

Unraveling the Migrations and Vertical Diving Behavior of Atlantic Bluefin Tuna:

Insights from pairing electronic tagging with satellite oceanographic data

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Abstract

Electronic tags that measure temperature, depth and light have been deployed on a variety of marine animals since the mid-1990s to study their migrations across ocean basins. One such species is the Atlantic bluefin tuna (ABT; *Thunnus thynnus*), which has historically been exploited by international fisheries throughout their range. Since 1996, scientists from the United States, Canada, Ireland, Norway, Spain and Israel have deployed over 2,000 archival, pop-up satellite and acoustic tags on ABT in the Atlantic, creating one of the longest electronic tagging time series in any commercial or recreational fishery. These tags have significantly advanced our understanding of the spatial distributions, life history and population structure of ABT. Leveraging a custom algorithm to identify individual dives from depth time series, I will present new results that show that different regional populations exhibit different vertical diving behavior when present in the same geographic regions. Pairing this electronic tag data with satellite oceanographic data has revealed that the vertical diving behavior of ABT is related to water column structure as ABT dive deeper and spend increased time at mesopelagic depths (i.e., greater than 200 m) where there are long-lived, quasi-stationary anticyclonic features (i.e., eddies or recirculation) and deeper mixed layer depths. It has also led to the discovery that large ABT utilize the warm North Atlantic Current to access foraging areas in the North Atlantic Ocean, such as the Newfoundland Basin. The use of this topologically-flat basin by ABT is previously undescribed, but interesting due to the presence of potentially the highest mesopelagic fish biomass in the world. Overall, these spatiotemporal data provide important ecological knowledge for the sustainable management and conservation of the recently recovered eastern ABT stock and have enormous value as climate change impacts the Atlantic ocean and stock mixing becomes increasingly complex.