

Acoustic detection of the spatial and temporal distribution of fish shoals in the Bay of Biscay



Echo sounder data were used to investigate the spatio-temporal variability of shoal behaviour in the Bay of Biscay. Data collected from annual surveys were processed using MOVIES-B software in order to measure this variability. The software was designed to measure morphological, energetic and space-time distribution descriptors from the acoustic signal received from fish shoals. Two surveys, DAAG 90 and DAAG 91, provided the appropriate characteristics for such an analysis. The survey's objective was to obtain relative abundance indices for the anchovy (*Engraulis encrasicolus*) biomass in the Bay of Biscay. The surveys were carried out in the same area (southern Bay of Biscay), at the same period (April) within one year interval (1990 and 1991), using the same equipment (vessel, acoustic system, fishing gear) in a multispecies environment. Frequency distributions for every descriptor were obtained and used to describe the acoustic detection of fish shoals. The analysis of frequency distributions of space-time descriptors (year, day-hour and bottom depth) allowed the construction of derived discrete variables, which defined new subsets of

detections. The subsets were then described by the continuous variables. A principal components analysis was used to describe the multidimensional data structure and to describe behaviour patterns. The size and external outline unevenness are correlated groups of shoal descriptors, but are independent of the water column shoal position and the degree of internal shoal structure. An important feature is shoal size variability between years. Significant differences in shoal characteristics were found between bathymetric zones of the same region and the pattern was similar between years. This spatial variability is related to the distribution of different species between bathymetric zones. Although it was not possible to explain size variability between years, this will be necessary to improve shoal characterization. More knowledge about oceanographic conditions, the productivity level and availability of food, predator pressure and accurate identification of shoal species is required, in order to study the spatial or temporal variability in size and behaviour of shoals.

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