Changes in distributional patterns of plaice Pleuronectes platessa in the central and eastern North Sea; do declining nutrient loadings play a role?

Since the beginning of the 1990s, there has been a change in the relative distribution of smaller age-classes of plaice Pleuronectes platessa (age 1–3) in the North Sea. The abundances have increased in deeper, more offshore areas, while coastal abundances have been stagnant or declining. For the same time period available time series data on nutrient conditions in the coastal North Sea area show that the freshwater nitrogen loading has decreased by about 50%.

While nutrient concentrations in the ambient environment have been shown to influence growth in juvenile plaice through influence on their prey, we here inspect the potential linkage between distributional changes in plaice and the decline in nutrient loading. We compare plaice observations in coastal areas in the eastern North Sea, which have experienced large changes in eutrophication, with observations for the Dogger Bank, a large sandbank in a shallow offshore area of the North Sea. The Dogger Bank was used as a reference location assuming this area has been less influenced from coastal eutrophication but similar regional climate conditions, and here we found no changes in the abundances of juvenile plaice. The increase in the use of offshore habitats as nursery areas by juvenile plaice in the North Sea appears not related to water depth per se but driven by specific processes dominating in near-shore areas and may be related to changes in nutrient loadings. This point to the importance of separating more general depth-related factors from conditions specific for near-shore areas, such as nutrient loadings in coastal waters and export offshore. The concurrent changes in environment and in distribution of juvenile plaice may have implications for environmental and fisheries management.