

DRAFT

**JOINT SAFMC/GMFMC MACKEREL
SCOPING DOCUMENT**

**AMENDMENT 19
TO THE COASTAL MIGRATORY
PELAGICS FISHERY MANAGEMENT PLAN**

**South Atlantic Fishery Management Council
Mid-Atlantic Fishery Management Council
Gulf of Mexico Fishery Management Council**

MARCH 2007

INTRODUCTION

The Gulf of Mexico Fishery Management Council (GMFMC), the South Atlantic Fishery Management Council (SAFMC), and the Mid-Atlantic Fishery Management Council (MAFMC) are preparing to amend the Coastal Migratory Pelagics Fishery Management Plan (FMP) by consideration of actions as stated and discussed below. The primary action under consideration would divide the FMP into a separate Atlantic and Gulf Coastal Migratory Pelagic Fishery Management Plans. The South Atlantic and Gulf of Mexico Councils previously indicated their intent to establish separate Fishery Management Plans in Amendment 8/EA implemented in March 1998.

In creating two plans, the Councils must determine the management structure (species, boundary lines, how fish are counted, etc.) and the permit system. These actions would affect the following seven species in the FMU:

- (1) Bluefish, *Pomatomus saltatrix* (Gulf of Mexico only)
- (2) Cero, *Scomberomorus regalis*
- (3) Cobia, *Rachycentron canadum*
- (4) Dolphin*, *Coryphaena hippurus*
- (5) King mackerel, *Scomberomorus cavalla*
- (6) Little tunny, *Euthynnus alleteratus*
- (7) Spanish mackerel, *Scomberomorus maculatus*

*Note: Dolphin in the South Atlantic, Mid-Atlantic, and New England Fishery Management Council's jurisdictions are managed under the new Dolphin and Wahoo Fishery Management Plan with the southern boundary at the border between the Gulf and South Atlantic Councils.

Each Council has a number of additional management actions they want to consider and have indicated their intent to evaluate additional management alternatives after completion of this joint amendment to establish separate fishery management plans. The public is encouraged to focus on the actions outlined in the scoping document for Amendment 16 and as specified by the Council's motions (Appendix A).

PURPOSE FOR TAKING ACTION

Separate fishery management plans would address the following:

(1) Ecosystem-Based Management - the South Atlantic Council desires to coordinate all fishery management regulations and policies within the Council's area of jurisdiction, or as close to this as is practicable, through development of a Fishery Ecosystem Plan.

(2) Different Management Philosophies - different philosophies exist between the Gulf and South Atlantic Councils. A number of the Magnuson-Stevens Act criteria and risk levels are specified at a lower level of risk in the Atlantic.

(3) Reduce Duplication and Minimize Costs - separate fishery management plans would eliminate the need for joint approval of amendments, especially those where actions may only affect one Council's area of jurisdiction. This change would expedite approval of proposed management measures. It would also reduce the need for affected fishermen and interested members of the public to travel to each Council's meetings to protect their interests in the fishery. These meetings range from Texas to Florida to North Carolina through New York.

Separate management plans would greatly reduce the level of inconvenience and cost to the public. Separate fishery management plans would also speed up the management process by eliminating delays in the review and implementation stages resulting from having both Councils review and approve actions similar to the experience with the previous two mackerel amendments.

In addition, the 2004 SEDAR 5 Assessment provided updated Maximum Sustainable Yield (MSY), Acceptable Biological Catch (ABC), etc. values for Gulf and Atlantic migratory groups of king mackerel (Table 1) based on counting 100% of fish in the mixing zone as Gulf king mackerel. Values are also shown in Table 1 based on counting 50% of fish in the mixing zone as Gulf king mackerel.

Based on the top end of the new ABC ranges under a 50/50 mixing rate, the total ABC for both Gulf and Atlantic migratory groups would be 16.7 million pounds. If the South Atlantic Council set Total Allowable Catch (TAC) at the best point estimate of 7.1 million pounds, and the Gulf Council continues to have a Total Allowable Catch (TAC) of 10.2 million pounds, the total TAC would be 17.3 million pounds, which would exceed the top end of the total Acceptable Biological Catch (ABC). This would result in overfishing and could push both migratory groups into an overfished stock status if the full limits were harvested.

Modifying the permit requirements for separate commercial permits for king and Spanish mackerel would better differentiate individuals for data collection and enforcement purposes.

Table 1. Total Allowable Catch (TAC) and Acceptable Biological Catch (ABC) for king mackerel and commercial landings.

Total Allowable Catch (Acceptable Biological Catch) for King Mackerel Migratory Groups (million pounds)							
		SEDAR 5 - King Mackerel Assessment		Recent Total Catches (Com. + Rec.)			
	Current	100% Gulf	50% Gulf	2002/03	2003/04	2004/05	2005/06
Gulf Migratory Group	10.2 (5.3 - 9.6)	8.3 (6.7 - 10.2)	5.7 (4.4 - 7.1)	7.65	6.59	6.87	6.24
Atlantic Migratory Group	10.0 (8.9 - 13.3)	5.7 (4.3 - 7.4)	7.1 (5.3 - 9.6)	4.46	5.93	6.13	6.25
Commercial Atlantic Migratory Group King Mackerel Landings from Commercial Quota Reports							
Fishing Year	Quota	Landings	Source	Percentage	Thru		
2002/2003	3,710,000	1,659,649	Quota report; Godcharles	45%	4/28/2003		
2003/2004	3,710,000	1,958,050	Quota report; Godcharles	53%	4/21/2004		
2004/2005	3,710,000	2,549,164	Quota report; Godcharles	69%	3/31/2005		
2005/2006*	3,710,000	2,149,733	Quota report; Rueter	58%	1/31/2006		
* Beginning with 2005/2006 the fishing year changed to begin March 1 thru the end of February.							
Previous fishing years began on April 1 thru the end of March.							

ACTIONS FOR SCOPING

ACTION 1. SPECIFY THE FOLLOWING CHANGES TO THE MANAGEMENT STRUCTURE (SPECIES, BOUNDARY LINES, HOW FISH ARE COUNTED, ETC.) FOR COASTAL MIGRATORY PELAGICS

Option 1. No Action. Retain the current management boundary lines for species in the FMU (Figure 1).

Option 2. Establish a fixed boundary for all Coastal Migratory Pelagics at the Miami-Dade/Monroe County line on the Florida East Coast corresponding to the existing Spanish mackerel fixed boundary. All fish north of the fixed boundary would be counted as 100% Atlantic fish and all fish south of the fixed boundary would be counted as 100% Gulf fish. This accounting process would be used for stock assessment and quota tracking purposes.

Option 3. Establish a fixed boundary for all Coastal Migratory Pelagics at the Miami-Dade/Monroe County line on the Florida East Coast to correspond to the Spanish mackerel fixed boundary. All fish north of the fixed boundary would be counted as 100% Atlantic fish and all fish south of the fixed boundary would be counted as 100% Gulf fish EXCEPT for king mackerel. All king mackerel south of the fixed boundary would be counted as 100% Gulf fish and 50% of the fish from the fixed boundary through Volusia County would be counted as Gulf fish. This accounting process would be used for stock assessment and quota tracking purposes.

Discussion

The Fishery Management Plan for Coastal Migratory Pelagic Resources of the Gulf of Mexico and South Atlantic (FMP), approved in 1982 and implemented by regulations effective in February of 1983, treated king and Spanish mackerel each as one U.S. stock. The present management regime under **Option 1** for mackerel recognizes two migratory groups of king and Spanish mackerel, the Gulf Migratory Group and the Atlantic Migratory Group. King mackerel from these two groups seasonally mix on the East Coast of Florida. For management and assessment purposes, a boundary between groups of king mackerel (Figure 1) was specified as the Volusia/Flagler County border on the Florida east coast in the winter (November 1 - March 31) and the Monroe/Collier County border on the Florida southwest coast in the summer (April 1 - October 31).

Spanish mackerel mix in south Florida but abundance trends along each coast of Florida are different indicating sufficient isolation between the two migratory groups. The boundary for Spanish mackerel is fixed at the Miami-Dade/Monroe County border on Florida's southeast coast.

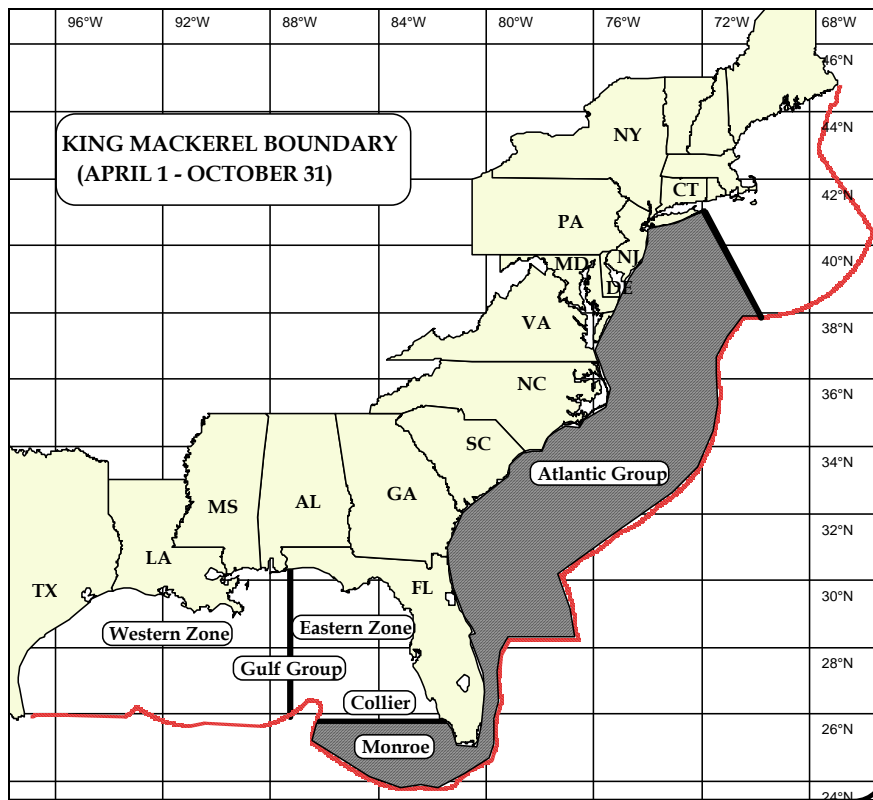
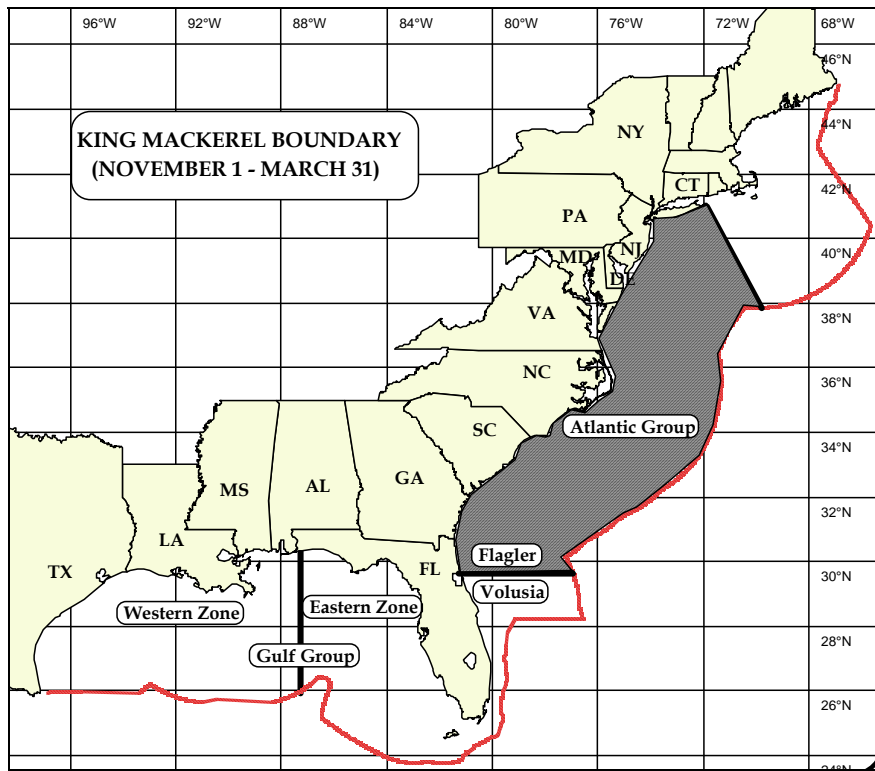


Figure 1. Seasonal boundary between Atlantic and Gulf Migratory Groups of king mackerel. (Source: SAFMC Staff)

Allocations were established for recreational and commercial king and Spanish mackerel fisheries, and the commercial allocation was divided between net and hook-and-line fishermen. For the purpose of allocating a limited resource among users, the management plan has set ratios based on historic unregulated catches. The Atlantic Migratory Group of king mackerel is allocated with 62.9% to recreational fishermen and 37.1% to commercial fishermen. The Atlantic Migratory Group of Spanish mackerel is presently allocated 55% to commercial fishermen and 45% to recreational fishermen. For Gulf migratory group king mackerel the allocation is 68% recreational and 32% commercial. For Gulf group Spanish mackerel, the allocation is 57% commercial and 43% recreational.

Option 1 (No Action) would continue to count 100% of king mackerel in the mixing zone as Gulf migratory group. This is not supported by the best available scientific data, but it has been the constant, historical basis for scientific review of the status of the 2 migratory groups in order to discern stock trends. When the original boundary was set, based on tagging data, the mix was 60% Gulf and 40% Atlantic. The Gulf and South Atlantic Councils agreed to count these fish as 100% Gulf fish to help rebuild the overfished Gulf migratory group.

In May 2004, the South Atlantic Council's SSC rejected this as not being the best available science. They recommended using a 50%/50% mixing rate. The mackerel motions from their May 19, 2004 meeting in Charleston, SC are as follows:

1. Landings - important to have most recent data
2. Discards - recreational and commercial bycatch data should be incorporated in the assessment; shrimp trawl bycatch data should be used if viable (DW recommended using the discard data.)
3. Growth curves/data - should have used "newer" growth data rather than "old" data (DW recommended using newer growth data.). Incorporate the new data in the assessment.
4. Natural Mortality - DW recommended 0.2 (0.15-0.25) for both groups. RW rejected this and used existing ranges (Gulf 0.15-0.25 with 0.2 as point estimate; Atlantic 0.1-0.2 with 0.15 as point estimate). Recommend that the RW explain why the DW recommendation was rejected; needs to be more than "consistency".
5. Fecundity - using data about 20 years old; batch vs. total spawning. Relationship between total spawning for a batch spawning fish. We question the use of this fecundity data. Need additional information on how data were used, implications of using the data and alternative assessment methods that would exclude the data.
6. Mixing rate - no scientific results indicate there is no mixing. RW supports 25-75% mixing but using 100% in base run.
 - SSC Subcommittee recommends using a 50% mixing rate:
 - a. most defensible (values above and below 50%)
 - b. AW, RW & Chair of RW suggested 50%
 - c. sensitivities on each side (25-75 or 40-60)
 - d. use 50% for the base run
7. Alternative model structures should be considered including methods that take into account aging errors (e.g., forward projecting); whatever model is chosen should be justified.
8. ABC - along the lines of the 50% mixing run in Table 19 but need to re-run after addressing the previous recommendations (see above). Best point estimate and range should be provided when the assessment is re-run.
9. Risk levels - policy not scientific decision. The SSC could provide recommendations on potential outcomes based on a risk level but the Council should specify the risk level.
10. SSC recommends that the Mackerel SEDAR Assessment not be forwarded to the Council; the assessment should go back to the Assessment Workshop stage and incorporate the recommendations provided above and then to the Review Workshop.

This issue was reviewed by a joint sub-committee of the Gulf and South Atlantic Councils' SSC on April 13, 2006 in Atlantic, Georgia:

Executive Summary

A joint *ad hoc* sub-committee comprised of Scientific and Statistical Committee members (Appendix 1) from the South Atlantic and Gulf of Mexico Fishery Management Councils (hereafter referred to as the SSC Panel) was convened in Atlanta, GA, on April 13, 2006, to address king mackerel stock identification and mixing rate issues raised in reviews of the recent stock assessment conducted under the auspices of the Southeast Data, Assessment and Review (SEDAR) process. (SEDAR 5, the Southeast Data Assessment and Review process for Atlantic and Gulf king Mackerel reviewed mixing rates between the two migratory units. The process included three workshops, a Data Workshop, an Assessment Workshop, and a Review Workshop.) A Terms of Reference and list of documents for the SSC Panel were provided by both Councils (Appendix 2).

The SSC Panel addressed each of the Terms of Reference, and a detailed description of the discussion and conclusions of the panel are presented below. A summary of the conclusions of the panel are as follows:

1. The SSC Panel concurred with conclusions of the SEDAR Data Workshop, Assessment Workshop and Review Workshop that tagging data were not conducive to estimating annual mixing rates between migratory groups, as the tagging studies were not designed to specifically address the mixing issue, but clearly showed significant winter mixing between groups. The SSC Panel concluded the genetic evidence confirmed distinct Gulf and Atlantic genetic signatures exist. The SSC Panel concurs with Gold et al. (2002) that genetic tags based on reported nuclear DNA microsatellite libraries are not robust enough for effective migratory group discrimination. Overall, the SSC Panel concluded otolith shape and chemistry analyses effectively distinguished king mackerel migratory groups, and can be used to provide a range of mixing rate estimates.

2. The SEDAR Review Workshop, except two members, agreed that the base model should provide the principal criteria for management advice. It has been the model used in the past (historical consistency). The SEDAR Review Workshop, except two members, decided there was only weak scientific justification to change the model or its input parameters. A majority of SEDAR Review Workshop participants agreed that to change the model at this point would not add any certainty to the management advice, given the sensitivity of the model to other poorly estimated biological parameters such as growth and fecundity estimates. The SSC Panel considered it important to note that historical consistency is not a criterion to be considered when making key decisions regarding a benchmark assessment and pointed out that there was no scientific data to justify the continued acceptance of the status quo (100% Gulf migratory group in the mixing zone). However, a member of both the SEDAR Review Workshop and the current SSC Panel reported that mixing was only one of the many assessment issues that required major review for a benchmark assessment, and that this last point was the most critical point to understand concerning the decisions of the SEDAR Review Workshop. Changing mixing rate estimates without making changes to other assessment components seemed inappropriate to a majority of the members of the SEDAR Review Workshop.

3. The SSC Panel was not made aware of, and did not have any personal knowledge of any additional research addressing Terms of Reference (TOR) article 3, however the SSC Panel did discuss research ideas/recommendations that might assist in elucidating the mixing rate issue temporally and spatially.

4. The SSC Panel recommends maintaining the current stock definition of a single stock with separate Gulf and Atlantic migratory groups as genetic differences are sufficiently weak (region explained only 0.19% of the total genetic variance (Gold et al. 2002) that the current paradigm of one stock (i.e. management unit) with different migratory units need not be changed. The SSC Panel agreed by consensus that otolith shape and otolith chemistry data suggest somewhere between 20% and 80% of the winter mixing zone landings likely are contributed by the Atlantic migratory group. Given the interannual and spatial variability in mixing rate estimates, the SSC Panel hypothesized the actual contribution of the Atlantic migratory group to winter mixing zone landings in any given year would lie somewhere in the range of 20%-80%.

5. The SSC Panel interpreted TOR 5 as directing the SSC Panel to recommend a method to allocate past winter mixing zone landings to either migratory group for the purpose of stock assessment and not as making a recommendation as to the allocation of future landings in a management context. To avoid confusion, the SSC Panel adopts the term "partition" rather than allocate. The SSC Panel did not have the time to discuss TOR 5 in sufficient detail, but concurred that no single value within the range of 20-80% was more defensible than another to partition past winter landings. As such, to partition past landings into the Gulf and South Atlantic migratory groups for the purpose of stock assessment, the SSC Panel suggested that imprecision in mixing zone estimates be incorporated in assessment models by randomly selecting a mixing rate between 20-80% for each year, as opposed

to a randomly drawn mixing rate that is held constant across years. The sensitivity of the stock assessment output to the uncertainty in the mixing percentages should be tested by comparing model output of multiple runs where the mixing rate is randomly selected each year. The uncertainty in the mixing rate can, and should, be incorporated directly into the uncertainty in the stock assessment output by including the randomly drawn mixing rates into the bootstrap routine currently employed. A similar approach could be taken if the new benchmark assessment were to use a Bayesian framework.

The SAFMC SSC reviewed the sub-committee report during their June 12-14, 2006 meeting and concluded the following:

The SSC agrees with the findings of the joint ad-hoc subcommittee regarding mackerel stock identification.

The SSC would like to stress the need for additional stock identification research. The otolith microchemistry technique is an appropriate and useful method to further resolve this issue. Currently, microchemistry data are extremely limited, both temporally and geographically (only 2 winters in South Florida). Sampling must be expanded both temporally and geographically.

Based on currently available data, the SSC supports the ad-hoc subcommittee's conclusion that between 20% and 80% of the winter mixing zone landings likely are contributed by the Atlantic migratory group. No single point estimate for mixing rate can be justified from the limited existing analyses for partitioning past catches or projecting catches into the future due to uncertainty. Stochastic simulations which incorporate the uncertainty can be used to partition past catches as well as future projections. This will provide a distribution of outcomes. None of the studies justify the continued acceptance of the status quo (100% Gulf migratory group in the mixing zone).

The SSC restates that the next assessment should not be an update because many issues (e.g. age, growth, and fecundity) were not adequately addressed in SEDAR 5 and still require the major review associated with a benchmark assessment. Also, changes in management strategies will require socioeconomic analyses of potential impacts.

In addition, the Council asked the SSC three questions during our meeting to which we respond below:

1. Is it the opinion of our SSC that the Terms of Reference provided to the joint ad-hoc committee were answered? Yes, to the fullest extent possible given the best available data and science.
2. Is it the opinion of our SSC that the best available data was in fact used by the joint ad-hoc committee in forming their joint recommendations? Yes, to the best of our knowledge.
3. Is it the opinion of our SSC that the answers to expressed questions in the Terms of Reference benefit the sustainability of the King Mackerel stock? Yes. The stock identification issue relates to partitioning landings, which is an important ingredient in the stock assessment process. The answers to the Terms of Reference move us forward in terms of both identifying research needs and improving landings estimates.

During the Joint Mackerel Committee/AP meeting June 14-15, 2006 Dr. Nancy Thompson, SEFSC Director, was asked about the Center doing the bootstrapping on the 20/80 percent mixing and the timeline for completing analyses (see pages 42-44 of the minutes):

“Mr. Hartig: Nancy, you're here. I appreciate you coming at such short notice. We had a question about what could the Center do with the advice we got from the SSC to do the bootstrapping on the 20/80 percent and what is your timeline? Could that be done in any sense of time that you have? I know you guys are strapped to the hilt. I don't understand how long that takes and certainly you can address that.

Dr. Thompson: In all honesty, I'm really trying to figure out what it means. You have 20/80, 80/20 and all the combinations in between and what the bootstrapping means is that you take any random combination that falls within that range and you do 10,000 of these things or however many number of them and you come up with a probability distribution of what the actual mixing rate is. If you take 20/80 and 80/20 and you do all of these, you end up with 50/50, right?

Really, I'm not really sure what value added there is to the bootstrapping. I don't know. My advice has been and will continue to be that you guys do something and then the Gulf Council will do something and it will come to me -- It will presumably come to me eventually for certification as being based on best available information and I will make a decision and I've said this.

I've said this to the Gulf Council and I've said it to you guys. I still think there's value in terms of meeting and getting this all out on the table and having the discussion with the Gulf Council SSC about what this means. However, I really haven't had the opportunity to talk with my scientists at any great depth about what this means, but I think it's pretty clear if you have bounds that are 20/80 and 80/20 that the midpoint is 50/50.

I've been suggesting that as a starting point for this mixing for several months now to both councils. I think that's the starting point. Now, there could be other reasons why you may want to deviate from that. There's the biology, there's the social overlay, there's the economic overlay as well, but my advice is, and will continue to be, that that is a reasonable starting point.

Mr. Geiger: If only you could be so forceful in causing the Gulf Council to take those actions and I know that's beyond you. That's just wishful thinking and my recommendation or my hesitancy to move forward unilaterally is that we don't see a benefit to both stocks with us doing something and the Gulf not doing something. If we can both move forward, I'm all for it, as we discussed.

Dr. Thompson: Like I said, if you do something that is a management action and the Gulf Council does something that's a management action relative to mackerel and it comes to me and I am required to certify it, I will make a decision. That is exactly what I have told the Gulf Council as well and they're aware of it as well.

Given the mixing, I mean -- Is there mixing? I've been through this before with them as well. Yes, there is mixing. Clearly there is mixing. The mixing is dynamic. The SEDAR and the SSCs have taken the information that's available and come up with these boundaries, which are this 20/80 and 80/20.

If you do the bootstrapping, which is simply developing a probability distribution, it's the midpoint again. It's going to show that on the average the mixing is somewhere around 50/50. That's all the bootstrapping is going to do. Yes, I think it's something that we could do, although the timing isn't great for us right now, but I'm not sure what more information it will provide.

My view of this whole thing has been that it's really not a science issue. The science and the information is there and so it's a matter of meeting with the Gulf Council and working it out and there could be a lot of other reasons other than the actual percentage of mixing to make a decision about where you're going with ABCs and TACs and that's it.

Mr. Hartig: Thank you. Are we done? We'll end on that positive note?"

During the SEDAR Steering Committee, August 1 - 2, 2006 in St. Thomas, USVI, the Committee reviewed the king mackerel mixing issue (the following is taken directly from the summary minutes):

"The Committee was provided the report of the king mackerel joint SSC subcommittee. The Committee did not believe that the suggestion of conducting Monte Carlo simulations will result in a mixing assumption different than 50/50 given the suggested simulation parameters. The Committee also discussed the other uncertainties in the assessment that were noted by the sub-committee.

The Committee agreed that it is not necessary to forward this issue for further deliberation by the subcommittee nor is it necessary to solicit an independent review of the mixing rate issue.

The Committee agreed that the Gulf and South Atlantic Councils should work to a consensus mixing rate assumption during the joint meeting scheduled for September 2006 in Hilton Head, SC."

Option 2 and 3 would split the king mackerel mixing zone between the South Atlantic and Gulf Councils. Data for cobia are presented in Table 2. Given that both Councils are required to manage towards the same goal (biomass capable of producing maximum sustainable yield), one could argue that this boundary removes any necessity to specify the mixing percentages. The fish would still be mixing but as long as the fishing mortality rate on both groups of fish is held constant (at a level to produce the maximum sustainable yield), both groups would be maintained at a level to produce the maximum sustainable yield over the long-term. Therefore, the mixing rate issue goes away and scarce research money can be redirected to more pressing issues like updating the almost 20 year old fecundity data.

The most recent cobia stock assessment (Williams 2001) indicated that there is very little mixing of cobia found in the Gulf and cobia from the Atlantic, and this mixing primarily occurs in the Florida Keys in winter. Prior to this recent analysis, cobia were believed to extensively mix in the Gulf and Atlantic, thus the councils adopted the following language in its Generic SFA Amendment: “For stocks, such as cobia, where scientific information indicates it is a common stock that migrates through the Gulf and South Atlantic jurisdictions, both Councils must concur on the recommendations.” The purpose of this action would be to separate management of cobia to be consistent with the current best available scientific information.

Table 2. Commercial landings of Cobia on Florida’s east coast by year and county.

Year	Florida East Coast	Monroe County	Total Landings
2000	60,478	26,461	86,939
2001	65,499	22,059	87,558
2002	61,340	18,954	80,294
2003	53,102	31,885	84,987

Source: Commercial landings of king mackerel (whole weight) for the counties on the east coast of Florida and Monroe County, 2000-2003. Data are from the Southeast Fisheries Science Center, General Canvass Landings Statistics, Miami, FL. Extraction date: 6/4/2004. Data provided by John Poffenberger, NMFS SEFSC. Table constructed by Dr. Kathi Kitner, former SAFMC staff.

ACTION 2. MODIFY THE EXISTING REQUIREMENTS FOR SEPARATE COMMERCIAL PERMITS FOR KING MACKEREL (CURRENTLY UNDER A MORATORIUM) AND SPANISH MACKEREL.

Option 1. No action.

Option 2. Modify the existing requirements by establishing separate commercial and charter/headboat permits for the Atlantic and Gulf based on the fixed boundary.

Option 2A. For king mackerel, the Councils are considering grandfathering in all existing permit holders who have historically landed in both areas to get a dual permit; when transferred to another individual it becomes either a Gulf or Atlantic permit.

IMPLICATIONS FOR MANAGEMENT UNDER A FIXED BOUNDARY

Landings data for each of the stock boundaries are shown below (Source: NMFS SEFSC):

Option 1. SEASONAL boundaries (current stock separations). Monroe County counted as Gulf November 1 – March 31 and counted as Atlantic April 1 – October 31. Miami-Dade through Volusia Counties counted as Gulf November 1 – March 31 and counted as Atlantic April 1 – October 31.

King mackerel landings (pounds) by migratory group and sector for 2001/2002 – 2005/2006 fishing years **using seasonal boundaries.**

seasonal_fy	Atlantic			Gulf		
	Commercial	Recreational	All Atlantic	Commercial	Recreational	All Gulf
2001/2002	2,057,999	3,240,479	5,298,478	2,902,390	3,755,770	6,658,160
2002/2003	1,788,407	2,671,654	4,460,061	3,174,044	4,474,997	7,649,041
2003/2004	1,828,978	4,100,409	5,929,387	3,090,470	3,503,214	6,593,684
2004/2005	2,838,484	3,287,142	6,125,626	3,210,827	3,660,884	6,871,711
2005/2006	2,298,934	3,946,766	6,245,700	2,930,373	3,314,167	6,244,540

Option 2. Fixed boundary (Monroe/Miami-Dade county line). Monroe County counted as Gulf all year. Miami-Dade through Volusia Counties counted as Atlantic all year.

King mackerel landings (pounds) by migratory group and sector for 2001/2002 – 2005/2006 fishing years **using a fixed boundary.**

fixed_fy	Atlantic			Gulf		
	Commercial	Recreational	All Atlantic	Commercial	Recreational	All Gulf
2001/2002	2,732,424	3,727,203	6,459,627	2,205,136	3,329,392	5,534,528
2002/2003	2,661,344	4,751,424	7,412,768	2,294,485	2,637,637	4,932,122
2003/2004	2,604,783	4,877,712	7,482,495	2,321,072	2,815,791	5,136,863
2004/2005	3,547,556	4,107,974	7,655,530	2,508,482	2,936,702	5,445,184
2005/2006	2,943,677	4,787,920	7,731,597	2,293,052	2,258,009	4,551,061

Option 3. 50/50 split in the mixing zone (Volusia through Miami-Dade counties, FL). Monroe County counted as Gulf all year. Miami-Dade through Volusia Counties counted as 50% Gulf and 50% Atlantic all year.

King mackerel landings (pounds) by migratory group and sector for 2001/2002 – 2005/2006 fishing years **using a 50/50 split in the mixing zone.**

FiftyFifty_fy	Atlantic			Gulf		
	Commercial	Recreational	All Atlantic	Commercial	Recreational	All Gulf
2001/2002	1,904,397	2,545,960	4,450,357	3,021,064	4,337,066	7,358,130
2002/2003	1,799,943	2,783,829	4,583,772	3,148,759	4,584,936	7,733,695
2003/2004	1,683,435	3,118,590	4,802,024	3,516,395	4,130,375	7,646,770
2004/2005	2,381,612	2,660,659	5,042,271	3,464,413	4,283,426	7,747,839
2005/2006	2,130,303	3,245,979	5,376,281	3,313,886	3,808,473	7,122,359

Projected ABC ranges for the three alternatives in this scoping document (based on 40% SPR) from the updated analyses conducted by the Southeast Fisheries Science Center (Appendix B, Table 5) are shown below. The most appropriate ABC values for Alternative 1 in the Amendment 18 scoping document (assuming Mackerel Amendment 18 is approved) is Scenario 2. The most appropriate ABC values for Alternative 2 in the Amendment 18 scoping document is Scenario 4 (Appendix B). The most appropriate ABC values for Alternative 3 in the Amendment 18 scoping document is bracketed by Scenarios 1 and 2.

Am 19 Scoping Document:	Atlantic (40% SPR)	Gulf (40% SPR)
Alt 1 (50/50 mixing)	7.6(4.6-11.8)	6.5(4.1-10.1)
Alt 2	6.6(3.8-10.9)	6.7(4.5-9.2)
Alt 3 (25/75) - (50/50)	7.2(5.1-11.6) - 7.6(4.6-11.8)	6.7(4.1-10.3) - 6.5(4.1-10.1)

Discussion

Under **Option 1** (Status Quo with shifting boundary and, if Mackerel Amendment 18 is approved, 50/50 mixing), the projected ABCs from Appendix B are as follows:

Atlantic Migratory Group (50% Atlantic) based on 40% SPR, ABC = 7.6 (4.6 – 11.8) MP

Gulf Migratory Group (50% Gulf) based on 40% SPR, ABC = 6.5 (4.1 – 10.1) MP

Under **Option 1** (Status Quo), the new catch data for fishing years 2001/2002 through 2005/2006 indicate the Atlantic migratory group of king mackerel has been producing on average about 56% of the current TAC (10.0 million pounds) while the Gulf migratory group has been producing on average about 67% of the current TAC (10.2 million pounds). However, based on the updated projections and 50% mixing, the best point estimate of the Atlantic TAC would be 7.6 million pounds and catches have been below that level. The best point estimate of the Gulf TAC would be 6.5 million pounds and catches have exceeded that level since 2001/2002 except for the 2005/2006 fishing year.

Under **Option 2** (Fixed boundary at the Miami-Dade/Monroe County Line on the Florida East Coast), the projected ABCs from Appendix B are as follows:

Atlantic Migratory Group (98% Atlantic) based on 40% SPR, ABC = 6.6 (3.8 – 10.9) MP

Gulf Migratory Group (2% Gulf) based on 40% SPR, ABC = 6.7 (4.5 – 9.2) MP

The updated landings data from Scenario 2 indicated that the best point estimate of the Gulf TAC has not been exceeded over the past 5 fishing years. The best point estimate of the Atlantic TAC was exceeded each year since the 2001/2002 fishing year.

Under **Option 3** (Fixed boundary at the Miami-Dade/Monroe County line on the Florida East Coast and including 50% of fish on East Coast as Gulf fish), the projected ABCs are best estimated from Appendix B using Scenario 1 (25% Atlantic, 75% Gulf) and Scenario 2 (50%/50%:

Scenario 1:

Atlantic Migratory Group (25% Atlantic) based on 40% SPR, ABC = 7.2 (5.1 – 11.6) MP

Gulf Migratory Group (75% Gulf) based on 40% SPR, ABC = 6.7 (4.1 – 10.3) MP

Scenario 2:

Atlantic Migratory Group (50% Atlantic) based on 40% SPR, ABC = 7.6 (4.6 – 11.8) MP

Gulf Migratory Group (50% Gulf) based on 40% SPR, ABC = 6.5 (4.1 – 10.1) MP

The updated landings data from Scenario 3 indicated that the best point estimate of the Gulf TAC (6.5 – 6.7 MP) has been exceeded each of the past 5 fishing years. The best point estimate of the Atlantic TAC (7.2 – 7.6 MP) was not exceeded over the past 5 fishing years.

REFERENCES

Williams, E. H. 2001. Assessment of cobia, *Rachycentron canadum*, in the waters of the U.S. Gulf of Mexico. U.S. Dept. Commerce. NOAA Center for Coastal Fisheries and Habitat Research, 101 Pivers Island Road, Beaufort, NC 28516-9722. 55pgs.

APPENDIX A. COUNCIL'S MOTIONS

Motion #1: The Council approved the following three alternatives for boundaries/mixing rates for king mackerel to take to public scoping:

1. NO ACTION
2. DADE/MONROE – NORTH OF LINE 100% ATLANTIC; SOUTH OF LINE 100% GULF
3. MONROE – 100% GULF; VOLUSIA THROUGH DADE – 50/50

Motion #2: Relative to an Atlantic/Gulf boundary for other coastal migratory species, the Council approved the following to take to public scoping: Develop separate Coastal Migratory Pelagic FMPs for the Atlantic and Gulf Councils and establish a fixed boundary at the Dade/Monroe County line on the Florida East Coast to correspond to the Spanish mackerel fixed boundary. This boundary applies to cero, cobia, king mackerel, Spanish mackerel, and little tunny; as new species are added, they would be included with this fixed boundary.

Motion #3: The Council voted to include the following permit alternatives to take to public scoping:

1. NO ACTION – ONE PERMIT BOTH COUNCIL AREAS
2. SEPARATE PERMIT FOR GULF AND SEPARATE PERMIT FOR ATLANTIC
3. FOR KING MACKEREL, GRANDFATHER IN ALL EXISTING PERMIT HOLDERS WHO HAVE HISTORICALLY LANDED IN BOTH AREAS TO GET A DUAL PERMIT; WHEN TRANSFERRED TO ANOTHER INDIVIDUAL IT BECOMES EITHER A GULF OR ATLANTIC PERMIT

Motion #4: The Council voted to take to scoping a joint amendment to create two separate Coastal Migratory Pelagic FMPs (Atlantic and Gulf) based on the alternatives outlined above in Motions #1-#3.

APPENDIX B. UPDATE OF KING MACKEREL PROJECTIONS FOR THE GULF OF MEXICO AND SOUTH ATLANTIC STOCKS BASED ON RESULTS PRESENTED AT SEDAR 5. SOUTHEAST FISHERIES SCIENCE CENTER. 11/14/06

In response to a request from the SAFMC and GMFMC joint SSC sub-committee, projections of stock trends were carried out for the Gulf and Atlantic King mackerel stocks with updated catches assuming different levels of mixing between stocks. The methods used followed those described in the sensitivity to mixing assumptions section of Ortiz (2004) except that the catches for the fishing seasons 2002/2003 through 2005/2006 were updated.

The updates of directed catch by fishing year within the mixing area (Florida east coast for recreational catch, MRFSS and Headboat; and Monroe to Volusia counties for commercial catch) were allocated according to fixed percentages for each stock. The following mixing runs and fits developed during the Assessment workshop SEDAR 5 were used for projections with the updated catch (Ortiz 2004):

Percent allocation catch mixing area	Atlantic stock	Gulf stock
Scenario 1	25%	75%
Scenario 2	50%	50%
Scenario 3	75%	25%
Scenario 4	98%	2%

Scenarios 1 to 3 follow the recommendations and conclusions from the SEDAR 5 review panel regarding the likely range of mixing between Atlantic and Gulf stocks. Scenario 4 was used as a proxy for the requested run assuming a Dade/Monroe north as 100% Atlantic and south as 100% Gulf. This proxy was used because it was not possible to partition the recreational catch by counties for Florida.

The directed recreational and commercial catches were updated for fishing years 2002/03 through 2005/06 under each of the above scenarios. Because 2006/07 is still ongoing, it was assumed that catch in 2006/07 was the same as in 2005/06 in all cases. Table 1 shows the updated directed catch by fishing year and stock for each of the mixing scenarios considered. For projections, commercial catch is input as weight (pounds), and recreational catch as numbers of fish landed.

The catch estimates provided by MRFSS for the charter boat (cb) component after the year 2000 were modified and updated (resulting mainly in a decrease in the estimates of offshore charter boat effort). Table 2 shows a comparison of the recreational landings as used in the last assessment for king mackerels and the current estimates with the “new” MRFSS-cb method. The new method gives substantially lower estimates, particularly for the Gulf stock). As the stock assessments were originally accomplished using the “old” MRFSS estimates, it would be most consistent to use the “old” MRFSS methodology to update the catches in the revised projections. For comparison, projections were also done using the “new” MRFSS estimates (Table 3). However, these projections are likely to be overly optimistic since the stock assessments were based on the higher “old” estimates, i.e., the projections using the lower “new” MRFSS estimates only for recent years suggest a greater proportional decline in the fishing mortality rate than actually occurred. The use of the “new” MRFSS estimates would have been more appropriate had the assessments also been conducted using the “new” estimates.

Results

Projections for each scenario were performed for a deterministic run model and 500 bootstraps runs to infer levels of uncertainty. Stock status was evaluated as in previous assessments by comparing the fishing mortality rates in 2006/07 FY and spawning stock biomass at the beginning of 2007/08 FY to adopted control rule benchmarks of MFMT and MSST, respectively (SEDAR 5 report). This control rule sets the minimum stock size threshold (MSST) to $(1-M) \cdot B_{MSY}$, and the maximum fishing mortality threshold (MFMT) to F_{MSY} for spawning stock above MSST and decreasing linearly to the origin for spawning stock sizes below MSST. For king mackerel, stock status are defined in terms of risk/probability such that overfishing is indicated when the probability of fishing mortality exceeding FMFT, $P(F > MFMT)$, is 50% or greater, and overfished is indicated when the probability of spawning biomass (SS) falling below MMST, $1 - P(SS > MSST)$, is 50% or greater. These probabilities were inferred from the cumulative probability densities of the 500 bootstrap runs.

Table 4 shows a summary of the stock status for Atlantic and Gulf king stocks under the different mixing scenarios. The “Percent $F_{2006} > F_{ref}$ ” indicates the probability the stock is undergoing overfishing as percent units. If this value is less than 50% it indicates that not overfishing is occurring in FY 2006/07. The “Percent $SS_{2007} < MSST_{ref}$ ” indicates the corresponding probability value that the stock at the beginning of FY 2007/08 (or end of FY 2006/07) is below MSST. If the value is less than 50% it indicates that the stock was likely not overfished in FY 2006/07. Table 4 also presents the results of the deterministic run in each scenario as direct ratios of F_{2006}/F_{MSY} , and the F_{2006}/F_{OY} ratio (F_{OY} for king mackerel was adopted as $F_{40\%SPR}$). Figures 1 and 2 show the control-rule plots for Atlantic and Gulf king stocks for the different mixing scenarios. For the Atlantic stock, in general there is larger uncertainty in the model fits and projections as indicated by the greater spread of results in the plots, compared to the Gulf stock results. The Atlantic stock in all cases is not overfished, i.e. spawning stock is above the MSST control value, and/or the probability of $SS < MSST$ is always below 50%. As the percent of catch within the mixing area increases, assuming that most of the catch in the Florida east coast actually is from the Atlantic stock, the trend indicates that the stock is more exploited, i.e. the spawning stock is closer to the biomass threshold of MSST at 98% of catch allocated to the Atlantic stock unit. This trend is also repeated in terms of fishing mortality. F_{2006} is below F_{OY} reference for mixing rates of 50% or below, at F_{OY} for mixing rate of 75%, and slightly above MFMT at 98% mixing scenario. In the case of the 98% mixing scenario, the deterministic run indicates an overfishing condition in FY2006, but the probability of $F_{2006} > MFMT$ inferred from the bootstrap analyses is only 30%.

For the Gulf stock Table 4 presents also the results of the stock status in FY2006. For all mixing scenarios evaluated, the spawning stock at the end of FY2006 is above MSST. The ratio of SS/SS_{MSY} is higher at lower mixing levels. Fishing mortality is also below the MFMT (F_{MSY}) in all mixing scenarios, and for mixing levels of 25% or less F_{2006} is at or below F_{OY} proxy. In conclusion no overfishing is going on in FY2006 for the Gulf stock under any mixing allocation evaluated.

Table 5 presents the estimated benchmarks for the Atlantic and Gulf stock under mixing scenarios and estimated allowable biomass (ABC) for the FY2007 if long term target is either F_{MSY} (30%SPR) or F_{OY} (40%SPR). The values presented are the median of 500 bootstraps with 10% and 80% percentiles of the cumulative distributions. For the Atlantic stock ABC (30%SPR) ranged from 9.1 to 10.9 million pounds for the different mixing levels, while ABC 40%SPR ranged from 6.6 to 7.9 million pounds. For the Gulf stock ABC (30%SPR) ranged from 9.1 to 9.4 million pounds and ABC (40%SPR) from 6.5 to 6.7 million pound. (Note that these ABC values are scaled in terms of the “old” MRFSS cb methodology; if quota compliance is measured in terms of the “new” MRFSS methodology, then an adjustment must be made to account for this.) All other benchmarks are the same as in the last assessment reports (SEDAR 5) as the models were not modified; only projections were performed with updated catches. Figure 3 shows these benchmark values for each mixing scenario, bars represent estimated 80% confidence bounds.

The aforementioned results pertain to the projections that used catches updated through 2005/06 using the “old” MRFSS charterboat methodology (as was used for the assessments the projections are based on). As mentioned previously, changes in the methodology for estimating catch and effort of the MRFSS recreational fisheries went into effect after 2000. The “new” estimates are substantially lower than those

obtained with the “old” methodology, particularly for the Gulf stock recreational catch (Table 2). For comparison purposes, projections of mixing scenarios were also done using estimated recreational catch with the “new” charter boat MRFSS estimates (Table 6). As expected, the estimates of stock status are slightly more optimistic. The drop in total catch levels from the assessment years (“old” method estimates) to the levels used for the projection years (“new” method estimates) is exaggerated owing to the change in methodology, which in turn exaggerates the reduction in fishing mortality predicted by the projections and makes future stock status appear slightly better. Again, it must be emphasized that these projections are **NOT** consistent with the assessment models they are based on. To be consistent, the “new” MRFSS estimates should be incorporated in the historical catch (i.e. within the VPA time period) as well as in the projections, which would essentially entail a new assessment.

References

Ortiz 2004. SEDAR5-AW3. Stock assessment analysis on Gulf of Mexico king mackerel. SFD -2004-004.

SEDAR5 2004. Final Report. Stock assessment report South Atlantic and Gulf of Mexico king mackerel.

Table 1. Commercial and recreational total catch by fishing year for the Atlantic and Gulf king mackerel stock under different scenarios (1 to 4) of allocation of the catch within the mixing area. Commercial catch is in pounds, recreational catch in numbers of fish landed (AB1). Shaded areas represent the years of updated catch for projections from the mixing models run during the assessment workshop SEDAR 5. The recreational estimates use the same model (“Old”-cb MRFSS) for estimating the charter boat component of MRFSS as were in the VPA assessments of Gulf and king mackerel SEDAR 5.

COMMERCIAL CATCH					
Scenarios of mixing					
		1	2	3	4
Atlantic		25%	50%	75%	98%
Gulf		75%	50%	25%	2%
MigGrp	Fyear	lbs	lbs	lbs	lbs
Atlantic	2000/2001	1,747,757	2,431,962	3,116,166	3,745,635
	2001/2002	1,676,836	2,345,331	3,013,825	3,628,840
	2002/2003	1,564,529	2,274,939	2,985,349	3,638,926
	2003/2004	1,361,007	2,078,840	2,796,672	3,457,077
	2004/2005	2,072,282	2,951,651	3,831,019	4,640,038
	2005/2006	2,087,981	2,781,538	3,475,094	4,113,166
Gulf	2000/2001	3,441,248	2,757,044	2,072,839	1,443,370
	2001/2002	3,278,282	2,609,788	1,941,293	1,326,278
	2002/2003	3,408,387	2,697,977	1,987,567	1,333,990
	2003/2004	3,553,371	2,835,539	2,117,706	1,457,301
	2004/2005	3,977,871	3,098,503	2,219,134	1,410,115
	2005/2006	3,244,279	2,550,723	1,857,166	1,219,095

Recreational Catch (Headboat + MRFSS + TXWP)					
Scenarios of mixing					
		1	2	3	4
“Old”-cb method MRFSS					
Atlantic		25%	50%	75%	98%
Gulf		75%	50%	25%	2%
MigGrp	Fyear	Numb	Numb	Numb	Numb
Atlantic	1998/1999	311,459	396,287	481,115	559,157
	1999/2000	211,420	297,875	384,330	463,869
	2000/2001	332,685	430,292	527,898	617,697
	2001/2002	209,640	269,174	328,709	383,481
	2002/2003	191,056	289,832	388,608	479,481
	2003/2004	243,954	340,436	436,918	525,682
	2004/2005	208,413	280,806	353,198	419,799
	2005/2006	246,193	302,864	359,535	411,673
Gulf	1998/1999	682,960	598,132	513,304	435,262
	1999/2000	623,537	537,082	450,627	371,089
	2000/2001	803,780	706,173	608,567	518,768
	2001/2002	694,987	635,452	575,918	521,146
	2002/2003	686,642	587,866	489,090	398,217
	2003/2004	684,351	587,869	491,387	402,623
	2004/2005	621,602	549,210	476,817	410,216
	2005/2006	582,444	525,773	469,102	416,964

Table 2. Comparison of the estimated recreational catch from the MRFSS component for Atlantic and Gulf king mackerel stock using the prior (Old-cb) and current (New-cb) methods. Assessments in 2003 (Atlantic stock) and 2004 (Gulf stock) used recreational catch from the prior method. Values are in thousand fish landed (AB1).

MigGrp	FYear	New-cb MRFSS 1000 x	Old-cb MRFSS 1000 x	Last SA SA2003	Difference
Atlantic	1998/1999	438.5	438.5	438.4	(0.07)
	1999/2000	359.2	359.2	359.2	(0.04)
	2000/2001	551.5	551.5	551.4	(0.07)
	2001/2002	336.5	336.5	336.6	0.12
	2002/2003	277.4	277.4		
	2003/2004	425.8	448.2		
	2004/2005	341.3	344.5		
	2005/2006	409.8	384.5		
		-		SA2004	
Gulf	1998/1999	453.5	556.0	561	107.55
	1999/2000	408.5	475.7	471	62.48
	2000/2001	445.6	585.0	585	139.45
	2001/2002	442.0	568.1	570	128.01
	2002/2003	526.6	600.3		
	2003/2004	412.3	480.1		
	2004/2005	430.8	485.6		
	2005/2006	390.0	200.2		

Table 3. Updated recreational catch (numbers of fish retained AB1) for Atlantic and Gulf king mackerel estimated with the “New” charter boat method by MRFSS by fishing year under different scenarios (1 to 4) of allocation of the catch within the mixing area.

Recreational Catch (Headboat + MRFSS + TXWP)					
Scenarios of mixing					
		1	2	3	4
“New” cb method MRFSS					
	Atlantic	25%	50%	75%	98%
	Gulf	75%	50%	25%	2%

MigGrp	Fyear	Numb	Numb	Numb	Numb
Atlantic	1998/1999	311,459	396,287	481,115	559,157
	1999/2000	211,420	297,875	384,330	463,869
	2000/2001	332,685	430,292	527,898	617,697
	2001/2002	209,640	269,174	328,709	383,481
	2002/2003	192,709	293,138	393,568	485,962
	2003/2004	236,749	326,025	415,302	497,437
	2004/2005	206,587	277,222	347,858	412,843
	2005/2006	257,412	320,015	382,619	440,214
Gulf	1998/1999	580,462	495,634	410,806	332,764
	1999/2000	556,345	469,890	383,435	303,897
	2000/2001	664,333	566,726	469,119	379,321
	2001/2002	568,835	509,300	449,766	394,994
	2002/2003	611,342	510,913	410,484	318,089
	2003/2004	601,297	512,020	422,743	340,608
	2004/2005	565,567	494,931	424,295	359,310
	2005/2006	542,407	479,804	417,200	359,605

Table 4. Stock status of Atlantic and Gulf king mackerel at the end of the fishing year (FY) 2006 under different scenarios of allocation of the catch within the mixing area. Stock evaluations are based on VPA mixing model runs done during the assessment workshop SEDAR 5 and updated with catch from FY2002 through FY2005, for FY2006 it was assumed similar catches as in FY2005.

PROJECTION WITH CACTH OF MRFSS OLD CB METHOD					
Allocation of the CAA Mixing Area for each stock					
ATLANTIC STOCK			GULF STOCK		
Summary of F ratios			Summary of F ratios		
25% MixRun	MODEL Mix 25	F/Fmsy	F / Foy	75% MixRun	MODEL 75% Mix
					F/Fmsy
					F / Foy
Deterministic	0.473008	0.6694		Deterministic	0.854427
Percent F2006> F ref	0.2%	2.6%		Percent F2006> F ref	38%
N boots F2006 > F ref	1	13		N boots F2006 > F ref	192
Percent SS2007< MSST ref	0.01			Percent SS2007< MSST ref	37%
N boots SS2007 < SS ref	4			N boots SS2007 < SS ref	184
50% MixRun	MODEL Mix 50%	F/Fmsy	F / Foy	50% MixRun	MODEL 50% Mix
					F/Fmsy
					F / Foy
Deterministic	0.605008	0.855201		Deterministic	0.799451
Percent F2006> F ref	3.2%	16%		Percent F2006> F ref	26%
N boots F2006 > F ref	16	79		N boots F2006 > F ref	130
Percent SS2007< MSST ref	4%			Percent SS2007< MSST ref	31%
N boots SS2007 < SS ref	21			N boots SS2007 < SS ref	155
75% MixRun	MODEL Mix 75	F/Fmsy	F / Foy	25% MixRun	MODEL 25% Mix
					F/Fmsy
					F / Foy
Deterministic	0.73442	1.037284		Deterministic	0.693945
Percent F2006> F ref	8%	31%		Percent F2006> F ref	15%
N boots F2006 > F ref	38	154		N boots F2006 > F ref	75
Percent SS2007< MSST ref	6%			Percent SS2007< MSST ref	20%
N boots SS2007 < SS ref	32			N boots SS2007 < SS ref	98
98% MixRun	MODEL Atl 98%	F/Fmsy	F / Foy	2% MixRun	MODEL Gulf 2% Mix
					F/Fmsy
					F / Foy
Deterministic	1.025795	1.480651		Deterministic	0.595706
Percent F2006> F ref	30%	64%		Percent F2006> F ref	4%
N boots F2006 > F ref	150	321		N boots F2006 > F ref	21
Percent SS2007< MSST ref	23%			Percent SS2007< MSST ref	8%
N boots SS2007 < SS ref	113			N boots SS2007 < SS ref	41

Table 5. Summary of estimated benchmarks for the Atlantic and Gulf king mackerel stocks under different mixing scenarios and estimated ABC for the FY 2007 of long term target F_{MSY} (30%SPR) or F_{OY} (40%SPR). Median, low 80% and upper 80% values represent the median, 10th percentile and 90th percentile, respectively of 500 bootstrap runs for each case. The deterministic value is the point estimated of the non-bootstrapped model.

PROJECTION WITH CACTH OF MRFSS OLD CB METHOD										
% Mixed	Atl 98%	SS MSY	F MSY	MSY	SS OY	F OY	OY	ABC 30% 20%	ABC 40% 20%	
		Median	4.159	0.312	8.318	5.609	0.218	7.738	9.1	6.6
		low 80%	3.319	0.269	6.379	4.601	0.191	6.175	5.2	3.8
		upp 80%	5.656	0.369	11.518	7.602	0.256	10.520	15.1	10.9
		deterministic	3.908	0.284	7.872	5.210	0.197	7.306		
% Mixed	Atl 75%	SS MSY	F MSY	MSY	SS OY	F OY	OY	ABC 30% 20%	ABC 40% 20%	
		Median	4.192	0.318	7.989	5.751	0.225	7.616	10.9	7.9
		low 80%	3.108	0.275	5.919	4.541	0.195	5.917	6.7	4.9
		upp 80%	5.628	0.369	11.128	7.432	0.260	10.258	17.1	12.4
		deterministic	3.900	0.307	7.626	5.200	0.217	6.997		
% Mixed	Atl 50%	SS MSY	F MSY	MSY	SS OY	F OY	OY	ABC 30% 20%	ABC 40% 20%	
		Median	3.772	0.309	7.359	5.113	0.218	6.929	10.4	7.6
		low 80%	2.701	0.267	4.985	4.135	0.189	5.343	6.3	4.6
		upp 80%	5.184	0.363	10.466	6.956	0.255	9.747	15.8	11.8
		deterministic	3.561	0.297	6.971	4.748	0.210	6.410		
% Mixed	Atl 25%	SS MSY	F MSY	MSY	SS OY	F OY	OY	ABC 30% 20%	ABC 40% 20%	
		Median	3.352	0.304	6.533	4.670	0.214	6.262	10.0	7.2
		low 80%	2.262	0.266	4.341	3.721	0.187	4.909	7.0	5.1
		upp 80%	4.686	0.351	9.431	6.341	0.247	9.027	16.0	11.6
		deterministic	3.225	0.287	6.322	4.300	0.203	5.826		
% Mixed	Glf 75%	SS MSY	F MSY	MSY	SS OY	F OY	OY	ABC 30% 20%	ABC 40% 20%	
		Median	5.859	0.267	10.413	7.852	0.188	9.225	9.3	6.7
		low 80%	5.108	0.233	8.813	6.826	0.164	7.835	5.7	4.1
		upp 80%	6.816	0.364	12.200	9.044	0.253	10.794	14.2	10.3
		deterministic	5.940	0.232	10.485	7.920	0.164	9.263		
% Mixed	Glf 50%	SS MSY	F MSY	MSY	SS OY	F OY	OY	ABC 30% 20%	ABC 40% 20%	
		Median	5.355	0.285	9.529	7.147	0.199	8.472	9.1	6.5
		low 80%	4.742	0.235	8.219	6.356	0.166	7.276	5.8	4.1
		upp 80%	6.212	0.415	11.404	8.235	0.283	9.942	13.9	10.1
		deterministic	5.385	0.256	9.508	7.180	0.180	8.405		
% Mixed	Glf 25%	SS MSY	F MSY	MSY	SS OY	F OY	OY	ABC 30% 20%	ABC 40% 20%	
		Median	4.969	0.293	8.776	6.635	0.203	7.791	9.1	6.5
		low 80%	4.356	0.239	7.410	5.831	0.167	6.619	5.7	4.0
		upp 80%	5.651	0.429	10.272	7.568	0.294	9.038	13.2	9.5
		deterministic	4.953	0.267	8.709	6.603	0.187	7.693		
% Mixed	Glf 2%	SS MSY	F MSY	MSY	SS OY	F OY	OY	ABC 30% 20%	ABC 40% 20%	
		Median	4.584	0.315	8.114	6.107	0.217	7.212	9.4	6.7
		low 80%	4.030	0.247	7.046	5.371	0.171	6.219	6.4	4.5
		upp 80%	5.251	0.499	9.565	7.015	0.331	8.518	12.9	9.2
		deterministic	4.551	0.295	8.082	6.067	0.204	7.143		

Table 6. Stock status of Atlantic and Gulf king mackerel at the end of the fishing year (FY) 2006 under different scenarios of allocation of the catch within the mixing area using the MRFSS estimates with the “new” cb method. Stock evaluations are based on VPA mixing model runs done during the assessment workshop SEDAR 5 and updated with catch from FY2002 through FY2005, for FY2006 it was assumed similar catches as in FY2005.

PROJECTION WITH CATCH OF MRFSS NEW CB METHOD					
ATLANTIC			GULF		
Summary of F ratios			Summary of F ratios		
25% MixRun	MODEL Mix 25		75% MixRun	MODEL 75% Mix	
	F/Fmsy	F / Foy		F/Fmsy	F / Foy
Deterministic	0.48325	0.683896	Deterministic	0.788638	1.11614
Percent F2006> F ref	0.2%	3.0%	Percent F2006> F ref	29%	72%
N boots F2006 > F ref	1	15	N boots F2006 > F ref	147	359
Percent SS2007< MSST ref	0.01		Percent SS2007< MSST ref	30%	
N boots SS2007 < SS ref	5		N boots SS2007 < SS ref	149	
50% MixRun	MODEL Mix 50		50% MixRun	MODEL 50% Mix	
	F/Fmsy	F / Foy		F/Fmsy	F / Foy
Deterministic	0.62042	0.876985	Deterministic	0.723836	1.031133
Percent F2006> F ref	4.0%	18%	Percent F2006> F ref	17%	58%
N boots F2006 > F ref	20	92	N boots F2006 > F ref	87	291
Percent SS2007< MSST ref	4%		Percent SS2007< MSST ref	24%	
N boots SS2007 < SS ref	22		N boots SS2007 < SS ref	118	
75% MixRun	MODEL Mix 75		25% MixRun	MODEL 25% Mix	
	F/Fmsy	F / Foy		F/Fmsy	F / Foy
Deterministic	0.754905	1.066218	Deterministic	0.61343	0.877624
Percent F2006> F ref	8%	33%	Percent F2006> F ref	7%	36%
N boots F2006 > F ref	40	166	N boots F2006 > F ref	37	180
Percent SS2007< MSST ref	7%		Percent SS2007< MSST ref	15%	
N boots SS2007 < SS ref	33		N boots SS2007 < SS ref	77	
98% MixRun	MODEL Atl 98%		2% MixRun	MODEL Gulf 2% Mix	
	F/Fmsy	F / Foy		F/Fmsy	F / Foy
Deterministic	1.056139	1.52445	Deterministic	0.509198	0.735638
Percent F2006> F ref	34%	67%	Percent F2006> F ref	1%	15%
N boots F2006 > F ref	172	336	N boots F2006 > F ref	5	75
Percent SS2007< MSST ref	23%		Percent SS2007< MSST ref	5%	
N boots SS2007 < SS ref	114		N boots SS2007 < SS ref	25	

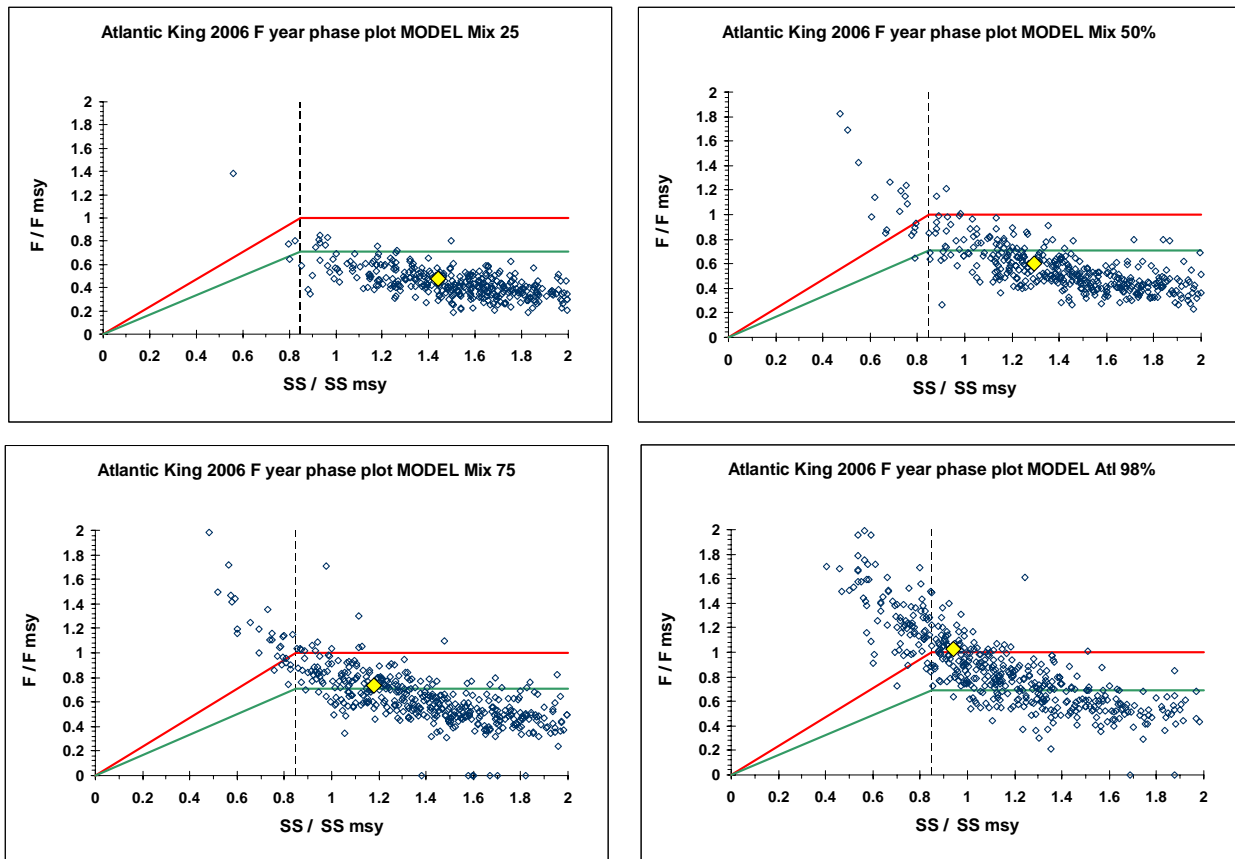


Figure 1. Phase plots of 500 bootstraps for the Atlantic king mackerel stock under different scenarios of catch allocation from the mixing area. The red solid line denotes the MFMT control rule (F_{MSY}), the vertical line the MSST, and the green line the target (F_{OY}) control rules. The larger diamond marker represents the deterministic run in each case.

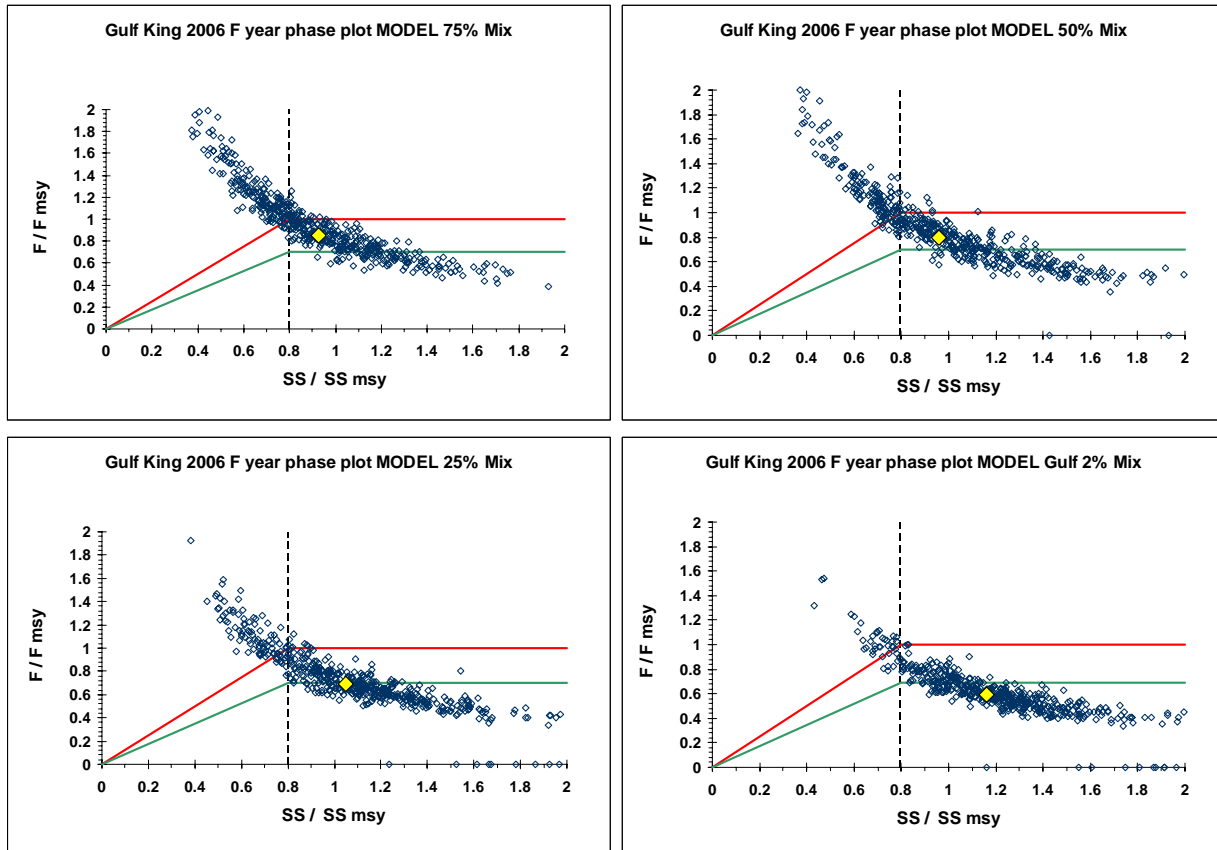


Figure 2. Phase plots of 500 bootstraps for the Gulf king mackerel stock under different scenarios of catch allocation from the mixing area. The red solid line denotes the MFMT control rule (F_{MSY}), the vertical line the MSST, and the green line the target (F_{OY}) control rules. The larger diamond marker represents the deterministic run in each case.

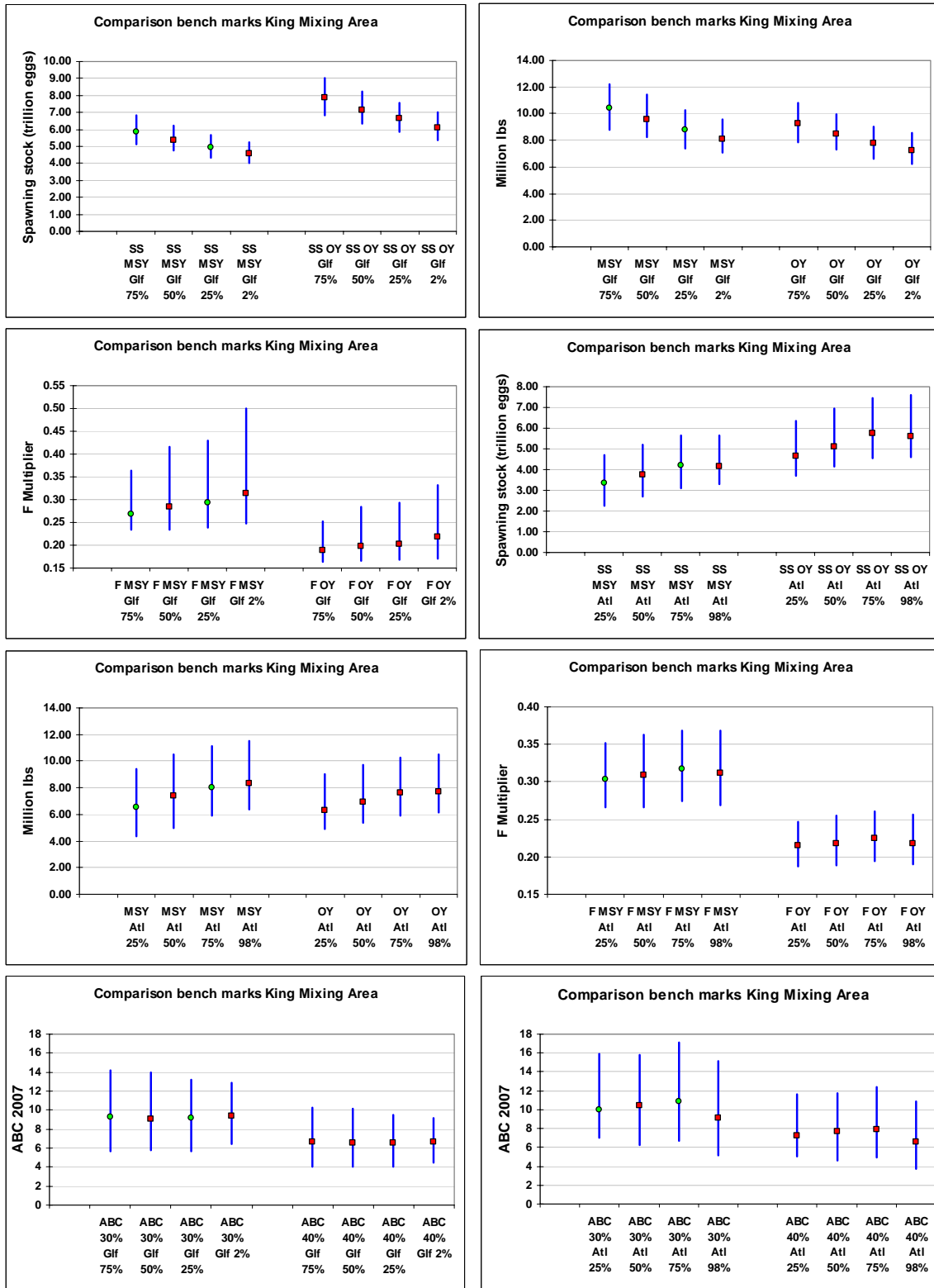


Figure 3. Comparison of estimated Atlantic and King mackerel benchmarks under different allocations of catch from the mixing area. Bars represent estimated 80% confidence intervals, marker the median of 500 bootstrap runs.