Oceanographic variability shapes the spawning distribution of blue whiting (Micromesistius poutassou) - DTU Orbit (12/11/2019)

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The spawning distribution of blue whiting (Micromesistius poutassou) has varied considerably between years, but quantitative understanding of the processes driving this change is lacking. Using 55 years of larval-observations from the wide-ranging Continuous Plankton Recorder (CPR) survey, we show that changes in the spawning distribution of blue whiting are associated with variations in the marine environment and particularly salinity. We first corroborated previously reported associations between variations in the spawning distribution and environmental regimes in the spawning region based on space-time interpolation models. We then applied species distribution models to quantify the linkage between the environment and the distribution of blue whiting larvae and verified these model results against independent fisheries and scientific survey data. Models incorporating salinity in the spawning region gave the best agreement with data, with observations of larvae in the CPR being limited to a window of salinities between 35.3 and 35.5. Changes in the area of suitable spawning habitat (estimated here to be up to 2.5 times) can therefore be understood as arising from the spread of saline subtropical water masses throughout the spawning region due to a weak North Atlantic subpolar gyre. We postulate that blue whiting actively select optimum oceanographic conditions to deliver their eggs to enhance their offsprings likelihood of survival and thereby their fitness. The knowledge derived here, together with the high predictability of salinity at depth in the North-East Atlantic, can potentially form the basis for forecasting the spawning distribution of this species.

General information
Publication status: Published
Organisations: National Institute of Aquatic Resources, Section for Oceans and Arctic, Technical University of Denmark
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Pages: 623-638
Publication date: 2018
Peer-reviewed: Yes

Publication information
Journal: Fisheries Oceanography
Volume: 27
Issue number: 6
ISSN (Print): 1365-2419
Ratings:
Scopus rating (2018): CiteScore 2.46
Web of Science (2018): Impact factor 2.66
Web of Science (2018): Indexed yes
Original language: English
Electronic versions:
Postprint
DOIs: 10.1111/fog.12382
Source: FindIt
Source ID: 2436243855
Research output: Contribution to journal › Journal article – Annual report year: 2018 › Research › peer-review