Characterizing *Corallium rubrum* populations of two Mediterranean MPAs using underwater photogrammetry

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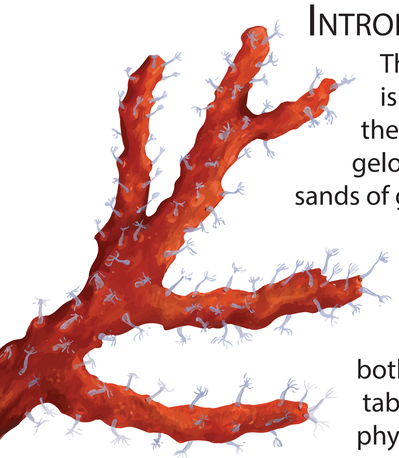
Objectives

1. Test if MPAs allow *C. rubrum* populations to recover, and investigating if it depends upon the time since MPA establishment.

2. Give managers useful data for population protection and local management.

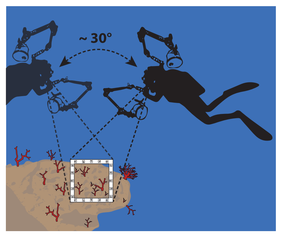


Introduction

The red coral, *Corallium rubrum* (*Cnidaria, octocorallia*), is a long-lived and slow-growing endemic species from the Mediterranean coralligenous biocenosis (Santangelo *et al.* 2012) . Each coral colony is formed from thousands of genetically identical polyps secreting a bio-mineral, branching, tree-like skeleton.

It is harvested to be made into jewellery since ancient times (Tsounis *et al.* 2010) and threatened by both local and global scale anthropogenic stressors, notably through climate change (Garrabou *et al.* 2001) and physical destruction (Linares *et al.* 2010).

Methods - Underwater photogrammetry



Photogrammetry can generate 3D models from a set of photographs. The photos should be taken from different points of view, and present a consistent overlap with each others.

To obtain our **biometrics**, homologous 2D points are manually detected and measured on the two photographs and turned into a 3D point through a process of triangulation.

Watch a short video to learn more on our work !

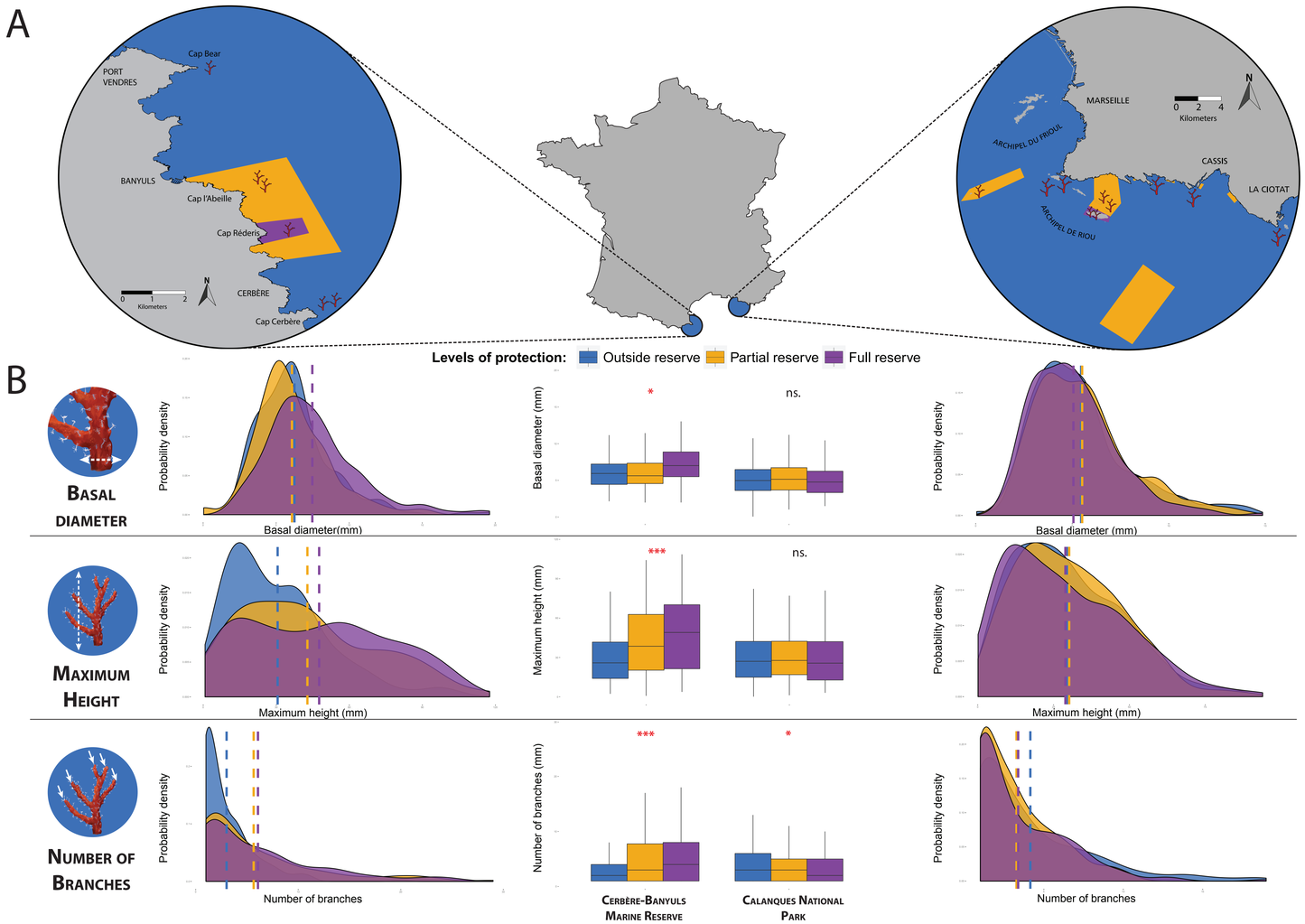


Figure 1: Comparison of Cerbère-Banyuls and Calanques National Park MPAs. A: The three levels of protection are showed within each MPA (blue: outside reserve, yellow: partial reserve, purple: full reserve), symbols indicate sampling sites. **B**: Coral colonies are compared in terms of basal diameter, maximum height and number of branches. Probability density functions show how biometrics distribute within each level of protection (dashed lines: mean values).

Results

- In Banyuls MPA, biometrics of populations were typical of long lived individuals. Contrastingly Calanques National Park populations displayed earlier developmental stage (e.g. thinner, smaller and less branched colonies) (**Fig. 1**).
- Protection effect on all colonies' biometrics (diameter, height, number of branches) was significant within the older Banyuls MPA but not in the recent Calanques MPA.(**Fig. 1**).

Conclusions

- We hypothesize that differences in development of *C. rubrum* branching colonies resulted from the interaction of reduced human impacts within MPAs and the duration of their establishment.
- Our results argue for long term fully enforced protection of a diversity of sites allowing to encompass the ecological diversity of the species in space and time.

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