

Land and sea species differ in climate change response: study

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(Phys.org) -- Marine and terrestrial species will likely differ in their responses to climate warming, new research by Simon Fraser University and Australia's University of Tasmania has found.

The study, published this week in *Nature [Climate Change](#)*, provides insights into why and how [species](#) are moving around the globe in response to global warming.

Researchers gathered published data from tests determining the physiological temperature limits – tolerance to heating and cooling levels - on 169 cold-blooded marine and terrestrial species, then compared the data with the regions the species inhabit.

They found that while marine animals closely conformed to the temperature regions they could potentially occupy, terrestrial species live farther from the equator than their internal thermometers suggest they can live. In other words warm temperatures aren't limiting them from living in closer to the equator.

“Finding that marine and terrestrial species are limited by their cold tolerance suggest that warming will allow expansions of animals towards the poles to take advantage of newly opened up habitats,” says lead author Jennifer Sunday, a biologist from Simon Fraser University, Canada.

“However because land animals are not limited by heat to the same

extent as marine animals, patterns of retreat in the hottest regions of species' ranges may differ between land and sea.”

The research team found that while both the cold and warm boundaries of marine species are marching towards the poles, terrestrial species have been less responsive at their warm versus their cold range boundaries.

“We think a combination of things is going on,” says Amanda Bates, co-author from the University of Tasmania’s Institute of Marine and Antarctic Studies (IMAS). “A species niche isn’t just set by temperature. On land where water is key, species may be hindered more by dryness rather than being too hot at this range boundary.

“Second, it could be that rare heat waves are actually setting boundaries on where species can live. Finally, as Charles Darwin pointed out over 150 years ago, there may be more species and much more ecological competition toward the tropics, which may be enough to exclude species from living in the warmer end of their potential real estate.”

The authors call for research to better understand how climate change will affect animals, especially those on land where predicting responses to warming may be particularly difficult.

“[Terrestrial species](#) ranges may stretch towards the poles – expanding their cold range boundaries but responding erratically at their warm boundaries,” says Nicholas Dulvy, a marine biologist at SFU.

“These individuals will be overrun by the ‘pole-wards’ march as other species enter their territories. So we will see all sorts of new ecology as species come into contact and interact as never before.”

The team concludes by pointing out that while chaotic species

combinations may be bad news for animals on land, entire assemblages of species are likely to shift in the ocean, meaning researchers can make better predictions about how [marine](#) species redistribute in the face of [climate](#) change.

Provided by Simon Fraser University

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