Predicting blue crab abundance and landings with life-stage variables from fisheries independent surveys from Charleston Harbor, South Carolina

Marked high fluctuations in blue crab seasonal and annual abundance, and commercial landings are typical, but data from both fisheries independent and dependent surveys have shown declines in populations in recent years in South Carolina and along the broader South Atlantic Bight region. Despite several long-term fisheries independent surveys encountering blue crab as either a target or non-target species, predictive models have not been developed in South Carolina to quantify or explain variation in abundance, landings and population structure. The purpose of this study is to explore predictive relationships between multiple, lagged life-stages and sizes of blue crab and annual abundance and landings. Because blue crab sampling is widely known to be adversely affected by sampling artifacts, data from several long-term South Carolina Department of Natural Resources fisheries independent and dependent blue crab surveys were put through a rigorous data wrangling process to develop a standardized abundance expressed as a catch per unit effort (CPUE) for each survey. Ordinary Least Squares regression models were developed with single and multiple life-history size and sex/maturity variables with 1- and 2-yr lags used as explanatory variables. A tidal creek trawl is the only survey with significant, but weak correlative relationships between lagged mean annual life-stage variables and its own mean annual total CPUE. When multiple regression models were populated with these significant variables, no interactions between variables were observed and no additive models have strong correlations. Significant relationships with stronger correlation were found between the Harbor Trawl survey’s immature males lagged 1-yr. and combined watershed landings, and Creek Trawl survey’s mature males lagged 1-yr. and the same landings. No interaction was observed between these variables when used to populate a multiple regression model, and correlation did not strengthen. These results suggest effective population sampling and influence on blue crab populations from outside of survey sources such as fishing, habitat or environmental variables.

Weak indices of relative abundance but ability to predict landings suggest effective population sampling, but

This study focuses on blue crab populations in Charleston Harbor and its three headwater tributaries (Ashley, Cooper and Wando Rivers), because crab populations vary widely between estuaries and sampling within these surveys predominantly occurs in this area.

Methodologies differ among sampling techniques, but the long-term nature of these surveys allows for a more comprehensive assessment of the population fluctuations and changes in life history patterns.

Development of predictive models for blue crab (Callinectes sapidus) abundance and landings using life-stage variables from fisheries independent surveys in Charleston Harbor, South Caroloina

Development of a blue crab (*Callinectes sapidus*) index of abundance and landings predictor with life stage variables in Charleston, South Carolina

Several of these significant variables were used to populate multiple regression models, but