

## **How much fish is there in shallow oceans and why?**

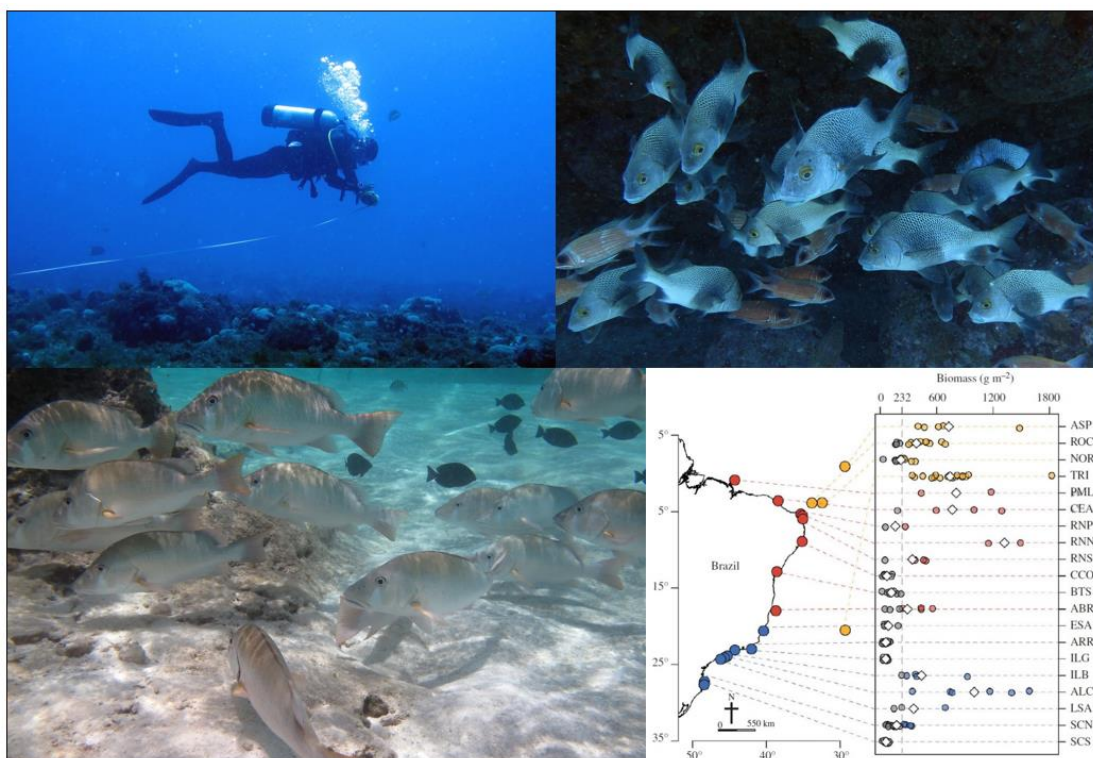
These seemingly trivial questions puzzle scientists all over the world. A lot of money is devoted to try and discover how oceans vary in terms of the amount of fish they sustain and why. Answering this is, of course, not as straightforward. But scientists in Brazil have just taken a small step towards understanding where fish concentrate in shallow Brazilian reefs and where they are most scarce.

The initiative is part of the Brazilian Marine Biodiversity Network (SISBIOTA-Mar, [www.sisbiota.ufsc.br](http://www.sisbiota.ufsc.br)) and was published on the 27 of October 2017 in the periodic *Journal of Fish Biology*. Over a period of more than 13 years, scientists have compiled an extensive database of fish counts (yes, underwater fish counts while diving) comprising more than 4,000 samples distributed in 137 sites and 20 localities along the Brazilian coast and oceanic islands. This included tropical and subtropical reefs from the northernmost limit of shallow Brazilian reefs (Parcel do Manuel Luís, in Maranhão state), to its southernmost limit (in Santa Catarina state). Using this database, the authors were able to calculate how much biomass – the total weight of living fish – exists in different reefs and, by comparing them, to tentatively suggest why they vary in so.

Among the most important results were the fact that oceanic islands had, in general, more fish biomass than coastal reefs, either in tropical or subtropical regions. However, sites with high fish biomass existed also along the coast, mainly in inaccessible or protected localities. The oceanic islands of Trindade and São Pedro and São Paulo, the isolated Parcel do Manuel Luís, in the tropical coast of Maranhão state, and the Alcatrazes archipelago, in the subtropical coast of São Paulo, were examples of places with more fish than the mean of the study. Very accessible locations, normally close to big cities, in general performed lower in the fish biomass score.

Other interesting results concerned the so-called trophic groups of fishes (fishes that use similar food resources). Whilst some fish groups (for example large predators or large herbivores such as parrotfishes) follow a similar pattern to the overall biomass (being higher in isolated or protected places), others behave

very differently. Omnivorous fishes, for example, (fishes that can feed in either algae or animals, depending on availability) had higher biomass in the oceanic islands and in subtropical reefs, being rare in tropical coastal reefs. Small herbivorous fishes, on the contrary, were only abundant in some very shallow tropical locations. These shallow tropical places host warm waters and receive high solar incidence that is ideal for the growth and photosynthesis of algae, their food. In conjunction, the results suggest that fish biomass along Brazilian reefs might vary according to factors such as water temperature, depth and isolation (or protection) from human impacts.



### ***Just the beginning***

But the study is far from solving the open question in the title. “For each question that we solve, five or ten more appear” says Renato Morais, leader of this study that was developed for his master’s dissertation in the Programa de Pós-Graduação em Ecologia of the Universidade Federal de Santa Catarina (UFSC). The work was supervised by his co-authors, Professor Sergio R. Floeter, also

from UFSC, and Professor Carlos E.L. Ferreira, from the Universidade Federal Fluminense (UFF). Funding was provided by CNPq, FAPESC and FAPERJ.

“We still need to address many more issues such as, for example, what are the exact causes of these variations in fish biomass” says Professor Sergio R. Floeter. “The work is still in progress and we are assembling long-term data to understand how fish biomass varies over the years” completes Professor Carlos Ferreira. Ferreira is also the leader of the Long-Term Ecological Monitoring Program of Brazilian Islands, PELD-ILOC, which is also funded by CNPq. “We hope to contribute information to the goal of adequately managing Brazilian marine resources”, finalizes Morais.

**Reference:** Morais, R.A., Ferreira, C.E.L. & Floeter, S.R. 2017. Spatial patterns of fish standing biomass across Brazilian reefs, Southwestern Atlantic. *Journal of Fish Biology*, doi:10.1111/jfb.13482

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