South Atlantic Ecopath with Ecosim (EwE) Model

Review Report

SSC Model Review Workgroup

Acknowledgement

SSC Ecopath with Ecosim Model Review Workgroup:

Dr. Yan Li (Chair), NC Division of Marine Fisheries, NC Dept. of Environmental Quality

Dr. Robert Ahrens, University of Florida

Dr. Alexei Sharov, Maryland Dept. of Natural Resources

Dr. Frederick Scharf, University of North Carolina Wilmington

Dr. Eric Johnson, University of North Florida

Dr. Marcel J. Reichert, MRRI, South Carolina Department of Natural Resources

Technical Participants:

Lauren A. Gentry, FWRI (Modeling Team: Technical Input on Model)

Luke McEachron, FWRI (Modeling Team: Technical Input on Model)

Laurent Cherubin, HBOI/FAU (Habitat Ecosystem AP Member: Technical Input)

Howard Townsend, NOAA Fisheries (Modeling Team: Technical Input/NOAA Guidance)

Roger Pugliese, SAFMC (Modeling Team: Staff Oversight)

Review Purpose: A defensible base model for the South Atlantic region

- Appropriateness of data
  - Validity of data sources
- Model parameterization and decisions
  - Justification of individual input values
  - Appropriateness of model assumptions
  - Validity of model setup
- Initial model outcomes
- Functionality in fisheries management
- Mostly focused on evaluating Ecopath

Review Process

- July 24-25, 2019: Discuss the collection of diet information and the spatial settings (in-person workshop)
- December 6, 2019: Develop the Terms of Reference (TOR) (conference call)
- February 6, March 10, August 27 and September 10, 2020: Review the EwE model and complete the review report (webinar)

Review conclusions

- The Workgroup (WG) concludes that the MT addressed each of the TOR adequately and this EwE model provides a valid base model that can be modified for specific research and management needs. The base model was developed based on the best information available currently, and will be updated and improved as new data become available.

- Model Team (MT): Tremendous effort and very responsive

Discussion and Concerns: Ecopath

- Functional groups
- Individual input values
  - Difficult to justify for data-limited species
  - Tradeoff between inputting biomass versus letting the model estimate
  - Biomass accumulation
  - Discard mortality and discards
- Potential overparameterization with 19 fleets separated

Discussion and Concerns: Ecosim

- Time series
- Fitting process
- Extreme estimates
- Primary productivity

Discussion and Concerns: EwE

- Functionality
  - Serve as a living tool to complement stock assessment and fisheries management.
  - Inform management decisions (e.g., management strategies evaluation), multi-species management, and ecosystem-based management (e.g., identifying biotic and abiotic drivers of the population dynamics).
  - Test hypotheses related to trophic interactions, and to evaluate uncertainties of parameters at ecosystem scale.
- The EwE will be updated and improved as new data become available.

Recommendations: Model Input

- Establish a well-maintained and regularly updated documentation of model inputs with justification for the use of individual values.

- Tune the biomass accumulation based on available information to match the biomass trend of the species during the reference time period, including the trends from fishery independent indices, biomass estimates from stock assessments and biomass estimates from surveys (e.g., surveys for shellfish).

- Validate individual discard mortality rates.

Recommendations: Model Input

- Potentially add a “discard fleet” to the fisheries data in the future. This would allow for a time series representing changes in discard mortality over time, such as before and after changes to gear regulations.

- Explore other alternatives for the default value of 20% to calculate commercial discards.

- Request discard estimates from states, especially for inshore species.

Recommendations: Model Output

- Validate the model estimated biomass based on similar species in this model or in other models for this region.

- Identify and evaluate extreme estimates.

Recommendations: Model Performance

- The inputs of biomass and diet are critical to the model performance of Ecopath, and can further influence the fitting of Ecosim.

- Recommend research into South Atlantic Regional biomass estimates for species important to the ecology and/or fisheries of the model region.

  - Ecologically high-impact species: Forage fish (such as herrings, anchovies, shad and sardines), Auxis mackerels (bullet and frigate mackerel) and red drum.

  - Fisheries-important species: Nassau grouper and Goliath grouper

Recommendations: Model Performance

- Recommend research into the diets of species for which the current literature lacks recent, local diet information necessary to accurately characterize feeding ecology.
    - Species: Auxis mackerels (bullet and frigate mackerel), blue runner, tarpon, mutton snapper and Nassau grouper.
    - Recommend further monitoring of lionfish diet in order to fully evaluate their impact on the ecosystem.

Recommendations: Future

- Recommend establishing a standing workgroup to help with future update and development of EwE, including Ecospace, in order to increase the functionality of EwE for fisheries management.