

Development of Estimates

Age 1+ Atlantic menhaden were distinguished from YOY using the monthly length cutoffs defined in Table 2. Age 1+ menhaden ranged from 11 to 32 cm FL with an average of 13.5 cm FL (Figure 1).

Following the approach described in section X, an index of age 1+ Atlantic menhaden was created using a zero-inflated negative binomial generalized linear model (ZINB) and bootstrapped estimates of uncertainty. Tows from all strata and seasonal cruises were included in the model as percent positive tows in all was greater than 5% thus there was no need to eliminate places or times of the year during which age 1+ Atlantic menhaden would not be expected to be caught in U.S. South Atlantic waters. A histogram of the frequency of catches of a given size can be found in Figure 3.

Estimates

A full ZINB that predicted catch as a function of the categorical variables year, season, and strata and continuous variables water temperature and salinity was compared with nested submodels using AIC. A reduced model that removed the covariate salinity from the count model of the ZINB was selected because it produced the lowest AIC ($2x -\log\text{Lik} = -12097.34$). The index was highly variable over time, but exhibited a general decrease from higher catches initially to series lows in the late-1990s before subsequently generally increasing through the present (Figure 3). Diagnostics indicated that the ZINB model was able to appropriately account for overdispersion, as the estimated ϕ from the final model was 1.82. Residual diagnostics plots can be found in Figures 4- 10. Overall, the model exhibited adequate diagnostics given the low sample size and high variability in the number of menhaden caught in this survey.

References

- Connecticut Department of Energy and Environmental Protection. 2013. A study of marine recreational fisheries in Connecticut – Marine finfish survey – Long Island Sound Trawl Survey Annual report. Federal Aid Project F-54-R-32.
- Delaware Division of Fish and Wildlife. 2013. Coastal finfish assessment survey – Annual report. Project F-42-R-25.
- New Jersey Department of Environmental Protection. 2013. Ocean Stock Assessment Program Annual Report.
- Reid, R.N., A.B. Frame and A.F. Draxler. 1979. Environmental baselines in Long Island Sound, 1972-73. NOAA Tech. Rpt. NMFS SSRF-738, 31 pp.
- Sissenwine, M.P. and L. Bowman. 1978. Factors affecting the catchability of fish by bottom trawls. ICNAF Research Bulletin No.13: 81-87.