

Horseshoe Crab Technical Committee Report

October 20 – 21, 2005

The Technical Committee (TC) met in Norfolk, Virginia, on October 20th and 21st to review the draft Stock Assessment and respond to the requests of the Management Board. The following is a summary of the meeting.

Attendees

Committee Members

Andrew Draxler (NMFS)
Larry DeLancey (SC)
Tina Moore (NC)
Sue Gerhart (FL)
Greg Breese (USFWS), Chair
Jeff Brust (NJ)
Stew Michels (DE)

Steve Doctor (MD)
Carl Shuster (VIMS)
Penny Howell (CT)
Lewis Gillingham (VA)
Robyn Burgess (NY)
Frank Germano (MA)
Brad Spear (ASMFC), Staff

Others

Kim McKown HSC SAS
Dave Smith, HSC SAS Chair
Rick Robins, HSC AP
Patrick Kilduff, ASMFC
Michelle Davis, Virginia Tech

Caroline Kennedy, Defenders of Wildlife
Perry Plumart, American Bird Conservancy
Greg Butcher, Audubon
Sue Schaller, Bar Mills Ecological
Win Watson, UNH

Delaware Bay HSC Assessment Using Surplus Production Model

Michelle Davis, lead author of the horseshoe crab model paper in press (attached), presented her model to the group. She incorporated data into the model that was used in the last horseshoe crab stock assessment (2004). Results in the paper by Davis et al. estimate a low relative biomass (B_{2003}/B_{MSY}) with a range of point estimates from 0.022-0.71, and sustainable to high levels of relative fishing mortality (F_{2002}/F_{MSY}) with point estimates from 0.9-9.5. According to the model, at 2003 harvest levels recovery would take at least four years but 4 of 7 models did not reach B_{MSY} in 15 years. Michelle cautioned that absolute biomass is estimated much less precisely than relative biomass. She suggested interpretation of relative biomass (B/B_{MSY}) and relative fishing mortality (F/F_{MSY}) for use in management.

The TC praised Michelle for a step forward in horseshoe crab assessment modeling. It felt additional information may help readers put the model results into context. The TC noted that data sets available do not encompass a full life cycle of the animal (~20 years). Also, only data through 2003 was available for use in the model. Effects of management actions from Addendum III are not incorporated into the model. The TC felt some of the model outputs in the paper appeared to be unrealistic. For example, the model population projections for recovery should be viewed with caution, as should any model results. The TC noted that a female crab takes approximately ten years to reach sexual maturity, which in effect may delay population increase further than that estimated by the model.

The overall conclusion reached by the TC was more data would benefit the model. The inclusion of future years data for the surveys used in the model as well as data from directed

horseshoe crab surveys, such as VT benthic trawl survey and Delaware Bay spawning survey, will produce a more robust model. The TC also recommended running the model with different values for maximum population growth and population growth curves. The model should continue to be run as new data become available. The TC concluded that the model should be more thoroughly reviewed before used for management purposes.

Delaware Bay HSC Tagging Studies

Dave Smith presented the results of his three-year study to the group. Over three years (2003-2005) more than 36,000 crabs were tagged with USFWS button tags, 437 crabs with radio tags, and 34 crabs with archive tags. The results of the survey indicate an increase in juvenile age classes of the population and that weather and age affect timing of spawning. Furthermore, abundance estimates from the study show relatively low harvest rates. The TC found Dave's studies informative and thought that mark-recapture studies may provide the best population estimates for horseshoe crab populations.

Delaware Bay HSC Age-structured Population Model

Dave Smith also presented a draft manuscript co-authored with John Sweka and Mike Millard (USFWS). The objectives of exploring this model were to:

- develop age structured population model for horseshoe crab to evaluate effects of natural mortality and harvest on population growth, population age structure, and food availability to shorebirds;
- conduct sensitivity analyses that may provide useful information for fishery managers;
- explore various harvest regimes that may assist managers in formulating reasonable guidelines.

Dave highlighted that accurate estimation of the vital population parameters are not a result of the model.

The model showed that changes in harvest have a relatively low impact on population growth relative to the effects of egg mortality and first year survival. Sensitivity analyses indicated that age-0 mortality had the largest effect on horseshoe crab populations. The TC concluded this was justification for focused research on the survivability of age-0 crabs. The committee reiterated that the value of this model is for seeing how adjusting various parameters may affect the horseshoe crab population. It is not useful for establishing or comparing biological reference points.

Peer Review Report on Proposed HSC Assessment Methodology

Patrick Kilduff presented to the TC a draft report from the peer review panel. He and the committee are in the final stages of completing the report. The Panel agreed that the catch-survey analysis (CSA) is 'desirable' and that interim modeling approaches be explored. The Panel made many recommendations for data collection including improved characterization of catch and landings, expanding the range of directed surveys, and developing an inshore or estuarine directed trawl survey.

Patrick recorded the TC's comments on the Panel's recommendations. One suggestion from a TC member was to reevaluate the CSA as the goal for a HSC assessment. It was noted that all the data necessary to execute the CSA is not currently being collected and there's no assurance that it will be collected in the future. There was consensus that the VT trawl survey should be re-

evaluated now that there are several years. And there is still the question about our ability to identify new recruits. Several members noted that a large-scale mark-recapture tagging study or several small-scale studies might be more cost-effective and can be done concurrently. Once a final report is completed, the SAS and TC will provide more formal comments and a plan for future HSC assessments.

Revisit VT Trawl Survey and DE Bay Spawning Survey Reports

In June 2005, the TC was given an urgent task to review new data from studies that give a sense of the DE Bay population of HSCs. The information was needed to help New Jersey make a determination as to whether it would extend a harvest moratorium already in place. The TC held a conference call to discuss the reports. While the TC carried out the task, they noted that not all committee members were able to make the call and they would have preferred presentations from the authors.

The TC had several questions for the authors of both reports. It requested that the committee meet again as soon as reports of both studies with data through 2005 are available. It is important for the committee to meet and discuss these reports before the next spawning season. The next TC meeting will likely occur in January or February of 2006.

Endangered Species Act Listing Process

Greg Breese (for Annette Scherer, USFWS) gave the TC the presentation the ASMFC Policy Board received on August 18, 2005, regarding the ESA listing process of the red knot and potential effects. Petitions are under review to determine whether the red knot or any subspecies will undergo emergency listing. If the red knot is listed under the ESA, a determination of 'take' could affect HSC harvest regulations. For example, if it were clear that red knots were not gaining sufficient weight to make their migration, then further restrictions would be required. The ESA also has provisions to allow incidental take for some activities, which in this case may apply to biomedical or scientific harvest.

Board Questions/TC Response Regarding HSC/Red Knot Issue and Call for a Moratorium

1) Are there sufficient eggs being laid in and around Delaware Bay to sustain a HSC population?

The number of eggs needed to support horseshoe crabs and shorebirds is not known, a target population size has not been identified, and the surveys that measure egg abundance are not designed for horseshoe crab sustainability measurement.

However, if the question is "are there indicators that suggest the horseshoe crab population is sustaining itself," then several surveys can be considered. The Delaware Bay-wide Spawning Survey (1999 through 2004) indicates a stable or slightly declining spawning population. Delaware's 30-foot trawl survey shows no trend in adult abundance since 1998. Delaware's 16-foot trawl survey (including preliminary 2005 data) indicates that juvenile (YOY and crabs less than 160 mm) abundances are at record highs for the last 2 years, and since 1998 there has been a significant increase in juveniles. The USGS Studies indicated a broader age structure between 2003 and 2005, suggesting an increase in juvenile horseshoe crab. It could be inferred that the increases in juveniles suggests an increase in eggs and/or better survival of juveniles. Virginia Tech benthic trawl survey suggests, based upon confidence intervals, that some life stages of females show decline while others have no trend.

2) *Is there evidence to mandate further restrictions on HSC harvest in...*

a. Delaware Bay Region?

Based on current data (see surveys referenced above) there does not appear to be an indication that further restrictions in harvest are needed for sustaining and/or expanding the current horseshoe crab population. A target population level still needs to be defined.

It should be noted that increased egg abundance due to apparent increases in juveniles reaching breeding age will lag due to the slow maturation rate of horseshoe crabs.

b. Outside Delaware Bay Region?

Although data are limited outside Delaware Bay, trend data available do not indicate a need for further restrictions in harvest.

However, harvest limitations imposed in the Delaware Bay Region have resulted and may result further in increased impacts to populations outside the Region.

Reported Bait and Biomedical Landings

Brad Spear circulated a bait landings table updated annually by the Plan Review Team (PRT) with landings reported via annual state compliance reports. During this year's review of landings through 2004, minor discrepancies were noticed for several states. Brad asked that each state review the table and verify ASMFC's bait landings data with its state's records.

Brad also sent around a draft summary of biomedical landings for 2004. Addendum III required states that have biomedical bleeding facilities to report harvest, landings, and processing information. The 2005 reports of the 2004 season was the first to contain this information. Brad put together preliminary findings for the group to review. The TC had several suggestions the he will take back to the PRT so it can draft a final report for the Board.

Voluntary Bait Cup Usage in the Massachusetts Conch Fishery

Frank Germano told the group about bait cups that are being manufactured and used that reduce the amount of HSC needed to fish for conch. Fishermen voluntarily use the bait cups. Frank noted that parts of one HSC are used in up to 10 traps (1 cup per trap). The bait cups work well for crabs that have been bled by the biomedical industry. He mentioned that conch fishermen can use a single bait for about 3 days, after which time it 'sours'. Frank also noted that waters in Massachusetts are generally colder than the southern states' waters, which may affect the effectiveness of the bait cups. The TC asked that Frank send out information on and pictures of the bait cups.