Beaufort Partial Response to the request from the SAFMC
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Executive Summary

In response to the SAFMC memo dated 8-20-09, we identify 64 fish stocks under the SAFMC jurisdiction for which OFLs are required. For many of these stocks, only limited information, primarily landings will be available. This report identifies data needs and offers a tiered approach for developing OFLs. The tiered approach ranges from developing landings streams to applying simple models to recommending a limited number of stocks for later SEDAR. There would be a minimum of six (6) workshops to accomplish these tasks. Processing and reading of archived age data for these 64 remaining stocks could take up to four years to complete.

This report is not intended as a proposal *per se* to accomplish the tasks requested, for which further refinement would be needed. But rather to provide background on what it might take to do so.

Introduction

The purpose of this report is to provide recommendations for how to proceed with the request from SAFMC memo dated 8-20-09:

> For unassessed stocks, the SSC requests the Council ask the Science Center to apply "best available science", and provide estimates of OFL and the associated uncertainty through 2015. It is strongly recommended that these estimates be developed through a peer-reviewed process. The SSC also requests that the report summarizing the results include a detailed description of the methodology used to calculate the estimates and uncertainty. PSA values as performed under the MRAG approach are needed for all stocks not included in the MRAG report dated March 2009.

This report addresses this request as follows:

1. Identify the unassessed fish stocks referred to in the SAFMC request above.

2. Identify data needs to meet this request.

3. Suggest a tiered approach to developing OFLs.

Identifying SAFMC Unassessed Fish Stocks

In a report prepared by Erik Williams (April 16, 2008), SAFMC stocks are grouped according to the level of assessment possibility. With modifications, these results are summarized in Table 1

for those SAFMC species which have yet to undergo a SEDAR peer review. For purposes of this discussion, we have deleted the following: spiny lobsters, shrimp, and corals. We have also deleted red drum because authority for management of Atlantic red drum was recently transferred from SAFMC to ASMFC. The Atlantic red drum stock(s) assessment just completed peer review through SEDAR 18. In this report, we do not include Williams' category "Definitely" which have undergone SEDAR review. Because the dolphin assessment did not go through a SEDAR review (i.e., predated SEDARs), we retain it here and list it as "likely", although this may be debatable, since attempts to develop a surplus production model were unsuccessful, and a metric based on landings was used for the benchmark. We have highlighted wreckfish (listed as "maybe" in the Williams report), because during the last assessment, Vaughan et al. (2002) noted that there was considerable concern over the unit stock assumption. This assessment was also pre-SEDAR.

Sixty-four (64) of the 79 fish stocks remain of those listed by Williams, after subtracting out the 15 stocks assessed through SEDAR (including SEDAR 19 in progress for red and black grouper). Of the unassessed fish stocks, 10 are listed under the FSSI.

For this discussion, the following table summarizes the 64 unassessed fish stocks by eight species groupings. 'Coastal' refers to the mackerel and coastal pelagics (mackerels, cobia, dolphin). Puddingwife was lumped with the porgies.

Count of FSSI?	Column Labels									
	Likely			Likely Total	Maybe		Maybe Total	No		No Total	Grand Total
Row Labels	No	Yes			No	Yes		No	Yes		
Coastal	1	3		4							4
Grouper	4	2		6	3	2	5	5	1	6	17
Grunt	2	1		3	1		1	2		2	6
Jack	2			2	3		3	2		2	7
Porgy	4			4	5		5	6		6	15
Snapper	3			3				7		7	10
Tilefish	1			1	1		1				2
Triggerfish	1	1		2	1		1				3
Grand Total	18	7		25	14	2	16	22	1	23	64

Identifying Data Needs and Tiered Approaches

To develop OFLs, some minimal level of data needs to be identified. At the very least, basic landings data will be required for all of the 64 unassessed fish stocks. This will likely be all that can be assembled for the 23 species identified as "No" under assessibility. Some of the 16 species fall into that gray area listed as "Maybe" under the Assessibility column (Table 1). Some of these species may have to fall back on simply using landings for developing OFL. The remaining 25 fish stocks will "likely" require some level of stock assessment. At the least, an

attempt to assemble additional data beyond landings will be necessary for the 41 fish stocks listed as either "likely" or "maybe".

In general one should consider a tiered approach based on a hierarchy of analysis/modeling for the purpose of estimating OFLs. Minimally landings data are required that sufficiently describe removals by the various fishing sectors. If these data are not available, then even an OFL based on landings statistics would not be possible.

There are several simple models that might be developed from these landings data depending on the availability of auxiliary data:
- If indices of abundance can be developed (preferably fishery independent but fishery dependent may be the only option), then surplus production models (e.g., ASPIC) should be investigated.
- If there is sufficient aging data to obtain a catch curve estimate of fishing mortality, then yield per recruit analysis should be considered. At the least, catch curve-derived F estimates may help to inform the statistic used from landings data for OFL.
- Another modeling approach that may be considered could be based on the recent work by Todd Gedamke using length composition data, particularly where length data may be robust over a long time period.
- Finally, more complex models such as statistical catch-age models would typically be reviewed by the SEDAR process.

Recent discussions with Steve Turner have outlined issues related to assembling landings data and the efforts required to accomplish this activity. Assembling of landings data is an essential first step in the process discussed here for addressing OFLs for the 64 fish stocks under the SAFMC jurisdiction not yet assessed.

Thus, we suggest the following tiered approach for possible development of OFLs for unassessed stocks:

1. Develop landings streams for the 64 unassessed fish stocks under the SAFMC snapper-grouper FMP. If not possible, list species as "ecosystem".

2. Develop indices of abundance from catch and effort streams and other auxiliary information for the 41 unassessed fish stocks listed as "likely" or "maybe" in Table 1.

3. Initially develop OFLs from these landing streams for stocks for all 64 stocks. Decide for which fish stocks this is the best we can do.

4. Develop surplus production models and/or yield per recruit analyses for those fish stocks for which auxiliary information can be developed.

5. Identify fish stocks for which a full blown SEDAR should be conducted.

We now proceed through these topics in greater detail.

1. Develop landings streams for the 64 unassessed fish stocks under the SAFMC snapper-grouper FMP.

As identified by Dr. Turner, the development of landings data from three major harvesting sectors is the critical first step. Each harvesting sector (commercial, recreational, headboat) has separate data collection programs. Problems associated with each of these must be addressed by those most familiar with the data. Solutions to these problems typically have been developed during SEDAR data workshops. Although one huge workshop might seem efficient, trying to cover 64 fish stocks would likely be overwhelming. A series of data workshops may actually be more efficient, where each workshop is devoted to a smaller grouping of fish stocks; e.g., snappers, etc., as provided in the summary table above.

Even before a series of data workshops begin, certain decisions and analyses will need to be accomplished, since it will be critical that groups responsible for different data sets pre-process and analyze their data prior to the workshops.

For all harvesting segments, the geographic boundaries must be set. This is typically from Cape Hatteras to the SAFMC/GSMFC boundary in the Florida Keys. By not having boundaries at state or county lines, a lot of time has been spent trying to split landings. Considerable time and effort is spent splitting commercial landings within Monroe County, FL. Various decisions have been made for the historical ALS data, with logbooks used for more recent Florida landings data (since 1992). An alternative would be similar to that used historically for Spanish mackerel and red drum. For these species, the split between SAFMC and GSFMC is made at the Dade-Monroe county line. This approach would simplify analyses for the snapper-grouper species in particular.

- Another issue affecting all harvesting sectors concerns species identification problems. The most recent example for this has been confusion in the data between gag and black grouper (resolved during their respective SEDAR data workshops). Staff responsible for providing landings (Commercial, Headboat, MRFSS/MRIP) with knowledge of these species will need to go through the list of 64 species and provide some judgment concerning this issue. For commercial landings, communication between NMFS and state agencies would be important. Recall that the TIP data base was used to resolve this problem for gag and black grouper during SEDAR 10. Any analytical work on this topic ought to be investigated ahead of the landings workshop.

- During our SEDAR data workshop, we typically try to reconstruct historical landings prior to when they have been identified to the species level in the landings data sets. For commercial landings, early landings are only given by species groupings; e.g., unidentified groupers. An effort will need to be made to parse these landings out proportionally among the identified groupers during the SEDAR data workshops. This effort will need to be consistent with earlier SEDAR efforts. This parsing process may not be possible or advisable for many, if not most, of the species listed as "No" for assessibility.

- Recreational landings from MRFSS (now MRIP) are primarily given in numbers and to put them in the same units as commercial landings, the landings in numbers will need to be converted to landings in weight. This is not as simple as it sounds. The basic sampling unit for MRFSS has been by mode, state, distance from shore, and 2-month wave. A fish sample collected from their intercept program is needed for each of these cells for which landings have been reported from their telephone survey, preferably more than one. There is often an issue of missing cells or cells with sample size of 1 or 2 that can lead to highly variable conversions of landings in numbers to landings in weight. Apparently much of this work has been accomplished for the Gulf of Mexico. This has only been done for assessed species in the South Atlantic. We need to at least discuss how efforts in the Gulf of Mexico can be done in the South Atlantic.

- Headboat data should be fairly straight forward, but there may be some issues with mis-identified species and low sample sizes for converting landings in numbers to landings in weight.

- Discards will need to be considered. Commercial discard information is available from the logbook program since about 2000(?). This is self-reported data. The MRFSS data include the B2 landings in numbers representing catch and released fished. The headboat program has recently instituted collection of released fish as well. None of the discard data have much in the way of associated size samples of discarded fish, critical for converting these catches from numbers to weight.

Personnel from a variety of shops must participate if this process is to succeed. For the commercial landings, participation by Dr. Turner's staff and South Atlantic state personnel involved in these data collection programs will be critical. These data sets include the historical ALS landings data, state-maintained landings data, snapper-grouper logbooks, and the TIP data for length composition information. For the recreational landings (including headboat), participation from MRIP and the headboat program at Beaufort is also critical.

A significant amount of effort will be required before any workshops are held. Depending on expectations of the workshops, at least 2-3 months will be needed before the first workshop is held. We do not believe that a useful summary of landings for 64 fish stocks could be developed and discussed in a one-week-long workshop. We recommend breaking these fish stocks into species groupings as summarized above. Grouper (17), snapper (10), and porgy (15) constitute 3 large groupings totaling 42 of the 64 fish species. The remaining 22 fish species (7 jacks, 6 grunts, 4 coastal pelagics, 3 triggerfish, and 2 tilefish) could be handled in a separate data workshop, although the jacks or grunts might be handled with the snappers for example. So we recommend at least 4 workshops. These workshops should not be held in consecutive weeks, there should be at least 2 weeks between them. Whether these could usefully be held as webinars does not seem likely, because of the necessarily large number of participants.

2. Develop indices of abundance from catch and effort streams and other auxiliary information for 41 unassessed fish stocks.

Would additional workshops be necessary for development of auxiliary information such as fishery independent CPUE and/or aging data for catch curves? It would probably be more efficient to combine working groups for this effort with the landings data working groups, particularly if a series of data workshops based on species groupings are contemplated. Prior to this workshop, staff working with the commercial logbook, MRFSS, and headboat should develop indices of abundance using an agreed upon standardized approach. This will need to reflect any approaches used to deal with species mis-identification problems found during preliminary development of data landing streams. To the extent that the Stephens & MacCall approach may be used for identifying appropriate trips, separate workshops by species groupings would be more efficient. Length composition data will need to be developed for those species for which catch curves are contemplated.

Beaufort, MARMAP, and FL FWC staff, who are involved in aging, need to develop their data sets for developing age-length keys, if catch curves are to be developed and analyzed. Beaufort alone holds nearly 50,000 age samples for species not yet assessed. At current staffing levels, it would take 4 years to analysis all those samples, not including new samples received or updates for species already assessed. For the less frequently encountered species, whether due to low population size or management restriction, there are not enough samples to create age-length keys. SCDNR MARMAP Survey has been able to enhance or to fill in gaps in life history data when not available from the fishery. Their program is somewhat limited in coverage, most notably for the deep water and most southerly occurring species of the Snapper-Grouper FMP. Ultimately, to be able to assess any of the Snapper-Grouper FMP stocks, sampling on the docks for bio-samples needs to be addressed in all fishery sectors, especially the recreational fisheries. Thus, an assessment is needed to determine the ability of these two groups to age the hard parts they may have on hand. This effort might be carried out in a separate workshop.

3. Initially develop OFLs from these landing streams for stocks for all 64 stocks. Decide for which fish stocks this is the best we can do.

Once landings streams are available, it will be necessary for open discussion to understand what the condition of the stock might have been with which these landings are associated. Do we see a decline in landings over time? Was this all prior to any management action that might confound our interpretation? Have landings been flat for the time period over which we have data? Are there harvesting segments that might be incomplete during certain time periods? These questions need to be considered before deciding on what landings statistic may be relevant for producing an OFL. If the data workshops are split into species groupings, it should be possible for the data development workshops and estimation of these landings statistic for OFL to be done together. However, producing OFL for all 64 fish stocks begs the question of whether these would be acceptable for those stocks for which more complex assessments might be possible (e.g., those listed under "likely" or even those listed under "maybe").

4. Develop surplus production models and/or yield per recruit analyses for those fish stocks for which auxiliary information can be developed.

Criticism of NOAA Fisheries (SEFSC) would likely be significant and justified if we simply proposed OFLs from landings statistics for the 64 species that remain unassessed currently through the SEDAR process. Therefore, we must consider available auxiliary information, and where possible apply this additional information in our analyses for OFLs. With landings streams and indices available, a series of production models (ASPIC) could be run. With catch curves developed, yield per recruit analysis could be run. These would probably include many of the species listed in Table 1 as "likely" and possibly some of the "maybe". There should be a separate workshop held at least 1-2 months after the last landings workshop. Participation in this workshop should include (but not limited to) the assessment group at Beaufort within the Sustainable Fisheries Branch.

5. Identify fish stocks for which a full blown SEDAR should be conducted.

During this workshop identified for #4 above, those species for which a full blown assessment is thought possible should be identified. These fish stocks would require scheduling through SEDAR. The decision depends largely on availability of additional data, such as length and age composition information across years. More important species (e.g., FSSI listed species) from that listed under the "likely" category should be considered.

Of the 25 fish stocks for which assessibility is listed as "likely", seven fish stocks have particularly robust samples of otoliths (>1000). These species include two groupers (scamp and speckled hind), two snappers (gray snapper and lane snapper), two grunts (Tomtate and white grunt), and the gray triggerfish. Other fish stocks with otoliths (250-1000) include six more groupers (rock hind, red hind, bank sea bass, graysby and wreckfish), the almaco jack, and the blueline tilefish. The coastal pelagics and some of the porgies and jacks have very robust sampling for lengths but few if any ages. Potentially as many as 15 fish stocks listed above could be recommended for assessments through SEDAR. One caveat should be mentioned concerning wreckfish. Assessment of this "stock" is problematic because the US fishery on the Charleston Bump likely constitutes a migratory portion of a North Atlantic stock including landings from the eastern North Atlantic.

Summary

We have identified the need for at least 6 workshops to develop landings and auxiliary information necessary for developing OFLs.

At least 4 workshops are needed to:

- develop the landings streams for 64 fish stocks
- evaluate fish stocks for which landings streams are insufficient
- develop auxiliary information for subset of 64 fish stocks ("likely" + "maybe")
- develop OFLs for fish stocks for which only landings streams are available
- identify fish stocks for which simple models can be developed in a later workshop

A separate aging workshop should be considered to develop age-length keys for species for which catch-curve analyses are contemplated.

A follow up workshop can then be scheduled at least 2 months later. Preliminary analyses will be conducted on the data developed during the four workshops with simple models for those fish stocks with useful auxiliary information. During this follow up workshop,

- validity of these simple models should be judged for estimating OFLs
- a subset of these may be recommended for more complex modeling approaches (SEDAR)
- this workshop might be usefully accomplished by webinar

Personnel required are as follows:

- SEFSC Miami Statistics Program (Steve Turner's staff, 6-8?)
- SEFSC Beaufort:
    o Sustainable Fishery (Erik Williams' staff, i.e., headboat, assessment groups)
    o Ecological (Todd Kellison's staff, i.e., Jennifer Potts group)
- MRIP Staff
- State Fisheries Statistics (FL, GA, SC, NC)
- ASMFC ACCSP (Geoff White, Julie Defilippi)

Table 1. Listing of 64 non-SEDAR assessed fish species as modified from "Stock assessments for species under the jurisdiction of the South Atlantic Fisheries Management Council (SAFMC)" prepared by Erik Williams (April 16, 2008).

Stock	Grouping	FSSI?	Overfishing?	Overfished?	ACL deadline	Last Year of Assmnt	Assessibility
Cero Mackerel	Coastal	No	Unknown	Unknown	2011	?	Likely
Little Tunny	Coastal	Yes	No	No	2011	?	Likely
Cobia	Coastal	Yes	No	No	2011	?	Likely
Dolphin	Coastal	Yes	No	No	2011	2000	Likely
Rock Hind	Grouper	No	Unknown	Unknown	2011	?	Likely
Red Hind	Grouper	No	Unknown	Unknown	2011	?	Likely
Bank Sea Bass	Grouper	No	Unknown	Unknown	2011	?	Likely
Graysby	Grouper	No	Unknown	Unknown	2011	?	Likely
Speckled Hind	Grouper	Yes	Yes	Yes	2010	2001*	Likely
Scamp	Grouper	Yes	No	No	2011	1998	Likely
Coney	Grouper	No	Unknown	Unknown	2011	?	Maybe
Yellowmouth Grouper	Grouper	No	Unknown	Unknown	2011	?	Maybe
Yellowedge Grouper	Grouper	No	No	No	2011	?	Maybe
Warsaw Grouper	Grouper	Yes	Yes	Yes	2010	2001*	Maybe
Wreckfish	Grouper	Yes	No	No	2011	2002	Maybe
Yellowfin Grouper	Grouper	No	Unknown	Unknown	2011	?	No
Rock Sea Bass	Grouper	No	Unknown	Unknown	2011	?	No
Misty Grouper	Grouper	No	Unknown	Unknown	2011	?	No
Tiger Grouper	Grouper	No	Unknown	Unknown	2011	?	No
Nassau Grouper	Grouper	No	No	Yes	2011	?	No
Goliath Grouper	Grouper	Yes	Unknown	Yes	2011	?	No
Bluestriped Grunt	Grunt	No	Unknown	Unknown	2011	?	Likely
Tomtate	Grunt	No	Unknown	Unknown	2011	?	Likely
White Grunt	Grunt	Yes	No	No	2011	2001*	Likely
French Grunt	Grunt	No	Unknown	Unknown	2011	?	Maybe
Spanish Grunt	Grunt	No	Unknown	Unknown	2011	?	No
Smallmouth Grunt	Grunt	No	Unknown	Unknown	2011	?	No
Almaco Jack	Jack	No	Unknown	Unknown	2011	?	Likely
Blue Runner	Jack	No	Unknown	Unknown	2011	?	Likely
Banded Rudderfish	Jack	No	Unknown	Unknown	2011	?	Maybe
Crevalle Jack	Jack	No	Unknown	Unknown	2011	?	Maybe
Lesser Amberjack	Jack	No	Unknown	Unknown	2011	?	Maybe

Bar Jack	Jack	No	Unknown	Unknown	2011	?	No
Yellow Jack	Jack	No	Unknown	Unknown	2011	?	No
Whitebone Porgy	Porgy	No	Unknown	Unknown	2011	?	Likely
Jolthead Porgy	Porgy	No	Unknown	Unknown	2011	?	Likely
Margate	Porgy	No	Unknown	Unknown	2011	?	Likely
Knobbed Porgy	Porgy	No	Unknown	Unknown	2011	?	Likely
Saucereye Porgy	Porgy	No	Unknown	Unknown	2011	?	Maybe
Schoolmaster	Porgy	No	Unknown	Unknown	2011	?	Maybe
Porkfish	Porgy	No	Unknown	Unknown	2011	?	Maybe
Longspine Porgy	Porgy	No	Unknown	Unknown	2011	?	Maybe
Scup	Porgy	No	Unknown	Unknown	2011	?	Maybe
Black Margate	Porgy	No	Unknown	Unknown	2011	?	No
Cottonwick	Porgy	No	Unknown	Unknown	2011	?	No
Sailors Choice	Porgy	No	Unknown	Unknown	2011	?	No
Sheepshead	Porgy	No	Unknown	Unknown	2011	?	No
Grass Porgy	Porgy	No	Unknown	Unknown	2011	?	No
Puddingwife	Porgy	No	Unknown	Unknown	2011	?	No
Silk Snapper	Snapper	No	Unknown	Unknown	2011	?	Likely
Gray (Mangrove) Snapper	Snapper	No	No	No	2011	?	Likely
Lane Snapper	Snapper	No	No	No	2011	?	Likely
Cubera Snapper	Snapper	No	Unknown	Unknown	2011	?	No
Atlantic Spadefish	Snapper	No	Unknown	Unknown	2011	?	No
Blackfin Snapper	Snapper	No	Unknown	Unknown	2011	?	No
Dog Snapper	Snapper	No	Unknown	Unknown	2011	?	No
Mahogany Snapper	Snapper	No	Unknown	Unknown	2011	?	No
Black Snapper	Snapper	No	Unknown	Unknown	2011	?	No
Queen Snapper	Snapper	No	Unknown	Unknown	2011	?	No
Blueline Tilefish	Tilefish	No	Unknown	Unknown	2011	?	Likely
Sand Tilefish	Tilefish	No	Unknown	Unknown	2011	?	Maybe
Ocean Triggerfish	Triggerfish	No	Unknown	Unknown	2011	?	Likely
Gray Triggerfish	Triggerfish	Yes	No	No	2011	2001*	Likely
Queen Triggerfish	Triggerfish	No	Unknown	Unknown	2011	?	Maybe

Based on trends report