UPDATE: Bay Wide Approach: Threshold effects of altered shorelines and other stressors on forage species in Chesapeake Bay

PIs Rochelle Seitz & Rom Lipcius, Gabby Saluta (VIMS), Denise Breitburg, Tom Jordan, Don Weller (SERC), and Matt Kornis (USFWS)

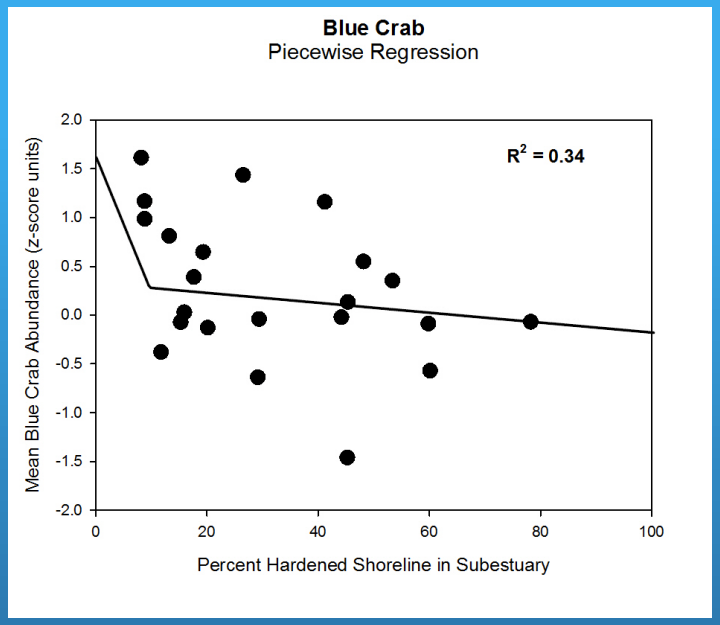
VIMS | William & Mary
Virginia Institute of Marine Science

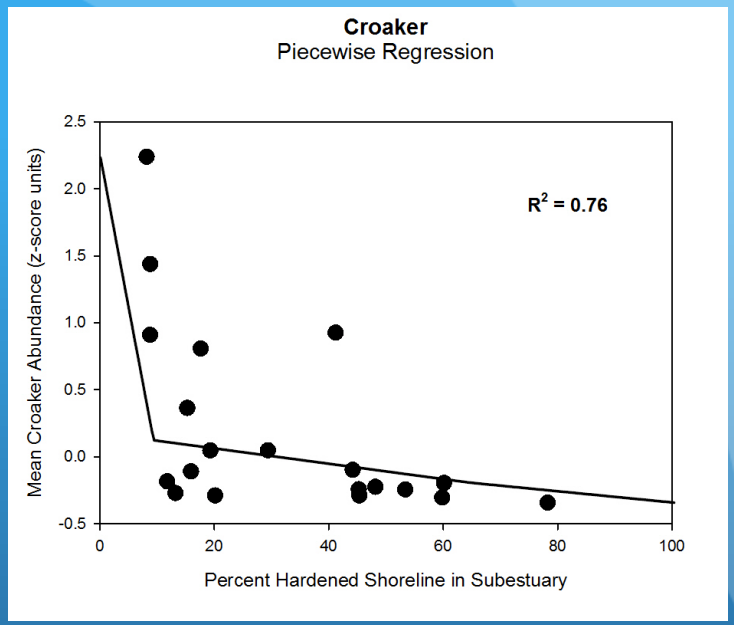
Smithsonian Institution

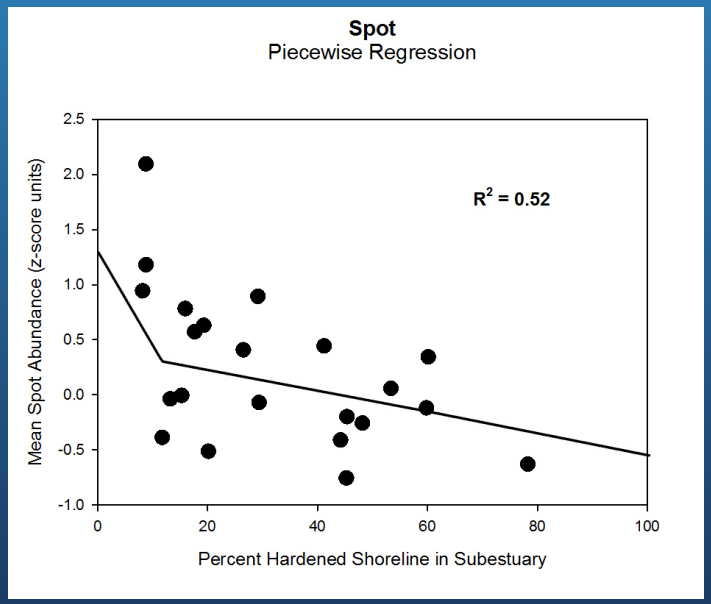
Bay-wide Approach: Methods

- Examine previously compiled Bay-wide data sets (588 sites Kornis et al. 2017) for threshold shoreline condition effects on important forage species (identified in Ihde et al. 2015 report)
- Graphical approach fitting non-linear curves (piecewise, sigmoidal)
- Examine new data sets (e.g., juvenile blue crab survey and Bay-wide blue crab dredge survey) for threshold shoreline condition effects for blue crabs

Results: Curves for Thresholds - Crab, Spot, Croaker



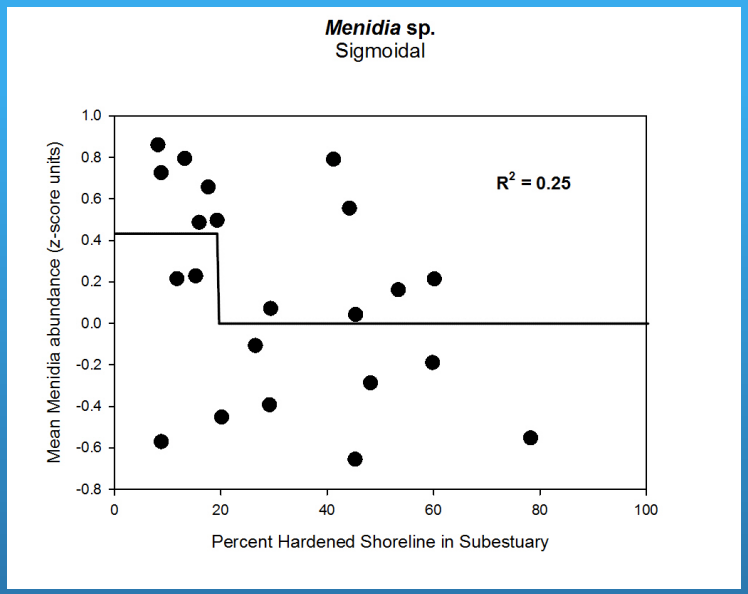


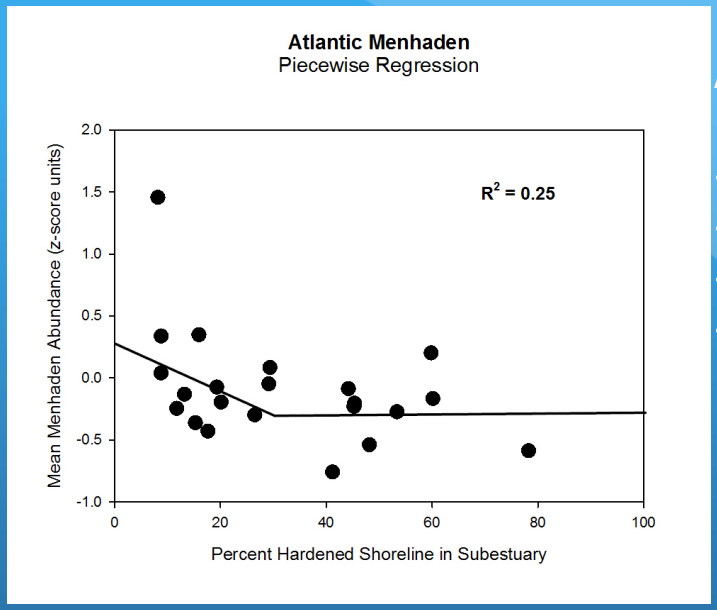


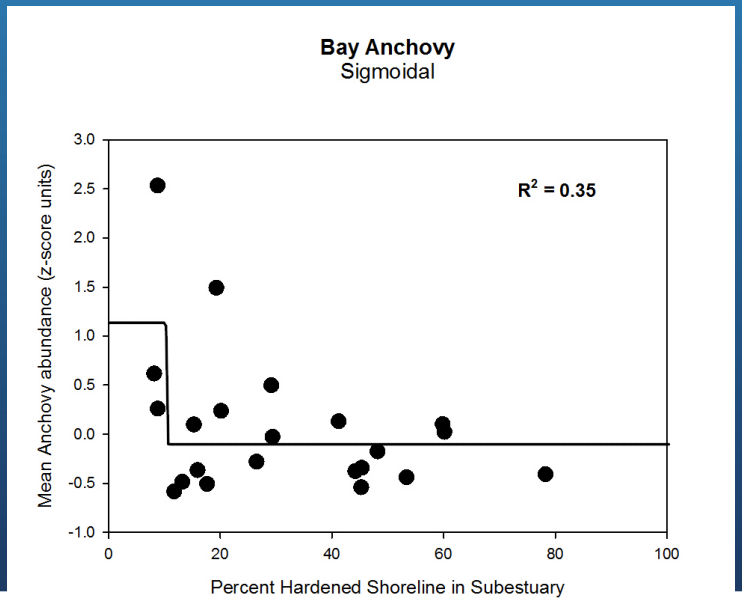
All improved over linear:
- Crab R^2 = 0.16
- Spot R^2 = 0.29
- Croaker R^2 = 0.29

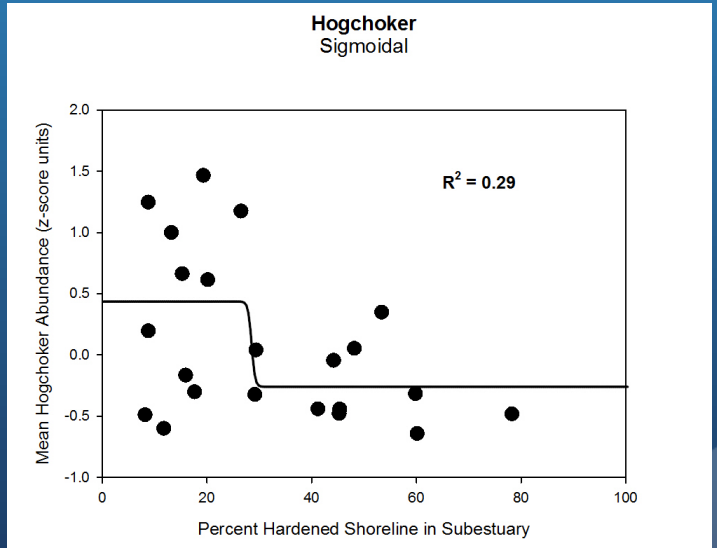
Threshold levels:
- Crab 10%
- Spot 10%
- Croaker 10%

Results: Curves for Thresholds - other fish





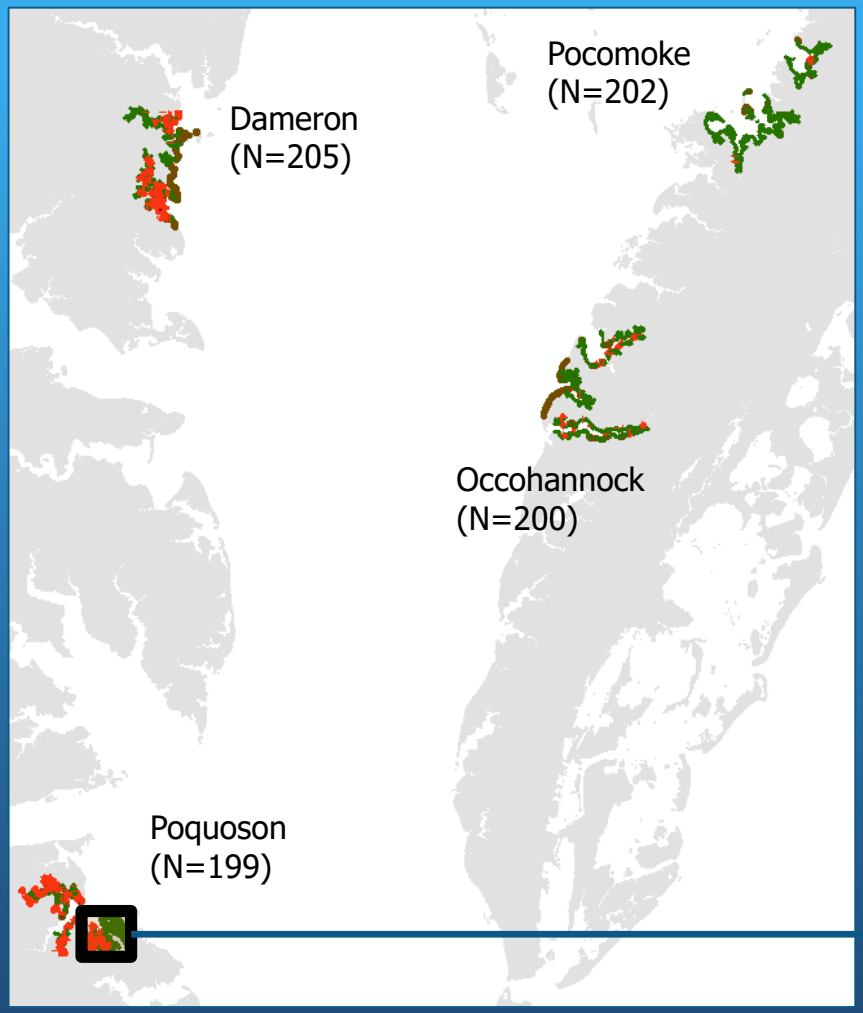


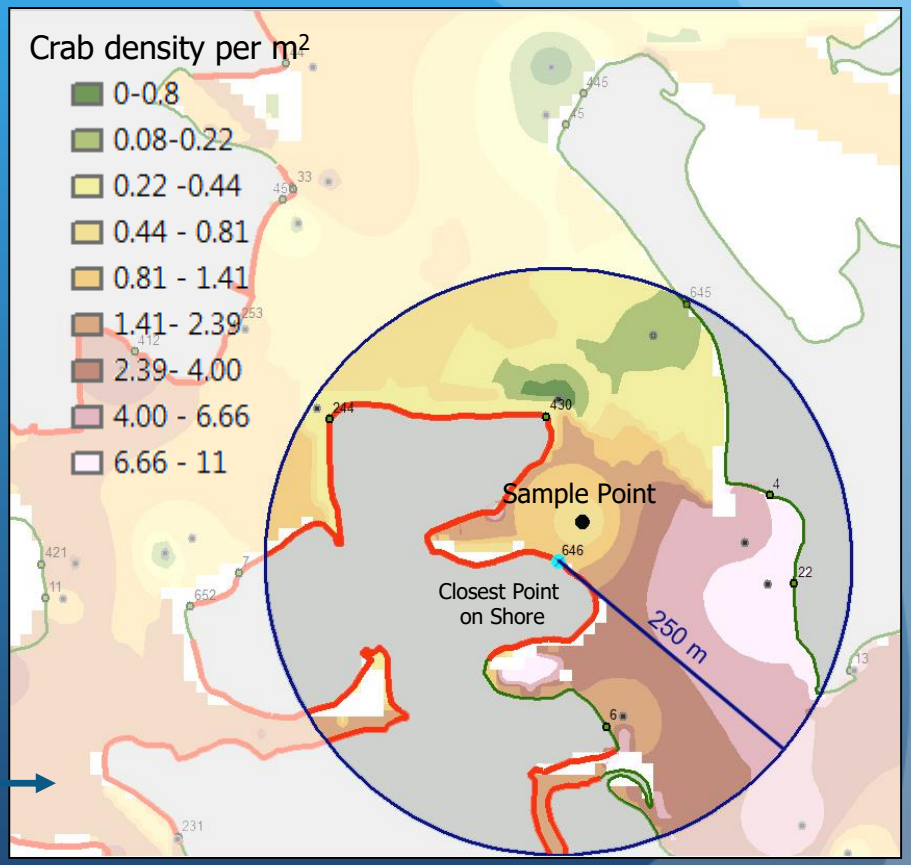


All improved over linear:
- Menidia R^2=0.16
- Anch. R^2=0.13
- Menh. R^2=0.18
- Hogch. R^2=0.19

Threshold levels:
- Menidia 20%
- Anch. 10%
- Menh. 30%
- Hogch. 30%

Methods: Juvenile Crab survey – link to nearest shoreline

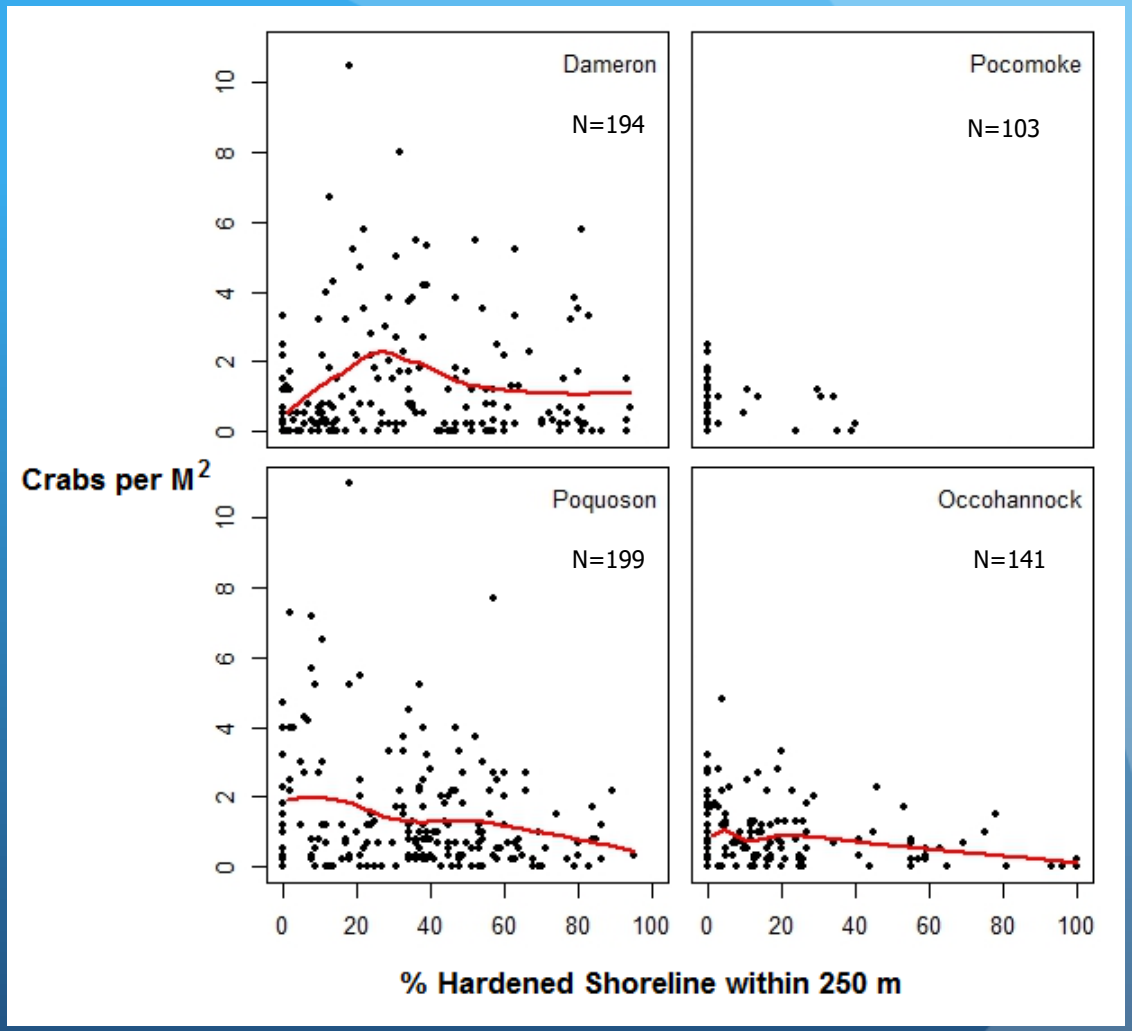




Shoreline Key:
Red = developed
Green + Brown = natural

Juvenile blue crab survey: thresholds?

- Including only points within 250 m from land and using 250 m shoreline buffer
- Results: Loess smoothed line shows generally declining linear relationship between crab density and % hardened shoreline (no threshold)
- Note - Red is Loess line



Progress and Future Directions

- Further investigations using adult blue crab data (dredge survey)
- Continue analyses and explore curve-fitting
- Comparison of Bay-wide and Subestuary-scale approach
- Coordination with CBT

Ultimately,

- Propose a numerical threshold for shoreline hardening for some species but not others
- This could inform land-use decisions

Contact for further information: seitz@vims.edu