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Abstract

Fish Assemblage Response to Eutrophic-Mediated Environmental Stress Events in the Mar Menor Coastal Lagoon (SE of Spain) †

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Abstract: In the last two decades, the extensive development of intensive irrigated agriculture around the Mar Menor coastal lagoon (SE Iberian Peninsula) has disturbed the characteristics of this initially oligotrophic ecosystem. The organic pollution that flows into the lagoon from agriculture and, to a lesser extent, from urban wastewater, has triggered the eutrophication of the system, resulting in dystrophic crises and mass mortality events of aquatic fauna. In order to explore temporal changes in the ecological quality of the shallow areas of the Mar Menor, fish assemblage parameters have been obtained and integrated into a multimetric fish index (modified-EMFI). A total of 18 sampling sites around the lagoon perimeter were seasonally assessed. Seasonal sampling was carried out in three two-years periods: (a) the reference period (2002–2004); (b) the critical eutrophic first period (2018–2019); and (c) the critical eutrophic second period with multispecies mass mortality events (2020–2021). The effect of sampling-site confinement (three levels of water-renewal time) and the degree of anthropic pressure on shallow areas were evaluated. Despite the magnitude of the eutrophication impact on the lagoon, the shallow areas' ecological quality (according to the modified-EMFI) did not show a drastic drop. Nevertheless, significantly lower values were detected in the critical eutrophic second period. The level of confinement showed effects on the ecological quality of the shallow areas, although the effects associated with the degree of anthropic pressure at site-approach were not significant. These results suggest that the shallow areas of the lagoon, beyond their usual function as recruitment areas for juvenile fish, could be playing a complementary role as fish refuge habitats and buffering against the long-term eutrophication process that is affecting the lagoon. However, fish assemblages in shallow areas could be undergoing significant changes in their structure and composition. We understand that the loss of the taxonomic and functional integrity of the shallow-area fish assemblage has repercussions on the dynamics of the fish populations present throughout the lagoon, and can compromise the recovery of this ecosystem.

Keywords: fish assemblage; shallow areas; ecological quality; multimetric fish index; eutrophication

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