

## **SIGNALS FROM THE SHALLOWS: IN SEARCH OF COMMON PATTERNS IN LONG-TERM TRENDS IN DUTCH ESTUARINE AND COASTAL FISH**

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Shallow waters along the North Sea coast provide nursery areas for juveniles of commercially exploited species and natural habitat for resident species and seasonal visitors. The areas have gone through major changes in the last decades due to climate

change and human activities such as fishing and eutrophication and changes in abundance of apex predators. Using a long-term dataset we present trends from 1970 to 2006 in 34 fish species in three coastal areas in the Netherlands: the Dutch Wadden Sea, the Westerschelde and the Dutch coastal zone. The patterns varied widely among individual species as well as between the three areas. Total fish biomass showed a dome shape pattern with an increase from 1970 to 1985 and a subsequent decline until the early 2000s. Based on multivariate and time series analyses we explore possible correlations of fish density with a predefined set of three categories of environmental variables: abiotic, biotic and fisheries related variables. Dynamic factor analysis (DFA) identified one common trend for every area: for the Wadden Sea and Westerschelde increasing from the 1970s to the early 1980s followed by a

steep decrease until the mid 1990s, a temporary period (until 2002) of increase for the Wadden Sea, and a continuing increase for the Westerschelde. The common trend in the Dutch coastal zone shows a similar increase but a time lag compared to the estuarine areas, while the distinct decline was absent here. The species that showed the strongest correlation with this common trend differed between the areas, and explains the difference between the common trend in the coastal zone with that in the estuarine areas. Common trends were best described by models containing variables from all categories of environmental variables (only maximum 2 tested at a time).