

New study predicts worldwide change in shallow reef ecosystems as waters warm

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Reef Life Survey diver assessing coral reef community, Australia. Credit: Graham Edgar/Reef Life Survey

A new study based on the first global survey of marine life by scuba divers has provided fresh insights into how climate change is affecting the distribution of marine life.

The research published in the journal *Science Advances* predicts that as the oceans warm fish - which appear to be superior predators in warm water - will extend their ranges away from the equator and cause a decline in the diversity of invertebrates such as crabs, lobsters, sea urchins and whelks.

Using data collated by the citizen science project Reef Life Survey (RLS), the IMAS-led research team found that total number of fishes and large invertebrates seen underwater changes little from the tropics to polar latitudes.

However, fish numbers are very high in the tropics but decline towards colder latitudes, while large invertebrates balance those patterns in the opposite direction.

Lead author and RLS founder, IMAS Professor Graham Edgar, said this distribution is likely to change as waters become warmer, affecting food webs, ecosystems and fisheries worldwide.

"The effects of [climate change](#) on marine life vary greatly between geographic regions," Professor Edgar said.

"In South Eastern Australia and Tasmania the 'tropicalisation' of marine life is already underway, but similar effects have not yet been detected in New Zealand.

"Previous research suggested that climate change would directly affect the range of [species](#) due to rising temperatures.

"Data collected by RLS divers during the world's first systematic global survey of marine [life](#) show this is not the end of the story.

"We found that the local presence and abundance of a species reflect not only its need for particular temperatures and environmental conditions but also its ecological interactions.

"As fish extend their range further from the equator with warming water, their advantage as predators will affect the abundance and diversity of large mobile invertebrates.

"Broad changes will likely spread across the ecosystem, affecting human activities such as fishing."

Professor Edgar said ongoing monitoring of [marine life](#) at both local and regional levels was needed to allow the early detection of such changes.

This would allow adaptive fisheries and conservation management, and help to minimise the social and economic impacts.

"Species monitoring of shallow reef communities at national scales is only possible with the support of citizen scientists, such as the RLS divers who contributed data to our study.

"The RLS data set now includes information on 4000 species in 50 countries, allowing a better understanding of how and why species are distributed, while also providing an early-warning mechanism for climate-induced changes," Professor Edgar said.

More information: "Abundance and local-scale processes contribute to multi-phyla gradients in global marine diversity," *Science Advances* (2017). [DOI: 10.1126/sciadv.1700419](https://doi.org/10.1126/sciadv.1700419) , advances.sciencemag.org/content/3/10/e1700419

Provided by University of Tasmania

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