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Applying north Atlantic climate-oceanographic models for forecasting European eel recruitment

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Eel populations in Europe are at low levels and have declined substantially since the 1970s-1980s. The decline is due to a combination of natural and anthropogenic factors in both the open sea and in estuaries (exploitation, habitat quality, pollution). Recent studies have demonstrated that oceanographic conditions (e. g., temperature, primary production, currents) at the eel spawning area in the Sargasso Sea have also contributed to the decline by affecting recruitment, presumably via effects on survival of eggs, larvae (leptocephali). As eel requires ca. 2 years to reach European rivers from the Sargasso Sea spawning area, and several more years before reaching sizes for exploitation, the impact of ocean conditions on recruitment could have value in forecasting changes in eel population dynamics, fishing opportunities and the impact of fishery management decisions. Moreover, there have recently been major advances in the forecast skill of north Atlantic Ocean temperatures using coupled climate - ocean models. These models now have forecast skill at seasonal to multi-annual scales for some regions of the north Atlantic, and could extend further the potential forecast leadtime for detecting changes in population dynamics. Here we investigate the potential that coupled climate-ocean and statistical time series models have predictive skill and quality at the spatial and temporal scales that could be relevant for monitoring European eel recruitment and population dynamics. We present these results and discuss some of the practical challenges that arise when attempting to apply elements of an ecosystem approach to forecasting eel recruitment.

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