

# STOCK ASSESSMENT OF THE BLUE CRAB IN CHESAPEAKE BAY



## 8.1. Research Recommendations

1. Assessment models
  - a. The new SSCMSA is a substantial step forward as it provides integrated estimation of reference points and stock status. However, a more complete understanding of the sensitivity of model outputs to parameter values. We also recommend an evaluation of the impacts of uncertainty in parameter estimates on reference points.
  - b. Evaluate the effects of possible miss-specification of model structure to explain the inability to match the sex-specific catch levels in the model (sex specific ratio at recruitment, sex-specific differences in M, sex-specific differences in catchability, alternative stock recruitment models).
  - c. The efficacy of alternative fishery-independent time series, such as the ChesMAPP samples, in assessment models should be evaluated.
  - d. The ecology and fisheries for blue crab exhibit considerable spatial variability – much of which coincides with the divisions among management jurisdictions. We recommend evaluation of spatially-explicit assessment models.
  - e. Additionally modeling work that specifically represents the diversity of fishery sectors, with different seasonalities and catchabilities would be beneficial.
2. Fishery-dependent data
  - a. The monitoring of removals by the different fisheries has improved. However, efforts to validate landings are currently inconsistently implemented across jurisdictions. Efforts to validate landings should be a high priority. These approaches could include directing monitoring of purchases by wholesalers or by indirect expansion of sentinel fishery data.
  - b. Although time series approaches to correcting landings for reporting changes appear successful, their use for any future reporting changes should be discouraged in favor of direct empirical estimates of the effects of the change from studies implemented contemporaneously with the reporting change.
  - c. We recommend that attention be given to ensuring that the biological characteristics of each fishery be quantified, and that the spatial and temporal distribution of the removals be quantified.
  - d. The recreational catch remains poorly described and its inter annual variability is largely unknown. Monitoring programs and surveys to quantify the recreational harvest should have a high priority.
  - e. There have been efforts to improve information on the distribution and dynamics of effort in the different fisheries exploiting blue crab in the

Chesapeake Bay. These efforts should be expanded to a consistent baywide coverage and continued.

3. Fishery-independent data
  - a. Fishery-independent surveys are critical to the assessment, particularly the winter dredge survey. Continuing investments in these surveys are important for ongoing assessment efforts.
  - b. Efforts to estimate gear catchability coefficients should be expanded. In particular, these efforts should focus on the interaction between the spatial distribution of crabs and area-specific patterns in catchability.
  - c. Additional analysis of the survey time series to understand their coherence, and their ability to track population variation would be beneficial. A thorough evaluation of survey efficiency and options for enhancing their utility should be undertaken.
  - d. Indices for age-0 and recruits are lacking other than for WDS. Exploration of alternative indices of age-0 crabs is a priority.
4. Ecology and Biology
  - a. Research that quantifies size-dependent, sex-specific and inter-annual patterns in natural mortality would greatly improve future assessments.
  - b. Understanding of growth as it affects recruitment of age-0 crabs to different fishery sectors is uncertain. Studies of the temporal and spatial variability in growth would improve our understanding.
  - c. The reproductive potential of the crab population likely varies with stock abundance and the sex ratio on the stock. Research on the variability of reproductive parameters (e.g., maturity, fecundity and batch production) is a high priority. Additionally, research on the impact of variation in the sex-ratio on the reproductive potential of the population would be beneficial.
  - d. Evaluation of how productivity may have changed over time in response to changes in availability of quality habitat
5. Management
  - a. Coordination among management jurisdictions is commendable. However, there remain important difference in the availability and format of data. We recommend that efforts be implemented to make harvest and survey data widely available and consistently managed. This would reduce time invested in data qa/qc during the assessment process and likely improve the reliability of future assessments.
  - b. The sex-specific approach to management recommended here has implications for new decisions management has to make regarding the future of the fisheries. Management should engage stakeholders to develop a vision for the fishery in light the adoption of a sex-specific approach.

- c. There have been no efforts in this assessment to consider blue crab management from an ecosystem view point. The exploration of both the impact of the ecosystem on the productivity of blue crab fisheries and of the impacts of the blue crab fisheries on the ecosystem are warranted.