2014 Florida Sea Grant: Developing a size-structured stock assessment model for the spiny lobster, *Panulirus argus*, in the southeast United States

Results – Stock assessment

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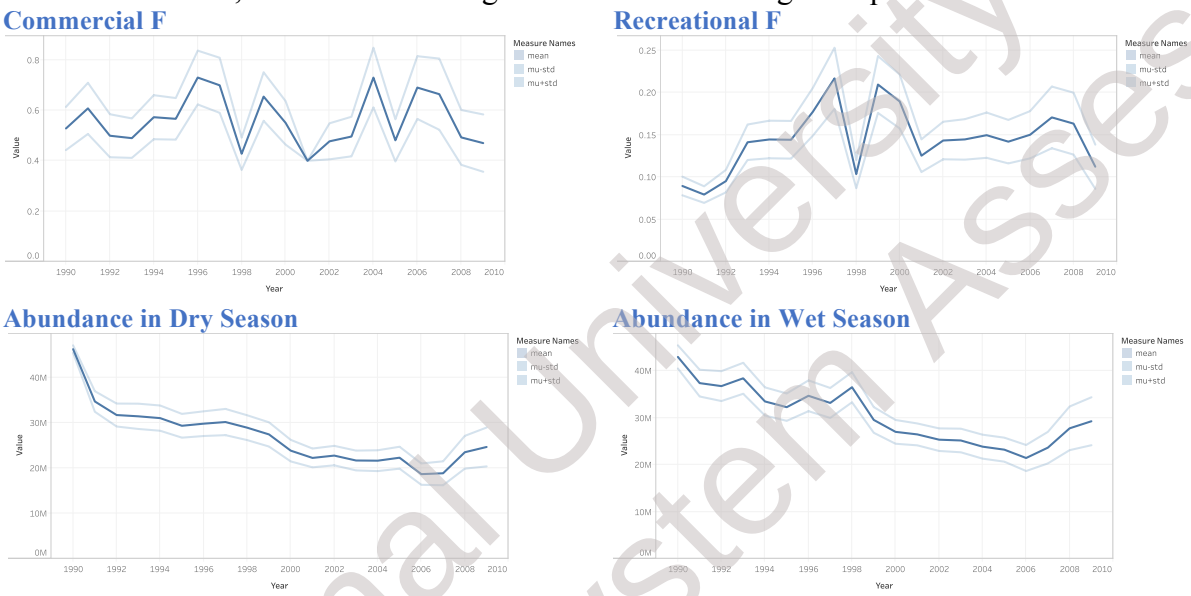
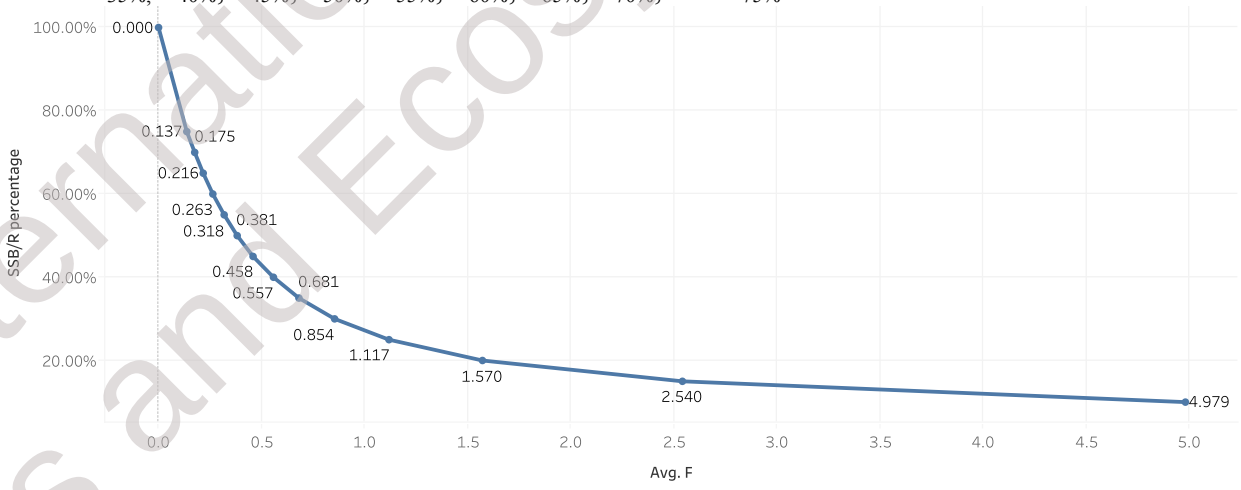
- A size-structured stock assessment model has been developed for spiny lobster stock assessment scientists and managers to use. With this tool, spiny lobster fishery status in the Southeast US can be estimated. The results vary according to different likelihood weights setting. The demonstrated run used an amplified likelihood weight for landing observations, and a reduced weight for the FLFWC length frequencies.

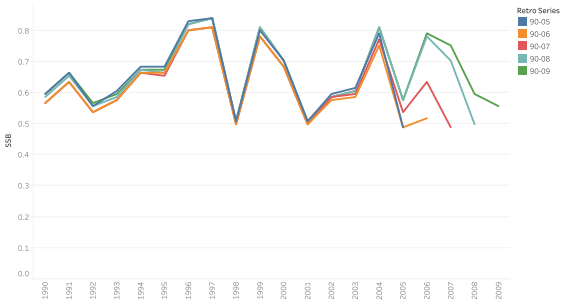


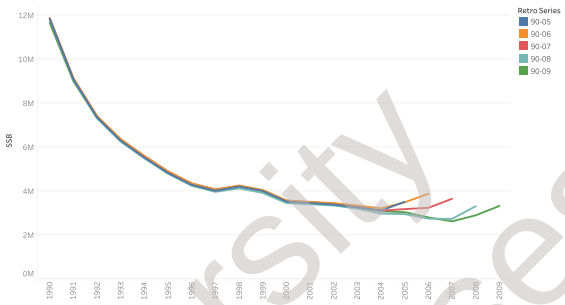
- A series of biological reference points have been derived, i.e. $F_{10\%}$, $F_{15\%}$, $F_{20\%}$, $F_{25\%}$, $F_{30\%}$, $F_{35\%}$, $F_{40\%}$, $F_{45\%}$, $F_{50\%}$, $F_{55\%}$, $F_{60\%}$, $F_{65\%}$, $F_{70\%}$, and $F_{75\%}$.



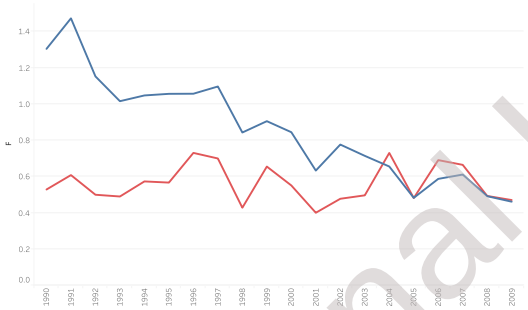
- Retrospective analysis for the stock assessment model was running back to the year 2005, At every rerun, the PI successively dropped one-year data, and the annual fishing

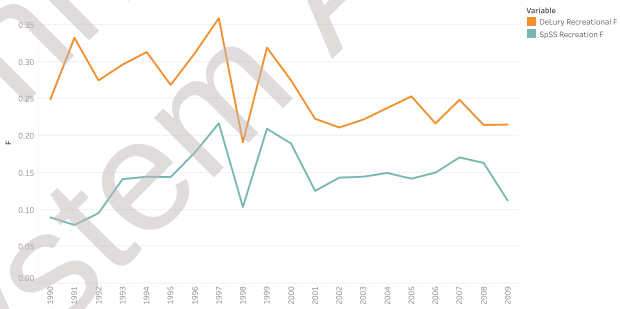
mortality and the stock spawning biomass time series was recorded. However, the demonstrated run exhibits some retrospective patterns: Fishing mortality always negatively deviates from the full-time series assessment, and SSB always positively deviates. This stock assessment model will be run in a longer time series in the future, and the PI will fully discuss with the government stock assessment scientists and managers about the setting of likelihood weight.





- The results were also compared to that derived from the DeLury Model, which was used in the last spiny lobster stock assessment.





- Because of limited information, the latest stock assessment model used a constant M for all lobster individuals: 0.25 year^{-1} and 0.43 year^{-1} as sensitivity runs (SEDAR, 2010). The stock assessment developed in this project inherits the constant M assumption, and fixed the M at 0.34 year^{-1}, but sensitivity analysis has been done to evaluate the effect of M selection on the model parameter estimations. When M input was larger than 0.4 year^{-1}, it is hard for the stock assessment model to converge at reasonable total abundance and recruitment levels. Sensitivity analysis could also be done to demonstrate the effect of length frequency sample size on the model parameter estimation.