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Claudio Lo Iacono, Katleen Robert, Rita Gonzalez-Villanueva, Andrea Gori, Josep-Maria Gili, **Covadonga Orejas**, 2018.

[Predicting cold-water coral distribution in the Cap de Creus Canyon \(NW Mediterranean\): Implications for marine conservation planning.](https://doi.org/10.1016/j.pocean.2018.02.012)

Progress in Oceanography (2018), <https://doi.org/10.1016/j.pocean.2018.02.012>.

Abstract: Predictive habitat mapping has shown great promise to improve the understanding of the spatial distribution and complexity of benthic habitats and is a valuable means to highlight species-environment relationships where field data are limited. Although spatial distribution models may represent an important step forward in science-based ecosystem management, reliable predictions are hard to obtain in deep-sea environments, mainly owing to the usual paucity of high resolution maps in these settings. The aim of this study is to apply and test different spatial models to statistically predict the distribution of two Cold-Water Coral (CWC) species (*Madrepora oculata*, *Dendrophyllia cornigera*) in the Cap de Creus Canyon (NW Mediterranean), based on high-resolution swath-bathymetry (5 m resolution) and video observations through the manned submersible JAGO (IFM-GEOMAR). Several submarine canyons host CWC communities, as the environmental conditions tend to be particularly suitable for their settlement and development. Along the Cap de Creus Canyon, presence/absence of CWC was estimated in each 5 m resolution pixel based on video imagery. Maximum Entropy (MaxEnt), General Additive Model (GAM) and Random Forest were applied to represent non-linear species-environment relationships using terrain variables derived from multibeam bathymetry (slope, rugosity, aspect, backscatter). According to the models, CWC were most likely to be found on the steep walls of the southern flank which face the head and the thalweg of the canyon, aligning with the known CWC ecology acquired from previous studies. Outputs from the three models showed similar average performances in predicting CWC distribution from the available environmental variables. Slope and aspect for *Madrepora oculata*, and rugosity for *Dendrophyllia cornigera* drive their distribution, although in some cases the three models identified different variables controlling each species. To reduce differences and associated uncertainties between model outputs, 5 m resolution ensembles were produced for the two species. As a final step, an

up-scaled 50 m resolution predictive map based on the fine scale ensembles is proposed as a valuable contribution for stakeholders, which need to manage large natural areas using objective and repeatable science-based approaches.

Keywords: Predictive habitat mapping, Ensemble maps, Cold Water Corals, Vulnerable marine ecosystems, Environmental management, Cap de Creus Canyon, NW Mediterranean