Benchmark Chesapeake Bay Blue Crab Stock Assessment

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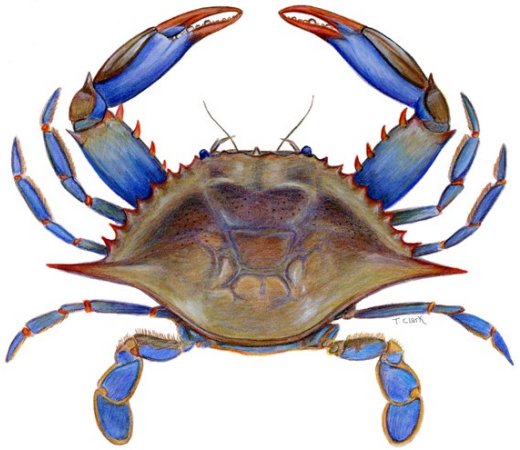
Introduction

- The last benchmark blue crab stock assessment for the Chesapeake Bay was completed in 2011.
- It has been updated several times since then.
- Concerns have been raised because estimated fishing mortality rate reference points have been trending downward, and blue crab abundance has not increased to the expected levels from the 2011 assessment.



Terms of Reference

- ***TOR 1:*** *Critically review and estimate life history parameters and vital rates of blue crab in the Chesapeake Bay…*

- ***TOR 2:*** *Describe and quantify patterns in fishery-independent surveys…*

- ***TOR 3:*** *Describe and quantify patterns in catch, effort, and CPUE…*

- ***TOR 4:*** *Evaluate the feasibility of, and if possible, implement blue crab stock assessment models…*

Terms of Reference

- ***TOR 5:*** *Characterize uncertainty in assessment estimates (mortality and abundance).*

- ***TOR 6:*** *Update the sex-specific catch survey models used in the 2011 benchmark stock assessment…*

- ***TOR 7:*** *Based on assessment model results recommend appropriate biological reference points...*

- ***TOR 8:*** *Evaluate stock status relative to recommended reference points.*

Terms of Reference

- ***TOR 9:*** *Identify relevant ecosystem and climate influences...*

- ***TOR 10:*** *Identify existing data sources and gaps, and, to the extent possible, characterize the uncertainty in the relevant sources of data.*

- ***TOR 11:*** *Report on the status of research recommendations from the most recent benchmark assessment. Identify and prioritize research recommendations for future work.*

Assessment Timeline

- 3/1/2024 – 3/1/2026 (Contract dates)

- The project team has monthly meetings, and TOR working groups have regular meetings

- All data have been received and reviewed
  - Analyses are being conducted

Harvest data

- Maryland, PRFC, Virginia
- Dockside sampling – Maryland and Virginia
- Cooperative sampling - Maryland

Surveys (indices, sex and size composition)

- Winter Dredge Survey
- VIMS Trawl Survey
- ChesMMAP
- Maryland Trawl Survey
- SERC Trawl Survey
- PEARL Pot Survey
- Maryland and Virginia Striped Bass Seine Surveys

Other Data

- Tagging Data (SERC and VIMS)
  - Natural mortality, recreational harvest, and movement
- Reproduction information
- Tethering studies
- Consumption by finfish predators
- Environmental data

Photo: Kim Richie

Population model processes

- Growth
- Maturation (for females)
- Fishing mortality
- Natural mortality
- Recruitment

Observation processes

- Fishery catch
  - Catch by sex
  - Length composition
- Surveys
  - Indices of abundance by sex
  - Length composition

Population dynamics

$$N_{t+1,l} = R_{t,l} + \left(\sum_{l'} G_{t,l',l} N_{t,l'} e^{-Z_{t,l'}} \right) e^{\delta_t}$$

- $N_{t+1,l}$ is the abundance at the next time step in length bin l
- $R_{t,l}$ is the recruitment in time t and length bin l
- $G_{t,l',l}$ is the probability that an animal in length bin l' grows to length bin l
- $Z_{t,l'}$ is the instantaneous total mortality rate for animals in length bin l'
- δt is a normally distributed process error for time t, sd = 0.1

Assessment Timeline

- Remainder of 2025
  - Complete index standardization
  - Finalize catch data
  - Complete model development and testing

- Goal is to have potential assessment models by May-June 2025
- Completed assessment and report in Dec. 2025
- Peer review in Jan. 2026

Acknowledgments

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