

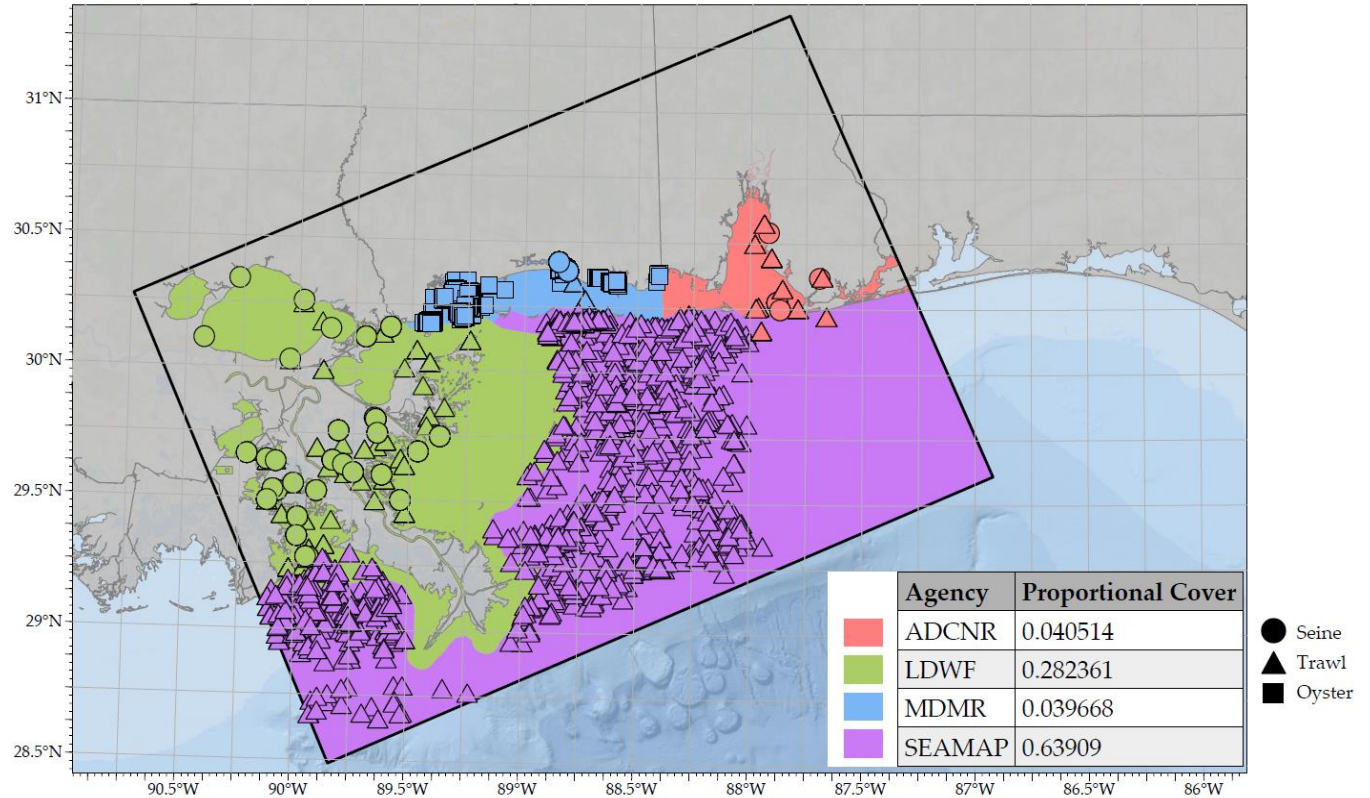
Investigating Alternative Bonnet Carré Spillway Operation Effects on Mississippi Sound and Bight Fish and Shellfish

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A New Coupled Ecosystem Modeling Framework to Inform Coastal Management



Decades of state and federal survey data of fish, shellfish and water quality were used to inform an ecosystem model representing the Birdfoot Delta, the Mississippi Sound and Bight, and Mobile Bay

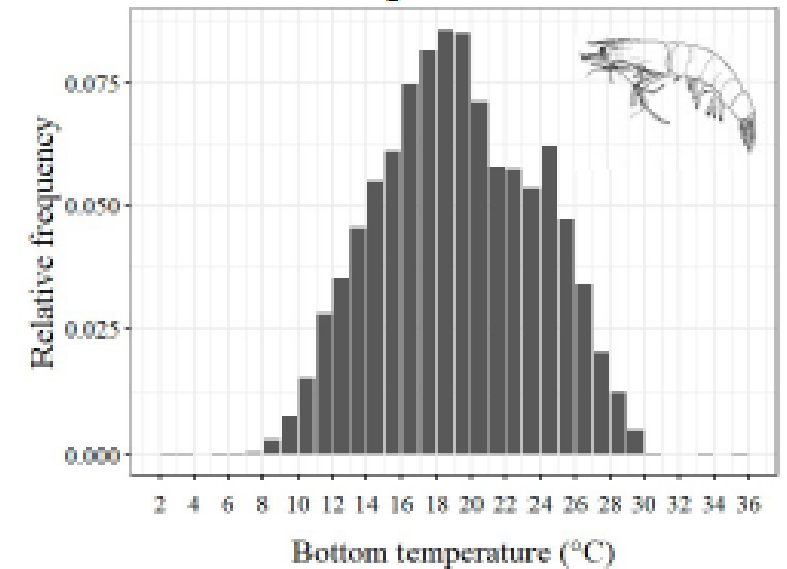
Ecosim



- 72 time series of biomass, landings and mortality from 2000-2018 were used to calibrate the model
- 500 response curves were created and included to allow for species-specific response to temperature, salinity, dissolved oxygen, turbidity and habitat features based on field observations and lab experiments
- Anomalies included to represent food quality for filter feeders prompted by Klein et al.'s work (last presentation)
- Calibration process reduced the total sum of squared difference between predicted and observed from 16088 to 667 (AIC reduced from 3141 to -398)



Oct-Mar Temperature $f_1(z)$



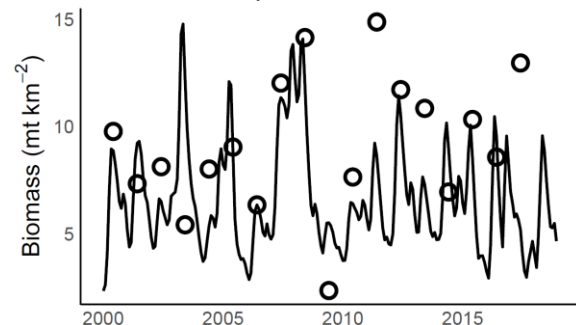
Presence environment, $f_1(z)$ – environmental observations when brown shrimp is found to be present

Gulf Menhaden (age 0 y – 4+)

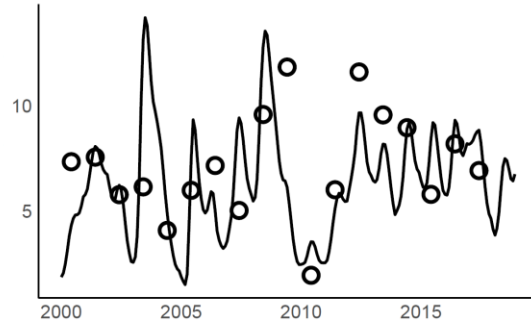


Biomass

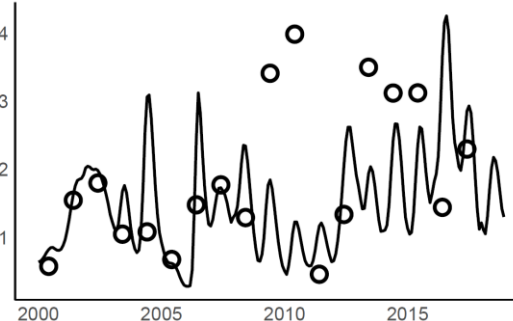
Gulf menhaden 1yr, SS=3.4313



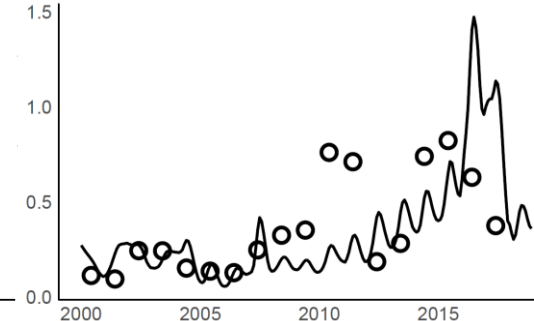
Gulf menhaden 2yr, SS=2.2541



Gulf menhaden 3yr, SS=5.6692

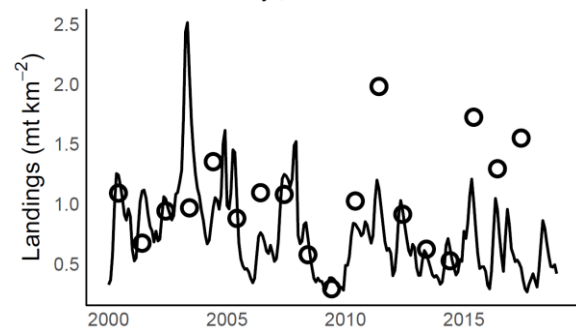


Gulf menhaden 4yr, SS=7.0621

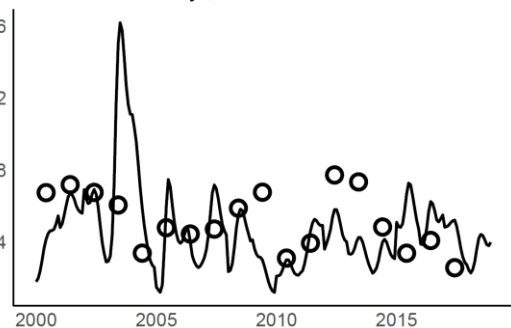


Landings

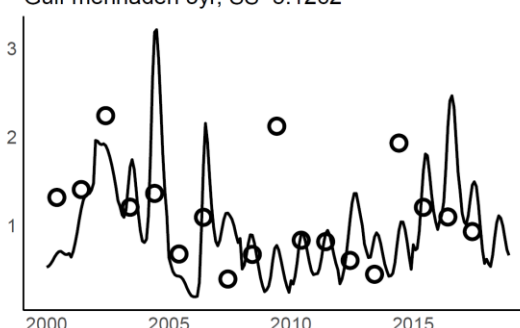
Gulf menhaden 1yr, SS=3.7861



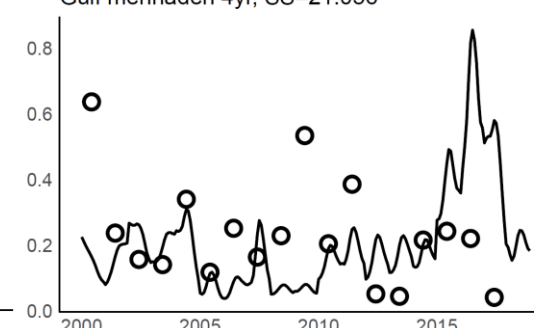
Gulf menhaden 2yr, SS=3.6598



Gulf menhaden 3yr, SS=5.1262



Gulf menhaden 4yr, SS=21.056



Current research questions/projects

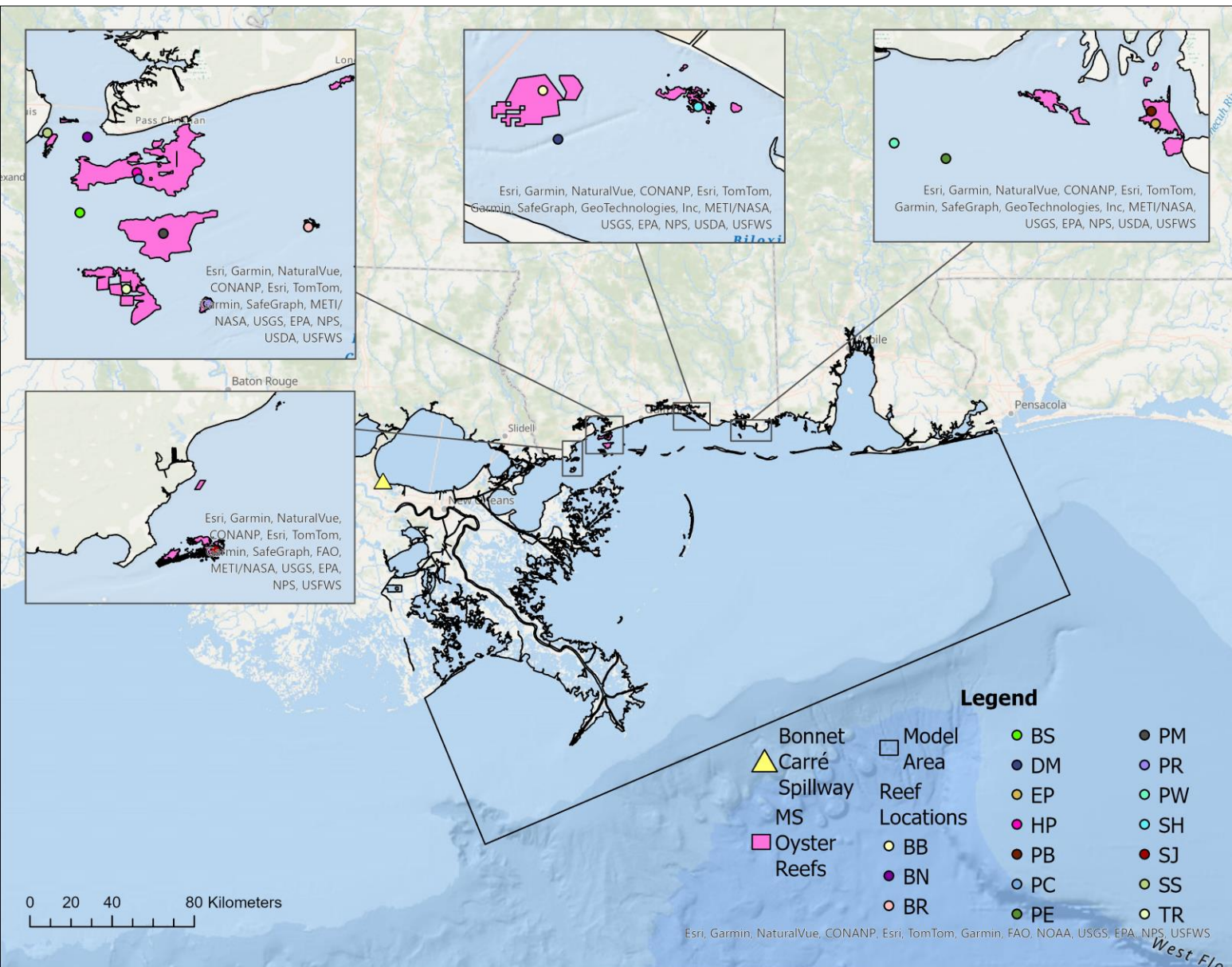
What is the tipping point of freshwater inflow for oyster survival in the Mississippi Sound? – **Mississippi Sound Coalition**

Could alternative operational regimes of the Bonnet Carré spillway mitigate negative effects on the ecology and fisheries of the Mississippi Sound? – **U.S. Coastal Research Program**

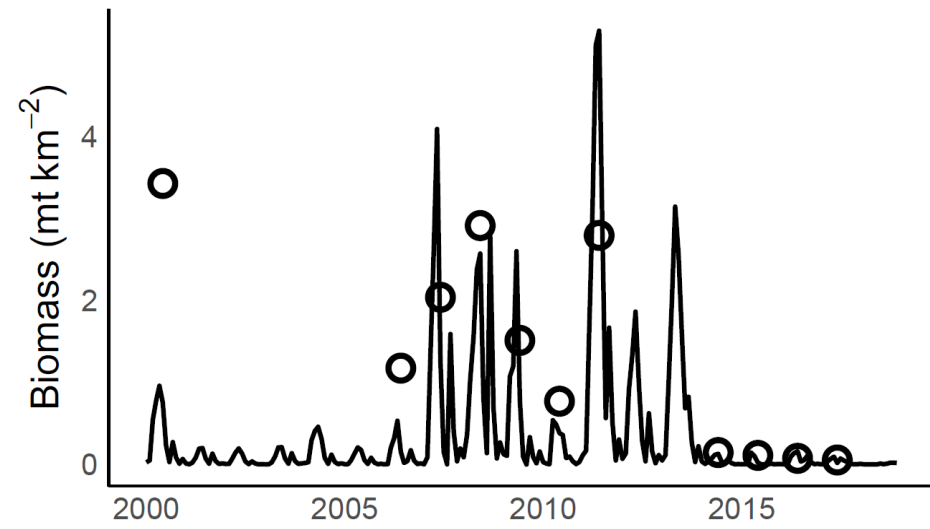
What would the effects be of the planned Mid-Breton Large Sediment Diversion on fish and shellfish in the MS Sound and Bight? – **Mississippi-Alabama Sea Grant Consortium**

How will the future evolution of the Birdfoot region affect the water quality, ecology and fisheries in the lower Mississippi River Delta and the Mississippi Gulf coast? – **NASEM Gulf Research Program**

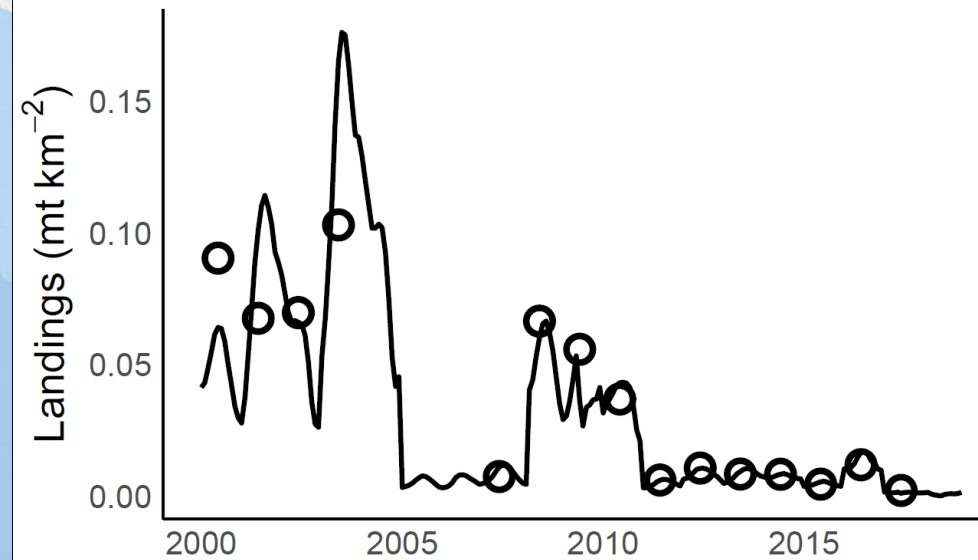
Eastern Oyster in the MS Sound



Oyster spat, SS=4.4051

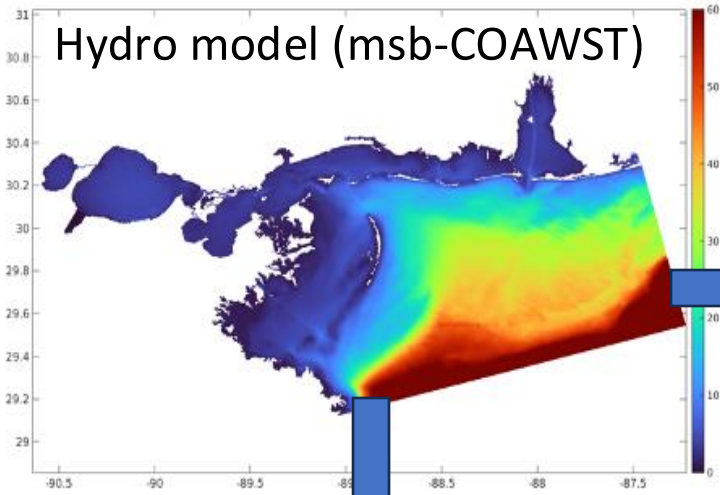


Sack oyster, SS=0.6161

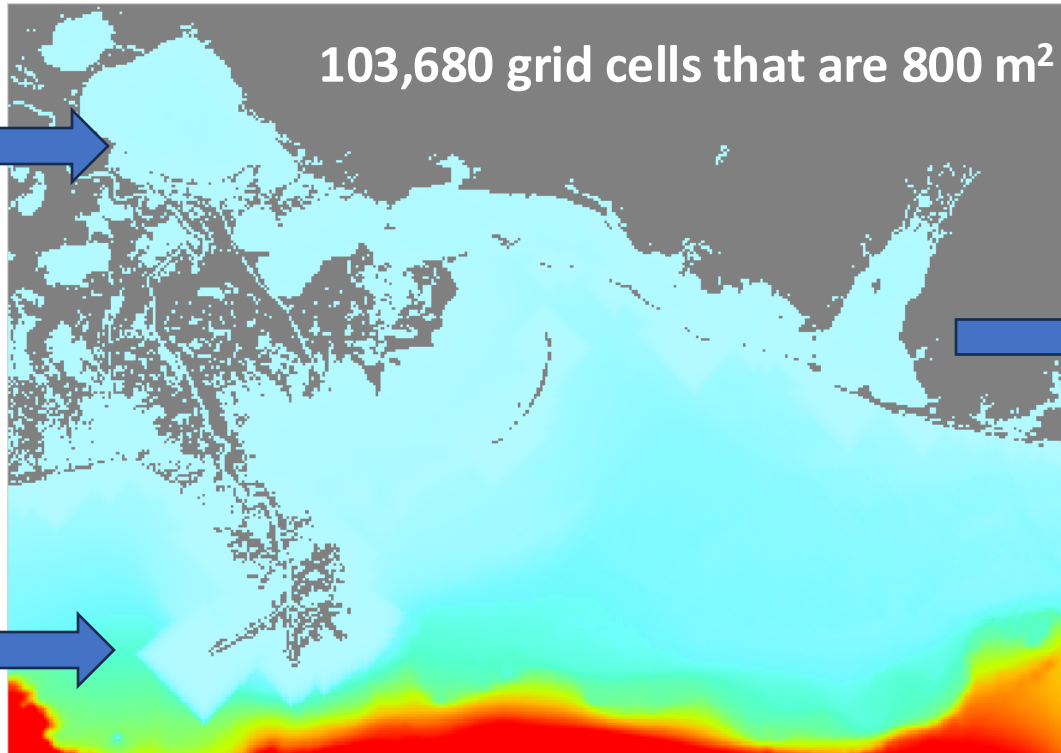


Model Coupling

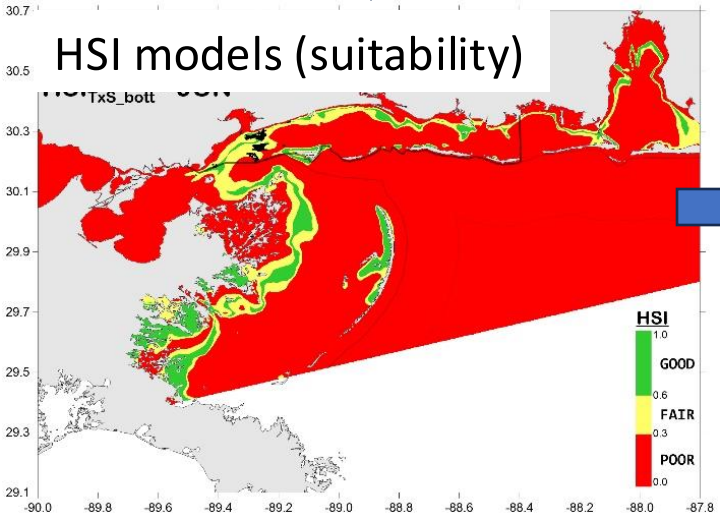
Hydro model (msb-COAWST)



Marine Ecosystem Model (Ecospace)



HSI models (suitability)



Scenario-driven
species
biomass and
distribution
forecasts



Acknowledgements

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