

## Annual indices of Atlantic bluefin tuna (



Fishery independent indices of spawning biomass of Atlantic bluefin tuna in western North Atlantic Ocean are presented which utilize National Marine Fisheries Service ichthyoplankton survey data collected from 1977 through 2007 in the Gulf of Mexico. Indices were developed using similarly standardized data from which previous indices were developed (i.e. abundance of larvae with a first daily otolith increment formed per 100 m<sup>2</sup> of water sampled with bongo gear). Indices were also developed for the first time from standardized data collected with neuston gear [i.e. abundance of 5-mm larvae (i.e. seven-day-old larvae) per 10 minute tow]. Indices of larval abundance were developed using delta-lognormal models, including following covariates: time of day, time of month, area sampled and year. Due to the large frequency of zero catches during ichthyoplankton surveys, a zero-inflated delta-lognormal approach was also used to develop indices. Finally, a multivariate delta-lognormal approach was employed to develop indices of annual abundance based on both bongo and neuston catches. The results of these approaches were compared with one another and with other indices of larval abundance previously developed for the Gulf of Mexico. Residual analyses indicated that abundance indices of Atlantic bluefin tuna larvae were more appropriately developed from bongo-collected data through the zero-inflated delta-lognormal approach than other data sets and modeling approaches. Also, when modeling bongo-collected data with the zero-inflated delta-lognormal approach, the index values increased, indicating some correction for zero-inflation, and their variability decreased as compared to indices developed with the delta-lognormal approach.

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