Developing Chesapeake Bay-specific abundance estimates for striped bass and spot

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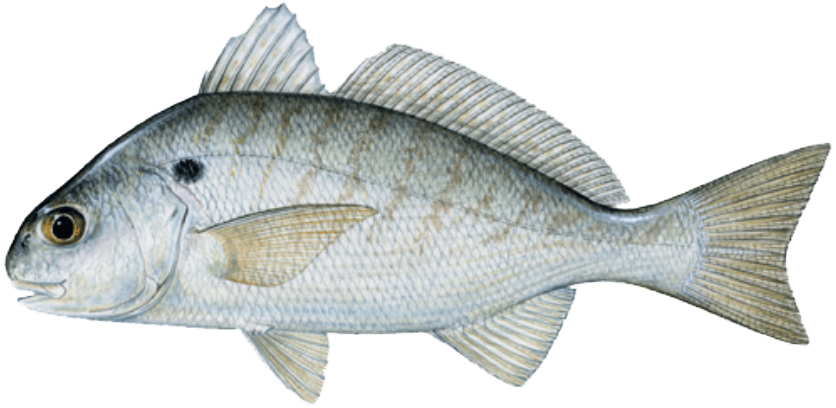


Background

- There is broad interest in understanding the effects of environmental changes on fish and shellfish populations in the Chesapeake Bay

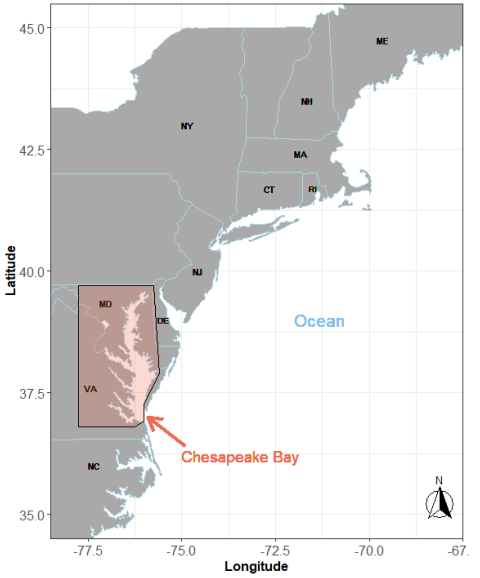
- We lack Bay-wide estimates for most species, which hampers our ability to determine causes of change in the community

Objectives

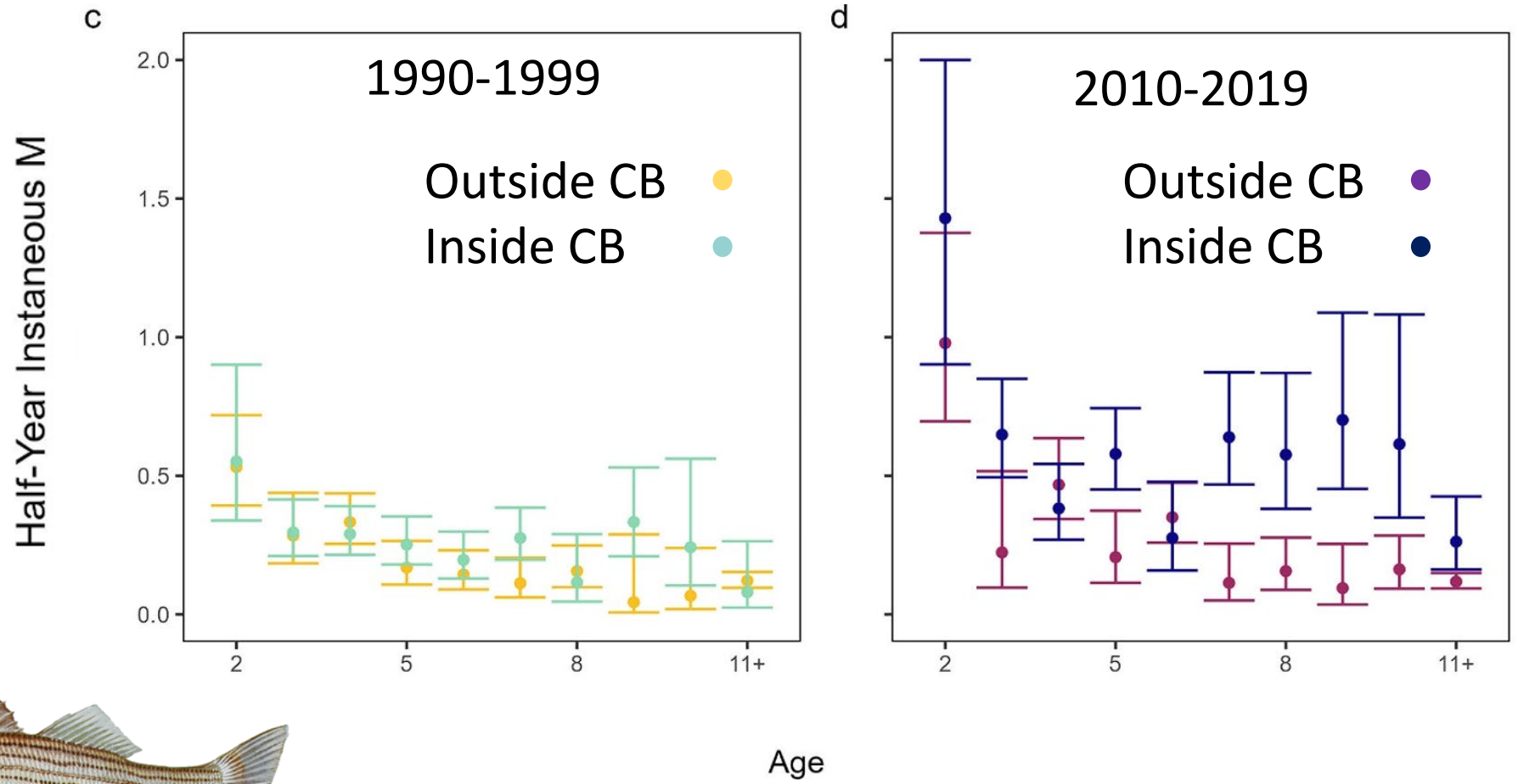
- Develop spatial models that estimate abundance and mortality rates for striped bass and spot in the Chesapeake Bay,
- Estimate the effects of environmental drivers on population dynamics, and
- Make the estimates publicly available to facilitate other studies

Striped Bass

- Mark-recapture model to estimate movement and natural mortality
  - Three stocks in two regions
    - Stocks: Chesapeake Bay, Delaware River, Hudson River
    - Regions: Chesapeake Bay, other coastal ocean and estuaries
- Spatial statistical catch-at-age model to estimate fishing mortality and abundance
  - Two stocks in two regions
    - Stocks: Chesapeake Bay, other stocks combined
    - Regions: Chesapeake Bay, other coastal ocean and estuaries
  - Four models

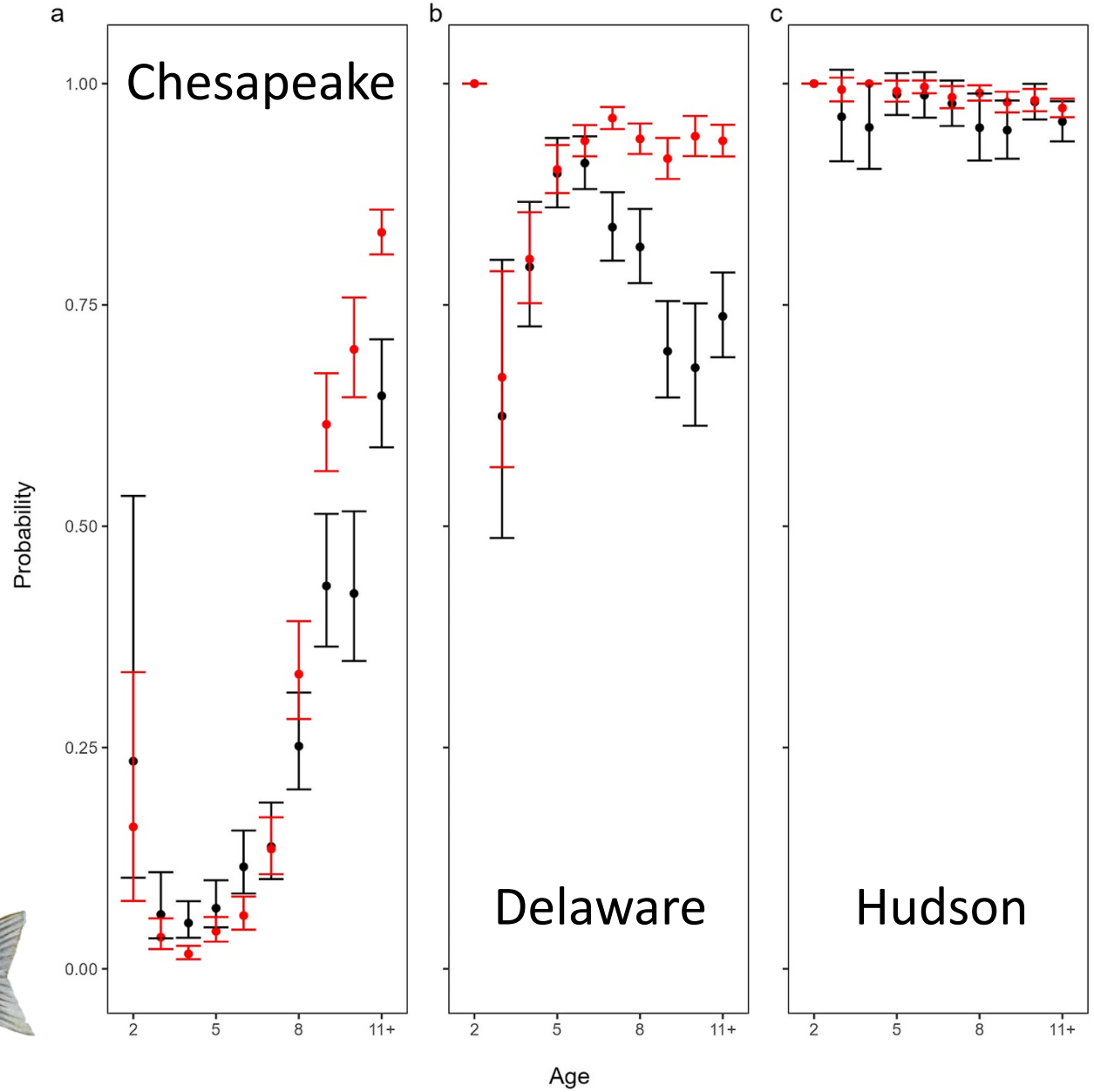


Tagging model natural mortality



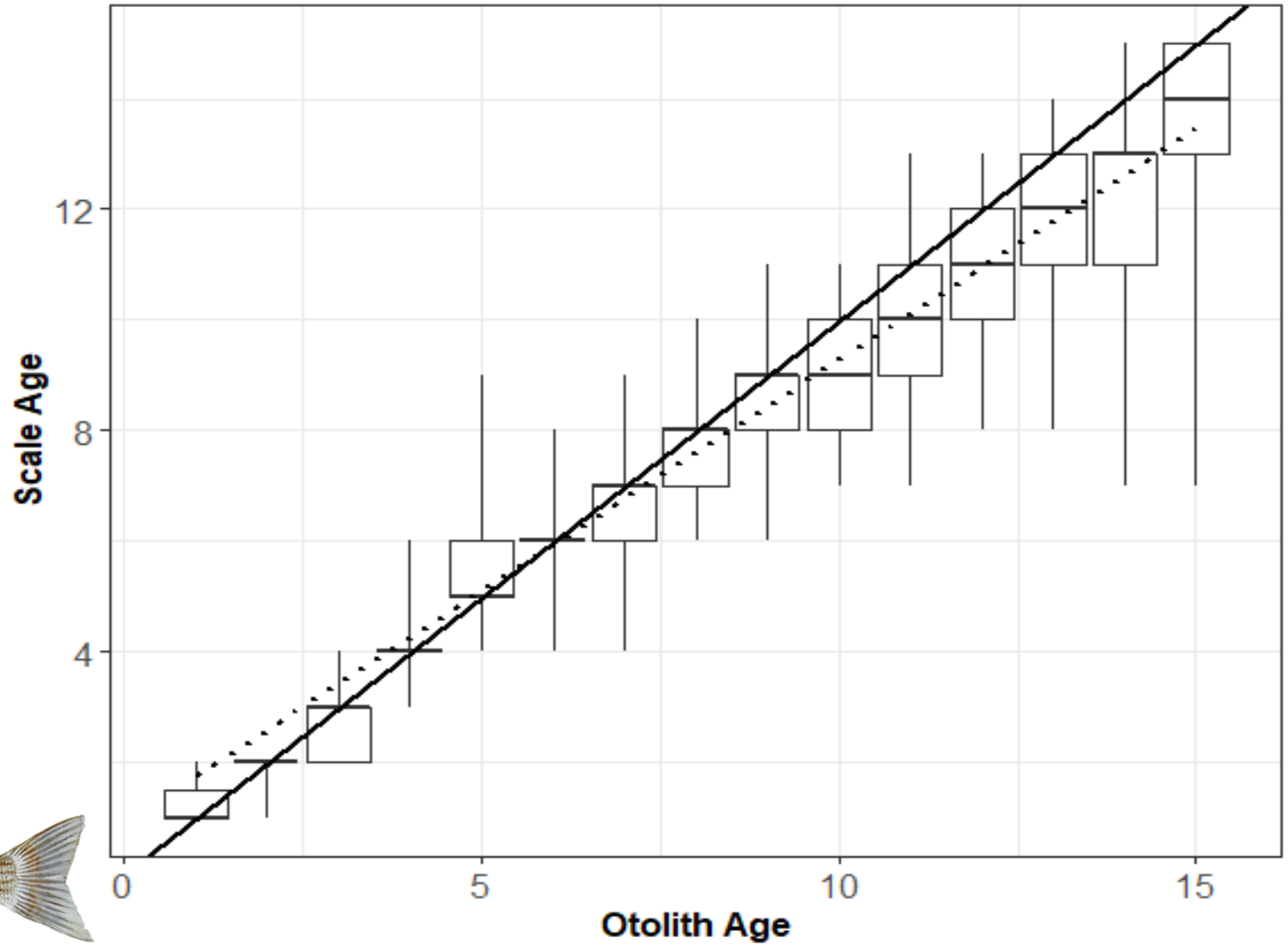
Schoenfeld et al. in prep.

Tagging model occupancy probabilities



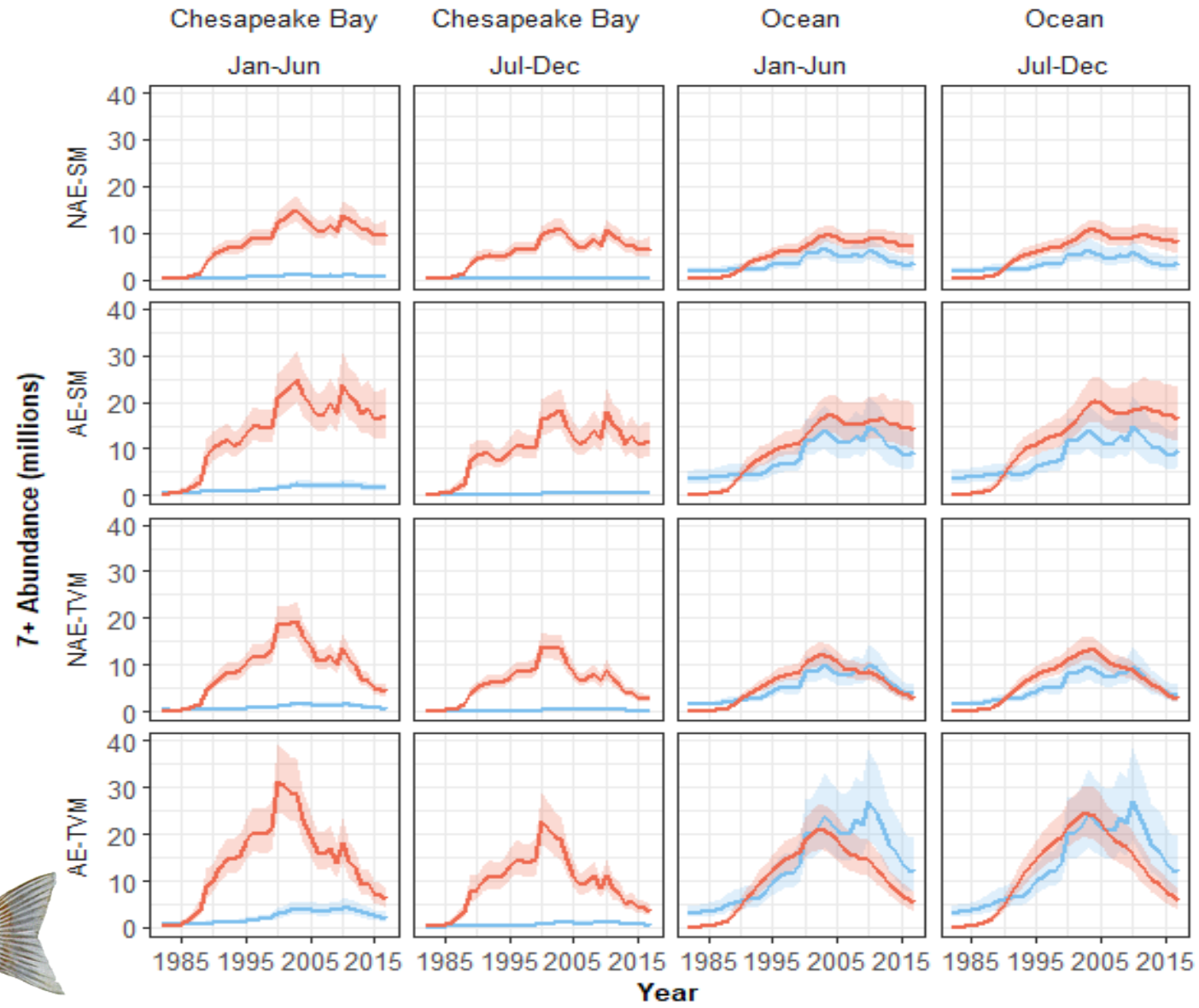
Schoenfeld et al. in prep.

Age-structured model ageing error



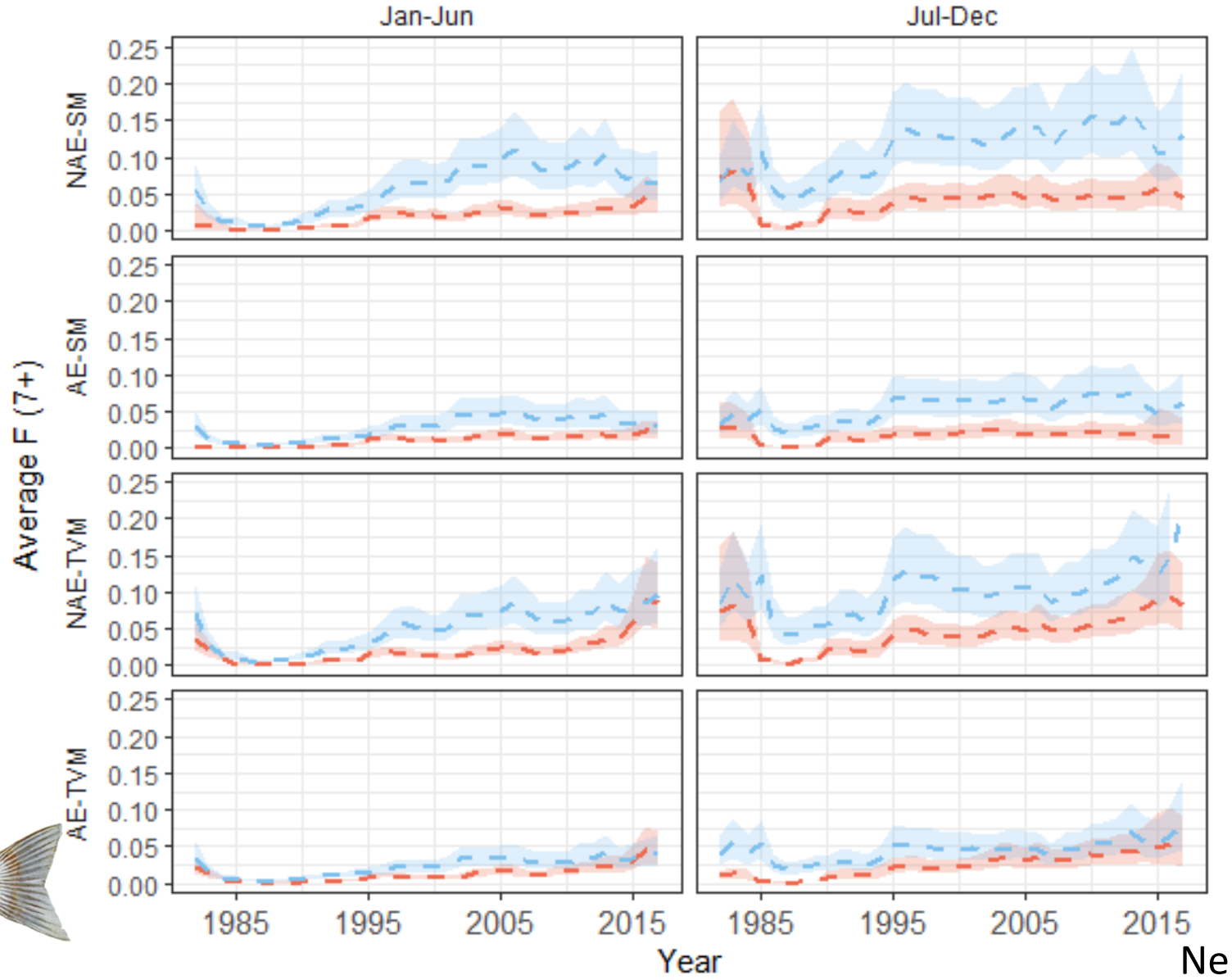
Nehemiah et al. in prep.

Age-structured model abundance



Nehemiah et al. in prep.

Age-structured model fishing mortality rates

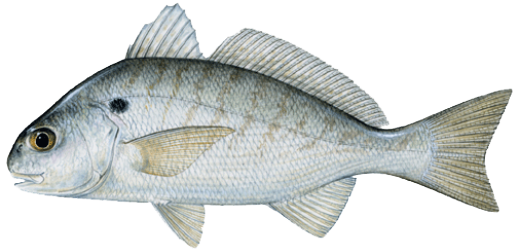


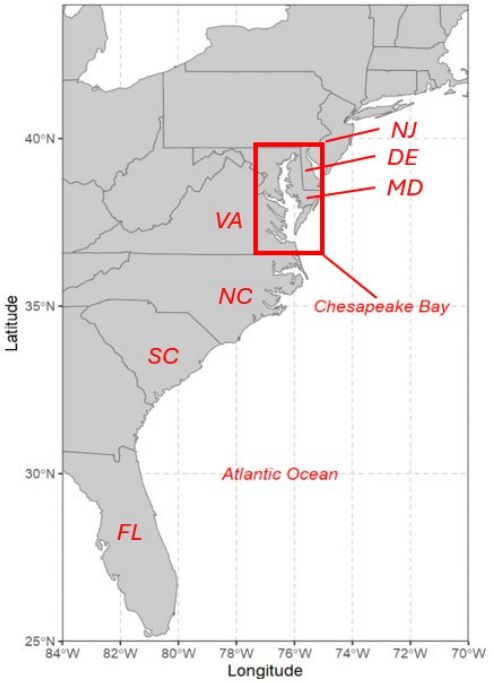
Nehemiah et al. in prep.

Spot

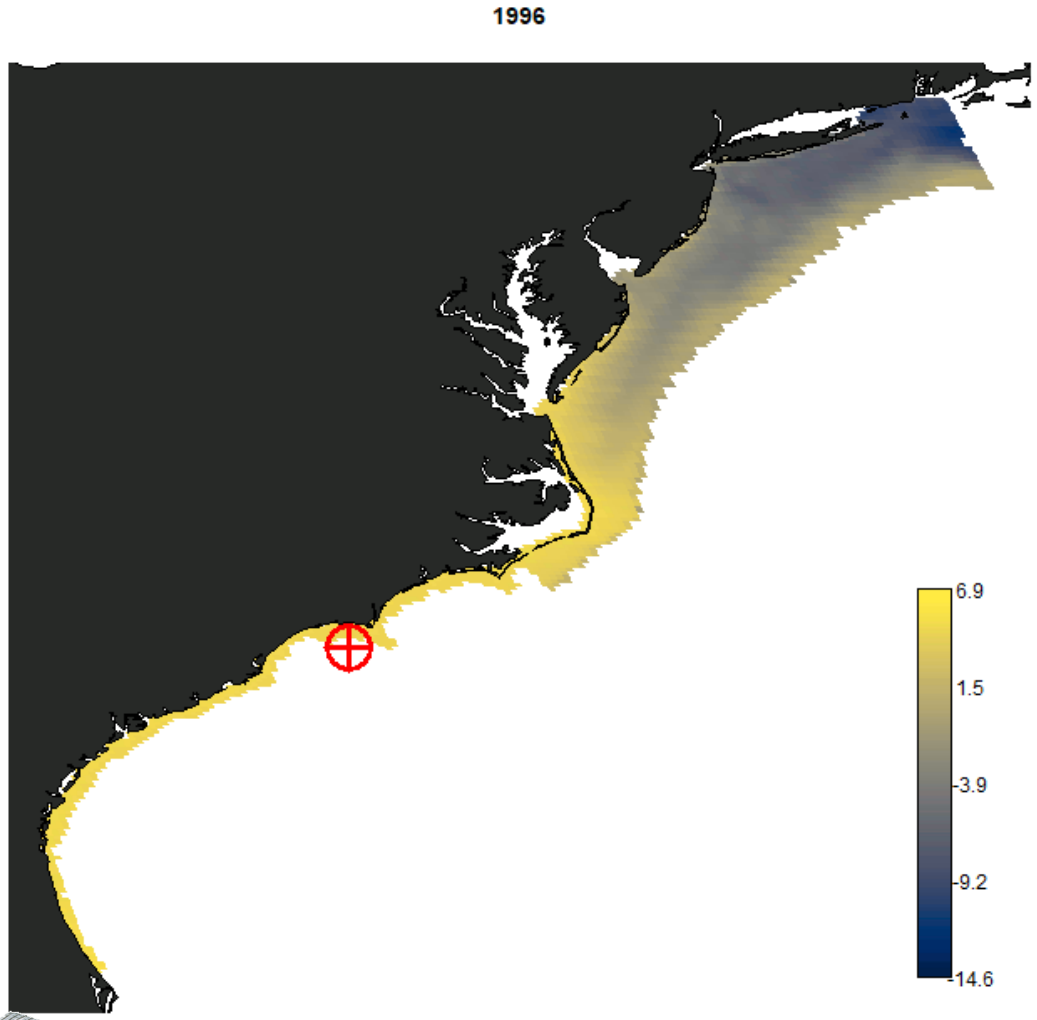
- VAST model to combine coastal spot indices

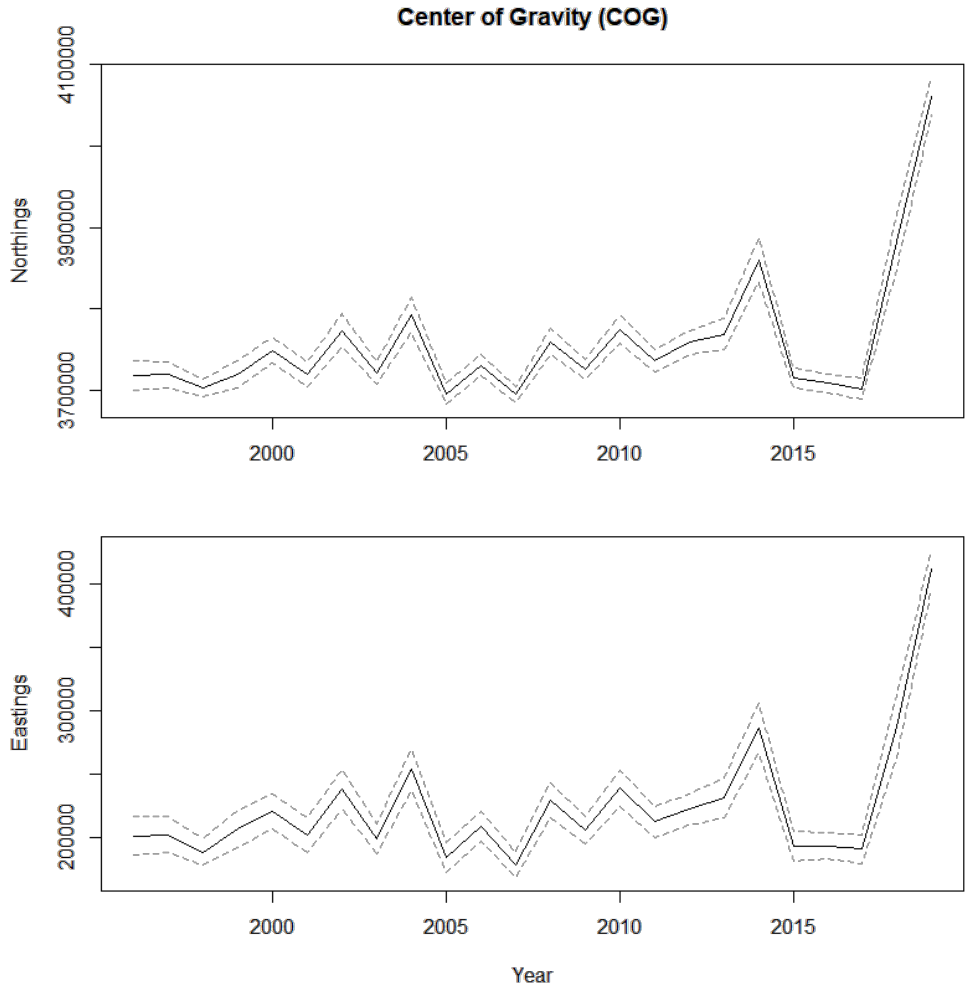
- Spatial statistical catch-at-age model to estimate fishing mortality and abundance
  - One stocks in two regions
    - Regions: Chesapeake Bay, other coastal ocean and estuaries
  - Two models
    - Time varying occupancy (TVO)
    - Spatially varying mortality (SPM)





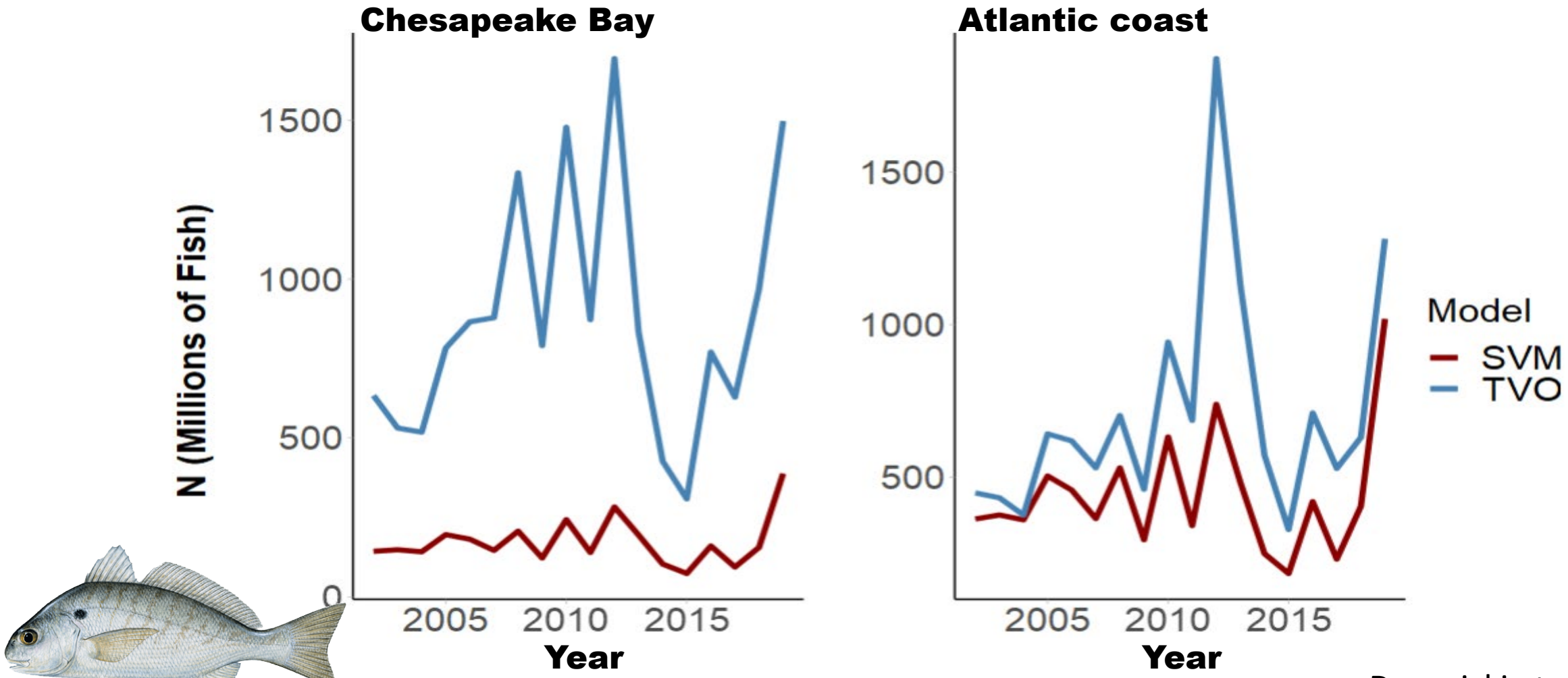
VAST non-Chesapeake abundance index





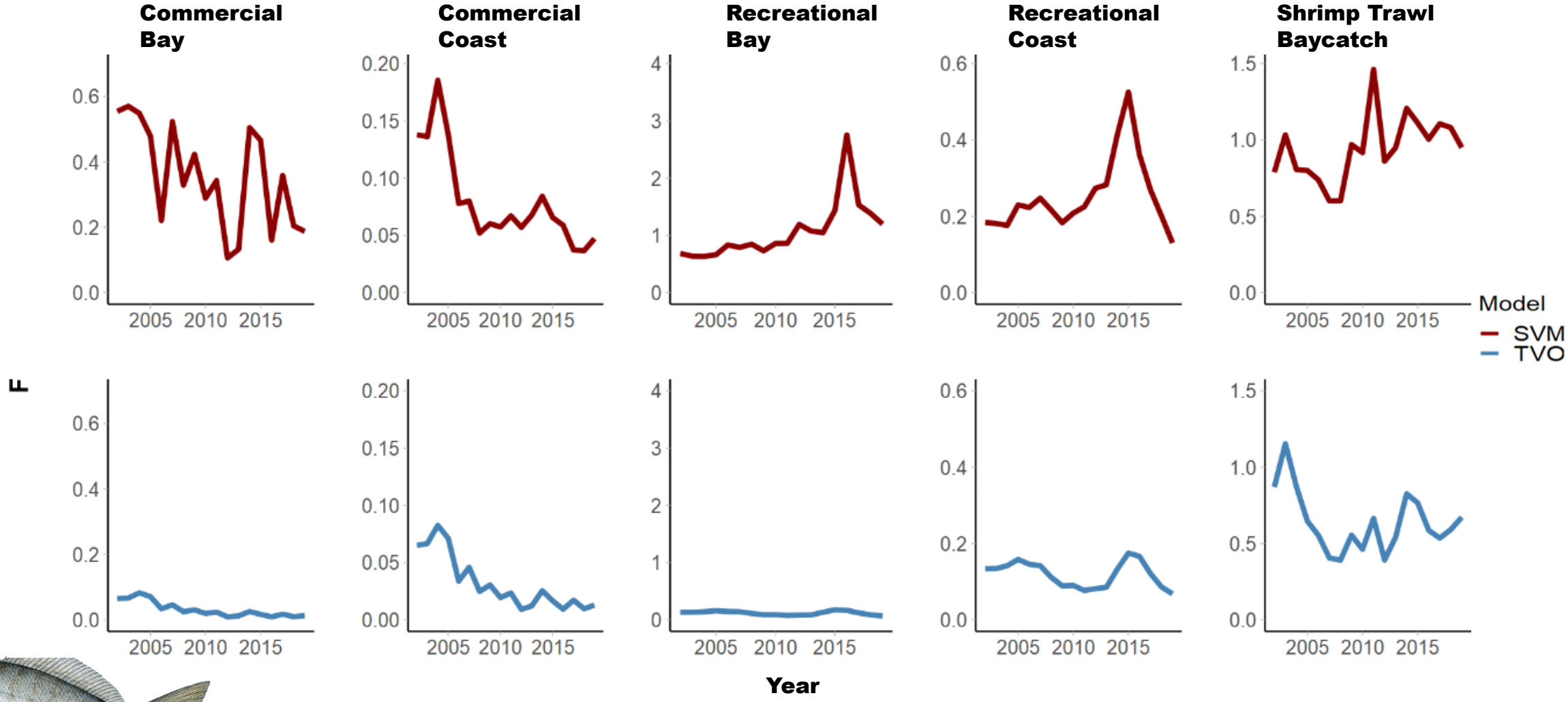
Mestav et al. in prep.

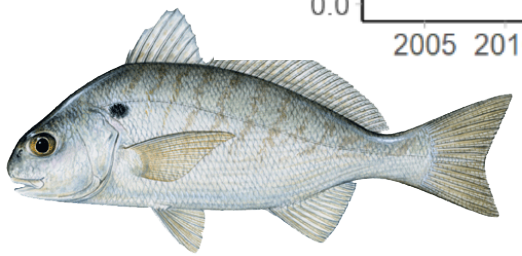
Age-structured model abundance



Drzewicki et al. in prep.

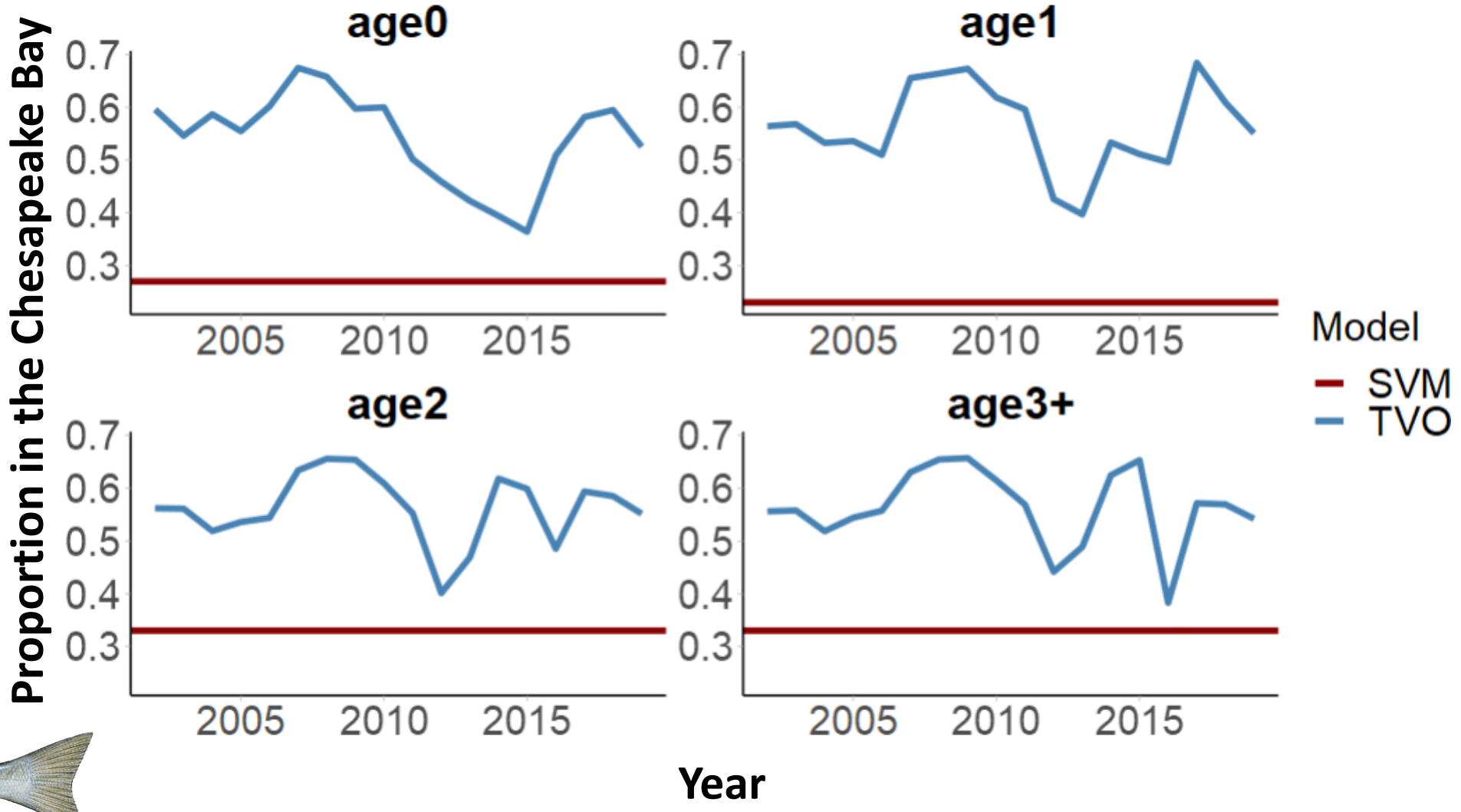
Age-structured model fishing mortality rates

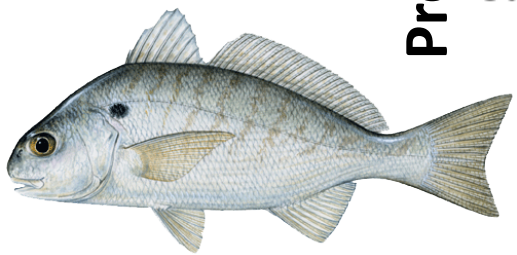




Drzewicki et al. in prep.

Age-structured model occupancy probabilities





Drzewicki et al. in prep.

Conclusions

- We were able to develop estimates of abundance of striped bass and spot in the Chesapeake Bay.
- Model estimates were sensitive to model assumptions.
- Models and methods are in the process of being submitted to journals, and abundance estimates will be publicly available soon.

Acknowledgments

- Steering committee
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- Striped bass TC
- Spot TC

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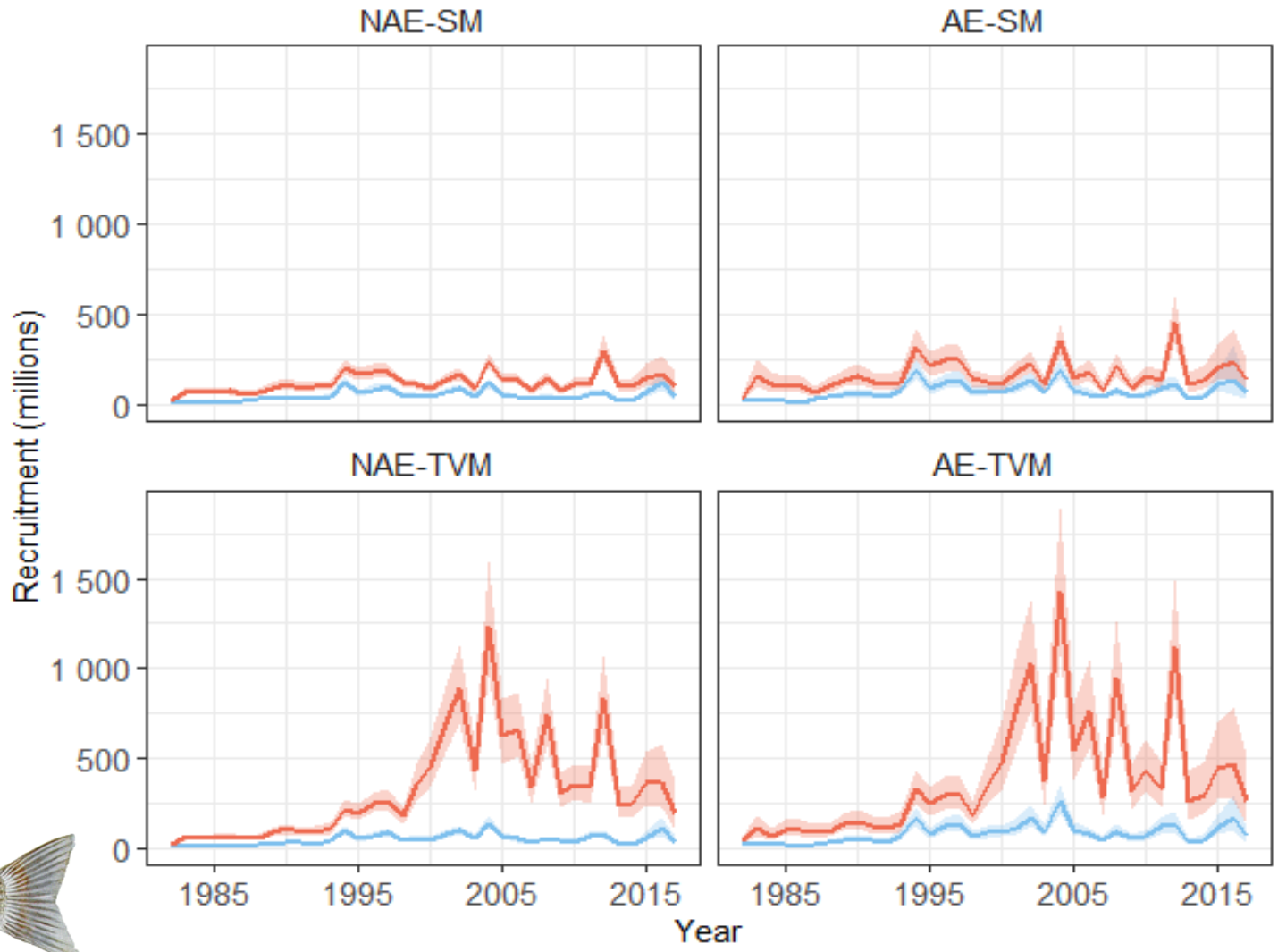
- Data
  - North Carolina
  - Virginia
  - Maryland
  - Delaware
  - New Jersey
  - New York
  - Connecticut
  - Rhode Island
  - Massachusetts
  - South Carolina
  - Georgia
  - Florida
  - NOAA
  - SEAMAP
  - VIMS
  - ACCSP
  - Dave Secor

Age-structed model recruitment



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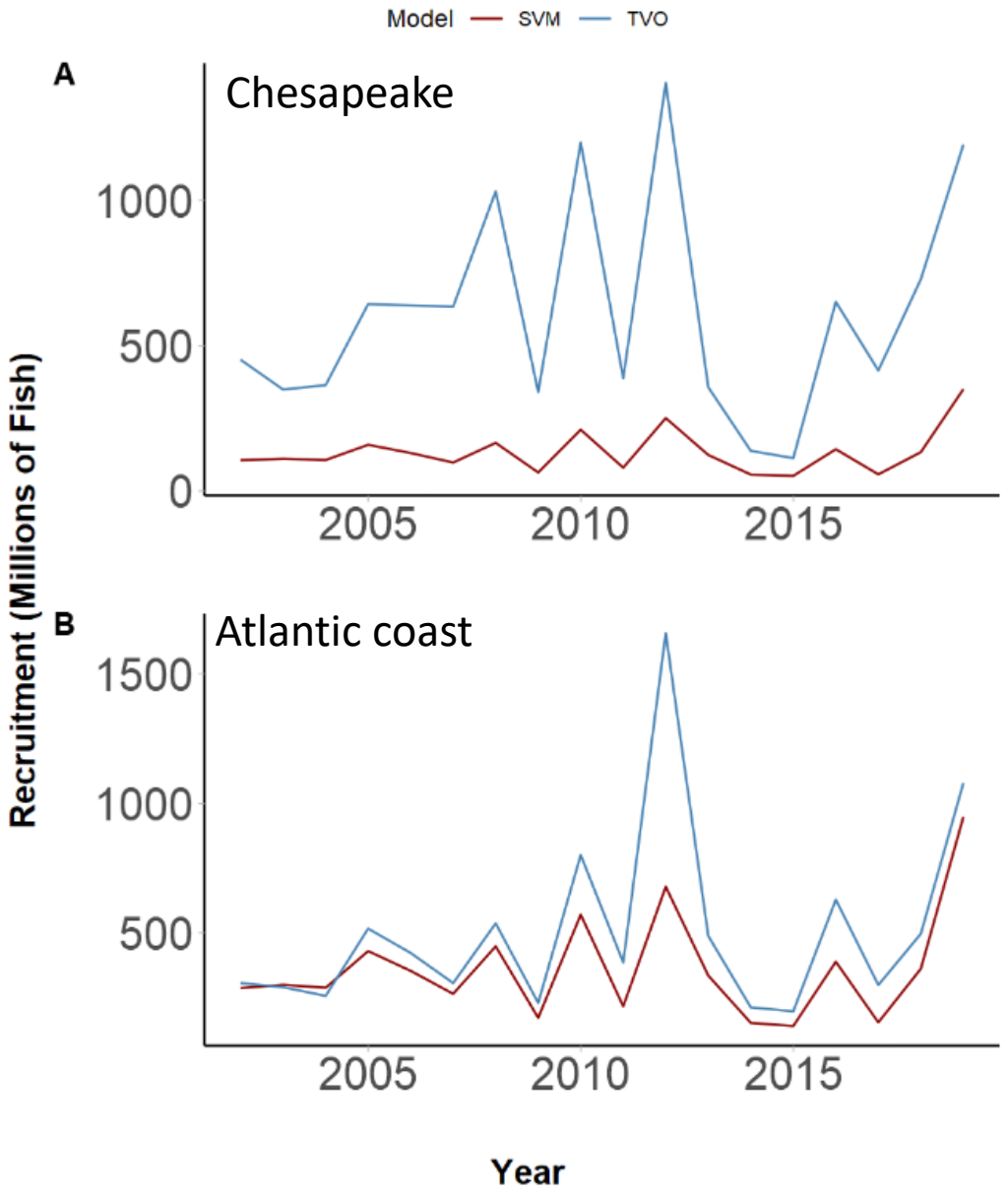
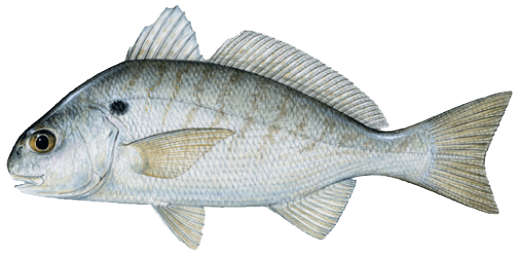
Age-structured model recruitment





Drzewicki et al. in prep.