INFLUENCE OF ABIOTIC FACTORS IN THE BIOMASS OF DEEP WATER SHRIMPS, *P. LONGIROSTRIS* AND *A. ANTENNATUS*, OFF CATALANO-LEVANTINE MEDITERRANEAN COAST OF SPAIN

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Abstract

Deep-water shrimps show large inter-annual fluctuations in biomass. We analysed the influence of some abiotic factors in these fluctuations using survey data (2006-2009). While *Parapenaeus longirostris* biomass was feebly affected by the T-S of the water masses, these factors, particulary salinity, seemed to have a significant effect on *Aristeus antennatus*, a species considered to be stenothermal and stenohaline, whose biomass distribution showed a direct relationship with the Levantine Intermediate Water.

Keywords: Biomass, Decapoda, Western Mediterranean

Introduction

The deep-water rose shrimp (*Parapenaeus longirostris*) and the red shrimp (*Aristeus antennatus*) are demersal species found on sandy and muddy bottoms in the Mediterranean Sea and South Atlantic Ocean of the Iberian Peninsula. Both species are among the most valuable resources for the trawl fishery. They show high inter-annual fluctuations in landings, despite the fishing effort applied remains almost constant, which suggests that these fluctuations do not completely dependent on fishing activities. Here we present an exploratory study of the influence of some abiotic factors in the biomass fluctuations of these two species.

Materials and Methods

Data are from the MEDITS_ES International spring trawl survey (2006-2009), performed according to a standard methodology [1]. Depth, temperature and salinity were recorded by means of a CTD SBE-37 probe located in the mouth of the gear. For each of these factors, the average of the data recorded during the effective trawl (when the gear is in contact with the bottom) was estimated for each haul and included in the analyses. Time period (2006-2009) and latitude were also considered as factors. Species biomass per haul was calculated as the catch in weight by sweep area and expressed in kg/km^2. G.I.S. was used to represent yearly distribution maps by kriging. Data were normalised by transforming to Ln (n+1), and the relationship between the different factors and species biomass was analysed by means of linear and multiple regressions (GLM), applying a simple model without interactions.

Results and Discussion

Analyses comprised data from 293 hauls (33-816 m depth) collected over a period of four years (2006-2009). Both salinity and temperature were highly correlated with depth, showing a gradient on both the continental shelf and the upper slope, with colder and saltier waters in depth, corresponding to the Modified Atlantic Water (MAW) and Levantine Intermediate Water (LIW) in the shelf and the slope, and to the Western Mediterranean Deep Water (WMDW) in depth, especially in the Ibiza channel. Average biomass of both species seemed to increase over the four years. Overall, *P. longirostris* was more abundant in Southern latitudes while *A. antennatus*' presence increased towards the North. *P. longirostris* appeared in 52 hauls comprising a depth range 370 m wide, with maximum biomass values in the 200-500 m depth interval. *A. antennatus* appeared in only 25 samples, showing a depth range 698 m wide, with maximum values in the 500-800 m interval. Despite both species biomass decreased with temperature and increased with salinity, we found remarkable differences between them in this sense. Thus, *P. longirostris* biomass appeared distributed in ranges of temperature and salinity 1.2442 C° and 0.5378 psu wide, respectively, with averages of 13.2010 C° (±0.2383 S.D.) for temperature and 38.5191 psu (±0.1505 S.D.) for salinity. On the other hand, despite its depth range was almost two-fold wider, *A. antennatus* showed a narrower range for temperature (0.3135 C°)and salinity (0.0859 psu), with 13.1569 C° (±0.099 S.D.) and 38.5054 psu (±0.0242 S.D.) as averages respectively. According to these observations, full model (all factors included) explained only 21% of the variance in *P. longirostris* biomass, none of the factors being significant for α= 0.05. In the case of *A. antennatus*, full model explained 44% of the variance, with depth and salinity being significant factors. These results suggest that *P. longirostris* fluctuations may be due to factors different from T-S, such as recruitment strength, food availability or others. In contrast, *A. antennatus* biomass seems to be significantly affected by T-S of the water masses, specially salinity, which reinforces its stenothermal and stenohaline character [2] as well as its direct relationship with the LIW [2] [3].

References

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