# Management and Conservation of Atlantic Bluefin Tuna (Thunnus Thynnus) and other Highly Migratory Fish In the Gulf of Mexico under IPCC Climate Change Scenarios: A Study Using Regional Climate and Habitat Models

Sang-Ki Lee, Yanyun Liu and Gustavo Goni

Increasing water temperatures due to climate change will likely have significant impacts on distributions and life histories of Atlantic tunas. A team of scientists from CIMAS, SEFSC and AOML/PhOD combined predictive habitat models with a downscaled climate model to examine potential impacts on adults and larvae of Atlantic bluefin tuna (*Thunnus thynnus*) and skipjack tuna (*Katsuwonus pelamis*) in the Intra-Americas Sea (IAS). An additional downscaled model covering the 20th century was used to compare habitat fluctuations from natural variability to predicted future changes under two climate change scenarios: Representative Concentration Pathway (RCP) 4.5 (medium-low) and RCP 8.5 (high). Results showed marked temperature-induced habitat losses for both adult and larval bluefin tuna on their northern Gulf of Mexico spawning grounds (Figure). In contrast, habitat suitability for skipjack tuna increased as temperatures warmed. Model error was highest for the two skipjack tuna models, particularly at higher temperatures. While impacts on fish populations remain uncertain, these changes in habitat suitability will likely alter the spatial and temporal availability of species to fishing fleets, and challenge equilibrium assumptions of environmental stability, upon which fisheries management benchmarks are based.
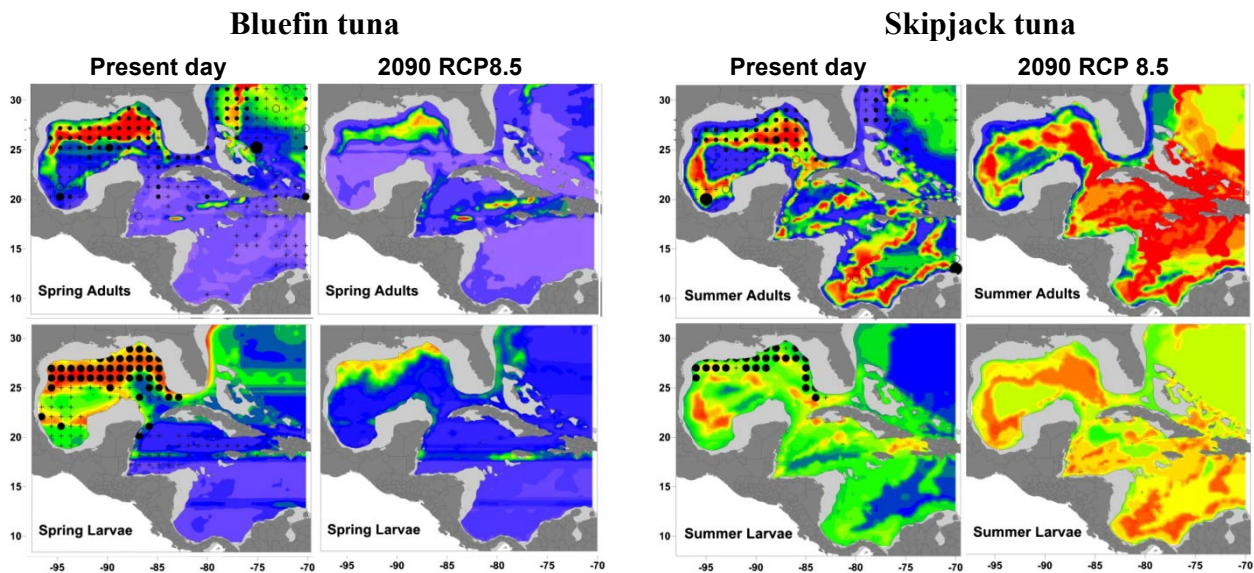


*Probabilities of occurrence for adult and larval (left panels) bluefin tuna in spring and (right panels) skipjack tuna in summer. Results are shown for the 2000s, and for 2090, under RCP 8.5. Observed data from the ICCAT Task II database (adults) and SEAMAP plankton surveys (larvae) are also shown for the same time period (postmaps). Locations where adults were recorded, but effort was low, are shown as open circles. Reproduced from Muhling et al. (2015).*