

Horseshoe Crab Technical Committee Report

October 1, 2009

The Technical Committee (TC) met on October 1st primarily to review the draft benchmark stock assessment. The group also reviewed North Carolina's quota transfer request. Under 'Other Business' the TC received information on Massachusetts's proposed regulation changes and findings from recent research and monitoring. The meeting was held at the Holiday Inn – Inner Harbor in Baltimore. The following is a summary of the meeting.

Attendees

Technical Committee Members

Larry DeLancey (SC), Vice Chair
Tiffany Black (FL)
Alicia Nelson (VA)
Jeff Brust (NJ)
Greg Breese (USFWS)
Joanna Burger (Rutgers)

Stew Michels (DE)
Steve Doctor (MD)
John Maniscalco (NY)
Alison Leschen (MA)
Brad Spear (ASMFC), Staff

Stock Assessment Subcommittee Members

Dave Smith (USGS), Chair
Michelle Davis (Virginia Tech)
John Sweka (USFWS)

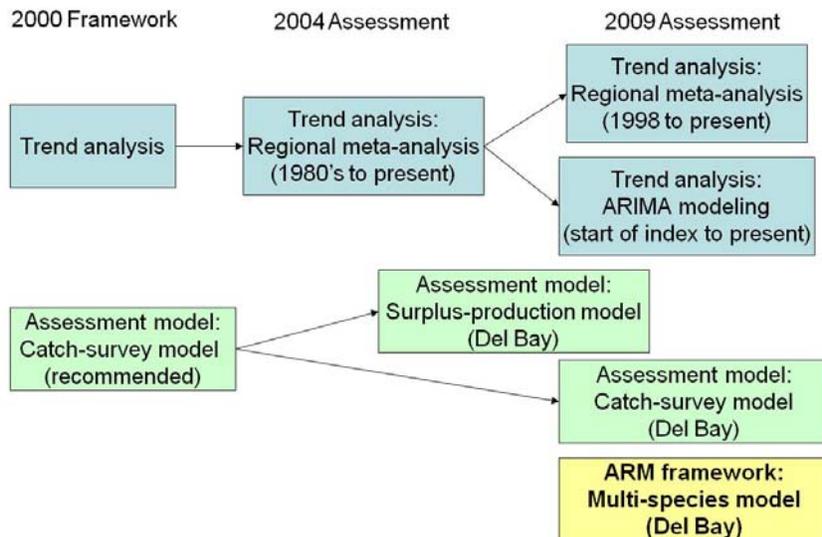
Others

Brian Hooker (NMFS), HSC PRT

Draft 2009 Benchmark HSC Stock Assessment

Overview

Dave Smith presented an overview of stock assessment methodologies since 2000:



In 2000, the assessment was based on trend analyses from various fishery-independent surveys that encountered horseshoe crabs along the coast. At the same time, the Stock Assessment Subcommittee (SAS) outlined their recommended assessment methodology (i.e. catch-survey model) once sufficient data became available. In 2004, the SAS completed an assessment updating the trend analyses and conducting a meta-analysis of the various surveys.

Between the 2004 and 2009 assessments, the SAS explored the use of a surplus production model for assessing the Delaware Bay population of crabs. While the model was useful for looking at relative biomass and fishing mortality levels, it was less reliable for estimating absolute numbers.

For the 2009 benchmark assessment, the SAS reran the trend analysis in addition to making several advancements. Autoregressive Integrated Moving Average (ARIMA) models were included to extract higher level of information from the survey data used in the assessment. Sufficient data from the Delaware Bay region was available to run the surplus production model again and the catch-survey model for the first time. On a parallel track, a multi-species model within an adaptive resource management (ARM) framework was completed. A report on this effort can be found in the “Joint Horseshoe Crab and Shorebird Technical Committees Report” dated October 2, 2009.

ARIMA Model

The ARIMA methodology is an advancement over a simple trend analysis because it minimizes measurement error from the surveys and allows inference of population status relative to some index-based reference point. Initial reference points chosen by the SAS were (1) the lower quartile (q25) for fitted index values over the time series, and (2) the fitted index value for 1998. The first reference point was chosen because it had been used in the past by Helser and Hayes (1995). The second was used because this will provide reference to what population trends are seen after the HSC FMP went into place in 1998. The model produces results that show for each survey the likelihood of being above (or below) the reference points.

The TC agreed with the choice of a 1998 reference point, but recommended making runs with reference points of q50 and q75 in addition to q25. TC members also suggested it would be informative to report the percentile of the 2008 index values relative to the entire time series for each survey.

Surplus Production Model

The SPM was run with data from Delaware Bay region surveys. Preliminary results showed a negative correlation between a couple of the surveys. This gives the model problems when it attempts to converge. Differences are seen between the Delaware 16' and 30' trawl survey catches. TC members explained that a number of factors could be affecting this such as the tides and catches during spawning season could be hit or miss. The SAS used an 80% confidence interval when reporting results. The TC suggested using a 95% CI but this would not be as informative.

Catch Survey Analysis Model

Data for this analysis included all landings from states where Delaware Bay crabs could be taken. The TC asked the SAS to explore the sensitivity of the model to excluding New York data because tagging data suggests that very few New York crabs end up in Delaware Bay.

The TC noted that there are likely differences in selectivity of gears and catchability of different aged horseshoe crabs. Pre-recruits and post-recruits could be differently distributed spatially. It is also possible pre-recruits have more energy to avoid gear.

Preliminary results of the CSA showed similar trends as the SPM.

Tagging Information

Using the horseshoe crab tagging database maintained, the SAS looked at movement of crabs. The data included in the analysis was limited to crabs recaptured after at least three months of initial tagging. Preliminary results showed very little movement of crabs within and out of the southeast (NC-FL). Crabs in New England showed little movement; 6 individuals ended up in the Delaware Bay over approximately 9 years. And, 93% of crabs tagged in Delaware Bay were recaptured in the Bay. The TC concluded these preliminary findings support the regional breakdown used in the assessment. The TC recommended including a summary of the tagging analysis in the stock assessment report.

Research Recommendations

The TC had several suggestions for research recommendations:

- Investigate stock mixing (if any) through analysis of VT Survey offshore tagging data.
- Explore effect of prey availability on horseshoe crab populations.
- Examine effects of water quality on early stage survival. [After the meeting, Joanna provided two published studies of metals levels in horseshoe crabs.]

North Carolina Quota Transfer Request

North Carolina exceeded its annual quota in 2009 by an estimated 7,237 crabs. Maine agreed to transfer its unlanded quota of 13,500 crabs to NC, as permitted under Addendum II. Voluntary quota transfers allowed under Addendum II require TC review and Management Board approval. Transfers should occur within a population, must be predicated on estimates of stock size, and should be evaluated for their impacts on competing crab populations, the biomedical industry, and migratory shorebirds. The TC reviewed NC's request and reports its findings in the form of a letter to the Board (enclosed).

Massachusetts Horseshoe Crab Updates

Female Mortality from Biomedical Bleeding Study

Results of surveys in Pleasant Bay (where only biomedical harvest is permitted) showed spawning sex ratios of 1 to 9, female to male crabs. This is much lower ratio of females compared to 1 female to 2-3 males observed in Florida and Delaware Bay. These observations prompted MA to investigate whether female mortality from biomedical bleeding could be causing the altered sex ratio.

The study used crabs harvested by biomedical fishermen. Crabs were placed into three different treatment groups (100 crabs in each group): (1) control – unbled, put directly into holding tank;

(2) bled, returned to the holding tanks same day; and (3) bled, stored in an air-conditioned truck overnight, returned to holding tanks [current practice of MD biomedical company]. The percent mortality in each of the treatments is as follows: (1) 3.1%, (2) 22.5%, (3) 29.8%. Preliminary results presented at the meeting showed the difference between the control (1) and the bled groups (2 & 3) was statistically significant, while there was no significant difference between the bled groups. This finding raised concerns about lethal and possible sub-lethal effects of biomedical bleeding on female horseshoe crabs. A more formal report of this study is forthcoming.

New Regulations

For the past two seasons, Massachusetts has imposed lower daily trip limit (1000 to 400 crabs/day) and lowered annual quota (330,337 to 165,000 crabs) for bait harvest. This was done to ensure a steady supply of bait for the conch fishery, while addressing issues of local depletion and increased out-of-state demand. Despite the new regulations, MA continues to see decreasing survey trends and occasional spawning females with no males. MA is now considering harvest slot size limits to address these issues.

January 4, 2010

Spud Woodward, Chair
Horseshoe Crab Management Board
Atlantic States Marine Fisheries Commission
1444 I St, NW, 6th Floor
Washington, D.C. 20005

Dear Mr. Woodward,

On behalf of the Horseshoe Crab Technical Committee (TC), I am writing to report the TC's findings from its review of North Carolina's quota transfer request.

North Carolina exceeded its annual quota in 2009 by an estimated 7,237 crabs. Maine agreed to transfer its unlanded quota of 13,500 crabs to North Carolina. Permitted under Addendum II, voluntary quota transfers require TC review and Management Board approval. Transfers should occur within a population, must be predicated on estimates of stock size, and should be evaluated for their impacts on competing crab populations, the biomedical industry, and migratory shorebirds.

The TC recommends North Carolina seek a transfer of crabs from a state within its region. We are concerned that displaced effort to smaller unknown populations could have significant negative effects on the population. For 2009, Georgia is the closest state with quota available. The TC noted that North Carolina went over quota in 2008 and again in 2009. If the trend continued, we feel the local population could become damaged. The TC suggested that North Carolina consider including in its request consideration of regulation changes or closing the harvest in time in order to avoid future overages.

The TC recognized that population data for horseshoe crabs in North Carolina are limited. However, more detail about local population trends should be included in the request. For example, if possible, we recommend putting together a chart showing the available trends compared to landings over the past ten or more years.

In conclusion, the TC recommends that North Carolina revise its quota transfer request to address the concerns noted above. We are standing by to assist North Carolina in meeting its horseshoe crab harvest needs and working toward health horseshoe crab populations.

Sincerely,

Mike Millard, Chair
Horseshoe Crab Technical Committee

cc: Horseshoe Crab Management Board
Horseshoe Crab Technical Committee