Modeling the dynamics of the Moroccan sardine (Sardina Pilchardus)

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An age structured model of the moroccan sardine (*Sardina pilchardus W.*)population dynamics is proposed. The model is based on the accumulated information on this species life cycle coming either from the literature or from acoustic and biological surveys. It is compartmented into two essential stages : 1) the larval stage composed of two substages S_1 and S_2, called respectively the passive and motile substages; 2) the exploitable stage composed of juvenile and adult stages.

The transition from S_1 to S_2, characterized by muth opening, is critical since larvae, having consumed their vitellus at that moment, are not yet able to move sufficiently in quest of food. The *recruitment* of a larva in the juvenile stage, occurs when the larva reaches a threshold size, depending on the amount of food it ingested during the whole stage S_2.

The sardine dynamics in the exploitable stage is given by a metapopulation model where migration depends on physical and bio-ecological factors such as the abundance of nutrients on the patches, sea surface temperature, periods and areas of spawning. The model takes into account the density-dependence effects induced by migration and competition on food.

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