

# Fish Assemblages Reveal the Environmental Heterogeneity of Shallow Coastal Areas in Monte Hermoso, Argentina

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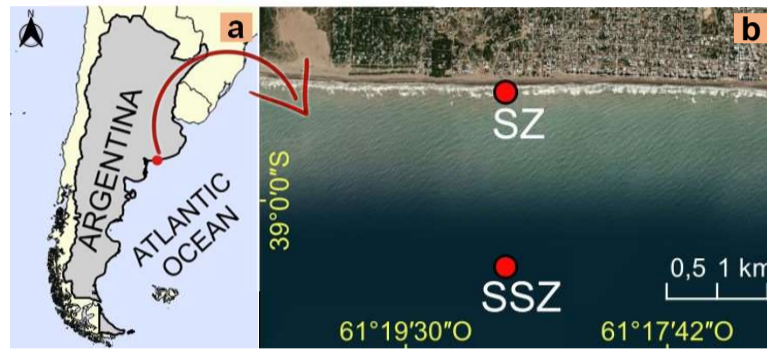
## INTRODUCTION

The waters of open-ocean dissipative sandy beaches can be differentiated into the **Surf Zone**, where wave action generates turbulent conditions, and the **Subtidal Zone** characterized by greater depth and calmer conditions.

Fish assemblages are expected to vary in response to the different hydrodynamic conditions of each zone, which could provide specific habitats for fish populations.

This study aimed to analyze the spatial and temporal variation in fish assemblage diversity in the Surf Zone (SZ) and the adjacent Shallow Subtidal Zone (SSZ) on wave-exposed sandy beaches.

## METHOD



**Figure 1.** a) Map of Argentina indicating the study area, Monte Hermoso beach. b) Location of study zones where fish assemblages were sampled.

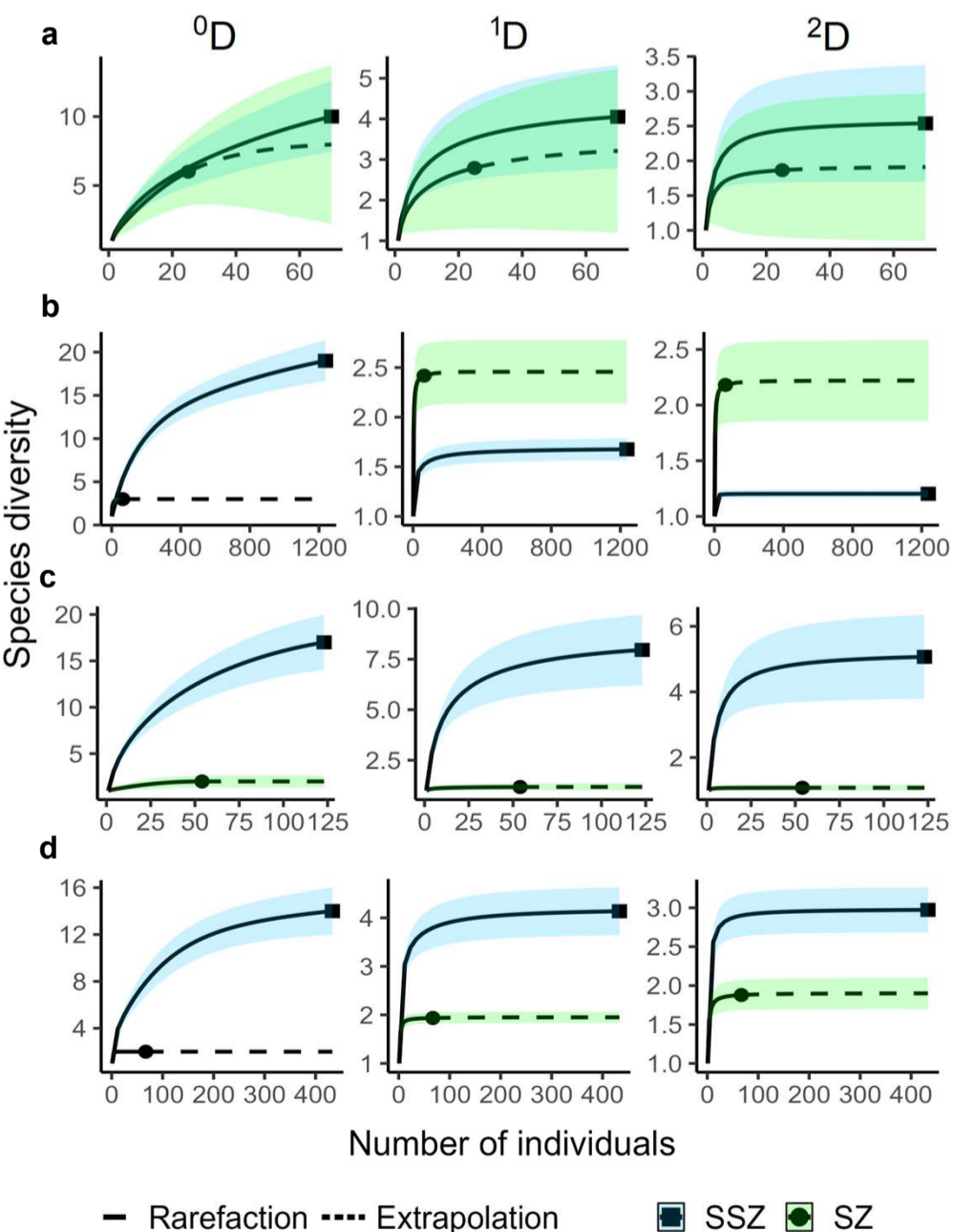
**Samples:** simultaneously collected using a 10 mm (knot-to-knot) net, dragged for 300 m parallel to the shoreline.

• **SZ** → Hand-towed trawls. Depth of 1.2 m.

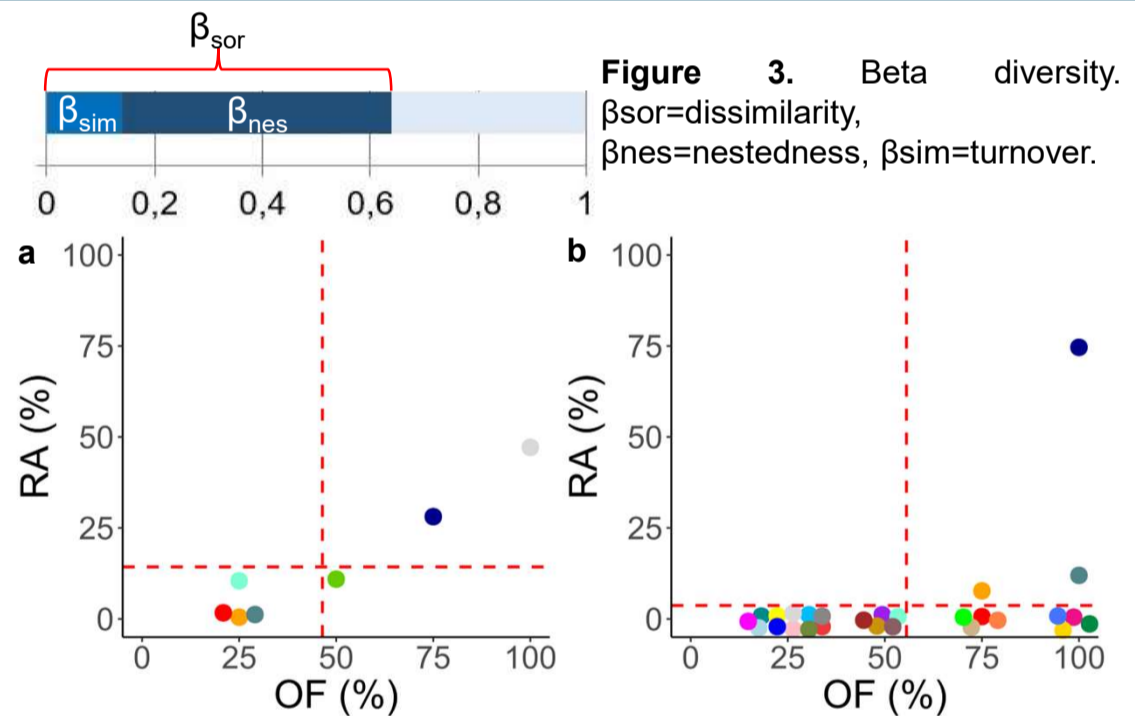
• **SSZ** → Aboard a vessel at a constant speed of 4 km/h. Depth of 5 m.

## RESULTS

**Were caught:** SZ → 210 ind. (7 spp.)  
SSZ → 1864 ind. (27 spp.)



**Figure 2.** Hill numbers. Sample-size-based Rarefaction (solid lines) and Extrapolation (dashed lines) curves of fish diversity in a) winter, b) spring, c) summer, d) autumn. <sup>0</sup>D: species richness; <sup>1</sup>D: Shannon diversity; <sup>2</sup>D: Simpson diversity.



**Figure 3.** Beta diversity.  $\beta_{sor}$ =dissimilarity,  $\beta_{nes}$ =nestedness,  $\beta_{sim}$ =turnover.

**Figure 4.** Olmstead-Tukey diagram for fish species present in the SZ (a) and in the SSZ (b), based on the percentage of occurrence frequency (OF) and the percentage of relative abundances (RA) of each species. Dashed red lines=arithmetic means. ●=*Discopyge tschudii*; ●=*Mustelus schmitti*; ●=*Myliobatis goodei*; ●=*M. ridens*; ●=*Psammobatis sp.*; ●=*Sympterygia acuta*; ●=*S. bonapartii*; ●=*Acanthistius patachonicus*; ●=*Anchoa marinii*; ●=*Astroscopus sexspinosus*; ●=*Brevoortia aurea*; ●=*Cynoscion guatucupa*; ●=*Dules auriga*; ●=*Genidens barbuis*; ●=*Lycengraulis grossidens*; ●=*Micropogonias furnieri*; ●=*Odontesthes argentinensis*; ●=*Oncopterus darwini*; ●=*Paralichthys orbignyanus*; ●=*P. patagonicus*; ●=*Parona signata*; ●=*Percophis brasiliensis*; ●=*Pomatomus saltatrix*; ●=*Porichthys porosissimus*; ●=*Prionotus nudigula*; ●=*Ramnogaster arcuata*; ●=*Stromateus brasiliensis*; ●=*Symphurus jenynsi*.

## CONCLUSIONS

This study represents the first record of shallow subtidal fish assemblages along the Argentinian coast and reveals that wave action in the surf zone (SZ) negatively affects species richness and abundance.

However, certain species, such as *Ramnogaster arcuata*, exhibit remarkable plasticity, adapting successfully to both environments.