Atlantic States Marine Fisheries Commission

1050 N. Highland Street • Suite 200A-N • Arlington, VA 22201
703.842.0740 • 703.842.0741 (fax) • www.asmfc.org

Atlantic Menhaden Stock Assessment Subcommittee and Technical Committee Meeting Summary

Hanover, Maryland
September 17-18, 2013

Technical Committee Members: Behzad Mahmoudi, Joey Ballenger, Kurt Gottschall, Micah Dean, Rachel Sysak, Scott Newlin, Matt Cieri, Rob Latour, Ellen Cosby, Todd Mathes, Joe Smith, Amy Schueller

ASMFC Staff: Mike Waine

Public: Ron Lukens, Aaron Kornbluth

I. **Welcome/Agenda Review**
   a. Amy Schueller – chair of SAS for menhaden

II. Review Progress on Data Submissions
   a. Data Workshop
      i. Mike W – January as preferred month, working back from a peer review of the assessment through SEDAR process in Dec. 2014
         1. Week of Jan. 13-16, 2014 – tentatively scheduled for this day
         2. Mike will provide location information ASAP

III. Age/Length – Presentation by Amy Schueller (see presentation for general notes)
   a. **New Data and Analyses**
      i. Bait fishery is generally harvesting larger fish than the reduction fishery since 1985
         1. Were changes in spatial sampling distribution or sampling intensity causing this problem – Potomac representative
      ii. Micah – Do the modes in the length distribution translate to different ages
         1. MD – Possible explanation is the operation of the New England fisheries in the early years catching the larger fish
         2. Micah – Did NC fishery primarily target 0 and 1s
            a. Joe – thought the fall NC fishery would give a good cross-section of the population
         3. Behzad – Did the sampling program for reduction fishery remain constant through time?
            a. Joe – same general procedure, measured 20 random fish from 1955-1971 to 10 random fish from 1971/1972-present
               i. Bait sampling has possibly changed but Joe does not have any major concerns
      iii. Amy – Why do we see the big swing in mean size at age through time? She can think of numerous reasons

1. Micah – Doesn't appear to be a gear selectivity change through time looking at the mean size-at-age and max size-at-age through time
    a. Amy – Could still be driven by spatial distribution
    b. Rob – Could also be due to changes in total mortality

iv. Amy – take home is that it looks like the bait and reduction fisheries due have different selectivities

v. Amy – appears there are several data sets with encounters with menhaden greater than the size of menhaden captured in the reduction fishery – possibly suggestive of dome-shaped selectivity for the reduction fishery

vi. Amy – How to get at each of the topics?
    1. Timing of spawning
        a. Amy – wants to see the results from Kristen's otolith microchemistry work at the data workshop
            i. Alexei – some concern that even if different coastal areas are contributing at different rates, how do we know that is affecting the growth rates
        b. Rob – Looking at ichthyoplankton data
        c. Micah – Could look at the powerplant entrainment data
        d. General consensus – going to be extremely difficult to prove or show that this is occurring – a lot of different things beyond just timing of spawning is at work here – bottom line, if they are getting to the same size by the end of the 1st year, timing of spawning may not be that critical at explaining differences in annual growth rates
        e. Joe – saw three different cohorts of YOY in NC sounds during the fall
        f. Micah – can explain the high variability in size-at-age of young menhaden, can't explain the smaller variation in size-at-age of older menhaden
        g. Behzad – Present growth curves by latitude
    2. Ageing Error
        a. Amy – No evidence for aging error in the Gulf data
        b. Amy – Of studies completed, doesn't seem to be much evidence of aging error
        c. Joe – Did monthly sampling of YOY to verify timing of 1st annulus formation and some daily increment work – fairly well known when 1st annulus is formed and 1 annulus is formed each year
        d. Matt – Enough evidence so far to warrant investigation of dome shaped selectivity, with constraints on descending limb
    3. Density Dependent Growth
        a. Amy – maybe using one and the same age and time varying growth curves for the population and fishery is not appropriate

b. Amy – found correlation between mean length at age for ages 0-3 and the appropriately lagged log(JAI) index value, though she isn't convinced this is evidence of density dependent growth
   i. Rob – look at a spatially restricted index and see if it is correlated with mean size-at-age
c. Amy – possibility for dome shaped selectivity is that there is fishery targeting going where they are targeting the largest schools. Since menhaden school by size and age, the large old fish would be found in smaller schools. Thus, those may not be targeted by the fishery. Another possibility is there is spatial segregation of different size fish.
   i. Amy – concerned that if missing a proportion of the distribution of size-at-age at oldest age classes, this is giving a very biased view of the growth curve, which is affecting our egg productivity estimates

4. Location of harvest along coast (selectivity)
   a. Amy – evidence for time varying selectivity – most recent density curve (last 10 years) pattern is significantly different from previous decades
      i. Alexei – could be due to a change in growth
   b. Amy, Alexei, Matt – seem to be in agreement that there is some type of dome shaped selectivity. Disagreement is over what we are getting. Defining better growth isn't going to help the selectivity question, which Amy readily acknowledges. Proper parameterization of the growth model is important for getting unbiased BRPs.
5. Do we need age and time varying lengths and weights in the models
   a. Rob – Can't believe the individual length-at-age estimates for the 70s
   b. Amy – likely do not need age and time varying lengths and weights for the population growth model
6. Correcting population growth curve
   a. Amy – proposes using a reverse Diaz correction for correcting the population growth curve
      i. Rob and others – some concern, though like the general idea. Would still like to see some more thought on other approaches
      ii. Discussion of possible additional age data
         1. Rob – may have some scales collected from the VA shad survey that is from fish larger than 350 mm
         2. Alexei – do have some limited Maryland data
         3. Joey – Cynthia may have some menhaden data

b. **Comparison with Update Inputs/Assumptions**

IV. **Natural Mortality** (Matt Cieri)

a. **Update TC/SAS on BERP Progress to Date and Plan for TOR #7**

i. Changed the bias/prey groupings in the model and brought together all the known diet data together into a single database – contains % diet by weight, # of stomachs sampled, regions sampled from
    1. Fixed many of the prey item groupings
    2. On track, hopeful meeting in early December with conference call in Nov.
    3. Plan is to have it partially run by the workshop
    4. Potomac woman – what the prey species
        a. Atlantic menhaden – only full prey species
        b. Anchovy, Atlantic herring, etc. – not full prey species
        c. Medium forage = sand lance, scup and butterfish
        d. Matt – made some significant changes

b. **Discuss Pros/Cons of Using Age-Specific vs. MSVPA-based M**
    i. Rob – have we thought about other methods for treating M-at-age for the menhaden assessment
    ii. Matt – would have other estimates of M in our back-pocket, like Lorenzen. Basically, we pop out an M vector with no uncertainty about that vector

V. **Public Comments from Tuesday evening**

a. Ron Lukens – comment with respect to the possibility of larger fish occurring in the area. Had some data from the Sulikowski data suggesting that there were indeed some old fish and large fish in the population.
    i. Amy/Joe – would like to check whether those were TL or FLs

VI. **Overview of CBL Menhaden Study** (Presentation given by Dave Secor and Ed Houde titled "Estimating abundance of Atlantic menhaden in Chesapeake Bay: comparing and evaluating methods"

a. Dave – Caught highest abundance of YOY menhaden in June, which is outside the sampling time of the MD DNR Seine survey
    i. Rob – Is there any reason to believe that the abundance of YOY in later months is not reflective of recruitment
        1. Dave - No
    ii. Alexei – Not surprising that YOY abundance is higher in June, though he is concerned that there is even more variability in M and thus year class strength has not be set
        1. Dave – I think there is a possibility that sampling earlier in the year may provide more contrast in recruitment variability from year to year, but I'm not wanting to push this too hard

b. Ed – Trawl catch and seine catch was very weekly correlated, and the individual tows were not correlated

c. Ed – seems to suggest that the probability of catching menhaden is higher in the trawl than with the seine

d. Ed/Dave – repeated tows were fairly consistent in the same area at the same time

e. Ed – Fairly similar CVs between the trawl and seine catches, perhaps a little lower in the trawl than the seine

f. Ed – fairly similar size composition being caught by the two gears

i. Micah – what is the reasoning for the two distinct modes

1. Ed – modes are due to growth of YOY throughout the season

g. Micah – Is the center of abundance correlated with salinity

i. Ed – no concrete data, though I will state that we generally do not collect menhaden at salinities higher than 10-15 ppt – juveniles are found in highest abundance in low salinity zones

h. Ed – seems that temp. and chl-A are important factors in predicting YOY abundance

i. Micah – Any speculation of why later hatched larvae survived better during their study years

i. Ed – those ingressing during Oct. – Dec. were coming into the bay during the coldest part of the winter, thus not suited well for survival – Dave says seen similar things for other species like herring and bluefish

j. Rob – from the analytical point of view, do you think there is any reason for modifying the available temporal period of the data for development of the JAI

i. Ed – adding something earlier in the year, say June, would be valuable to do, but not want to only looking at the earlier years

ii. Dave – would focus more on the spatial distribution of sampling when trying to reduce your set, not temporal

k. Potomac representative – any indication of a change in zooplankton or phytoplankton composition through time

i. Ed – saw some evidence, but no current monitoring plans

ii. Rob – some evidence that the phytoplankton community has shifted, shifting towards smaller, shorter chain phytoplankton

l. Behzad – are you seeing a similar trend in recruitment for other forage species in the Chesapeake Bay, and have you looked to see if there has been an overall decline in carrying capacity of forage species

i. Ed – we would like to be able to answer those questions, but with our limited data set it is hard to make that conclusion

VII. **Maturity/Fecundity**

a. **New Data and Analyses**

i. NEAMAP Information (Presentation by Jeff Brust)

1. 50% maturity around 175-180 mm FL
2. Came up with a lot different age-at-maturity curve based on his treatment of the NEAMAP data
   a. NEAMAP does not have age data for these fish, though Jim says they would be happy to start collecting age information
   b. Jeff suggests not using the age-at-maturity based on his analysis for the assessment because it is not based on real age data

3. Mike – follow-up on scheduling an age workshop
4. Joey – what sample sizes are you getting from the NEAMAP survey – are you missing those largest fish from a given age class that could be biasing your age-at-maturity data
    a. Amy/Rob – weren't concerned because getting ample large fish that we expect to be mature
    b. Joey – looking at the age-at-maturity from the NMFS survey and the growth model, I retract my statement
5. Rob – these are macroscopic staging of gonads in the field that has not been verified via histology

ii. Fishery-dependent maturity schedule update (Presentation by Joe Smith)
1. Higham and Nicholson – looked at both microscopic and macroscopic spawning conditions
    a. Came up with an index of determining whether they are mature
2. Joey – concerned with the bumping of age classes and that's impact on the shifting of the curve along the x-axis – likely that if modeled the maturity curve based upon fractional ages, may get something even more in line with what Jeff estimated based upon the NEAMAP data
    a. Joe – Do not have the raw data to convert to fractional ages
3. Rob – is the data that go into creating the red line for fecundity available somewhere
    a. Joe – not that he knows of
    b. Joey – I have some concerns regarding the combined impact that changed growth curves for the population, exponential pattern for fecundity, and potential dome-shaped selectivity of the fishery will lead to a much larger estimate of contribution of old, large fish to total egg production

iii. Amy – how do we move forward with regards to this question for the data workshop?
1. Behzad – look into a couple of additional data sets mentioned by Matt and Micah
2. Amy/Rob – collect additional data via the NEAMAP program for this fall
3. Behzad – very critical to nail down the value for the age-2 % maturity
    a. Amy – agrees
    b. Joey - agrees
4. Behzad – did we run a sensitivity with different maturity schedules
5. Rob – what is the error bars about that egg production vs length relationship? That could be useful for a sensitivity analysis of uncertainty in the egg production vs. length relationship.
6. Amy – sounds as if we need to dig into this more and bring back up during our discussion of plan of attack and things needing to be accomplished prior to the data workshop

b. **Comparison with Update Inputs/Assumptions**

VIII. **Review of Tagging Database and Plan for Analyses** (Presentation by Rachel)

a. Amy – there is some historical tagging data in paper format from the 60s-70s available in Beaufort. Those data were key entered over the summer, and Rachel has been working on analyzing the data
b. Rachel – database will be fully functional by the time we get to the data workshop
    i. Running into an issue with duplicate records, missing data fields, etc. that are causing some database important information
c. Behzad – What are we hoping to use this data for?
d. Amy – When will the base database formed?
    i. Rachel – end of Oct
    ii. Amy – Will Smith has volunteered to look at the data, he had experience and some code
e. Joey – How are we envisioning using this data?
    i. Amy – single coastwide model vs. some type of spatial model and using this data to infer some type of migration rates
    ii. Joey – thinking of the constraints for the analysis of the data, as how you constrain the data will likely give you different estimates of migration rates
        1. Robb – think this is going to be an iterative process, and a lot of this may depend on the potential time step of a spatial model
        2. Mike – thinks we should establish a sub-group/committee of people that are familiar with how to analyze tagging studies
            a. Tagging sub-committee members
                i. Joe Smith
                ii. Rachel
                iii. Amy Schueller
                iv. Will
                v. Rob Latour
                vi. Potentially investigate involving people from other groups (striped bass)
                    1. Alexei – focus of members of striped bass tagging sub-committee was on estimating annual survival, not migration. Suggests casting a wider net.
                vii. Alexei Sharov – interested in participating, but he is not a tagging model expert
            b. Committee is charged with developing methods/models to use to analyze the data for migrational movements and mortality

f.Joe – Catch and effort data by region is available, which could be used to weight the data

IX. **Preliminary Review of Landings Data Preparation**

a. **Reduction** (Joe Smith)
    i. Have decent monthly landings data going back to the 40s, with no accompanying age data prior to 1955
        1. Rob – why not extend the landing histories back to 1940
    ii. Alexei – Did anyone try to verify the actual #s of fish in the sample of fish? When the fish were smaller on average (70s & 80s) there would be more fish than when the average fish captured was larger (current)

1. Joe – In house manuscript from the 1960s that looked at across factories the average weight of the # of fish in the hopper. That is where the 670 lbs per dump came from.
2. Alexei – is it worth the effort to double check the weight/#s of fish per hopper
    a. Joe – some concern that this would not be viewed favorably by the reduction facility and I do not have the man power to do this
3. Joe – cv of 4% in hopper weight from that 1966 paper

b. **Bait** (Joe presentation on VA bait fishery, Mike region wide presentation on bait fishery)
    i. Mike took over the bait landings analysis from Jeff
    ii. There are landings in this data set prior to 1985, but it appears that 1985 is a good cutoff point
        1. Getting better reporting each year
            a. Previous assessment had bait landings reconstruction back to 1940

c. **Recreational** (Behzad presented)
    i. Amy – add them in to the total landings and that is about it

X. **Spotter Pilot Data** (Amy presented)

a. Question – do we want to consider this data at the data workshop
    i. Group consensus – yes, adding the 2012-2013

XI. **Update on Progress of Fishery-Dependent Subcommittee** (Micah gave update)

a. Jay – has not provided RI fish trap data thus far, which was 1 of the 6 fishery-dependent sources considered for further development
    i. Doesn't think he will be able to extend behind
b. Trying to get some more detailed information from PRFC regarding our non-negative pound net collections
    i. Indication from nearest MD pound nets suggest we would expect 0 menhaden catch in PRFC pound nets
c. VA pound net data apparently does not identify all of the pound net catch by species, but rather has a very large magnitude "bait" category
    i. Likely makes the use of this data unusable
    ii. Would mean we were down to 5 data sets
d. Do not really need to consider soak time as an important variable in our standardization of the indices
e. Investigate whether we can get confidentiality access for the people on the sub-committee

XII. **Update on Progress of Fishery-Independent GLM Subcommittee** (Amy Schueller)

a. Total of 40 data sets to be considered – received 23 in the template form requested
b. Lots of discussion regarding the powerplant impingement data and its utility
    i. A lot of high temporal density data – difficulty is getting the data
    ii. May be very difficult to get this data by the January data workshop, but would like to give a shot
        1. Mike suggests involving/tasking the sturgeon TC to work on this

XIII. **Create Plan of Attack for January Data Workshop (Task List with Assigned, Responsible Individuals, Timeline, Conference Call Schedule)**

a. Landings
   i. Mike – will follow up with the bait stuff
   ii. Rec stuff is pulled together
   iii. Joe will be responsible for pulling together commercial
   iv. Touchbase before holidays concerning historical reconstruction

b. Natural mortality
   i. Matt will bring the BERP stuff
   ii. Ask Matt to bring the other options – Charnov, Lorenzen, point estimators
      1. Need to have discussion of whether to scale

c. Maturity/Fecundity (Joe Smith/Jeff Brust)
   i. We have the historical papers – likely do not have the original data but will check (Joe)
   ii. NEAMAP analysis by Jeff
   iii. Consider additional samples via Joe and NEAMAP (Rob/Jeff)
   iv. Look into the possibility of observer data (Matt)

d. Growth (Amy Schueller)
   i. Amy will take the lead – she will follow-up regarding missing data currently

e. Spotter Pilot Data (Joe/Amy/Jay/Behzad)

f. Indices
   i. Fishery-Dependent
   ii. Fishery-Independent

g. Tagging Sub-Committee (Joe/Rachel/Amy/Will/Rob/Alexei/etc. from outside this TC)
   i. Mike will follow-up about outside participation

h. Terminal Year
   i. Should have a goal of having a terminal year of 2013

i. Spatial vs. Coastwide Model
   i. Amy feels we will likely have a coastwide model in the future, but are we going to have a spatially explicit model in any way
      1. When are we going to make that decision
   ii. Joe – recommendation from 2010 peer review to stop looking at bait vs. reduction fishery dichotomy, but rather a north/south dichotomy
   iii. Rob – cast a wide net at this point to not limit us

j. Assessment Model Time Step
   i. Annual step (traditionally done) vs. seasonal step