Black Sea Bass Conference Call

December 17, 2013

10:30- Noon

Participants: Toni Kerns, ASMFC, Rich Seagraves, MAFMC, Kiley Dancy, MAFMC, Genny Nesslage, ASMFC, Kirby Rootes-Murdy, ASMFC, Gary Shepherd, NEFSC, Jessica Blaylock, NEFSC, and Paul Rago, NEFSC.

The meeting opened with a general discussion of management and science priorities, with an emphasis from MAFMC and ASMFC about the importance of black sea bass (BSB) as a primary management concern. We reviewed the conclusions of the April 2013 data review meeting (Attachment #1) and again highlighted the importance of new information before a benchmark assessment is warranted. To that end the group focused on a general review of the work that has been done thus far and what is being planned.

Rich noted that a major proposal to Sea Grant by U. MD on black sea bass was not funded. This would have brought additional resources to address some critical research needs. The group noted that the *NSF Science Center for Marine Fisheries* (SCEMFIS) project, led by Eric Powell, may have an ability to support research on black sea bass. Rich Seagraves noted that the SSC had developed a working group on BSB and might be able to provide limited support for travel.

Gary reviewed recent modeling work that he, Jessica Blaylock and Al Seaver were working on (Attachment #2) . It was noted that the object of the modeling was to examine model behaviors under alternative hypotheses about growth, maturation, migration, and exploitation. The model is a heuristic tool for evaluating population dynamics, identifying priority data collection programs and serving as a possible prototype for improving the assessment model formulation.

Subsequent to the April data meeting, an aging workshop was held with representatives from the Center and states. A report of the meeting is available at *http://www.asmfc.org/uploads/file/529e60e8BSBAgeingWorkshopProceedings_Dec2013.pdfexp*.

Discussion then focused on a number of fixed gear monitoring projects. It was noted that the URI's scup trap project, which also caught BSB, would probably not be useful for BSB monitoring owing to its limited spatial scope. A separate coast-wide project, underway for the past 3 years, may ultimately be useful, but not before an external peer-review of the program was complete. The MAFMC SSC had requested a review of the BSB fixed gear survey in 2014. Rich was going to check on the status of that review. John Hoey would be contacted.

A number of analytical projects were also reviewed, including proposed work on the utility of pooled age length keys. This and some of the recommendations from the April Data meeting might be addressed by the Technical Committee in 2014. Among other projects, some focused consideration of the utility of state survey indices should be conducted in 2014.   Preliminary

work by Alicia Miller and Gary suggests that year class strength may be determined by oceanographic conditions during the first winter. This could help with interpretation of state indices.

Gary and Jessica gave a brief overview of their modeling project (Attachment #2), particularly as a tool for interpreting field observations and the ability of existing data to support models with greater spatial and temporal resolution.

The group discussed next steps in the process. It was noted that this could be viewed as an implementation of the "Research Track", a concept endorsed by the NRCC as a way of identifying stocks with critical research needs. A first task would be to develop Terms of Reference that could addressed over the next several years. The TOR would provide managers with some assurance that critical research needs were being addressed. The TOR would also specify a periodic process for reviewing results and communication with the broader scientific community. It was suggested that a review in April 2014 would correspond to the anniversary of the Data Review meeting and might be a suitable occasion to formalize the Research Track process. The group discussed several options for external review, including the SARC and an ASMFC sponsored review. Finally, it was noted that changes in the assessment, particularly the inclusion of spatial components would require changes in management. For MAFMC this would be an Amendment. For ASMFC this would require an Addendum.

The meeting ended at high noon.

Attachment #1

Black Sea Bass Data Workshop Recommendations

A black sea bass data workshop was held April 9-11, 2013, sponsored by the Partnership for the Mid-Atlantic Fisheries Science (PMAFS) and conducted by the Atlantic States Marine Fisheries Commission (ASMFC). The workshop participants included PMAFS scientists, ASMFC staff, MAFMC staff, NEFSC staff, state biologists on the ASMFC Black Sea Bass Technical Committee, University of Rhode Island (URI) and Rutgers University scientists, and Mid-Atlantic Fishery Management Council (MAFMC) Scientific and Statistical Committee (SSC) members. The workshop summarized available state and federal fishery independent and dependent data, as well as any outside (academic) research surveys/projects available for use in the development of indices of relative abundance; evaluated the utility of indices as measures of black sea bass relative abundance; evaluated the spatial heterogeneity of indices among states/regions; and recommended approaches for utilizing indices available within a black sea bass benchmark assessment. The group also developed short and long term research recommendations intended to address both the most recent peer review and SSC highlighted concerns for the black sea bass assessment.

The working group concluded that there are no additional data analyses or data sets that, if taken in conjunction with the existing assessment model, would likely result in an SSC decision to elevate the black sea bass assessment from Level 4 to 3 (based on the ABC control rules the SSC applies). Therefore, based on the information reviewed at the workshop, it is highly unlikely the SSC's perception of uncertainty in the assessment will change with an assessment update. In this case, an assessment update would not be used for management purposes and the SSC would continue to apply catch-based approaches under the Level 4 control rules.

It is the recommendation of the working group to delay the 2014 black sea bass benchmark peer review to 2016 or later, depending on the amount of progress that could be made on interim analyses and modeling approaches. The working group outlined critical areas of analysis, research, and modeling approaches that will need to be addressed for a benchmark to provide meaningful results. This work should be started immediately in preparation for a 2016 peer review. The group recommends that in lieu of an assessment update in 2013 and 2014, the Southern Demersal Working Group should provide a summary of the most recent catch to inform the SSC and Council specifications process. It is recommended the resources that would have be used for a 2014 benchmark and 2013 assessment update go toward the following short and long-term recommendationsto forward the progress of black sea bass modeling:

Short term research to address SSC Concern #2 (uncertainty in the spatial structure of the stock)

Assessment Model Development

- Explore the impact of spatial heterogeneity on the stock assessment results. Conduct sensitivity analyses on this topic. Specifically, if you break the stock north-south do you get qualitatively different stock status results than coastwide stock? [Center resources needed and outside funding possibly needed]
- Explore the use of time-varying catchability to account for changes in density dependent surveys catchability. This was a criticism of use of trawl surveys for a "structure-obligate" species. This will need to be added to the current assessment model (SCALE) code. [Center resources needed and outside funding possibly needed]
- Use paired trawl experiments coefficient/data as prior's when estimating survey selectivities and estimate the change in selectivity instead of specifying it. This will need to be added to the assessment model code. [Center resources needed and outside funding possibly needed]

Supporting Analyses

- Characterize ageing uncertainty: a) Conduct ageing validation study. b) Conduct formal ageing comparison of NEAMAP & NMFS ageing. c) Conduct formal ageing comparison between south and north Atlantic and borrow their ALKs. Conduct aging exchanges for otoliths (no scales). d) Develop ageing error matrices using this comparison study data for informing model inputs. [multiple agency staff required]
- Explore cohort tracking in surveys (formally check that all surveys with multiple age classes show coherence). Determine if the surveys are tracking strong year classes such that age or length structure in the data could inform the assessment model. [Technical Committee]
- Compare the temporal and spatial trends among surveys and report on the evidence of spatial structure of stock among surveys or lack thereof (e.g., spatial autocorrelation of catch and LF, cluster analysis). [Technical Committee]
- Explore the catchability of surveys relative to black sea bass migration (e.g., correlation with temperature cues, etc.). Conduct a comprehensive spatio-temporal comparison of availability (side-by-side mapping and analysis of catch in each survey by date and location). [Technical Committee]
- Conduct paired scup/BSB pot survey and VAS data with NJ trawl comparison using nearby locations. Explore if BSB are truly structure obligate and if trawls are valid for BSB. Compare catch and length frequency on/off structure. [Technical Committee and URI]
- Build an index of relative abundance using Jon Hare's larval survey data. [Center resources]
- Look at the implication of pooling samples in the age-length keys (ALK) versus filling parts of the annual keys that are low on samples. [Center resources]

Long term research to address SSC Concern #2 (uncertainty in the spatial structure of the stock)

Assessment Model Development

- Build a simulation model that incorporates spatial structure for black sea bass as well as other necessary features (e.g., protogynous life history, sex-specific, etc.). Use existing data to simulate/ determine the scale at which management could be implemented. This simulation exercises should be developed at a complex level, but then be used to determine how simple your models need provide management advice. The simulation can be used to identify critical model features (e.g., plasticity of the size/age at transition from female to male, etc.) and data gaps – see protogynous fish workshop report. [likely require outside collaboration]

- Evaluate the ability of the existing data to support a spatially-explicit assessment for management (if needed based on the simulation study above) and implement any necessary data collection protocols to support this approach. [long-term permanent commitment]
- If needed, build a spatially-structured, sex-specific assessment model for management. [long-term research track]

Fieldwork

- Collect additional biological data on all FI surveys
- The collection of nearshore commercial trawl and pot fishery biosamples (i.e., lengths and sex) are needed
- Sex ratio data should be collected from commercial and recreational port/intercept sampling to explore importance of sex information in assessment modeling
- Ages should be collected from nearshore surveys (MA, RI, CT, NJ) for use in development of regional/local ALKs
- Tagging study (natural or artificial) should be conducted to determine mixing/migration [2yr , funding required]

Long term research to address SSC Concern #1(Unusual Life History – priority 2)

Fieldwork

- Studies should be conducted to understand the general reproductive behavior of black sea bass. What is the role of non-dominant males (e.g., sneaker males) in reproductive stock dynamics? Do black sea bass develop spawning harems or leks? [outside funding]
- Studies should be conducted to determine the relationship between fertilization rates and sex ratio so this can be included into population dynamics models. A parentage analysis could be used to determine fecundity. [outside funding required, long-term]
- Work should be conducted to determine the natural mortality by sex; life stage research is needed [ongoing, outside funding]

Model Development

- Examine the implications of spatial heterogeneity on stock assessment results. Conduct sensitivity to stock status using various north-south splits in distribution.

- Explore use of time-varying catchability to account for possible density dependent survey results.

- Develop new assessment models including
  - A simple separable catch at age model
  - A spatially structured model with seasonal time steps
  - An age-structured model which could include tag return data

Supporting Information

- Evaluate ability of existing data to support a spatially-explicit assessment for management and implement any necessary data collection protocols to support this approach.

- Address ageing uncertainty
  - Conduct ageing validation study.
  - Conduct formal exchange of ageing material among labs.
  - Develop ageing error matrices using comparison study data for informing model.
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- Examine feasibility of pooling age length keys across years.

- Examine consistency of size structure within commercial market categories and implications of generalizing to missing information.

- Compare temporal and spatial trends among surveys and examine evidence of spatial structure among surveys (e.g., spatial autocorrelation of catch and LF, cluster analysis).

- Explore catchability of surveys relative to migration (e.g., temperature cues, etc.).

- Conduct comprehensive spatio-temporal comparison of availability to surveys (side-by-side mapping and analysis of catch in each survey by date and location).

- Analyze black sea bass pot survey results and compare information with comparable trawl survey results.

- Build index of spawning stock biomass using NEFSC larval survey data.

- Collect sex ratio information from recreational and commercial fishery catches.

Biological Processes

- Continued research on rate, timing and occurrence of sex-change.

- Examine environmental influences on winter offshore distribution of juveniles and adults.

- Examine influence of overwintering survival on young-of-year in determining year class strength.

- Examine ecological implications of range expansion of black sea bass into the Gulf of Maine.

- Expanded genetics study to evaluate potential of population structure north of Cape Hatteras.

Evaluation

- Develop a length-based simulation model to evaluate critical data and model components that are sensitive to the unique life-history characteristics of black sea bass.

- Develop a management strategy evaluation (MSE) to better understand the implications of a broad range of management strategies.

Sources:

PMAFS and ASMFC Black Sea Bass Data Workshop, April 9-11, 2013, Woods Hole, MA. Black Sea Bass Data Workshop Recommendations. 3 p.

SAW/SARC 53 Panel Summary Report (T. Miller, SARC chair). www.nefsc.noaa.gov/saw/saw53/.

Shepherd,G., K. Shertzer, J. Coakley and M. Caldwell (Editors). 2013. Proceedings from a workshop on modeling protogynous hermaphrodite fishes, Raleigh, NC. 33p.