

## Interaction between marine populations and fishing activities: temporal patterns of landings of La Rochelle trawlers in the Bay of Biscay



Marine populations are distributed heterogeneously in space and time because of the diversity of habitats and the requirements of species life cycles. Human exploitation of these resources also varies as a function of space, time and the type of fishing activities performed. These three factors determine fishing strategy at different levels of integration. The purpose of this study was to describe and analyse, with respect to different time scales, the relations between the modalities of resource exploitation and the biological or demographic characteristics of the species involved. These investigations relate to the more general task of acquiring the basic knowledge needed for spatialised management of fishing effort. A fleet of trawlers from La Rochelle, operating in the Bay of Biscay, was studied over a 15-year period (1979–1993), which led to the development of a reference resource exploitation scheme for these vessels. The degree of stability of this scheme over time was determined from landing profiles of the 18 most important species fished (94% of landings). An annual cycle for the species composition of landings was determined by multiple factor analysis. Two

factors account for more than 55% of the inertia of the data. The first, of biological origin, is closely related to the breeding activity of species and associated migrations between the coast and the open sea. The second is spatial in nature, corresponding to the distribution and availability of resources according to a bathymetric gradient. This organisational scheme persisted over the first 13 years, but showed signs of change toward the end of the study period. Analysis of multi-year trends indicated four periods marked by sustained levels of landings per unit of effort for some species (decreasing for sole and wedge sole, or increasing for Norway lobster, striped red mullet, rays and the smallspotted catshark). These changes are attributable to restrictions on resource access imposed on the fleet (regulations and/or competition among the fishing gears for occupation of space), variations in the abundance of traditionally fished populations (hake, anglerfish) and changes in the professional behaviour of fishermen.

**Auteurs du document :** Jean-Charles Poulard, Jean-Pierre Léauté

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