

{rokbox title=|Presence and absence records of *L. phalangium* :: Image: Authors|
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images/stories/ieo/imagenespublicaciones/centro-oceanografico-baleares-ieo-csic-habitat-vulnerable-crinoid-leptometra-phalangium-climate-change-scenarios-millot-et-al-2024.jpg{/rokbox
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Habitat shifts of the vulnerable crinoid

Leptometra phalangium

under climate change scenarios.

Progress in Oceanography. Volume 229, December 2024, 103355.

<https://doi.org/10.1016/j.pocean.2024.103355>

Abstract: Crinoid beds of *Leptometra phalangium* (Müller, 1841) have been identified as sensitive habitats by the General Fisheries Commission for the Mediterranean (GFCM) due to their high vulnerability to bottom trawl fisheries. Poorly resilient to physical damage,

L. phalangium

has been listed as a potential indicator of Vulnerable Marine Ecosystems (VMEs) in the Mediterranean Sea. If fishing activities represent the main cause of habitat destruction for this species, the ongoing changes in climate conditions may rapidly exacerbate the process. In this study, we developed an ensemble Species Distribution Modeling framework to predict the potential habitat of

L. phalangium

for present-days in the Mediterranean Sea, and used the model to infer potential changes in its spatial distribution by 2050 under two different climate scenarios (IPCC Representative Concentration Pathways RCP2.6 and RCP8.5). True presence-absence records were used and correlated to a parsimonious set of environmental predictors considered as important drivers of benthic species distribution. In present conditions,

L. phalangium

seems to be widely distributed along the continental slopes of the western and central Mediterranean. This crinoid is often described as confined to the continental shelf-break (100–200 m), but our results show that it can be found over a wider depth range, between 100 and 500 m. Our predictions obtained for the mid-21st century indicate an important habitat loss for

L. phalangium

under future climate conditions, mainly in the central and southern basins. Declines of 50 to 70% in its suitable habitat were predicted under RCP2.6 and RCP8.5 compared to present-day predictions. Climate refugia (i.e., areas where environmental conditions remain suitable for the species in the future) were restricted to the northwestern basin (e.g., Gulf of Lion, the Catalan Sea, the Balearic Sea, Ligurian Sea) and in the southern Adriatic Sea. Provided by a robust statistical framework, climate refugia predictions, along with uncertainty assessments, must support the identification of priority areas for the conservation of VME indicator species by governmental bodies and regional management organizations.

Keywords: Climate change, Conservation, Crinoid beds, Habitat suitability, *Leptometra phalangium*,

Mediterranean Sea, Species Distribution Model, Vulnerable Marine Ecosystem