South Atlantic Fishery Management Council
Scientific and Statistical Committee Meeting Report
April 20 – 22, 2010
Hilton Garden
North Charleston, SC 29405

Synopsis:
The primary focus of this meeting was to provide fishing level recommendations (primarily ABC) for inclusion in the Council's Comprehensive ACL Amendment and several other FMPs that include MSRA actions. The Committee also considered recent stock assessments of black and red grouper.

1. Introduction

Actions
Introductions
Adopt agenda
Approve minutes

1.1. Approval of Agenda

Agenda was approved with one minor addition to discuss appointments that still needed to be filled for Goliath grouper and spiny lobster SEDAR workshops and reviews.

1.2. Approval of December 2009 Minutes

December 2009 meeting minutes were approved.

2. Nomination of SSC Candidates

Overview
The Council will consider SSC applicants in June 2010. The SSC is invited to submit candidates for consideration. Staff will provide application information to any individuals nominated by the SSC, and those making suggestions are asked to inform the nominees that they were nominated. The SSC should consider expertise required on the committee when making nominations.

Actions
Nominate SSC candidates

Jason Murray, University of South Carolina – recommended by Marcel Reichert
George Sugihara from the University of California – recommended by Yan Jiao

3. Update on 2010 National SSC Workshop

Overview
The SAFMC is hosting the 2010 National SSC Workshop. It will be held at the Charleston Marriott, October 18 – 22, 2010. The SAFMC SSC chair is expected to chair the National Workshop.

Expected topics include: SSC progress report on ABC control rule implementation; update on NS2 guidelines; update on the data poor subcommittee; assessment peer review processes; developing fishing level recommendations, data poor approaches, and defaults when no recommendations are provided by the SSC. Committee members are asked for feedback on topics of interest and critical questions.

The standard delegation is 3 SSC members (Chair, vice-Chair, and 1 other) and 1 staff. Given the location, there is a possibility that the Council will provide travel expenses for other individuals who may be interested in attending.

Actions
Recommend 2010 National SSC representation.
Recommend topics or questions for discussion at the National Workshop.

The Coordinating Committee hopes to have a final agenda near the end of next month, so that it could be considered at the Chairs meeting or at least give them a report on it as well at the Council Chairs, which will meet in May. Then we will be contacting the councils about deciding who is going to participate. The normal plan is that we ask for three SSC members from each council, the chair, the vice-chair and one other. John is hoping for more participation from our SSC as our region is sponsoring this event. The council covers three people but can appoint more if they care to do so. The current SSC chair (Carolyn Belcher) will act as chair for this meeting.

An additional point of information is the SSC member exchange that had been discussed at last year's national meeting. The general idea was to send SSC members to other SSCs during their actual meetings to see how they function and interact with each other. To date, none of the SSCs have made much progress with this. Each council is supposed to be submitting their SSC meeting information to Dave Witherell out at the North Pacific and he is going to post them on to the council's website. All the councils have a combined website which has links to the National SSC reports and other national level documents that affect all the SSCs. There is going to be a listing there of the SSC meetings for all the SSCs around the country. If anyone is interested and has some time that may allow them to attend another SSCs meeting, check with this website. John will send the link to folks in the near future. John also indicated it would be a good idea if someone could go prior to our meeting in October.

Luiz Barbieri and Carolyn Belcher will attend as vice-chair and chair. A third person has not been identified. No topics or questions for discussion at the National Workshop were brought up.

4. Election of Chair and Vice-Chair; Representatives to Spiny Lobster and Goliath Grouper SEDAR workshops

Overview
The Committee elects a chair and vice-chair bi-annually, typically at its June meeting. Chair Belcher and vice-Chair Barbieri were elected in June 2008. Elections were held at this

meeting since a meeting was not expected in the summer of 2010. SSC representation at spiny lobster and goliath grouper SEDAR workshops was lacking at the time of this meeting. Members were asked to participate.

Actions
Elect Chair and vice-Chair.
Determine participants for both spiny lobster and goliath grouper SEDAR workshops

4.1. Election of Chair and Vice-Chair

Carolyn Belcher will continue on as Chair
Luiz Barbieri will continue on as Vice-Chair

4.2. Representatives to Spiny Lobster and Goliath Grouper SEDAR Workshops

Luiz Barbieri – Chair for goliath grouper and reviewer for spiny lobster
Matt Cieri – Review workshop for goliath grouper and spiny lobster
Carolyn Belcher - Review workshop for goliath grouper and spiny lobster
Ann Lange – Webinars and one face-to-face workshop for the spiny lobster assessment workshop
Sherry Larkin – Webinars for spiny lobster assessment

5. ABC Recommendations I (Refer to Table 1)

Overview
The SSC-recommended control rule that was developed in March 2009 used finfish as example stocks. However, the Council also manages a number of other types of organisms, including shellfish, corals, and sargassum. The Committee is asked to recommend ABCs for these managed stocks. The Committee may choose to adapt the current SSC ABC control rule to these FMPs or to develop alternative approaches.

The Committee should consider ABC control rule alternatives under consideration by the Council when making recommendations to provide a range of ABC values. ABC values will be included in the Council's Comprehensive ACL Amendment, which will amend numerous Council FMPs.

ABC Control Rule Options and Background
This is a critical subject that will be considered throughout the SSC deliberations of ABCs during much of this meeting. Therefore, some background and summarization of recent events is provided here.

According to the NS1 guidelines, the Council shall specify a process for developing ABC. This includes establishing an ABC control based on input from the SSC. So far, the SAFMC SSC has developed an ABC control rule and presented the SSC recommended control rule to the Council. In March 2010 the Council considered the SSC control rule and directed that staff develop a list

of alternative control rules for consideration in the Comprehensive ACL Amendment. This process is described in the following NS1 excerpt:
(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.

Timeline for the Comprehensive ACL Amendment:
A. Scoping – January/February 2009.
B. Review scoping comments and options – March & June 2009. Includes SSC Review: June & December 2009, April 2010.
C. Approve for public hearings - December 2010.

D. Public hearings – January/February 2011.
E. Review all comments and approve all actions – March 2011.
F. Review complete document and approve for formal review by Secretary of Commerce - June 2011.
G. Send to Secretary of Commerce for formal review – June 2011.

SHRIMP
Advice varies as to whether shrimp are required to have ABCs. At this time, shrimp ABC and an ABC control rule is included as an action in the Comprehensive ACL Options Paper. Stock status criteria for shrimp stocks were provided. The MSRA includes an exception to specifying ACL for species that live 1 year or less, but according to the following text from the Federal Register notice of the NS 1 Guidelines, ABC and other fishing level recommendations are required:

"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 cannot 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."
And, "The MSRA provides two statutory exceptions to the ACL and AM requirements under MSA section 303(a)(15) (see MSRA section 104(b) (adding two exceptions under a MSA section 303 note); see also § 600.310(h)(2) of this proposed action). First, MSA section 303(a)(15) "shall not apply to a fishery for species that have a life cycle of approximately 1 year unless the Secretary has determined the fishery is subject to overfishing of that species" (see MSRA section 104(b)(2)).

NMFS interprets "fishery for species" to be a stock. In addition, NMFS interprets "a life cycle of approximately 1 year" to mean that 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 stocks that qualify for the 1-year life cycle exception would not need to have ACLs and AMs, such stocks should still have SDC, MSY, OY, ABC, and an ABC control rule."

The NS1 guidelines also specify that the Council will need to "propose alternative approaches to satisfying the NS1 requirements" if it choose to deviate from the standard approaches for specifying reference points and management criteria, based on circumstances such as unusual life history characteristics.

GOLDEN CRAB
Golden crab ABC is currently included in Golden Crab Amendment 5, but may shift to the Comprehensive ACL Amendment. The Golden Crab amendment includes landings and effort information for 1995 to 2007. The following ABC alternatives are also included:

ACTION 3. Establish an Allowable Biological Catch (ABC) for the Golden Crab Fishery of the South Atlantic region.
Alternative 1. No action (THERE IS NO ABC SPECIFIED FOR GOLDEN CRAB)

Alternative 2. ABC = 2 MILLION POUNDS
Alternative 3. ABC = 1.5 MILLION POUNDS
Alternative 4. RECOMMENDATION FROM THE SSC.
Alternative 5. ABC = 4.0-4.5 MILLION POUNDS

CORAL
Landings and fishery information for gorgonians were provided in summary form. Most, if not all, landings are taken from state waters and records are held by the State of Florida. Coral ABC will be addressed in CEBA II.

SARGASSUM
The SAFMC Sargassum FMP was approved in November 2002. Actions include:

ACTION 1. Establish 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.

ACTION 2. Maximum Sustainable Yield (MSY) for South Atlantic pelagic Sargassum is estimated to be 100,000 metric tons (220,460,000 pounds) wet weight per year.

ACTION 3**.** Specify Optimum Yield (OY) for pelagic Sargassum as 5,000 pounds wet weight per year.

ACTION 4. Specify Overfishing Level to meet Magnuson-Stevens Act Mandate for pelagic Sargassum. Overfishing is defined as the rate of harvest, which compromises the stock's ability to produce MSY. The Maximum Fishing Mortality Threshold (MFMT) is 9.0 to 18.0 units per year. The Minimum Stock Size Threshold (MSST) is 25,000 metric tons (55,115,000 pounds).

Actions
Recommend ABC control rules and ABC values for these stocks.

Questions and concerns were expressed about the Council's request for options for selecting an ABC control rule. Concern was expressed about giving the Council a range of ABC values from which they would select values as it seems to circumvent the role currently identified in the MSRA for the SSC in setting the ABC. An additional concern was that multiple rules would be used across species and that lack of consistency could lead to issues when buffers vary by large amounts. It was recognized that an additional approach would be needed to develop a control rule for data poor stocks.

Some members of the SSC felt that the use of the one-size-fits-all control rule for setting ABC levels for data-poor stocks is perhaps overly prescriptive and, in the case of octocorals and golden crab, overly cautious. Each data poor stock differs in the type and quality of data that are available upon which to judge projected stock trends under different catch scenarios.

Usually, the only data available are trends in catch and stock biomass. Instead, ABCs for data poor stocks should be set based on expert judgment given best available scientific information, and not a generic control rule, especially if an OFL cannot be determined. Neither the octocorals nor the golden crab fisheries appear to be endangering the stocks; catches have been relatively stable and at low levels compared to the information available on overall stock sizes. If an OFL must be chosen for these stocks, then it should be the highest catch during the selected time period, as opposed to the median catch for that period. An OFL set at the median catch level implies that overfishing has been occurring in 50% of the years contained within the selected time period. A potential alternative discussed for the ABCs for octocorals and golden crab was the average of the three most recent years of catch.

5.1. Shrimp FMP

OFL: maximum annual landings over the time period of (1990-2000) for each of the species White 23, 691,923 lbs. Brown 10,908,183 lbs. Pink 2,691,072 lbs. Rock lbs. ABC: OFL (The SSC agreed to change their ABC control rule to say that ABC can be equal to OFL when you have an annual crop that is environmentally driven such as shrimp.)

5.2. Golden Crab FMP

OFL: median of 1997 – 2007 landings (518,316 lbs.) ABC: ABC criteria scoring -> 15+15+10+25=65% of OFL (336,905 lbs.) Values are based on the median of landings from 1997 – 2007 landings

5.3. Coral FMP

Myra Brouwer gave a short presentation on the current coral FMP and characteristics of that fishery. Discussion focused on the lack of fishery-independent data and concern that the landings may not provide the best information on stability for corals since multiple species are captured but not identified to that level. Additional difficulties with setting an ABC for corals included the fact that corals also act as EFH and are considered HAPC. Focus was applied to

OFL: median of 33,755 colonies caught in South Atlantic (only) state and federal waters combined (2000 – 2009)
OFL: median of 4,970 colonies caught in South Atlantic federal waters only (2000 – 2009). This is based on landings from the EEZ.
ABC: 35% of OFL

The SSC is directing the Council to select one or the other OFL. Once the Council has made its decision, then ABC will be equal to 35% of the selected OFL.

5.4. Sargassum FMP

OFL: 0
ABC: 0

If the Council wishes to allow harvest in the future, the Council should approach the SSC to re-establish the ABC. Until such time the ABC will remain 0.

6. Assessment Reports

Overview
Assessments for South Atlantic and Gulf of Mexico black grouper and South Atlantic red grouper were developed through SEDAR 19. The SSC was asked to review these assessments to develop fishing level recommendations and ensure uncertainty in the findings is adequately represented and described.

Actions
Provide fishing level recommendations for black and red grouper

6.1. SEDAR 19, Southeastern United States Black Grouper

Assessment discussions

Dr. Bob Muller (Florida Fish and Wildlife Commission, FWRI) presented the SEDAR 19 bla ck grouper assessment. The stock was found to be not overfished in 2008 ($SSB_{2008}/SSB_{30\%SPR}$ = 1.40) or undergoing overfishing ($F_{current}/MFMT = 0.50$, with the current F represented by the geometric mean for the period 2006–2008).

The SSC discussed different aspects of the assessment. Discussion topics included the use of a constant catchability coefficient, estimating dome-shaped selectivity in the largest fishery, potentially biased high M value, and lack of sex-specific information. These concerns are described below.

The assumption of constant catchability is a concern because in reef fisheries in the southeast it is well known that catchability has likely increased with improved fish finding technologies. Assuming constant catchability when catchability may have been increasing can result in higher population size estimates, which in turn may portray an overly optimistic estimate of the stock status.

Selectivities estimated within an assessment model can be biased; specifically, when larger fish drop out of the catch, the model can explain this either by increasing fishing mortality or lowered selectivity. Here, the model fit used a dome-shaped selectivity, which, if not true, results in a negatively-biased fishing mortality rate.

Model results were highly sensitive to natural mortality input values; a lower M value than the one used in the assessment could be justified given the catch curve results.

SSB was not sex-specific, and biomass of larger males may not be good predictor of recruitment.

Many of these concerns can cause a negative bias in F estimates (i.e., biased on the low side) and a positive bias in biomass estimates (i.e., biased towards higher estimates). This led to concerns that the assessment was potentially "overly optimistic".

Despite these discussions the SSC consensus was to accept the black grouper assessment. The SSC accepted the biological reference point values in Table 1 of the assessment summary and proceeded to make ABC recommendations.

<u>ABC discussions</u>

The use of $F_{30\%}$ as a proxy for F_{MSY} was intensely discussed. However, the SSC decided to keep $F_{30\%}$ as the F_{MSY} proxy since this was the proxy accepted by the SEDAR 19 Review Panel.

ABC was determined by applying the ABC control rule. A P of 0.325 was determined based on the following scoring: Dimension I = tier 2 (-2.5%), Dimension II = tier 3 (-5%), Dimension III – tier 1 (0%), Dimension IV = tier 3 (-10%).*

The original assessment projections were not influenced by different P values. This was due to relatively low variability in input parameters but, more importantly, a result of how projections were modeled.*

Discussion ensued about whether to use data poor (i.e., landings trends) approaches instead of data adequate approaches (e.g., P) given these concerns with projections, the F_{MSY} proxy, and the cumulative optimism. The SSC recommended that additional P* projections be performed with the following modifications:*

(1) SD = 0.5 for recruitment (0.5 recommended based on findings from Rick Deriso); and

(2) applying the variability in the MCMC F_{msy} values to $F_{30\%SPR}$ (recommendation from Kyle Shertzer)

<u>Additional P discussions and changes to tier rankings</u>*

Discussion on the appropriate P value was revisited given continued concern with the "cumulative optimism" in the assessment. Specifically, the tiers within dimensions II and III were discussed. With changes in input values that reduce cumulative optimism the output is closer to benchmark values. This was used as an argument to move to tier 2 within dimension III. There was additional discussion on the most appropriate tier within Dimension II (uncertainty characterization); the SSC concluded that the tier for this dimension should be changed from a 3 to a 4 given insufficient characterization of uncertainty. The new P* value was based on the following scoring: Dimension I = tier 2 (-2.5%), Dimension II = tier 4 (-7.5%), Dimension III – tier 2 (-2.5%), Dimension IV = tier 3 (-10%). P* = 0.275*

Additionally, the SSC concluded that the language in their ABC control rule document should be changed for Dimension II, tier 4. The word "lacking" should be changed to "insufficient".

Discussion of revised black grouper projections

Bob Muller provided the SSC with updated projections. The SSC pointed out a minor technical issue with the new projections: the new runs were supposed to be done using a SD of 0.5 and Bob used a CV of 0.5. It was concluded that this would not change results too much so there was no need to re-do the analyses (in log space a CV of 0.5 would give a SD of 0.47).

There was discussion about whether or not to provide the Council with a single year recommendation for 2011, and then revisit to see landings, or to provide projections to 2020. It was determined that the projection should be provided so the Council could see where the population was headed, with the caveat that the SSC reserves the right to revisit ABC recommendations annually. The final SSC recommendation was to move forward with an ABC for 2011 using a P = 0.275.*

After acceptance of ABC values, discussions regarding "cumulative optimism" were revisited. The committee recalled that attempts were made to handle both optimism and uncertainty by adjusting the P value. However, it was pointed out that small adjustments in P* will have little effect if the P*-based projections since they do not capture all of the assessment uncertainty.*

Table 2. Summary of stock status determination criteria for black grouper.

Criteria	Recommended Values from SEDAR 19	
	Definition	Value
M (Instantaneous natural mortality; per year)	Average of Lorenzen M (if used)	0.136
F_{2008} (per year)	Fishing mortality in 2008	0.108
$F_{current}$ (per year)	Geometric mean of the directed fishing mortality rates on fully selected ages from 2006 - 2008	0.096
F_{MSY} proxy (per year; if used)	$F_{30\%SPR}$	0.216
SSB_{2008} (million pounds)	Spawning stock biomass in 2008	8.29
$SSB_{MSY\ (or\ proxy)}$ (million pounds)	$SSB_{F30\%SPR}$	5.92
MSST (million pounds)	(1-M)*$SSB_{F30\%SPR}$	5.12
MFMT (per year)	$F_{30\%SPR}$	0.216
MSY (million pounds)	Yield at 30%SPR	0.520
OY (million pounds in 2011)	Yield at F_{OY}	OY (65% F_{30SPR})= 0.461 OY (75% F_{30SPR})= 0.530 OY (85% F_{30SPR})= 0.596
F_{OY} (per year)	F_{OY} = 65%,75%, 85% $F_{F30\%SPR}$	65% F_{30SPR}= 0.141 75% F_{30SPR}= 0.162 85% F_{30SPR}= 0.185
Biomass Status	$SSB_{2008}/SSB_{F30\%SPR}$	1.40
Exploitation Status	$F_{current}$/MFMT	0.50

***All weights are whole weight in pounds.

6.2. SEDAR 19, South Atlantic Red Grouper

Dr. Kyle Shertzer (NMFS-SEFSC, Beaufort Laboratory) gave a presentation summarizing South Atlantic red grouper assessment results. The stock was found to be overfished ($SSB_{2008}/MSST$ = 0.92) and overfishing occurring (F/F_{MSY} = 1.35, with the current F represented by the geometric mean for the period 2006–2008). Estimated time series of stock status ($SSB_{2008}/MSST$) showed declining biomass until the mid-1980s, and then steady increase since, but with a decrease in the terminal assessment year (2008). The estimated time series of F/F_{MSY} suggests that overfishing has been occurring throughout the assessment period. The F/F_{MSY} series peaked during the 1980s, decreased to its lowest levels during 1991-2005, but has been increasing ever since.

The SSC discussed different aspects of the assessment. The issue of whether red grouper's discontinuous distribution between North Carolina and south Florida indicates a two-stock structure was identified as a significant source of uncertainty. The SSC recommends a possible two-stock scenario be considered for the next assessment. Other relevant uncertainties discussed: 1) catchability (constant vs. time-varying), 2) release mortality (all sectors), and 3) the magnitude and composition of early catches. Additional questions and discussion points included: 1) differences in model structure between the Beaufort Assessment Model (base model used for this assessment) and Stock Synthesis 3, 2) differences on how uncertainties were treated in the mixed Monte Carlo and bootstrap approach (MCB) versus in projections, and 3) the fact that assessment results suggest $F_{30\%}$ may represent an appropriate proxy for F_{MSY} for South Atlantic red grouper (F_{MSY} = 0.221; $F_{30\%}$ = 0.189; $F_{40\%}$ = 0.127).

By consensus the SSC accepted the red grouper assessment. Since the stock was found to be overfished ABC was determined by applying the ABC control rule for rebuilding stocks, i.e., probability of rebuilding equals (100% - P). The P* value for this assessment was 30%, so ABC is the projected yield stream with a 70% probability of rebuilding success.*

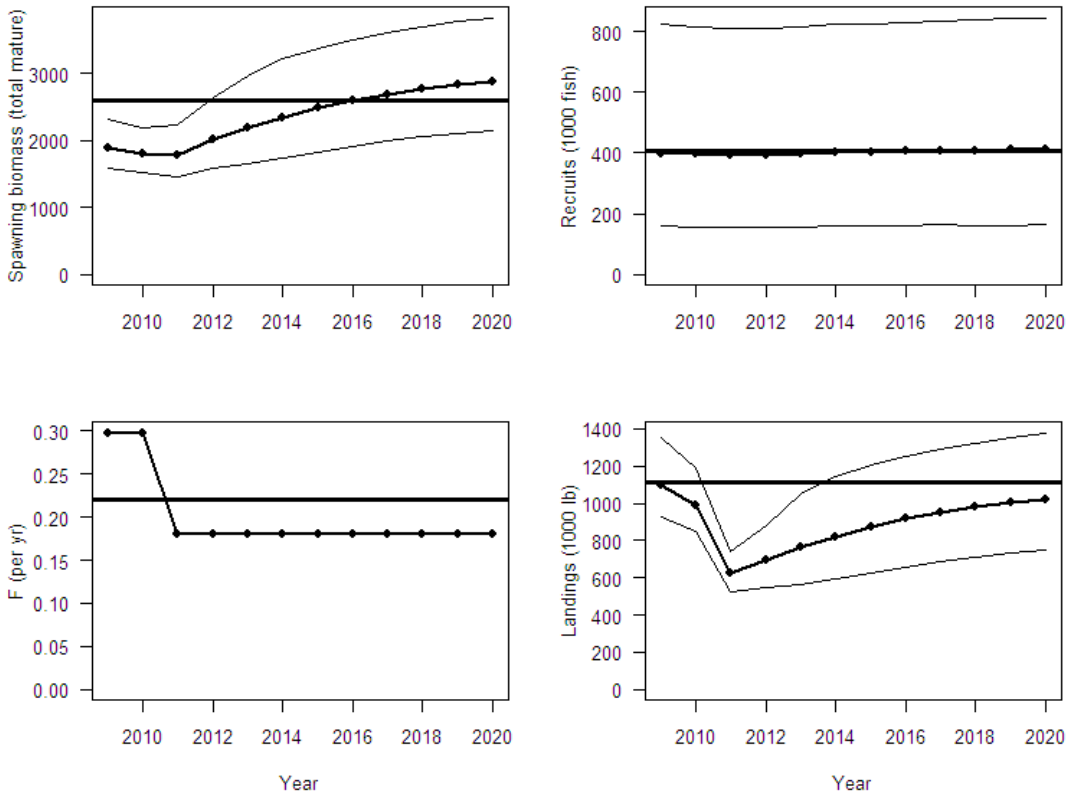
Table 3. Summary of stock status determination criteria for red grouper.

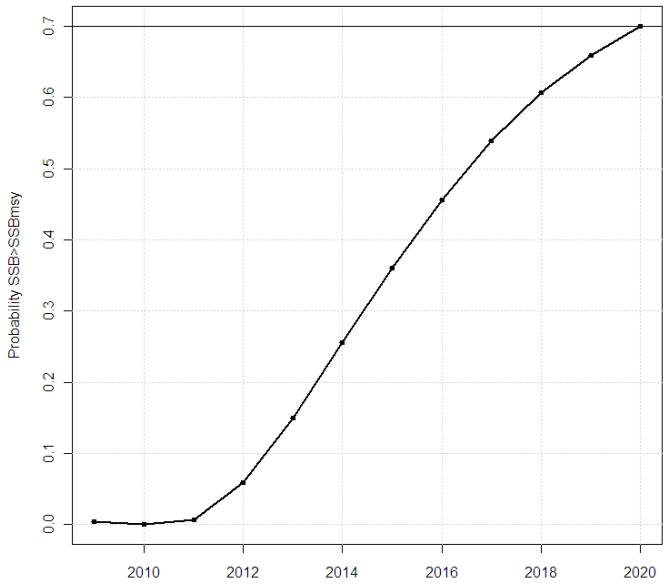
Quantity	Units	Estimate	SE
F_{MSY}	y^{-1}	0.221	0.030
$85\%F_{MSY}$	y^{-1}	0.188	0.026
$75\%F_{MSY}$	y^{-1}	0.166	0.023
$65\%F_{MSY}$	y^{-1}	0.144	0.020
$F_{30\%}$	y^{-1}	0.189	0.029
$F_{40\%}$	y^{-1}	0.127	0.019
$F_{50\%}$	y^{-1}	0.088	0.012
B_{MSY}	mt	3680	569
SSB_{MSY}	mt	2592	519
MSST	mt	2229	487
MSY	1000 lb	1110	102
D_{MSY}	1000 fish	27	8
R_{MSY}	1000 age-1 fish	407	58
Y at $85\%F_{MSY}$	1000 lb	1103	101
Y at $75\%F_{MSY}$	1000 lb	1089	99
Y at $65\%F_{MSY}$	1000 lb	1064	96
F_{2008}/F_{MSY}	—	1.35	0.26
$SSB_{2008}/MSST$	—	0.92	0.25

Projection results under scenario with fishing mortality rate fixed at F=Frebuild, to achieve 0.7 probability of rebuilding in 2020.

Year	F(per yr)	Pr(SSB>SS	SSB(mt)	R(1000)	D(1000)	D(klb)	L(1000)	L(klb)	Sum L(klb)
2009	0.298	0	1888.74	399	32	61	107	1098	1098
2010	0.298	0	1800.36	396	35	70	94	985	2083
2011	0.181	0.01	1783.42	394	21	43	62	622	2705
2012	0.181	0.06	2015.42	394	21	44	70	693	3398
2013	0.181	0.15	2188.42	399	22	44	77	762	4160
2014	0.181	0.26	2343.64	402	22	44	82	822	4982
2015	0.181	0.36	2477.94	404	22	45	86	873	5855
2016	0.181	0.46	2592.02	406	22	45	89	915	6770
2017	0.181	0.54	2686.78	407	22	45	91	951	7721
2018	0.181	0.61	2764.29	408	22	45	93	980	8701
2019	0.181	0.66	2827.41	409	22	46	95	1004	9705
2020	0.181	0.7	2878.51	410	22	46	96	1023	10728

F = fishing mortality rate (per year), Pr(SSB>SSBmsy) = proportion of stochastic projection replicates exceeding SSBmsy,
SSB = spawning stock (mt), R = recruits (1000 age-1 fish),
D = discard mortalities (1000 fish or 1000 lb whole-fish weight),
L = landings (1000 fish or 1000 lb whole-fish weight),
Sum L = cumulative landings (1000 lb).
For reference, estimated benchmarks are Fmsy=0.22 (per yr), SSBmsy=2592 (mt), and MSY=1110 (1000 lb).
Expected values presented are from deterministic projections (klb=1000 lb).





7. ABC Recommendations II (Values summarized in Table 1)

Overview

The SSC is asked to provide ABC recommendations for remaining stocks in the Snapper-Grouper FMP. Many of these stocks have not been assessed so the Committee will first need to develop a yield-based OFL and then determine how to determine ABC from OFL. The Council is considering several alternative ABC control rules, some of which will not be applicable for unassessed stocks for which only landings are available.

Included in the alternatives is the control rule recommended by the SSC. The Committee briefly discussed application of the control rule to data poor stocks in December but did not develop any firm recommendations. Staff built on these discussions to develop example buffer values for managed stocks. One critical decision that remains is to determine how the control rule-derived buffer value will be used to adjust OFL to provide ABC.

OFL

The Council requested, on behalf of the SSC, that the SEFSC provide OFL estimates for all stocks managed by the South Atlantic Council. The SEFSC was not able to fulfill this request in its entirety, and advised that the SSC consider average landings for determining OFL. Staff compiled a landings time series from which alternative averages can be considered for OFL and landings trends can be evaluated, and to which the DCAC approach is applied. For the landings evaluation, data available to SAFMC staff from MRIP, the ALS, and the headboat program are included for 1986 to 2007, based on data compiled during 2009. It is anticipated that this time series will be useful for evaluating trends and comparing general, ad-hoc approaches to assessment estimates. However, it is acknowledged that more recent data are available, and may be considered when the SSC makes its final recommendations to ensure consistency with subsequent Council actions on other criteria. Efforts were made to obtain a more up to date time

series. However, recent data files provided by SEFSC, including additional years at both ends of the time series, were not included in these analyses due to delayed submission and ongoing difficulties in determining confidentiality, variable definitions, and the appropriate approaches for separating landings into Gulf and Atlantic components. Moreover, it is now known that the SERO developed a database approved by SEFSC to use in evaluating ACLs, ACTs, and AMs. Staff recently requested average landings from this dataset for consideration in making ABC recommendations, which, if obtained, will help ensure consistency in data used throughout the process. Results will be provided at the meeting if possible.

ABC Approaches

Several alternatives for deriving ABC from OFL are explored. These include the "DCAC" approach by MacCall, a range of flat rate adjustments from ABC tied to a landings level or yield from a pre-determined reference point as described in the current Council Options Paper, application of the ABC control rule and its buffer values based on various criteria, and the "Cooper approach" a method developed by Dr. Andy Cooper during the January conference call.

Council staff applied the DCAC approach to South Atlantic stocks and presented a worksheet that can be used to explore alternative assumptions. The DCAC method of MacCall requires average landings, estimates of M, and two scalar parameters, one that reflects the reduction in biomass over time and another that reflects the relation between M and Fmsy. The general approach applied for this exercise was to fix the Fmsy scalar at 1, which in practice assumes Fmsy=M for those stocks for which an M estimate is available, and also assuming M=0.2, thus Fmsy=0.2, for the remaining stocks. Next, a value for the biomass trend scalar was found such that provided a 25% reduction in average catch, to be consistent with the rule of thumb of ABC=75% MSY. Any of these assumptions can be modified or based on more informed information if available. Similar applications of this approach are described in documents from the North Pacific Council SSC. In addition, MARMAP status of stocks reports contain fishery independent CPUE trends that may provide information of stock biomass trends for refining the DCAC parameters. Application of the ABC control rule alternatives is fairly straight forward, once OFL is agreed. Some, in particular those tied to reference points or particular P* values, cannot be evaluated for unassessed stocks due to a lack of reference points and estimates of current stock abundance. Staff explored initial application of the SSCs ABC control rule to develop buffers between OFL and ABC for unassessed stocks. The Committee will need to agree to the tier values, an OFL, and a means for applying the control rule buffer to the OFL. Finally, the Cooper approach provides a further alternative. This approach also builds from the ABC control rule, but treats the derived buffer as a P* adjustment, as done for assessed stocks, and converts the point estimate of OFL to a distribution based on an assumed CV. Staff also pursued examples of this approach for consideration.

The Committee should review the range of alternatives for developing ABCs in data poor situations. To facilitate this process and comparison of the various approaches that are pursued through numerous documents and spreadsheets, a summary of the OLF and ABC alternatives is provided in a single spreadsheet. Please note that these remain 'works in progress' to some extent, and we may provide updated versions prior to the meeting. In addition, reference documentation of some long-standing approaches to addressing OFL and ABC for unassessed stocks include a data poor workshop report from 2001 and the Restrepo et al. technical guidance

prepared for the 1998 SFA. The Committee is asked to recommend ABC for each stock and to review the ABC control rule alternatives under consideration by the Council.

Actions

Review and comment on approaches for determining OFL for unassessed stocks in the snapper-grouper complex.

Recommend OFL for each stock.

Review and comment on alternatives for determining ABC for unassessed stocks in the snapper-grouper complex.

Recommend a range of ABC for each stock.

The SSC recognized that there are some commonalities among the members of the snapper-grouper complex. In general many of the members of this complex are captured as part of an overall multi-species fishery that is fished by both commercial and recreational sectors. On average the commercial and recreational catch is roughly equally split between these two sectors. It is the multi-species nature of this group of fishes that allows for some inferences to be made from stocks that have been assessed. On average the history of assessed snapper-grouper species in the South Atlantic suggests a pattern of recent overexploitation. The majority of assessed stocks suggest overfishing and overfished conditions. This was taken into account during the SSC's deliberations about appropriate estimates of OFL and ABC.

The SSC decided to set OFL for each species based on the median of landings for 1999 to 2008. From there, the data-poor ABC control rule was applied for all the species to develop the ABC adjustment level. The results of the data-poor ABC control rule will be multiplied by the OFL to determine the adjustment to the OFL for each individual species. Each ABC would start at 35% (0% for unknown depletion, 15% because not forage or habitat, __% the appropriate PSA score, 20% out of 25% for certainty of OFL level) of OFL. The variability in the ABC for each species will depend on the PSA for each species, since the remaining parts of the data-poor ABC control rule are fixed for this set of species. Therefore, the possible range of ABC values for each data poor species will be 35% to 55% of OFL. This approach will be revisited species by species as more data become available. This is considered the "Triage Approach" for the snapper grouper data poor species. Current species exceptions are golden tilefish, yellowtail snapper, wreckfish, and amberjack. Since the Council is following the red porgy rebuilding plan, they won't be included in this data poor analysis.

Yellowtail snapper – *OFL: lbs. (SSC is recommending MSY value from 2004 SEDAR analysis) ABC: lbs. (SSC is recommending OY value from 2004 SEDAR analysis) This stock is scheduled to be reassessed in 2012*

Golden tilefish – *OFL: 336,400 lbs. ABC: 311,000 lbs. OFL is MSY from SEDAR 4, 2004, and ABC is from May 5, 2009 golden tilefish memo from science center. Will be reassessed in 2011 (or at least that has been requested)*

Wreckfish – *OFL: unknown ABC: lbs. The SSC decided not to give an ABC for wreckfish because of the ITQ system. The SSC initially tried to set ABC at the median of landings for the last 10 years, which is about 10% of the TAC. This will mean that if fishermen want to keep their*

current landings, they'll have to buy up the shares from the other people who aren't using them. In place of setting an ABC, the SSC decided to recommend that the Council keep total annual catches at or below 200,000 lbs to avoid the impacts of setting an ABC for a species with an ITQ program. It will be up to the Council to decide an appropriate quota level, given the current active ITQ holders, that will ultimately result in annual catches at or below 200,000 lbs.

Greater Amberjack – *OFL: 2,005,000 lbs. ABC: 1,968,000 lbs. From SEDAR 15 in 2007, coming up again for assessment in 2012*

8. ABC Recommendations III (Values summarized in Table 1)

Overview

Coastal-Migratory Pelagic FMP

King and Spanish mackerel were both assessed through SEDAR recently and both assessments were reviewed by the SSC in December 2008. Additional projections in support of OFL and ABC determinations are available for king mackerel as requested by the SSC. The Spanish mackerel assessment was partially accepted, with the SSC endorsing the review panel conclusions regarding stock status and determining that current exploitation and biomass estimates are unreliable. Landings data are available for other species in the CMP complex.

Dolphin-Wahoo FMP

Landings and status criteria alternatives for the Dolphin-Wahoo FMP are summarized in Attachment 30. The 2000 exploratory assessment of Dolphin is also provided (Attachment 31)

Actions

Recommend OFL and ABC for stocks in the Coastal-Migratory and Dolphin-Wahoo Fishery Management Plans

8.1. Dolphin-Wahoo FMP

8.1.1. Dolphin

The existing MSY estimate for dolphin (Prager 2000) applies to the Gulf of Mexico, South Atlantic, and Caribbean regions (i.e., no MSY value specific for the Atlantic stock exists). Therefore, the SSC decided to use landings data to estimate OFL. However, given dolphin's distribution and stock structure the OFL should be based on landings data for the entire Atlantic stock (i.e., not just South Atlantic). The SSC also discussed the decline in recreational landings (the bulk of total dolphin landings) during 2008-2009, which the group thought was strongly influenced by the economic downturn and associated reduction in recreational effort (number of fishing trips). The SSC decided not to use these years for developing the OFL estimate. Other points were also brought up regarding regulations that probably have kept dolphin landings down since 2004. The committee decided to use the period 1994-1997 (Atlantic coast landings data obtained from the Dolphin-Wahoo FMP) to calculate average landings as the OFL estimate (OFL = 11,882,898 pounds; the mean was used instead of the median because of the short

landings time series). Application of the data-poor control rule generated the following adjustments (Tier 1: +15%, Tier 2: +15%, Tier 3: +20%, Tier 4: +25%) and determined an ABC value equal to 75% of OFL. Therefore, ABC for dolphin = 8,912,174 lbs for the entire Atlantic stock.

8.1.2 Wahoo

Since no MSY estimate is available for wahoo OFL was estimated from landings data (Atlantic coast landings data also obtained from the Dolphin-Wahoo FMP). Similar to dolphin, wahoo landings were thought to be impacted by economic trends as well as the 2004 regulations (for wahoo, 2-fish bag limit and a 500 lb trip limit). OFL (1.1 million pounds) was determined as the median of landings for the period 1994-2003 (used the median instead of the mean since this was a longer time series than used for dolphin). Application of the data-poor control rule generated the following adjustments (Tier 1: +15%, Tier 2: +15%, Tier 3: +20%, Tier 4: +25%) and determined an ABC value equal to 75% of OFL. Therefore, ABC for wahoo = 826,000 pounds.

8.2. King Mackerel FMP (Actually Coastal Pelagics FMP)

8.2.1 King mackerel

The OFL for king mackerel is 12.835 million pounds (corresponds to yield at $F_{30\%SPR}$, the accepted MSY proxy from the last stock assessment). From the ABC control rule the P for king mackerel equals 27.5%. Looking at Table 1 in document A28_Updated MackerelProjs3-17-10.pdf (attachment 28 in the SSC briefing package) we find a value of 11 million pounds corresponding to a probability of overfishing of 28% for 2011. However, the SSC decided not to use this value since the P* value (28%) is a bit higher than 27.5% (higher risk of overfishing than established by the control rule). The group decided to determine ABC for the period 2011-2020 through a linear interpolation of TAC values from 27.5% to 28.0%.*

8.2.2 Spanish mackerel

Since no estimate of MSY is available for Spanish mackerel the SSC decided to develop ABC recommendations based on landings data. Based on the SEDAR 17 review panel recommendation that an estimate of OFL could not be determined and that it was very likely that overfishing was not occurring, the SSC decided to bypass the OFL estimate and recommend ABC as the median of landings over the last 10 years. Therefore, ABC for Spanish mackerel = 4,913,254 pounds.

8.2.3 Cobia

Since no estimate of MSY is available for cobia the SSC decided to estimate OFL as the median of landings data for the period 1986-2008. Therefore, OFL = 857,714 pounds. Application of the data-poor control rule generated the following adjustments (Tier 1: +0%, Tier 2: +15%,

Tier 3: +20%, Tier 4: +20%), so ABC will be set at 55% of OFL. Therefore, ABC for cobia = 471,743 pounds.

9. Review Recommendations and Draft Committee Report

Because of the level and intensity of the group's discussion, a draft committee report was not produced prior to the conclusion of the meeting. The chair requested that everyone pass his/her notes to her for collation by the close of business on April 30, 2010. Once the draft has been collated, it will be forward to the group for review and then to John Carmichael for inclusion in the June council briefing book.

Table 1. OFL and ABC recommendations by FMP and Species.

FMP/Stock	OFL	ABC	NOTES
Coastal Migratory Pelagics			
cero	NA	NA	Species for data collection purposes
Cobia	857714	471742.7	median 86-08, ABC rule
King Mackerel	12.8359 mpds	10.95 mpds catch; 2011 value	P*=27.5
King Mackerel		10.36 mpds catch; 2012 value	
King Mackerel		10.06 mpds catch; 2013 value	
Littly tunny	NA	NA	Species for data collection purposes
spanish mackerel	unk	4,913,254	median 99-08 landings, ref SEDAR RW rec'd
Coral/CEBA			
Coral Fed + State	33,755	11,814	
coral Fed, colonies	4,970	1,740	ABC 35% Median Landings, 2000-2009
Dolphin/Wahoo			
dolphin	11.4 mpds	8,522,123	OFL=94-97 avg catch
wahoo	1,101,231	825,923	OFL=94-03 median catch
golden crab	518,316	336,905	abc 65% OFL of Median Catch 1995-2007
sargassum	0	0	Based on no reported landings, in effect until such time as there is renewed interest in developing a fishery
Shrimp			
brown shrimp	10.91 mpds	10.91 mpds	OFL=max of 1990-2000; ABC=OFL
pink shrimp	2.70 mpds	2.70 mpds	OFL=max of 1990-2000; ABC=OFL
rock shrimp	No landings avail		OFL=max of 1990-2000; ABC=OFL
white shrimp	23.691 mpds	23.691 mpds	OFL=max of 1990-2000; ABC=OFL

Lbs WW unless otherwise noted
Landings only unless otherwise noted
* - OFL=median landings 1999 - 2008
Source of median landings is the SERO "ACL" dataset. May require SEFSC validation.

Table 1. Cont'd.

FMP/Stock	OFL	ABC	NOTES
Snapper-Grouper			
almaco jack*	229,126	80,194	
atlantic spadefish *	185,011	101,756	
banded rudderfish *	119,589	41,856	
bank sea bass *	6,145	2,765	
bar jack *	4,914	1,720	
black grouper	818959	610482	OFL from new runs of the model requested by the SSC in April 2010. ABC using P*=27.5 and good for 2011 only
black margate*	64,768	22,669	
black sea bass	Yield @ MFMT	847,000	Based on Rebuilding Plan, Landed catch only
black snapper*	0	0	No Landings Reported
blackfin snapper*	1,081	378	
blue runner*	847,013	381,156	
blueline tilefish*	140,633	49,221	
bluestripe grunt*	21,816	11,999	
coney*	1,965	884	
cottonwick*	111	50	
crevalle jack*	739,485	332,768	
cubera snapper*	22,257	7,790	
dog snapper*	2,432	851	
french grunt*	2,795	1,258	
gag grouper	Yield @ MFMT	885,000	total removals; Based on Rebuiling Plan; Gutted weight
goliath grouper*	0	0	No Landings Reported
grass porgy*	641	224	
gray snapper (mangrv)*	762,720	266,952	
gray triggerfish*	275,215	151,368	
graysby*	13,027	5,862	
greater amberjack	2,005,000	1,968,000	BASED ON ASSESSMENT RESULTS

Lbs WW unless otherwise noted
Landings only unless otherwise noted
* - OFL=median landings 1999 - 2008
Source of median landings is the SERO "ACL" dataset. May require SEFSC validation.

Table 1. Cont'd.

FMP/Stock	OFL	ABC	NOTES
Snapper-Grouper			
hogfish*	127,602	44,661	
jolthead porgy*	31,141	14,013	
knobbed porgy*	23,239	10,457	
lane snapper*	113,933	51,270	
lesser amberjack*	6,787	2,375	
longspine porgy*	0	0	No Landings Reported
mahogany snapper*	53	19	
margate*	21,091	9,491	
misty grouper*	2,364	827	
mutton snapper	1,727,591	1,409,612	from assessment; SSC will need to review and approve; not done at April 2010 meeting
nassau grouper*	39	13	
ocean triggerfish*	10,053	4,524	
porkfish*	14,772	5,170	
puddingwife*	99	45	
queen snapper*	5,337	2,401	
queen triggerfish*	6,585	2,963	
red grouper	669,000	665,000	Based on Rebuilding Plan. OFL=2011 yield@Fmsy. ABC from updated projection.
red hind*	37,968	17,086	
red porgy		395,281 for 2010	use the rebuilding plan values, will re-evaluate after the next assessment
red snapper			based on rebuilding plan, amendment 17A
rock hind*	32,778	11,472	
rock sea bass*	2,125	744	
sailors choice*	18,408	6,443	
sand tilefish*	4,092	1,432	
saucereye porgy*	2,959	1,035	

Lbs WW unless otherwise noted
Landings only unless otherwise noted
* - OFL=median landings 1999 - 2008
Source of median landings is the SERO "ACL" dataset. May require SEFSC validation.

Table 1. Cont'd.

FMP/Stock	OFL	ABC	NOTES
Snapper-Grouper			
scamp*	483,603	169,261	
schoolmaster*	3,031	1,061	
scup*	6,579	2,961	
sheepshead*	1788504	804826.8	
silk snapper*	16,847	5,896	
smallmouth grunt*	0	0	
snowy grouper	Yield @ MFMT	102960	Based on Rebuilding Plan
spanish grunt*	102	36	
speckled hind	UNK	0	Amendment 17 B
tiger grouper*	0	0	
tilefish	336400	311000	P*=37.5
tomtate*	64,052	28,823	
vermilion snapper		1109000	Based on Rebuilding Paln
warsaw grouper	UNK	0	Amendment 17 B
white grunt*	354,174	159,378	
whitebone porgy*	24,644	8,625	
wreckfish	UNK	not specified	SSC recommends that ACL not exceed 200,000 lbs
yellow jack*	7,114	3,201	
yellowedge grouper*	14,124	4,943	
yellowfin grouper*	4,284	1,499	
yellowmouth grouper*	2,180	763	
yellowtail snapper	yield @ FMSY	2,898,500	Based on most recent assessment MSY and OY
spiny lobster	SSC will wait until Nov 2010 update is complete		

Lbs WW unless otherwise noted
Landings only unless otherwise noted
* - OFL=median landings 1999 - 2008
Source of median landings is the SERO "ACL" dataset. May require SEFSC validation.

Summary of information used by the SAFMC SSC in April 2010 to establish ABC recommendations.

From amendment 5
Gold Crab time series.

1995	61,660
1996	523,160
1997	1,034,447
1998	518,316
1999	682,224
2000	841,747
2001	781,138
2002	500,774
2003	359,087
2004	278,336
2005	432,846
2006	599,374
2007	502,292
2008	385,000
Med 97-07	518,316
avg 97-07	445266.9

KING MACK TAC | P* = 0.275

Interpolation of projected values

2011	10.95 mpds catch
2012	10.36 mpds catch
2013	10.06 mpds catch

WAHOO LANDINGS STREAM FOR ABC

YEAR	Wahoo Total	Source
1984	439,028	FMP
1985	466,141	FMP
1986	2,549,204	FMP
1987	863,328	FMP
1988	886,400	FMP
1989	778,238	FMP
1990	343,037	FMP
1991	598,367	FMP
1992	702,076	FMP
1993	687,698	FMP
1994	902,624	FMP
1995	1,090,763	FMP
1996	926,295	FMP
1997	984,259	FMP
1998	1,027,512	FMP
1999	1,504,812	Decision Doc
2000	1149004	Decision Doc
2001	1111698	Decision Doc
2002	1305557	Decision Doc
2003	1159979	Decision Doc
2004	1015597	Decision Doc
2005	863590	Decision Doc
2006	804684	Decision Doc
2007	1984050	Decision Doc
2008	673111	Decision Doc
2009	309386	Decision Doc
94-03 med	1,101,231	

Table 9. Recreational and commercial landings of dolphin (pounds) North Carolina, Florida, South Carolina and Georgia for 1984-1999 (Source: Goodyear (1999) and data provided by NMFS in 2000 & 2002).

Year	North Carolina		Florida*		South Carolina		Georgia		Total South Atlantic	
	Recreational	Commercial	Recreational	Commercial	Recreational	Commercial	Recreational	Commercial	Recreational	Commercial
1984	6,730	47,144	3,393,058	350,332	76,029	19,878	0	9,606	3,475,817	426,960
1985	446,745	42,348	3,887,256	241,676	1,229,824	17,974	5,915	14,104	5,569,740	316,102
1986	1,451,175	35,923	3,113,305	469,822	2,269,895	11,416	390	14,917	6,834,766	532,078
1987	764,391	70,516	3,617,409	385,698	12,626	19,372	1,493	8,095	4,395,920	483,681
1988	909,643	56,098	5,277,293	386,149	147,104	27,921	0	11,039	6,334,041	481,207
1989	1,905,274	98,899	7,821,178	821,279	103,757	67,463	0	7,915	9,830,209	995,556
1990	1,562,247	96,207	5,800,055	782,171	67,988	70,479	0	12,231	7,430,291	961,088
1991	1,552,804	140,837	9,580,978	1,279,631	130,115	94,604	7,992	14,189	11,271,890	1,529,261
1992	1,004,709	72,119	4,137,917	466,625	47,064	58,064	2,808	8,264	5,192,498	605,072
1993	2,362,142	149,043	2,580,573	594,210	351,549	91,355	120,725	12,637	5,414,984	847,245
1994	2,944,912	160,747	6,597,850	837,294	97,434	107,010	3,401	9,063	9,643,594	1,114,114
1995	3,558,751	355,644	8,552,429	1,306,215	81,019	287,509	2,426	27,408	12,194,620	1,976,776
1996	2,243,169	126,849	5,075,847	868,444	157,219	143,918	3,778	8,843	7,480,014	1,147,694
1997	4,866,647	229,783	5,369,543	949,805	181,840	283,739	1,130	12,023	10,419,160	1,475,350
1998	3,466,778	149,993	3,652,418	526,562	123,473	48,138	606	2,589	7,242,667	727,282
1999	4,397,882	209,860	5,171,410	643,822	193,630	76,827	17,196	9,566	9,780,115	940,075
Avg. 84 - 97	1,827,096	120,154	5,343,192	696,604	353,819	92,907	10,718	12,167	7,534,825	920,870
Avg. 94 - 97	3,403,370	218,256	6,398,917	990,440	129,378	205,544	2,684	14,334	9,934,347	1,428,484
Avg. 97 - 99	4,243,769	196,545	4,731,124	706,730	166,314	136,235	6,311	8,059	9,147,314	1,047,569

*Florida Commercial landings 1988-1999 include all of Monroe County, FL landings.
1997-1999 Recreational data from NMFS MRFSS Web Site. Note: South Atlantic totals from Table 9 are slightly different from South Atlantic totals in Table 8 because MRFSS by state summed versus by South Atlantic total.

Re-running P* estimates for black grouper at the request of the South Atlantic Scientific and Statistical Committee.

21 April 2010

In the discussions of the black grouper stock assessment, members of the South Atlantic Scientific and Statistical Committee (SSC) expressed discomfort with the lack of variability among the P* runs presented in the Addendum of the SEDAR19 Black Grouper Assessment Report. The P* program includes two sources of variability in the projections: the variability surrounding the fishing mortality limit usually the rate at maximum sustainable yield (F_{msy}) and the variability in recruitment from the bias-correction term. The variability in the F_{msy} was small because the recommended reference point was $F_{30\%SPR}$ instead of the actual calculated F_{msy} value and the bias-correction term in the Beverton-Holt stock-recruit curve also was small. Therefore, the SSC asked for P* runs using CV = 0.5 for recruitment which was the input value to the assessment model rather than the estimated value and applying the variability in the MCMC F_{msy} values to $F_{30\%SPR}$.

The SSC request was implemented as follows. Using the relationship for a log-normal distribution that $CV^2 = e^{\sigma^2} - 1$ and rearranging the terms to solve for σ^2, $\sigma^2 = \ln(CV^2 + 1)$, the bias-correction term is bc = $\exp(\sigma^2/2)$ or for CV = 0.5, the bias-correction term was 1.118 as opposed to the original 1.013. To apply the F_{msy} variability in the MCMC runs to $F_{30\%SPR}$, I used the ratio of the mean $F_{30\%SPR}$ from the MCMC results to the mean F_{msy} and then used that ratio to scale the 2500 MCMC F_{msy} values. The enhanced $F_{30\%SPR}$ values ranged from 0.140 per year to 0.304 per year with a mean of 0.214 per year while the original $F_{30\%SPR}$ values from the MCMC runs ranged from 0.200 per year to 0.225 per year with a mean of 0.214 per year. To illustrate the revised P* results, runs were made over a range of probabilities of exceeding the overfishing limit of 0.10 to 0.40 in 0.10 increments and an additional run with a probability of 0.275 from the control rule. These P* runs are shown in Table 1 and Figure 1.

When these results are compared to the original runs in the addendum (Table A3.3.4.16 and Figure A3.3.5.24), the results for the different probabilities were more separated and the landings, discards, and fishing mortality rates were lower and the spawning biomass estimates were higher. Exploring further, I made a series of runs with the CV = 0.5 for bias correction but kept the original $F_{30\%SPR}$ values from the MCMC and those results values were only slightly higher than the values presented here indicating that, in this case, the variability in stock size from the bias-correction term had a larger effect than did the variability in the fishing mortality limit.

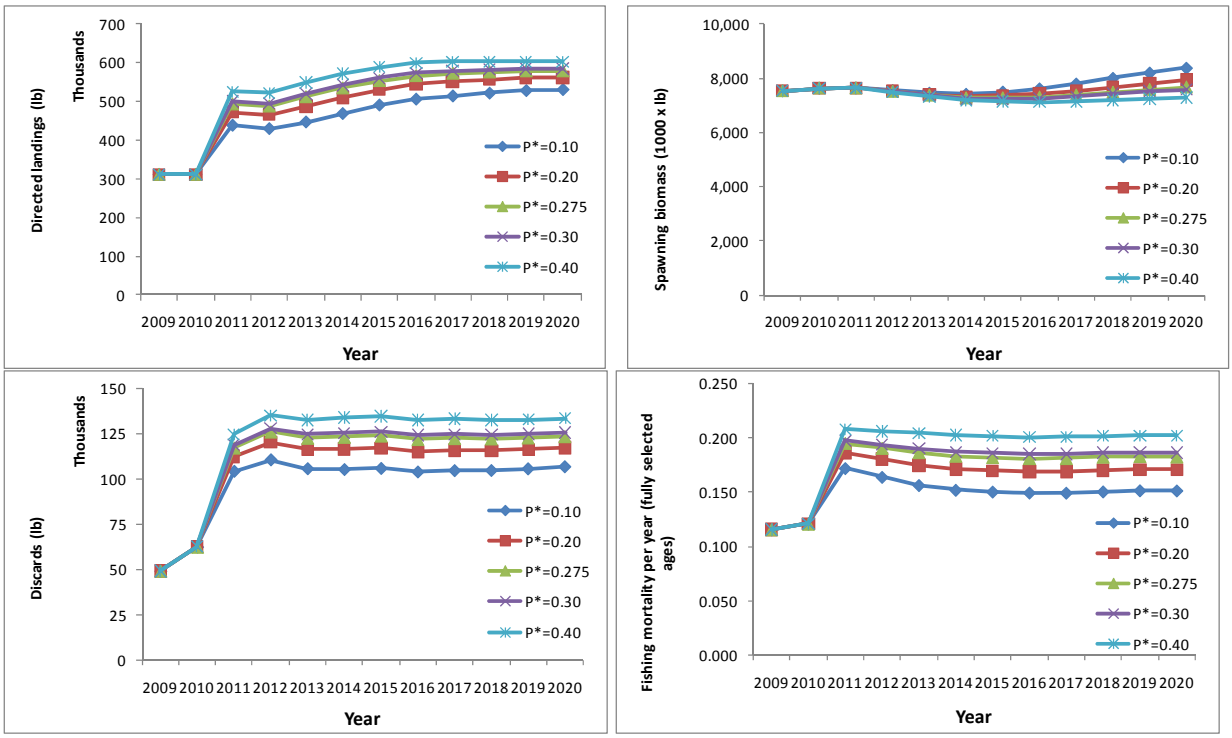


Figure 1. P* estimates of landings (a), spawning biomass (b), discards (c), and fishing mortality rates (d) for a range of probabilities of exceeding the overfishing limit ($F_{30\%SPR}$).

Table 1. . P* estimates of landings, spawning biomass, discards, and fishing mortality rates for a range of probabilities of exceeding the overfishing limit ($F_{30\%SPR}$).

	Landings (lb)				
Year	Pr=0.10	Pr=0.20	Pr=0.275	Pr=0.30	Pr=0.40
2009	310,890	310,890	310,890	310,890	310,890
2010	310,891	310,891	310,891	310,891	310,891
2011	438,214	472,544	493,204	499,672	524,573
2012	429,435	465,863	487,877	494,765	521,504
2013	446,590	487,357	511,777	519,496	549,041
2014	468,477	509,895	534,629	542,222	571,447
2015	490,519	529,996	553,443	560,704	588,162
2016	505,733	544,113	566,407	573,401	599,143
2017	513,990	551,399	572,698	579,046	602,838
2018	521,261	556,756	576,003	581,792	602,875
2019	527,893	561,080	578,718	583,866	603,067
2020	530,456	561,783	578,991	584,057	602,885
	Dead discards (lb)				
2009	49,296	49,296	49,296	49,296	49,296
2010	62,573	62,573	62,573	62,573	62,573
2011	104,279	112,394	117,278	118,809	124,699
2012	110,602	120,252	126,117	127,941	135,032
2013	105,732	116,294	122,728	124,744	132,629
2014	105,247	116,498	123,243	125,440	133,875
2015	105,854	117,008	123,904	126,061	134,699
2016	103,916	115,042	121,972	124,125	132,627
2017	104,672	115,830	122,560	124,794	133,209
2018	104,735	115,638	122,313	124,348	132,479
2019	105,651	116,460	122,859	124,967	132,821
2020	106,794	117,310	123,563	125,593	133,478
	Fishing mortality per year on fully selected ages				
2009	0.116	0.116	0.116	0.116	0.116
2010	0.121	0.121	0.121	0.121	0.121
2011	0.172	0.186	0.195	0.198	0.208
2012	0.164	0.180	0.191	0.194	0.206
2013	0.157	0.175	0.187	0.190	0.205
2014	0.152	0.171	0.183	0.187	0.203
2015	0.151	0.170	0.182	0.186	0.202
2016	0.150	0.169	0.181	0.185	0.201
2017	0.150	0.169	0.181	0.185	0.201
2018	0.151	0.170	0.183	0.186	0.202
2019	0.152	0.171	0.183	0.187	0.202
2020	0.152	0.171	0.183	0.187	0.202
	Spawning biomass (1000 x lb)				
2009	7,539	7,539	7,539	7,539	7,539
2010	7,636	7,636	7,636	7,636	7,636
2011	7,647	7,643	7,641	7,641	7,638
2012	7,554	7,530	7,515	7,510	7,492
2013	7,457	7,404	7,372	7,362	7,323
2014	7,418	7,326	7,270	7,251	7,185
2015	7,497	7,360	7,274	7,249	7,149
2016	7,620	7,423	7,302	7,266	7,124
2017	7,796	7,533	7,378	7,329	7,141
2018	8,008	7,681	7,481	7,422	7,199
2019	8,203	7,816	7,586	7,515	7,243
2020	8,383	7,938	7,672	7,591	7,289

South Atlantic Red Grouper SSC Meeting, April 2010

Projection results under scenario with fishing mortality rate fixed at F=Frebuild, to achieve 0.7 probability of rebuilding in 2020.

Year	F(per yr)	Pr(SSB>SSE	SSB(mt)	R(1000)	D(1000)	D(klb)	L(1000)	L(klb)	Sum L(klb)
2009	0.298	0	1888.74	399	32	61	107	1098	1098
2010	0.298	0	1800.36	396	35	70	94	985	2083
2011	0.181	0.01	1783.42	394	21	43	62	622	2705
2012	0.181	0.06	2015.42	394	21	44	70	693	3398
2013	0.181	0.15	2188.42	399	22	44	77	762	4160
2014	0.181	0.26	2343.64	402	22	44	82	822	4982
2015	0.181	0.36	2477.94	404	22	45	86	873	5855
2016	0.181	0.46	2592.02	406	22	45	89	915	6770
2017	0.181	0.54	2686.78	407	22	45	91	951	7721
2018	0.181	0.61	2764.29	408	22	45	93	980	8701
2019	0.181	0.66	2827.41	409	22	46	95	1004	9705
2020	0.181	0.7	2878.51	410	22	46	96	1023	10728

F = fishing mortality rate (per year), Pr(SSB>SSBmsy) = proportion of stochastic projection replicates exceeding SSBmsy,
SSB = spawning stock (mt), R = recruits (1000 age-1 fish),
D = discard mortalities (1000 fish or 1000 lb whole-fish weight),
L = landings (1000 fish or 1000 lb whole-fish weight),
Sum L = cumulative landings (1000 lb).
For reference, estimated benchmarks are Fmsy=0.22 (per yr), SSBmsy=2592 (mt), and MSY=1110 (1000 lb).
Expected values presented are from deterministic projections (klb=1000 lb).