth grouper	20k	3,504	yes	high	yes (no SSR)

[23] *ACL DEIS,* at 13-14.
[24] *Draft ACL Amendment*, 255 (February, 2011).
[25] MRAG AMERICAS, "South Atlantic PSA Results" (March 2009).
[26] *Snapper-Grouper FMP, Amendment 4* (1991).

Notwithstanding the Council's previous warnings about the long-term negative impacts of species removal cited above, and absent any evaluation of the state fishery management laws and regulations, the DEIS simply declares that removing federal regulations "would not be expected to decrease protection."[27] As discussed further below, this summary conclusion is based on a number of flawed and unexamined assumptions, including:

- That the species are mainly caught in state waters and state regulations would continue to apply;
- That landings in federal waters are relatively low compared to total landings of snapper grouper species; and
- That the 20 fish bag limit is not likely restricting current harvest for the species to which it applies.[28]

1.1 State Regulations are Inadequate to Fill Void Left by Removal from Federal Management

The DEIS asserts that "[t]he states currently manage species identified for removal..." and that management by the states is "likely more appropriate" and "more efficient" for these species than federal management.[29] The DEIS itself, however, omits any meaningful analysis of the current state regulations, including an evaluation of what gaps in management would occur once federal regulations no longer apply.[30] Nor, as explained below, is the DEIS' assertion supported by the reality of current state fisheries management programs and fisheries laws.

NRDC's review of the applicable state fishery laws and regulations demonstrates serious gaps in management if species are removed from the federal FMU (*see* Attachment E for a chart of currently applicable federal and state regulations that pertain to the species proposed for removal). These gaps could jeopardize the sustainability of the fishery resources off the South Atlantic coast, including by permitting unrestricted fishing mortality, as the Council concedes. For example:

- Florida:

---

[27] *ACL DEIS*, at 295.
[28] *ACL DEIS*, at 295.
[29] *ACL DEIS*, at 308, 310.
[30] Although the DEIS claims that Table 4-1 includes a listing of applicable state regulations for species proposed for removal, no such information is actually included in that table or anywhere else in the document. *Compare ACL DEIS*, at 295 (stating that "Table 4-1 shows the management measures currently in place by the states of North Carolina, South Carolina, Georgia, and Florida for species in Alternative 4 (Preferred)"), *with ACL DEIS*, at Table 4-1 (including only the Federal regulations and the State of Florida's bag and size limits for sheepshead and which species fall under the State's Marine Life Species Rule). There is no mention whatsoever of any regulations for Georgia, South Carolina, or North Carolina. Table 4-1 also inexplicably excludes three species being proposed for removal: black margate, whitebone porgy, and yellow jack, and mistakenly reports that misty and tiger grouper are subject to a minimum size limit, and that misty grouper is subject to a seasonal closure. *See* 50 C.F.R. § 622.35 (listing tiger grouper, but not misty grouper, as subject to the seasonal closure); *see also* 50 C.F.R. § 622.37 (listing neither misty or tiger grouper as being subject to a minimum size requirement).

  - Currently regulates only 19 of the 40 species proposed for removal and the state's regulations pertaining to marine fishing do not extend beyond state waters.[31]
  - Fourteen of the 20 species being proposed for removal under Alternative 4 (species with greater than 80% of landings in state waters) and Alternative 8 (tomtate, knobbed porgy, jolthead porgy, and whitebone porgy) lack any species-specific regulations in Florida.[32]
  - Eleven of these 14 species lacking state protections have either a medium or high vulnerability, according to the MRAG PSA analysis discussed above.[33]
  - Thirteen of 27 species proposed for removal due to landings below 20,000 pounds lack any specific regulation in Florida, and 12 of the 13 have either medium or high vulnerability.
- Georgia:
  - Currently regulates only one of the 40 species proposed for removal: sheepshead.[34]
- South Carolina:
  - Currently adopts all federal fisheries management regulations in state waters via legislation. Once federal protections are removed for these 40 species, they will simultaneously lapse in state waters, meaning a complete gap in protections for all 40 species from the shores of South Carolina to the 200-mile limit.
  - Because the state's legislature has not vested rulemaking authority in the South Carolina Department of Natural Resources, the legislature must enact laws every time it wants to change the state's fisheries management.[35]
- North Carolina
  - State fisheries regulations (issued via "Proclamation" by the Director of the Marine Fisheries Commission) do not extend into federal waters.[36]
  - Nine of the 20 species being proposed for removal pursuant to Alternatives 4 and 8 lack species-specific protections in the state, and five of the nine have a medium or high vulnerability to overfishing.[37]

---

[31] FLA. ADMIN. CODE ANN. r. 68B-14.001, r. 68B-42.001, r. 68B-48.003; *see* Florida Fish and Wildlife Conservation Commission, *Basic recreational saltwater fishing regulations*, http://myfwc.com/media/1349466/2011_jan_sw-chart.pdf (explaining that that state regulations apply to the state waters of Florida and that "Federal rules apply beyond state waters"); *see also* FLA. ADMIN. CODE ANN. r. 68B-14.0035 (directing that state size limit provisions reef fish apply to "species harvested in or from state waters"); FLA. ADMIN. CODE ANN. r. 68B-14.0036 (directing that state recreational bag limits, recreational seasons, commercial harvest, and allowable gear apply exclusively to harvest or possession in state waters or specific portions thereof).

[32] FL. ADMIN. CODE ANN. R. 68B-14.

[33] Attachment E to these comments.

[34] GA. COMP. R. & REGS. 391-2-4.04.

[35] S.C. CODE ANN. § 50-5-2730.

[36] *See* N.C. GEN. STAT. ANN. § 113-134.1 (The N.C. Marine Fisheries Commission has statutory authority for "the conservation of marine fisheries resources in the Atlantic Ocean to the seaward extent of the State jurisdiction...").

[37] N.C. DIV. OF MARINE FISHERIES PROCLAMATIONS FF-49-2011 (effective April 5, 2011) and FF-58-2011 (effective June 22, 2011).

- Of the 27 species proposed for removal with landings less than 20,000 pounds, 10 lack any specific regulations in North Carolina, all of which have either medium or high vulnerability to overfishing.

In addition, current federal regulations apply a 225-pound commercial trip limit to all snapper-grouper species unless a species-specific trip limit is set.[38] None of the South Atlantic states have similar measures. For example, in Florida, only one of the 40 species – mutton snapper – contains any limit on the quantities that can be taken by commercial fishermen, and even that limit only applies for two months out of the year.[39]

Another significant difference between federal and the relevant states' fishery regulations is the relative weakness and ambiguity of the states' conservation standards when compared with federal law. Among other important mandates, the MSA prohibits overfishing, requires rebuilding overfished species in as short a time period as possible, and requires the use of the best available science to set ACLs and AMs.[40] Florida's fisheries management framework, by contrast, contains no such specific conservation goals or requirements. Instead of preventing overfishing and obtaining optimum yield, the stated "paramount objective" of Florida's fisheries regulations is the "long-term well-being" of fish resources "for the benefit of all the people."[41] Instead of the mandate to prevent overfishing and achieve optimum yield, based on specific status determination criteria and well-defined limits for overfishing, Florida standards merely advise that "rulemaking should permit reasonable means and quantities of harvest, consistent with optimum sustainable populations."[42] The DEIS remains silent on the impacts of the different conservation standards required by federal and state fisheries laws – a difference that could result in inadequate protections even in cases where State regulations cover specific species.

The recent debate between the SAFMC and the Florida Fish and Wildlife Conservation Commission (FWCC) over the management of mutton snapper, one of the species proposed for removal, illustrates the states' inability to adequately replace federal management.[43] In the case of mutton snapper, the FWCC retracted its initial request to take over management of the species after determining that "Florida could not adequately manage fishing effort and harvest by out-of-state vessels if management of mutton snapper in federal waters is transferred to the state."[44] The FWCC explained that removal of the species from federal management would

---

[38] 50 C.F.R. § 622.44.

[39] FLA. ADMIN. CODE ANN. R. 68B-14.0045 (2011).

[40] 16 U.S.C. §§ 1851(a)(1); 1854(e)(4); 1851(a)(2); 1853(a)(15).

[41] FLA. ADMIN. CODE ANN. R. 68-1.004(2).

[42] *Compare* 16 U.S.C. § 1851(a)(1), *with* FLA. ADMIN. CODE ANN. R. 68-1.004(4) ("Optimum sustainable populations shall mean the highest degree of population productivity within available habitat to sustain fish and wildlife for the long term use or enjoyment of all the people.")

[43] As mentioned in a footnote above, the Council voted to keep mutton snapper in the FMU at the June, 2011 Council meeting, but that change has not been updated in the DEIS, so we are assuming that mutton snapper will still be removed.

[44] Letter from Mark Robson, Director, Florida Fish and Wildlife Conservation Commission, to Dr. Roy Crabtree, Regional Administrator, NMFS (June 3, 2011) (Attachment B, Exhibit A to the instant comment letter).

mean that commercial vessels would no longer require permits in federal waters, which "would result in an increase in mutton snapper fishing effort." The FWCC also expressed concern that the state "may not be able to regulate harvest of mutton snapper by out-of-state vessels fishing in Federal waters off Florida and landing in other states." Although the focus in this case was on mutton snapper, the same valid concerns by the FWCC would apply to other species being proposed for removal. The DEIS is silent on the matters of effort shift resulting from removing permitting requirements and the ability of one state to regulate catch in its waters when landed in another state. This latter issue could become a particular problem due to the lack of alignment among state regulations, creating incentives for fishermen to dock at out-of-state ports with more lenient regulations.

1.2 Unregulated Catch in Federal Waters Could Significantly Impact Removed Species

The DEIS acknowledges that state regulations for any of the removed species "would not apply in federal waters unless states extend their jurisdiction into federal waters."[45] The Council downplays the significance of this regulatory gap by asserting that "landings of the vast majority of species to be removed (99%) in the preferred alternatives occur in state waters..."[46] However, just two pages after announcing that 99% of the landings from removed species are caught in state waters, the DEIS estimates that "the effective landings" from federal waters is approximately 425,000 pounds out of the total combined landings of 3,823,000 pounds.[47] That equates to 89%, not 99%.

For many species with landings below 20,000 pounds, especially those found in deeper waters, unregulated catch in federal waters could push them well above their overfishing limit, possibly without any indication that has occurred. The unregulated catch of even a small portion of removed species in federal waters could mean the difference between overfishing for some of the individual species affected, as well as others indirectly affected by increased bycatch. By removing federal protections for these species, including the need for federal permits to catch them, some removed species that are already caught in deeper, federal waters – such as sheepshead, crevalle jack, queen snapper, and bank sea bass – "could once again be targeted by fishermen with state licenses..."[48] If fishing effort in federal waters is unregulated and increases accordingly, as the DEIS indicates is quite possible, this could not only lead to increased fishing mortality for the removed species, but also for co-occurring target stocks that remain in the FMU, such as gag grouper, yellowtail snapper, and red grouper.[49]

2. The Lack of Analysis of State Fisheries Regulations Violates NS2 and the APA

---

[45] *ACL DEIS*, at 295.
[46] *Id.*, at 308.
[47] *Id.*, at 310.
[48] *Id.*, at 308.
[49] *Id.*, at 308.

National Standard 2 requires that "conservation and management measures shall be based upon the best scientific information available."[50] Scientific information "includes, but is not limited to, information of a biological, ecological, economic, or social nature."[51] Management decisions must be based on a thorough review of all the relevant information available at the time the decision was made.[52] This requires that fishery regulations be diligently researched, based on sound science, and supported in the record.[53] The failure to conduct a review of the applicable state regulations and an analysis of whether they are adequate to meet the conservation and management needs of species proposed for removal is a violation of NS2 and the APA.

The criteria for removal are based narrowly on landings volumes and percentages in state versus federal waters, but fail to consider other critical scientific information, including:

- vulnerability analyses,
- misidentification of the species with other targeted fish,
- bycatch,
- life history characteristics,
- ecosystem impacts,
- landings and effort trends,
- prior scientific status determinations (at least 8 species previously identified as believed overfished are proposed for removal)

This information is vital to the decision regarding whether to remove these species from federal management and essential to clarifying the risks of reducing protections for these species.

3. *The DEIS Violates NEPA for Failing to Take a Hard Look at the Environmental Consequences of Species Removal*

The DEIS fails to analyze adequately the direct, indirect, and cumulative effects of removing species from the FMU, as required by NEPA.[54] Among other things, NEPA requires that federal agencies take a "hard look" at the direct, indirect, and cumulative environmental impacts of proposed actions.[55] As discussed above, the DEIS presumes – absent analysis of the potentially applicable state regulations – that the species proposed for removal are "effectively managed by the states."[56]

---

[50] 16 U.S.C. § 1851(a)(2).
[51] 50 C.F.R. § 600.315(b)(1).
[52] *Hall v Evans*, 165 F. Supp.2d 114, 128 (D.R.I. 2002); *Parravano v. Babbitt*, 837 F. Supp 1034, 1047 (N.D. Cal. 1993).
[53] *Id.*
[54] 42 U.S.C. § 4321 *et seq.*
[55] *Marsh v. Oregon Natural Resources Council*, 490 U.S. 360, 371 (1989); *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council*, 435 U.S. 519, 558 (1978).
[56] *ACL DEIS*, at 310.

The document contains no evaluation of the specific state regulations that would pertain to the removed species, including whether such regulations would be more or less protective than the federal regulations that would otherwise apply. In particular, there is little to no analysis of whether the state regulations are sufficient to prevent overfishing, account for and reduce bycatch, and provide other conservation protections currently afforded these species under the MSA. There is no discussion of what additional measures would be required of the states in the absence of federal management. There is also no discussion of the implications of removal for many of the 40 species that have a medium or high vulnerability to overfishing.

One of the rationales provided for removing the species contained in Alternative 7 and 8 is that "they are not retained by commercial fishermen due to low economic value, are not generally sought after as a food fish, and have relatively small landings."[57] These bases conflict with the Council's own analysis that describes 18 of the 32 species proposed for removal under Alternatives 7 and 8 as retained for sale or personal use, and nine of the 32 species as targeted by fishermen.[58] The four species contained in Alternative 8 – tomtate, knobbed porgy, jolthead porgy, and whitebone porgy – are all listed as both targeted and retained, and all but tomtate are listed as vulnerable to overfishing.[59] Additionally, all four species have recent landings in excess of the 20,000 pound limit used as the basis for removal in Alternative 7. The DEIS fails to provide a rationale for removal of these species and fails to consider the direct, indirect, and cumulative impacts of their removal from management.

The Council and NOAA Must Reconsider Species Removal

We see no permissible basis for removing any species from the FMU at this time and call upon the Council to reconsider this action prior to submitting the Amendment for Secretarial approval. While we are not categorically opposed to potentially removing some species from federal management or designating some as ecosystem component species, such actions must comply with the requirements of the MSA, APA, and NEPA, be consistent with the National Standard Guidelines, and satisfy the objectives of the applicable FMP. At a minimum, before deciding to take such actions, the Council must evaluate the alternative management regime(s) that would be responsible for ongoing management of removed species to determine whether these alternative regimes are adequate to provide sufficient protection to prevent overfishing and achieve the other substantive requirements of the MSA.

If species are removed from the FMU at some point in the future, the Council must also adopt a specific mechanism in the FMP for tracking the vulnerability of any removed stocks or designated EC species and triggering actions to resume management or reclassify species as stocks in the fishery if they cross certain biological thresholds or reasonable proxies when no such thresholds are available. Ongoing monitoring and data collection is crucial to assessing whether a species, once removed, becomes subject to overfishing or overfished, or surpasses

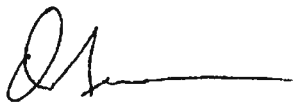
[57] *ACL DEIS*, at 299-300.
[58] *Draft ACL Amendment*, Table 4-9 (February 2011).
[59] *Id.*

some other biological threshold, such as declining landings in the face of consistent or rising fishing effort.

On this point, the DEIS provides contradictory information as to the type of monitoring that would continue if these species are removed from management. In one place, the DEIS states that "data collection would not be altered from current levels if species are removed..."[60] However, just a dozen pages later, the DEIS cautions that "[i]f species are not removed from federal management...landings would need to be monitored on a regular basis."[61] In other words, if species are removed, then landings would not need to be monitored on a regular basis. The DEIS must clarify whether and precisely how any removed species would continue to be monitored to ensure appropriate conservation actions can be taken.

We appreciate the opportunity to comment on this important component of the amendment development process.

Very Truly Yours,



David Newman, Oceans Program Attorney
Brad Sewell, Senior Attorney
Natural Resources Defense Council
40 West 20th Street, 11th Floor
New York, NY 10011
212-727-4557
dnewman@nrdc.org

cc: SAFMC Members

[60] *ACL DEIS*, at 297.
[61] *Id*, at 310.

449 Central Avenue
Suite 200
St. Petersburg FL 33701

Ocean Conservancy
Start a Sea Change

727.895.2188 Telephone
727.895.8652 Facsimilie
www.oceanconservancy.org

August 1, 2011

Dr. Roy E. Crabtree, Regional Administrator
NOAA Fisheries, Southeast Region
263 13th Avenue South
St. Petersburg, FL 33701

Re: Comments on the Draft Environmental Impact Statement for Comprehensive ACL Amendment

Dear Dr. Crabtree:

Ocean Conservancy provides the following comments on the Draft Environmental Impact Statement (DEIS) to analyze the impacts of the South Atlantic Fishery Management Council's (SAFMC) Comprehensive Annual Catch Limit Fishery Management Plan Amendment for the South Atlantic region (ACL Amendment). The current draft of the proposed ACL Amendment includes important provisions to comply with the legal requirements of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) to end and prevent overfishing and to implement the National Standard 1 (NS1) guidelines. It is imperative that the SAFMC take final action at its August meeting to put measures in place as soon as possible, as it is already unlikely that the amendment will be approved and implemented by the 2011 Annual Catch Limit/Accountability Measures deadline under the MSA.

The DEIS evaluates a range of alternatives, as required under the National Environmental Policy Act (NEPA), for over 30 actions developed to meet the MSA legal requirements to set annual catch limits (ACLs) and accountability measures (AMs) for multiple fisheries in the South Atlantic region. This DEIS is crucial to inform the National Marine Fisheries Service's (NMFS) decision to approve or disapprove the amendment once it is approved by the SAFMC and submitted to the agency. In addition, due to the unique nature of fisheries management under which the agency can only approve, disapprove or partially approve a councils' recommended FMP amendment, it also provides critical analyses that the SAFMC should use to inform its decision making process. The DEIS includes some comprehensive analyses of a range of alternatives, but is still missing some important analyses. We appreciate that a draft EIS has been completed prior to the SAFMC's final decision, but it has been made available so close to the decision that there is little time for the council to consider public comments and no opportunity for the council to benefit from the agency's responses to comments.

We offer the following top-line recommendations on the DEIS to help ensure the agency conducts a sufficient analysis as required under NEPA and ultimately, with the SAFMC, develops an amendment that meets the requirements of the MSA. We urge you to incorporate our

recommendations, which are primarily focused on the actions regarding the snapper grouper fishery management plan (FMP), before taking final action on the amendment.

In summary, we offer the following recommendations for the snapper grouper fishery:

- To remove species from the snapper-grouper fishery management unit (FMU), the agency must analyze alternatives including implications of removing species using criteria in addition to magnitude of landings and establish thresholds and triggers for determining whether species that are not currently under federal management should be added to the FMU.
- Analyze the potential for bycatch of major species as a result of species removals from the FMU and add language describing how the agency and the council intend to track and account for this change in bycatch of snapper-grouper species from fishing on species that are removed under Action 1.
- Include an alternative in which species in stock complexes will be evaluated if landings composition of stock complex members changes significantly.
- Require a future performance evaluation of the ABC control rule to determine when and how it needs to be modified to achieve its goals.
- Describe how discard mortality is incorporated into the ABC for all assessed species and explicitly state whether ABCs for assessed species provided in the document represent landings-only or total catch.
- Provide ABCs for landings and discards separately, where available.
- As often as possible, and at a minimum every time the stock assessment for a species is updated, compare previously projected dead discards to actual dead discards for that period.
- Include an update on the implementation of the standardized bycatch reporting methodology (SBRM), the Atlantic Coastal Cooperative Statistics Program (ACCSP), in the ACL Amendment and describe why it is or is not suitable for monitoring current bycatch and dead discards in the fishery in its current state of implementation.
- Specify the monitoring needs in order to move toward full bycatch accounting.
- Explicitly analyze the level of management uncertainty for each sector and account for management uncertainty in the setting of ACLs or ACTs.

MAGNUSON-STEVENS REAUTHORIZATION ACT AND NATIONAL ENVIRONMENTAL POLICY ACT

As amended in 2007, the MSA requires all FMPs to establish a mechanism for specifying ACLs "such that overfishing does not occur in the fishery," and AMs to help ensure those ACLs are not exceeded.[1] Under the law, ACLs and AMs must be in place for all stocks by 2011. In order to provide guidance to fishery managers on implementing the ACL and AM requirements, NMFS revised the NS1 guidelines, setting forth key biological reference points and status determination criteria that must be included in FMPs, and procedures for setting ACLs and AMs that should be followed in order to ensure the intent of Congress to end overfishing is truly met. While the ACL Amendment makes progress toward meeting the requirements of the MSA and the NS1

[1] 16 U.S.C. §303(a)(15).

guidelines, it still lacks some key components, and changes will need to be made in order to ensure full compliance with the MSA.

In addition, under NEPA, the agency is required, for any major action significantly affecting the quality of the human environment, to prepare a detailed statement of, among other things, the environmental impacts of the proposed action, the adverse environmental effects that cannot be avoided, and alternatives to the action.[2] Fishery management plans and amendments are major federal actions requiring the preparation of environmental impacts statements (EIS). The SAFMC's ACL Amendment has the potential to transform the way fisheries are managed in the South Atlantic region and warrants a thorough environmental analysis. The draft EIS accompanying the amendment falls short of NEPA requirements in several respects. Specifically, in some instances, the DEIS does not present a full and fair discussion of the environmental impacts of the proposed actions. Throughout the DEIS, only cursory analyses of the potential direct, indirect and cumulative effects on the physical, biological, and ecological environment from the proposed actions – including the alternatives and preferred alternatives – are offered.

Additionally, for some actions, important viable alternatives have not been considered, as required under NEPA and established case law. The consideration and analysis of alternative actions is the "heart of the environmental impact statement."[3] The analysis should "present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public."[4] In this case, there are alternatives that the council and the agency have failed to consider that could result in less detrimental effects on the marine environment. In order to comply with NEPA, the final EIS will need to consider additional alternatives and conduct significantly more thorough analyses of the environmental impacts of the range of alternatives.

SPECIFIC RECOMMENDATIONS

1. Removing Species from the Snapper Grouper Fishery Management Unit

There are currently 73 species in the snapper grouper fishery management unit (FMU), many of which are of minor importance to the fishery and are data-poor. Many of these species were added for data collection purposes in an effort to be all-inclusive, long before federal law required ACLs for all stocks in the fishery. In action 1 of the ACL Amendment, the Council proposes to use state-federal landings proportions, total landings thresholds, and the Florida Marine Life Rule as a basis for removing a number of species from the FMU, in addition to removing four species based on no specific criteria.

a. Additional criteria needed for species removal

We understand the desire to remove species from the FMP that are not in need of federal management and thereby streamline management, and are not opposed to removing species from management. We have some concerns, however, with how the SAFMC is proposing to go about this. Specifically, with the exception of alternative 5 and 8, all alternatives use only criteria

[2] 42 U.S.C. §4332(2)(c).
[3] 40 C.F.R. §1502.14 (CEQ NEPA guidelines).
[4] Id.

related to the magnitude of landings; but landings alone are not sufficient information to determine whether a stock is in need of management. As stated in our previous letters, magnitude of landings alone is not a sufficient criterion for species removal from the FMU. The SAFMC needs to include and the agency needs to analyze species removal using additional fishery information such as species vulnerability, species distribution, species misidentification issues (e.g., species whose identity could be confused with that of another federally managed stock), and information on the targeting behavior of the fleet. **To remove species from the FMU, the SAFMC should select and the agency must analyze alternatives including implications of removing species utilizing criteria in addition to magnitude of landings such as species vulnerability, species misidentification issues, trends in landings, and/or species distribution.**

An additional consideration, which is implicit in the alternatives, is "desirability," or a change in targeting behavior of the fishery. The desirability of some species is used informally to justify exceptions to the landings criteria on the basis that those species would get fished heavily if removed from the FMU. Unrestricted landings of the species that would be removed could lead to these species being caught in such high volumes that the sustainability of the stock and future profitability of the fishery could be jeopardized. **The document should formally incorporate and the agency should consider the concept of desirability under Action 1 to prevent removing species that would be fished unsustainably if not under federal management.** The document also fails to consider the full potential cumulative impact of these removals. These include the difficulty states may have to manage these species and the potential for the misreporting of species landed in state waters (where regulations apply) as species landed in federal waters (where no regulations apply).

b. Criteria for adding species to the FMP should be included

Under the current proposal for removing species, once species are removed from the FMU there will be no mechanism in place by which to add them back into the FMP if it becomes necessary. If, for example, the average combined state and federal landings of a species increases significantly above the 20,000 lbs threshold established in Alternative 7, the SAFMC should determine whether to add the species back into the FMP. **The DEIS should include an alternative for establishing thresholds and triggers for determining whether species that are not currently under federal management should be added to the FMU.** At its June meeting, the SAFMC approved a motion that staff provide an update to the SAFMC every three years on the landings and trends of stocks that have been removed from the snapper-grouper FMU. This alternative should be analyzed in the EIS, and expanded to include thresholds and triggers for species that have never been under council management. An analysis should be conducted as a response to the potentially adverse biological and socioeconomic impacts that the ACL Amendment identifies under this action.

c. The agency must analyze the potential for bycatch of major species as a result of removal

We are concerned about the potential for increased bycatch of major species in the snapper grouper FMU (such as gag and red grouper) that would likely result from vessels that are state, but not federally, permitted fishing for species newly removed from federal management. The document acknowledges that, "by removing species from the FMU in Alternatives 2-8, species

such as sheepshead, crevalle jack, queen snapper, schoolmaster, bank sea bass, and dog snapper could once again be targeted by fishermen with state licenses, but no federal snapper grouper commercial permit, which could result in some increased bycatch of co-occurring species such as gag, yellowtail snapper, and red grouper."[5] If this increase in bycatch-related mortality is significant, the model assumptions used to project dead discards for the major species will be inaccurate and overfishing could occur by exceeding the maximum fishing mortality threshold, even if the landings ACL is not exceeded. **The ACL Amendment must include provisions for tracking and accounting for this change in bycatch.**

d. The agency must perform more thorough environmental analysis on this amendment overall

The decision to remove such a significant number of species from federal management could substantially affect the long-term sustainability of snapper grouper fisheries and associated marine ecosystems. Such a decision should not be made without a comprehensive analysis of the long-term environmental and socioeconomic effects. The analysis currently accompanying this action is insufficient. The SAFMC has previously made the deliberate decision that these species are in need of conservation and management under the MSA.[6] Both the SAFMC and NMFS must conduct a comprehensive review before deciding that the species are no longer in such need.[7]

2. Species Groupings for Snapper Grouper Species

We support the use of species groupings as described in preferred Alternative 4 of the ACL Amendment. The complexes identified in alternative 4 are based on robust, peer-reviewed analyses that considered a number of factors related to fishery and life history characteristics, and management information is not currently sufficient to manage these species individually. The DEIS should, however, analyze and describe the potential negative aspects of managing stocks in complexes and how those aspects can be addressed. Monitoring catches only at the stock complex level could result in overfishing on individual species within the complex going undetected and changes in targeting behavior of the fleet being overlooked. **The EIS should include an alternative in which species in stock complexes will be evaluated if landings composition of stock complex members changes significantly. Ultimately, the ACL Amendment should specify that stock complexes will be re-evaluated periodically to ensure species groupings are still appropriate.**

3. ABC Control Rule for Snapper Grouper Species

At its June, 2011, meeting, the SAFMC identified alternative 7 under Action 3 as its preferred alternative for developing an acceptable biological catch (ABC) control rule, though the DEIS does not currently reflect this. Based on that recent action, we support alternative 7 for

---

[5] ACL Amendment, p. 308.

[6] *See* 16 U.S.C. § 302(h), 303(a).

[7] NMFS recently rejected a proposal from the Pacific Fishery Management Council (PFMC) to remove two species from the Pacific Coast Groundfish Fishery Management Plan because there was not sufficient analysis to support such a significant change. *See* Letter from William W. Stelle, Jr., Regional Administrator, NMFS, to Mark Cedargreen, Chair, PFMC, (Dec. 27, 2010).

establishing a control rule for determining ABC for snapper grouper species, with the understanding that some improvements will need to be made to this approach as soon as possible. For assessed species, the control rule developed by the SAFMC's Scientific and Statistical Committee (SSC) will be applied. The SSC's approach reduces ABC from the overfishing limit (OFL) based on the P^* method. Briefly, this means the ABC is obtained by applying the probability of overfishing (termed the P^* value) determined for each stock to the "probability density function" (pdf, which reflects scientific uncertainty around the OFL estimate) produced in the stock assessment. The range of the P^* value itself was given by the SAFMC, and the exact value within that range is obtained by the SSC evaluating each stock in four areas: assessment information, characterization of uncertainty, stock status, and productivity/susceptibility of the stock.

We are concerned that the control rule for assessed species does not account for all sources of scientific uncertainty, and that, therefore, if an assessment significantly underestimates the uncertainty in the probability density function, the ABC buffer will be too small even if a very low probability of overfishing (P^*) is calculated. Nevertheless, the control rule does account for some major sources of uncertainty and we support applying it. **The amendment should call for a future performance evaluation of the control rule to determine when and how it needs to be modified to achieve its goals.**

For unassessed species, until the SSC has completed its ABC control rule, ABCs will be based on a decision tree identified in the DEIS. We support the use of the decision tree in the absence of a more developed methodology. The SSC plans to incorporate into its ABC control rule the methodology developed by the NMFS *ad hoc* working group to address management of species that have only reliable catch data available ("only reliable catch stocks," or "ORCS"). The report by the working group reviews existing methods for setting catch limits for ORCS and presents its own approach, "designed to build on existing approaches, while strengthening the biological and population dynamics underpinnings. The method provides additional flexibility and allows policymakers to set risk levels, as required under the NS1 guidelines."[8] The findings and recommendations of the ORCS working group provide the basis for more effective alternatives for setting ABCs for data-poor species, and it is critical that NMFS examine the ORCS recommendations and analyze additional alternatives for ORCS.

4. Accounting for and Managing Total Mortality

The NS1 guidelines define catch as "fish that are retained for any purpose, as well as mortality of fish that are discarded."[9] The guidelines further state that "ABC should be expressed in terms of catch, but may be expressed in terms of landings as long as estimates of bycatch and any other fishing mortality not accounted for in the landings are incorporated into the determination of ABC."[10] Even though the ACL Amendment states explicitly that the SAFMC intends to account for bycatch and manage total mortality,[11] the document is currently lacking any discussion on

[8] Calculating Acceptable Biological Catch for stocks that have Reliable Catch Data Only (Only Reliable Catch Stocks – ORCS) NOAA Technical Memorandum NMFS-SEFSC-616, p. iii
[9] 50 C.F.R. § 600.310(f)(2)(i).
[10] Id. § 600.310(f)(3)(i).
[11] ACL Amendment, p. 10.

how discard mortality is taken into account in setting ABCs. In order to set meaningful ACLs and AMs that truly hold catch to the specified ACL, as intended by Congress, it is imperative that ABC and ACLs account for all sources of mortality, both directed catch and discard mortality.

For assessed species, dead discards are estimated as part of the stock assessment process and are projected into the future based on certain assumptions about the future operation of the fishery. Uncertainty in dead discard estimates should be incorporated into the probability density function used in the ABC control rule. Currently, the only species in the ACL amendment that has ABCs listed for landings and discards is black grouper. **The ACL Amendment must describe how discard mortality is incorporated into the ABC for all assessed species and explicitly state whether ABCs for assessed species provided in the document represent landings-only or total catch. In addition, the document must provide ABCs for landings and discards separately, where available.**

We recognize that it currently may not be possible for the SAFMC to monitor in-season bycatch and dead discards. Nevertheless, there is value in being explicit about what portion of the total ABC is landings and what portion is dead discards, to provide a form of bycatch-related accountability. The document should include an alternative that requires, as **often as possible and at a minimum every time the stock assessment for a species is updated, that previously projected dead discards are compared to actual dead discards for that period. If a stock assessment shows that catch limits were exceeded because dead discards were higher than allowed, an extra buffer should be applied to future ABCs to account for that.** This would provide consistency with the NS1 guidelines.

For unassessed species, the ACL Amendment must clarify if the intent of the ABC control rule is to specify a landings-only ABC. If that is the case, the document must specify how discard mortality is accounted for in the case of unassessed species. If the intent is to allow discard mortality to continue at the same rate at which it is has been occurring or at a rate slightly higher, the document needs to build the argument for why that is acceptable and how the SAFMC and the agency intend to monitor future bycatch and dead discards to assure discarding does not increase undetected and overfishing does not occur. **The DEIS should include an update on the implementation of the SAFMC's standardized bycatch reporting methodology (SBRM), the Atlantic Coastal Cooperative Statistics Program (ACCSP), and describe why it is not suitable for monitoring current bycatch and dead discards in the fishery in the current state of implementation. The DEIS should assess monitoring needs in order to move toward full bycatch accounting.**

5. Annual Catch Limits for the Snapper Grouper Fishery

The ACL Amendment preferred alternative under action 5 for setting ACLs in the snapper grouper fishery is to set ACL equal to ABC. We are not opposed to that as long as management uncertainty is then accounted for in setting an ACT below the ABC/ACL. The NS1 guidelines specify that councils must account for scientific and management uncertainty in setting catch

limits and targets.[12] In Action 6, however, the Council's preferred alternative for commercial accountability measures (AMs) does not require the use of an ACT. If the SAFMC moves forward with that decision, it would have to show that management uncertainty in the commercial fishery is negligible in order to comply with the NS1 guidelines. **If the management uncertainty for the commercial sector is not demonstrably negligible and no ACT is employed as an AM, in Action 5 the ACL Amendment must set the ACL below the ABC in order to account for management uncertainty and comply with the NS1 guidelines.**

6. AMs and ACTs for Species in the Snapper Grouper FMU

The ACL amendment offers three alternatives for commercial and three alternatives for recreational accountability measures under actions 6 and 7 respectively. The preferred alternatives for commercial AMs would not use an ACT, would use a prohibition on purchase and sale of a stock as an in-season AM, and use a full overage deduction as a post-season AM. The preferred alternatives for recreational AMs would use an ACT set at ACL*[(1-PSE) or 0.5, whichever is greater], no in-season AM, and reduce the length of the recreational season in the year following an ACL overage to keep the fishery within its ACL as a post-season AM.

We support applying different AMs to each sector because each sector has unique data availability, timeliness, and quality issues affecting the appropriateness of certain management measures. The SAFMC's current intent for the commercial fishery is to set ACL equal to ABC and use no ACT, thereby implying that there is no management uncertainty in the commercial fishery and that management measures will constrain catch within the ACL with the in-season AMs proposed in the amendment. The in-season AM the SAFMC proposes in the ACL Amendment is to prohibit purchase and sale and limit harvest and/or possession to the bag limit after the commercial ACL is projected to be met. This AM would be insufficient to prevent quota overages. While the Council does propose to use full overage payback for the commercial fishery, it is crucial to prevent ACL overages in addition to correcting them after they occur.

The SAFMC should analyze the level of management uncertainty present in the commercial fishery. If the analysis shows that management uncertainty in the commercial sector is not negligible, the Council should change its preferred alternative from Subalternative 2a (do not establish a commercial sector ACT) to Subalternative 2b (sector ACT equals 90% of the sector ACL) or 2c (sector ACT equals 80% of the sector ACL), depending on the level of management uncertainty present in the fishery. In addition, the EIS should include and analyze a new alternative that would give the regional administrator the authority to close the fishery in-season if the ACL is exceeded in order to prevent large ACL overages from occurring and having to be paid back the following year.

We support the use of ACTs in the recreational fishery and the use of the percent standard error (PSE) to determine what that ACT should be. This links the ACT directly to variability in landings data, which is not the only source of management uncertainty in the recreational fishery but a large part of it. Managing for the ACT and not the ACL provides a higher certainty that the ACL will not be exceeded. However, there will probably be situations where, in spite of

[12] 50 C.F.R. § 600.310(b)(3).

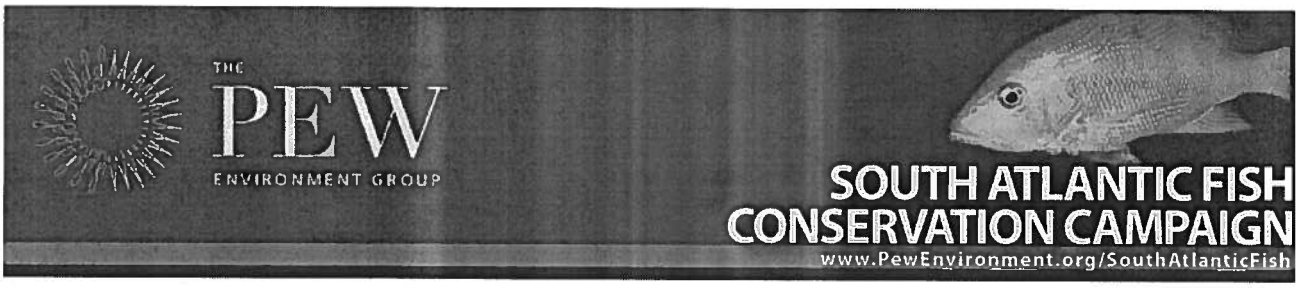
managing toward an appropriately set target, the recreational ACL is projected to be exceeded in a fishing year. Therefore, alternative 4b (the regional administrator shall publish a notice to close the recreational fishery when the ACL is projected to be met) is the optimal alternative to help ensure large recreational overages do not occur. We support the post-season AM to adjust the fishing season in order to keep the sector within its catch limit (subalternative 5f), and additionally recommend that the ACL be explicitly reduced in the following season by the amount of the ACL overage.

Conclusion

We appreciate the opportunity to provide comments on the Comprehensive ACL Amendment DEIS and look forward to continued work with you on our shared goal of ensuring the long-term health of South Atlantic fisheries.

Sincerely,

Samantha Port-Minner
Policy Analyst, Fish Conservation Program
Ocean Conservancy
449 Central Avenue, Suite 200
St. Petersburg, FL 33701



July 25, 2011

Dr. Roy Crabtree
Regional Administrator
Southeast Regional Office, NOAA Fisheries Service
263 13th Avenue South
St. Petersburg, Florida 33701-5505

RE: Public Comment on DEIS for the South Atlantic Fishery Management Council's Comprehensive Annual Catch Limits (ACLs) and Accountability Measures (AMs) Amendment (NOAA-NMFS-2011-0087)

Dear Dr. Crabtree,

On behalf of the Pew Environment Group's South Atlantic Fish Conservation Campaign, we are writing to offer comments on the Comprehensive Annual Catch Limit Amendment (Amendment) currently under review by the South Atlantic Fishery Management Council (Council) and the National Marine Fisheries Service (NMFS). The Comprehensive ACL Amendment makes significant improvements to the system of fishery management used by the South Atlantic Council.

In the 2006-2007 fishing year, only six species out of seventy-three in the snapper and grouper fishery management unit had catch limits, and none of these six fisheries were closed in-season when those limits were met[1]. In the 2012-2013 fishing year, twenty-four snapper and grouper species will have catch limits, and the commercial fisheries will be subject to in-season closure when they meet that limit. The Council has also carefully heeded the advice of its scientists, and incorporated their recommendation for a control rule for setting allowable biological catch (ABC). This Amendment, in conjunction with Amendment 17b, sets up several strong accountability measures for species undergoing overfishing, like paying back overages in the next fishing year. The Amendment also appropriately establishes species complexes so that vulnerable species within each grouping are not put at risk of overfishing. Finally, we are pleased to see that the ACL Amendment includes the use of annual catch targets (ACTs) to

[1] NMFS Stock Status Report to the South Atlantic Fishery Management Council, December, 2006. http://www.safmc.net/Portals/6/Meetings/Council/BriefingBook/Dec2006/NMFS%20Status.pdf

address the inability to constrain catch exactly to the limit in nearly every fishery in the region, although we are concerned that these ACTs as designed are ineffectual.

Though we recognize the substantial improvements in pro-actively managing fish populations in a way that should prevent overfishing that this Amendment represents, we do have serious concerns that weak accountability measures (AM) and the removal of species from management may both allow overfishing to continue in the future. Thus, we have two sets of recommended changes to the ACL Amendment before it is finalized: strengthening AMs, and further evaluating species removals.

Strengthen Accountability Measures

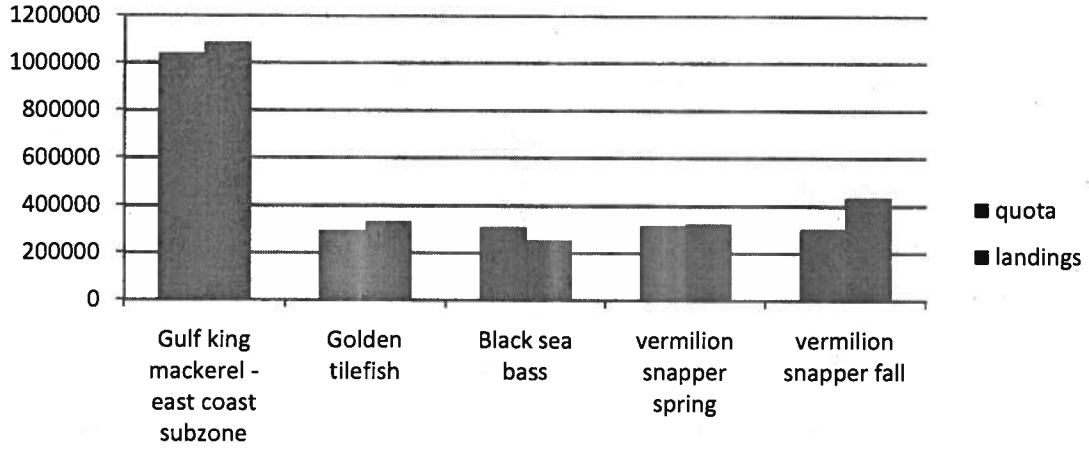
The actions proposed in the Amendment set appropriate science-based catch limits, but good catch limits are often not enough to ensure healthy, sustainable fisheries. The failed rebuilding plans for black sea bass are good examples of the importance of accountability measures. Black sea bass was found to be overfished and to be undergoing overfishing in 1991, and catch limits were set in order to achieve the necessary improvements in the status of the population by the end of the ten-year rebuilding plan. Even if the catch limits had been sufficient to recover the stock, they were routinely exceeded, and the rebuilding plan failed.

Ten years later, in 2001, the stock had not recovered and another rebuilding plan was developed and approved. The fishery routinely exceeded these catch limits as well. This year marks the midway point of yet a third attempt to rebuild the black sea bass population. Although we, and many others, hope that the stock assessment currently underway will find that the population has finally rebounded, it has been twenty years since the Council was first notified that the stock was in trouble. In 2010, for the first time in two decades of trying to rebuild this population, the black sea bass fishery closed two and a half months early when the limit was projected to have been exceeded. Catch limits are only effective if they truly limit mortality on the water, and this is the purpose of AMs.

Action 6 in the document deals with commercial AMs, and the current preferred AM for the commercial fishery is to limit the fishery to the recreational bag limit when the ACL is met.[2] Figure 1 below shows that in-season closures were not able to control commercial fisheries well in 2010, and most exceeded their quotas.

[2] Comprehensive ACL Amendment, South Atlantic Fishery Management Council, June, 2011 version. Page 51.

Figure 1



4 fisheries with a total of 5 quotas were closed in-season during the 2010 fishing year. This graph shows that there is management uncertainty associated with even these relatively well-controlled fisheries.

In Action 6, we recommend choosing Alternative 2c as the preferred alternative (which would set a commercial sector ACT), and adding language to the preferred alternative 3 that would give the NMFS authority to reduce trip limits when the ACT is projected to be met. This would help to keep the fishery within its limit, and could extend the season for commercial fishermen.

The AMs for the recreational fishery are more difficult, but are no less important, as it is difficult both to track recreational landings, and to hold the recreational fishery to its catch limit. In June, 2011, the Council devised a new AM system for recreational fisheries. In this system an overage in year one would trigger a possible in-season closure in year two. If there are overages in each of the first two years, then the third season would be shortened to ensure that the ACL is not reached. In order to see how recreational ACLs and AMs might play out, an example using catch data for a species where there were quotas in the past helps to visualize how the system will work. If we apply these rules hypothetically to the most recent rebuilding plan for black sea bass, and landings since 2006 (Figure 2), we can see how this system could allow large overages and chronic overfishing in the recreational fishery. In addition, the example shows the system to be overly complicated and not at all transparent to the public.

Figure 2 – Black Sea Bass Recreational Landings[3]

Fishing Year	Rec. Allocation (lbs.)	Rec. Catch (lbs.)	Rec. Overage (lbs.)	% Rec. Overage
2006/07	633,000	702,426	69,426	11%
2007/08	560,000	555,638	(4,362)	-1%
2008/09	409,000	440,992	31,992	8%
2009/10	409,000	486,722	77,722	19%

[3] NMFS report on black sea bass catches to SAFMC, June 2011.

2010/11	409,000	633,000[4]	224,000	54%

Figure 3 – Black Sea Bass Catch from the Marine Recreational Fishing Survey Statistics[5]

Year	Data Wave	Months in Wave	Catch (lbs.)	Total Catch in 2009-10 fishing year (lbs.)
2009	Wave 4	July – August	105,325	105,325
2009	Wave 5	September – October	35,479	140,804
2009	Wave 6	November – December	44,983	185,787
2010	Wave 1	January – February	63,801	249,588
2010	Wave 2	March – April	144,842	394,430
2010	Wave 3	May - June	165,740	560,170

In the black sea bass example, the recreational fishery has gone over its quota four of the last five years, by as much as twenty percent.[6] Although black sea bass is not addressed by this Amendment, the example is illustrative because the only recreational fisheries with any kind of quota in the past have been those in rebuilding plans.

- In year one (2006/07), an 11% overage has no immediate consequences, but would trigger monitoring in year two.
- In year two (2007/08), the recreational catch was 1% under the quota, so there are no AMs triggered.
- The clock now starts over, so in year three (2008/09) an 8% overage triggers monitoring in year four. If the fishery reaches its ACL in year four, the fishery should be closed.

In reality, this is not so straight forward. Figure 3 shows the recreational catch data in the fishing year 2009-2010 (year 4). The data is analyzed in 2-month "waves". Up through February of 2010, with four months left in the fishing year, the total catch was 249,588 pounds, well below the quota. March and April, 2010 (wave 2) information reveals that the total catch is 394,430 pounds, very close to the quota. It might be assumed that at this point the NMFS would prepare to close the recreational fishery. However, because there is a 45 – 60 day delay before the Wave 2 information is available, this information would not be available for use in management until after the fishing year ended, making an in-season closure impossible. Under the proposed system, with overages in years three and four, the season for year five would be shortened to ensure that the ACL is not exceeded once again. In the example here, however, a shortened season would likely not prevent the recreational fishery from exceeding its quota in year five, when the fishery appears to be more than fifty percent over its limit. The final result is that the fishery exceeded its limit in 4 out of 5 years, sometimes dramatically, under the proposed system of AMs that are the Council's current preferred alternatives in the Amendment.

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) states that councils must enact "implementing regulations, or annual specifications, at a level such that overfishing

[4] Value taken from NMFS online recreational landings database on 7/12/2011.
[5] Ibid
[6] http://www.safmc.net/LinkClick.aspx?fileticket=B2M%2b%2fYRfMlk%3d&tabid=666

does not occur in the fishery, including measures to ensure accountability."[7] Although it is difficult to know at what level overfishing "does not occur," NMFS has offered further guidance in its National Standard 1.

> "If catch exceeds the ACL for a given stock or stock complex more than once in the last four years, the system of ACLs and AMs should be re-evaluated, and modified if necessary, to improve its performance and effectiveness."[8]

Clearly, having overages in four out of five years is an inappropriate method of managing a fishery both because it is not consistent with the law, and because it is likely to allow overfishing to occur. **In order to remedy the AM system, we recommend that both the recreational and commercial ACTs have real management function.** The ACT could provide tangible management benefit in lengthening recreational seasons and in reducing the effect of data lags on the fishery if it were used to reduce effort as the fishery approaches its ACL. The new Alternative 5e added in June says:

> "*Monitor following year and reduce bag limit as necessary. If the ACL is exceeded, the following year's landings would be monitored for persistence in increased landings. The Regional Administrator will publish a notice to reduce the bag limit as necessary.*"

A change in the preceding Alternative 5e to read "ACT" instead of "ACL" would achieve the goals of the AM without allowing chronic overfishing to occur. In Action 7, we recommend that the Council choose 3b, 3c, or 3d as the preferred AM trigger (using annual landings or a running average or 3 or 5 years) and 5f as the preferred AM (shortening the following season). The multi-year averages represented in these options are discussed and recommended by NMFS in its National Standard 1 guidance:

> A "multiyear plan" as referenced in section 303(a)(15) of the Magnuson-Stevens Act is a plan that establishes harvest specifications or harvest guidelines for each year of a time period greater than 1 year. A multiyear plan must include a mechanism for specifying ACLs for each year with appropriate AMs to prevent overfishing and maintain an appropriate rate of rebuilding if the stock or stock complex is in a rebuilding plan. A multiyear plan must provide that, if an ACL is exceeded for a year, then AMs are triggered for the next year consistent with paragraph (g)(3) of this section. [9]

Accountability measures are critical to ending and preventing overfishing, and we believe that these recommended changes to the document will result in a much more effective management system capable of ensuring more vibrant and sustainable fisheries in the future.

Evaluating Species Removals

---

[7] 16 U.S.C. 1853 MSA § 303.109-479(15)
[8] 16 U.S.C. 1801 Section 600.310(g)(3)
[9] Ibid.

In addition to the strengthening of accountability measures, we also offer a recommendation regarding the removal of species from the fishery management units. NMFS' own guidance on MSA says that "As a default, all stocks in an FMP are considered to be 'in the fishery,' unless they are identified as EC species (see §600.310(d)(5)) through an FMP amendment process."[10] Thus far, the Council has rejected use of the EC species classification and is instead proposing the removal of 39 species from management. The guidance goes on to say that "a Council should monitor the catch resulting from a fishery on a regular basis to determine if the stocks and species are appropriately classified in the FMP. If the criteria previously used to classify a stock or species is no longer valid, the Council should reclassify it through an FMP amendment, which documents the rationale for the decision."[11]

The Council has chosen to use landings as its only formal criterion for removing species from the management unit. The landings level chosen by the Council is a fairly low 20,000 pounds, and most of these species were not being actively managed by the Council. However, we consider this to be an incomplete rationale for species removals. The Council itself used additional criteria for some species and not for others on an ad hoc basis. For instance, mutton snapper is not proposed for removal despite its low landings level because of landings trends and state management concerns. This is the right decision, and **we recommend that this more comprehensive look at each species' circumstances be extended to the rest of the management unit before they are removed from federal management and that these species be retained as ecosystem components until such an evaluation can be undertaken.** Important additional criteria include:

1. The co-occurrence with other targeted fish of the species in question
2. Misidentification of the species with other targeted fish
3. Bycatch concerns
4. Life history characteristics such as long lifespan, aggregate spawning and sequential hermaphroditism that make species especially vulnerable to fishing pressure
5. Ability of states to adequately manage those species with significant landings in their state waters
6. General ecosystem impacts of a species removal
7. Landings and effort trends over time that may indicate a growing or crashing fishery
8. Prior scientific status determinations (at least 8 species previously identified as probably overfished are proposed for removal)

The NMFS lists "developing science-based approaches to regional ecosystem-level management" as one of its highest priority in the South Atlantic region.[12] The Council has expressed a similar goal, and we believe that this goal is both desirable and necessary in order to sustainably manage ocean resources in the future. In addition to criteria for removals on a species by species basis, we are concerned that the large-scale removal of ecosystem component species is directly contrary to the expressed goals of both the regional Council and the NMFS.

---

[10] 16 U.S.C. 1801 Section 600.310(d)(1)
[11] 16 U.S.C. 1801 Section 600.310(d)(6)
[12] http://www.regions.noaa.gov/secar/pdfs/SECARRegionOverview_042407.pdf

Conclusion

Although the Council proposes to make significant advances in its fisheries management practices though this Amendment, we are concerned that it may not be sufficient to entirely end and prevent overfishing. We have recommended changes that can be made before final approval of the document that will significantly address the weaknesses in the Amendment, and that we do not believe would require further analysis or the drafting of a supplemental draft environmental impact statement, as they are either alternatives currently in the document or within the range of alternatives that the Council has already considered. We thank the NMFS and its staff for their hard work on this Amendment, and we look forward to continuing to work with you to ensure vibrant South Atlantic fisheries for the future.

Sincerely,

Sera Drevenak
Sr. Associate, Science and Policy Analyst
South Atlantic Fish Conservation Campaign
Pew Environment Group

Holly Binns
Director
Southeast Fish Conservation Campaigns
Pew Environment Group

NOAA Fisheries
South Atlantic Fisheries Management Council
July 31, 2011

Re: Generic Annual Catch Limit/Accountability Measures Amendment

To NOAA Fisheries and SAMFC Council:

The American Sportfishing Association is pleased to provide the following comments on the Generic Annual Catch Limit (ACL) and Accountability Measures (AM) amendment currently under development by the South Atlantic Fishery Management Council. As the sportfishing industry's trade association, the American Sportfishing Association (ASA) has been closely following and providing input to the Councils throughout the ACL/AM development process, which stands to have a significant impact on the thousands of saltwater recreational fishing-dependent businesses in the Southeast and the broader sportfishing community at large.

After review of the latest version of the amendment we offer the following comments. It remains our opinion that Generic ACL/AM Amendment is simply not viable as a management tool, particularly as related to the control rules. This document is virtually impossible to read and comprehend and there is no possible way that the industries and people being managed can comprehend the implications of enacting this amendment. More importantly the document still abrogates the socio-economic impacts of the proposed actions, having not included any methodology to include those factors. This, we believe, tests the Magnuson-Stevens Fishery Conservation and Management Act (MSA) mandates and less importantly does not follow the spirit of the National Standard 1 guidelines. Passage of this amendment with these rules would be a disservice to the fisheries management process.

General Comments

ASA believes the amendment contains the potential for numerous unintended consequences as a result of the network of complexity built into the control rules being developed in order to try to accommodate the interpretation of MSA in the National Standard 1 Guidelines. ASA wishes to remind the Council that that they are guidelines and in our view provide some misinterpretations of MSA and remain overly conservative. In essence the overfishing level is a precautionary number, then the acceptable biological catch precautionary to overfishing level, then the annual catch limit is precautionary to the acceptable biological catch and finally the annual catch target is then set precautionary to the annual catch limit. This approach, with all of the various iterations and interactions, is simply not understandable to the lay fisher and thus doomed to conflict and poor implementation.

Another general view ASA has on this amendment is very well expressed in Action 1 where as many species are proposed to be removed from federal management. This is being done because of the difficultly in providing an ACL and includes a discussion on the savings to the fishery management process by not having to include these species. ASA can only conclude that if

AMERICAN SPORTFISHING ASSOCIATION
225 Reinekers Lane, Suite 420, Alexandria, VA 22314 • 703-519-9691 • Fax: 703-519-1872
Web: www.asafishing.org • E-mail: info@asafishing.org

Councils are forced to develop "work around" solutions to developing ACLs, then it is abundantly clear that the MSA is flawed and must be modified as opposed to just finding a way to get around the challenge.

We also observe that even though socio-economic information in the amendment is voluminous within the document there is no serious attempt to include economics and absolutely no guidelines or prescriptions on how and when it will be used in the decision making process. This is contrasted by an overly quantitative approach to setting ACLs and ACTs. Further we could not find in the volumes of often rote economic and social information any kind of summary that makes any sense for the lay reader. We ask that the Council specifically summarize the economic and social impacts of this amendment somewhere in this document. We contend that the lack of treatment in this amendment of socio-economics is a serious flaw and fails to meet MSA intent.

We also observe that it does not appear that the issue of allocation is well thought out, defined and implemented as part of this amendment. Use of landings as the method of allocation is not longer an acceptable approach. We believe that allocations based on new approaches suggested by NOAA must be an addition to all ACL developments.

We are very concerned on the approach taken for dolphin and wahoo. Although the Council Actions appear on the surface to be using an approach to best benefit the fishers it is really a set up for potential disaster economically if AMs are enacted. This is particularly disturbing to the industry when it is clear that there is no data to suggest MSY is being exceeded or even approached. It will be very easy for the recreational sector to exceed the values being set in the preferred alternatives especially given the fact that shifting fishing effort is extremely likely to occur due to MSA enactment.

And finally we remain very concerned that this amendment and others with ACLs continue to be passed with the knowledge that new assessment values for most species and complexes will be made available in the near future. To move forward on ACL determinations with the knowledge that time and effort will have to be re-spent on the same species and complexes in the very near-term is the type of bureaucracy failure that this country is so concerned about in these tough economic times.

Action 1
ASA supports any species removal that will result in state management of that species or another federal fisheries management council. We do not support removal of species when another entity has not agreed to take over full management. We are not supportive of removing species from management plans as a work around to MSA and thus we propose that Council declare that data are so poor for many species that the requirements of MSA cannot be met and take no action. Then take additional time, data, and deliberation to develop a better data collection and analysis effort to manage these species under MSA.

Action 2
ASA does not support the preferred alternative and believe the council should consider lane snapper, grey snapper and rock hind and white grunt as individual species.

Action 3
ASA recognizes that this Action provides the Council with a more defined role is setting ABCs based on risk and other factors. We believe the high end of risk should be 50% as opposed to 45% in all alternatives. We continue to ask that the Council retain as much discretionary decision making as possible. With that said ASA feels that the MSA did not contemplate managed species having inadequate data and we recommend that the Council delay any actions on data poor species unless there is compelling information for rule making. We would like to see the Council do this in spite of the deadlines found in MSA and have a much more deliberate and informed process than has been accomplished to date.

Action 4
ASA does not support any alternative that divides the recreational sector. We remain disappointed that the SAFMC allocation process remains tied to only landings even when NOAA has provided guidance to broaden the scope of the allocation process. We request that alternatives in this action be given a deadline for revisiting allocations rather than what appears to be rules that give the Council no timeframe for revisiting allocations. This would leave the fishermen with no commitment by the Council to adjust allocations and past and current history would suggest that this means allocations will not be changed even when needed.

Action 5
Alternative 2 is the better of the proposed alternatives. We believe that ABC and ACT should be equal and do not support any overly conservative approach that will further harm the industry and fishers when it has not proven necessary. We continue to have an overall concern that the enactment of rules for ABC and ACT remain too complex and cannot support this action.

Action 7
Any selected alternative should use a multi-year average for determining overages that may trigger an AM and should minimize short-term economic impact.

Action 13
ASA continues to oppose setting sector allocations that are based solely on landings and do not take into account the economic factors associated with the industries.

Action 18
For dolphin, which will have no OFL and thus a cascading lack of data to make sound decisions, and with no indications of problems in the fishery ASA cannot support an action that simply uses landings to determine an ABC or ACL or ACT. This action should set an ABC above current landings to insure that AMs are not enacted under any condition until data with an acceptable confidence levels are available to set a true ABC.

Action 19
ASA does not support any alternative that separates the recreational sector to create a for hire sector. We remain concerned for all allocations that economics are not part of the allocation process.

Action 20
Again for a species that has no OFL and an estimated MSY of between 14.1 and 34.9 million pounds to set an ABC, ACL, OY or ACT below the lower estimate of MSY is simply not justified. We do not consider this to be sound scientific decision making and it remain too conservative even for guesswork. We ask the Council to re-evaluate this Action and set justifiably higher limits before considering AMs.

Action 22
We believe that this remains part of a process that is fundamentally too conservative and thus any AMs based on this process would likely result in direct and serious impacts to the recreational industry and economics of recreational fishing.

Action 23
ASA supports Alternative 2

Action 24-29
Please refer to comments on dolphin as they remain the same for Wahoo.

Conclusion
ASA supports good fisheries management and is highly concerned that this ACL/AM amendment as drafted will not achieve that result. The generic amendment is over-complex, nearly impossible to fully comprehend and will not be understood nor appreciated by the industry or fishers. Poor understanding and complexity lead to poor compliance and acceptance. Unfortunately the burden placed on the Council by Congress and NOAA is leading to a staff driven document that simply will be a policy nightmare of ill will and unnecessary regulation. While we understand that the Council feels obligated under MSA to pass this amendment we philosophically and practically feel is mistake to procede on its current path given the likely consequences and negative impacts to the recreational fishing community.

Thank you for your consideration.

Sincerely,

Kenneth Haddad
Marine Fisheries Advisor

Cc: Gulf of Mexico Fishery Management

PUBLIC SUBMISSION

As of: August 01, 2011
Received: June 25, 2011
Status: Pending_Post
Tracking No. 80eb3748
Comments Due: August 01, 2011
Submission Type: Web

Docket: NOAA-NMFS-2011-0087
Comprehensive Annual Catch Limit (ACL) Amendment for the South Atlantic Region.

Comment On: NOAA-NMFS-2011-0087-0018
Notice of Availability of DEIS

Document: NOAA-NMFS-2011-0087-DRAFT-0021
Comment from Robert Kinchen

Submitter Information

Name: Robert Lee Kinchen
Address:
134 NW Curry St.
Port Saint Lucie, Florida, 34983
Email: bert_K@comcast.net
Phone: 772-323-9945
Organization: Self

General Comment

The best way to stop "Over Fishing" in the South Atlantic region is to open season on the North Atlantic Vacumme Cleaner AKA (Golith Grouper/Jew Fish). I realize that the data ya'll are going by is well over three years old. These fish move from reef to reef cleaning them out, yet you insist that it is the Human population that is doing the damage. I don't think it is. The second week of June I was off the Fort pierce Inlet. I had a nice fish on, then I was dragged to the bottom and my line broke off. I knew what happened. A Golith Grouper stole my fish. I was useing 60 lb. test and it snapped like a twig.