

**Creating a species distribution model for swordfish: evaluations of the initial habitat variables**

**Authors:** Michael J. Schirripa, Francesca Forrestal, C. Phillip Goodyear, F.J. Abascal, W.J. Buley, R. Coelho, A. Hanke

**Abstract**

This study develops a species distribution model (SDM) for Atlantic swordfish using a habitat suitability framework. When suitably parameterized, the model is intended to estimate the time-varying, three dimensional (3D) distribution of swordfish habitat that would be useful for many aspects of stock assessment, including visualizing stock boundaries, habitat corridors, and including habitat information to catch per unit effort (CPUE) standardization. Currently, the model integrates ocean depth, annual average estimated total zooplankton by latitude, longitude and depth, month and year and temperature and oxygen by latitude, longitude, depth, month and year. Model predictions, pop-off satellite archival tag tracks and general distributions of North Atlantic swordfish catches are used as criteria for the inclusion and treatment of variables. Initial trials demonstrated that the habitat cannot be predicted using temperature and oxygen alone. The inclusion of the spatial annual average productivity via zooplankton markedly improved distribution predictions. The current formulation predicts the north-south seasonal migration in the North Atlantic but predictions of high abundance in areas of low swordfish catch need further addressing. Better, time-varying data for ecosystem productivity relevant to swordfish might resolve this problem, but important habitat features may also be missing.

**Keywords:**

swordfish, habitat, stock assessment, statistics, species distribution, data simulation, population modeling

**Contact author:**

Michael J. Schirripa, NOAA Fisheries, Southeast Fisheries Center, Sustainable Fisheries Division, 75 Virginia Beach Drive, Miami, FL, 33149-1099, USA. Michael.Schirripa@noaa.gov