

Modelled Day-Night Biases in Spatial Structure of Jack Mackerel (*Trachurus* (*Trachurus murphyi*) in Chile

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Abstract

The jack mackerel population has been assessed directly by acoustics methods showing differences in the aggregation pattern between day cycle. In this work the information from acoustic survey was carried out on fishing vessels that operates in the fishery of Jack mackerel in the offshore zone in the central-southern of Chile. Acoustic information was recorded with SIMRAD ER60 echo integration system using a frequency of 38kHz.

The diel behavior of Jack mackerel fish schools were assessed by variograms in order to characterize the spatial structure of fish density. In general, variograms showed differences in the day-night spatial structure. The day variogram showed a higher nugget effect than night. The rate of variance unexplained by the sampling design (sill/nugget) was 62,64 in the day variogram and 34,25% at night variogram and 32,70% in the day-night variogram. An intense schooling behavior during the day is likely to be responsible for this increased small-scale variability. The night variogram were characterized by a smaller range of autocorrelation than day variogram. These features may be caused by differences in schooling behavior which exists in jack mackerel with respect to day and night. On the day, schools of Jack mackerel were formed in compact higher densities that were distributed in a more extensive aggregation (variogram range 20,31 n.mi.), but occupying lesser area of distribution (30831,11 n.mi.²). While at night, these schools were joined to form large aggregations in extensive higher densities layers (variogram range 12,84 n.mi.), but occupying more area of spatial distribution (46615.07 n.mi.²).

Differences in school aggregation have direct implications in the interpolation process by kriging as well in the the estimation of the population parameters.

Keywords: Jack mackerel, diel, fish school behavior, spatial structure, Fishing vessels data.

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