

Trophic control in the Guadalquivir estuary and neighbouring waters of the Gulf of Cadiz

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The Guadalquivir estuary (SW Spain) is a non-stratified estuary with a gradual change in salinity. It supports an important biodiversity and functions as a nursery area for many commercial species (e.g. anchovy) in the Gulf of Cadiz (GoC). The understanding of the interplay between the environmental forcing (bottom-up) and the trophic regulation is essential to understand its functioning in relation to the GoC fisheries. Here, we seek to study the effects of environmental variables and predator-prey interaction (mysid-anchovy) in the estuary and surrounding marine areas with a particular focus on the zooplankton as key intermediaries between primary production and marine fish juveniles. A long-term (18 yr) monitoring program has been carried out in two sites: Tarfia and Bonanza (32 km and 8 km distance from the river mouth respectively). The latter station samples well the marine water masses advected into the estuary during the ebb flow. Our dataset includes mysids, anchovy larvae and juveniles, temperature, salinity, turbidity, freshwater discharges, precipitation and winds. We used time series-analysis (GAMs) to test the trophic, environmental and anthropogenic effects. Temperature was found to have a positive effect on mysids at both stations while salinity showed a positive effect only at Tarfia. Turbidity showed a strong negative effect on the whole estuary and so did the freshwater discharges at Bonanza, which are regulated by a dam. The results indicate that the trophic control in the estuary of the Guadalquivir is resource-driven. Our models also highlight that marine mysids have a positive effect on anchovy.

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