Marine life spawns sooner as oceans warm

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This eastern shovelnose stingaree was once unheard of in northern Tasmania. Now it is abundant. Image: Peter Last.

Warming oceans are impacting the breeding patterns and habitat of marine life, effectively re-arranging the broader marine landscape as species adjust to a changing climate, according to a three-year international study published today in *Nature Climate Change.*

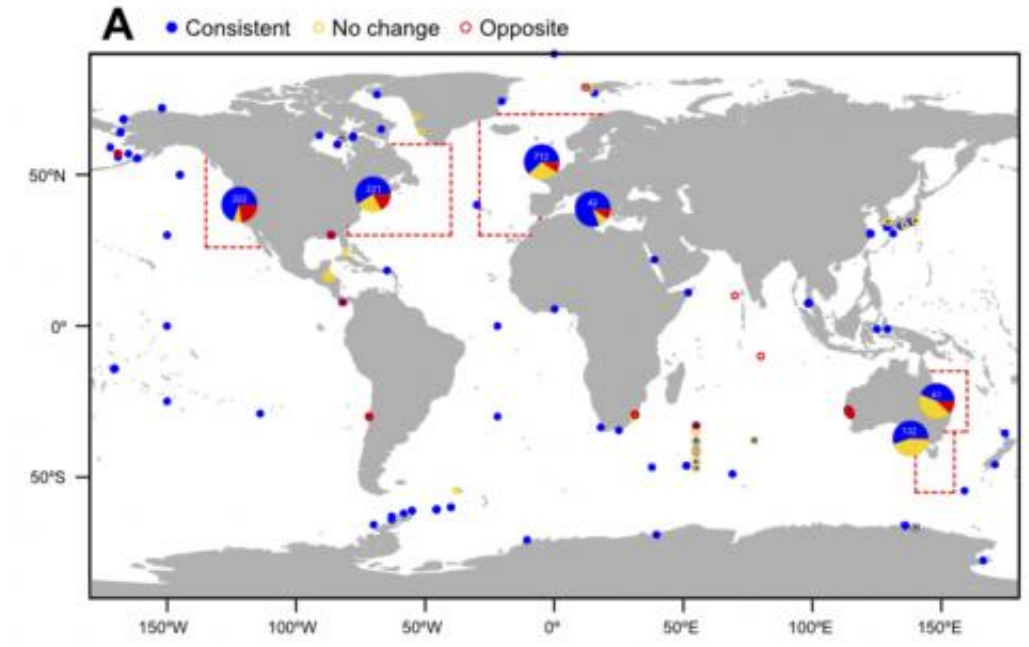
The international team led by CSIRO's Climate Adaptation Flagship and University of Queensland marine ecologists Elvira Poloczanska and Anthony Richardson, based their findings on a review of peer-reviewed literature from around the world, identifying more than 1700 changes, including 222 in Australia.

CSIRO's Dr Poloczanska said marine species are shifting their geographic distribution towards cooler regions and doing so much faster than their land-based counterparts.

Despite the ocean having absorbed 80 per cent of the heat added to the global climate system, the ocean's thermal capacity has led to surface waters warming three times slower than air temperatures over land.

"The leading edge or 'front line' of a marine species' distribution is moving towards the poles at the average rate of 72 kilometres per decade, which is considerably faster than terrestrial species moving poleward at an average of six kilometres per decade," said Dr Poloczanska.

"This is despite sea surface temperatures warming three times slower than land temperatures."



Are changes in marine life consistent with climate change? Credit: Elvira

Poloczanksa.

Dr Poloczanska said winter and spring temperatures, over both the ocean and land, are warming fastest, which might advance phenological events such as the start of growing seasons and the timing of reproduction. In addition, anthropogenic carbon dioxide uptake by the oceans is altering seawater carbonate chemistry, which can impact some marine organisms .

"Given these findings, we expect marine organisms to have responded to recent climate change, with magnitudes similar to or greater than those found for terrestrial species," she said.

The research team also considered changes in species' life cycle, such as breeding times, to find these are also changing as seas warm.

Associate Professor Richardson explained that the timing of breeding and migration are, on average, occurring much earlier in the sea with marine species advancing by 4.4 days each decade which is also much faster than land based species which are breeding around 2.3 – 2.8 days earlier each decade.

Although the study reported global impacts, there is strong evidence of change in the Australian marine environment.

Dr Poloczanska said that in Australia's south-east tropical and subtropical species of fish, molluscs and plankton are shifting much further south through the Tasman Sea. In the Indian Ocean, there is a southward distribution of sea birds as well as loss of cool-water seaweeds from regions north of Perth.

"Essentially, these findings indicate that changes in life events and distribution of species indicates we are seeing widespread reorganisation of marine ecosystems, with likely significant repercussions for the services these ecosystems provide to humans.

"For example, some of the favourite catches of recreational and commercial fishers are likely to decline, while other species, not previously in the area, could provide new fishing opportunities," Dr Poloczanska said.

The international team included 19 researchers from Australia, USA, Canada, UK, Europe and South Africa.

More information: dx.doi.org/10.1038/nclimate1958

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