

## Spatial and temporal variability of *Sardinella aurita* and *Sardinella maderensis* in Senegalese waters: effect of non-climatic variables

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### Abstract

Firstly, this work describes how two economically important small pelagic species, *Sardinella aurita* and *Sardinella maderensis* fisheries are distributed along Senegalese coast over ten years (2004-2013). Secondly, it reports the influence of non-climatic variables on this spatial and temporal repartition of abundance of these species. Two spatial areas were defined, the northern and southern zones. The generalized additive models (GAM) were applied to quantify the effect of non-climatic variables on abundance and distribution of both *Sardinella aurita* and *Sardinella maderensis*. Cubic spline smoothers and Poisson distribution were used to build up the models. Since reliability of local fishery abundance is supposed to be proportional to fishing (sampling) effort, two models were built: the standard unweighted model (where fishing effort is not taking into account) and the weighted model (incorporating fishing effort). The variables included in the models were: year, month, season, zone and fishing gear. It appears that biomass, fishing effort and abundance of both species are unevenly distributed in Senegalese waters. For *Sardinella aurita*, the factor gear, in both unweighted and weighted models is the most important with respectively 47.4% and 54.1% of the total deviance. In the unweighted model the variable month comes in second (5.06%), while it is the variable zone with 4.75% in the weighted model. The factor year is supporting 4.99% in the unweighted model and 4.61% in the weighted model. However, the effect of temporal factor season on *Sardinella aurita* is relatively negligible. Regarding *Sardinella maderensis*, the factor zone is the most important with 13.90%. It come the variables gear, year month and season with respectively (6.35%, 3.21%, 1.55% and 0.5%). In the weighted model, gear is responsible for 13.20% of the deviance, while zone explains 4.65%.



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