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Marine heatwaves threaten global biodiversity

Extreme weather events occur in the oceans as well as the atmosphere. Marine heatwaves – periods of anomalously high temperatures – are increasing in frequency, with 54% more heatwave days per year from 1987–2016, than from 1925–1954, yet their impacts on species and ecosystems are poorly known.

A paper published online this week in *Nature Climate Change* is the first to quantify and contrast the magnitude and impacts of several prominent marine heatwaves using the same methods and metrics. In doing so, the researchers show that marine heatwaves have negative effects on a broad range of marine organisms, with major socioeconomic and political ramifications.

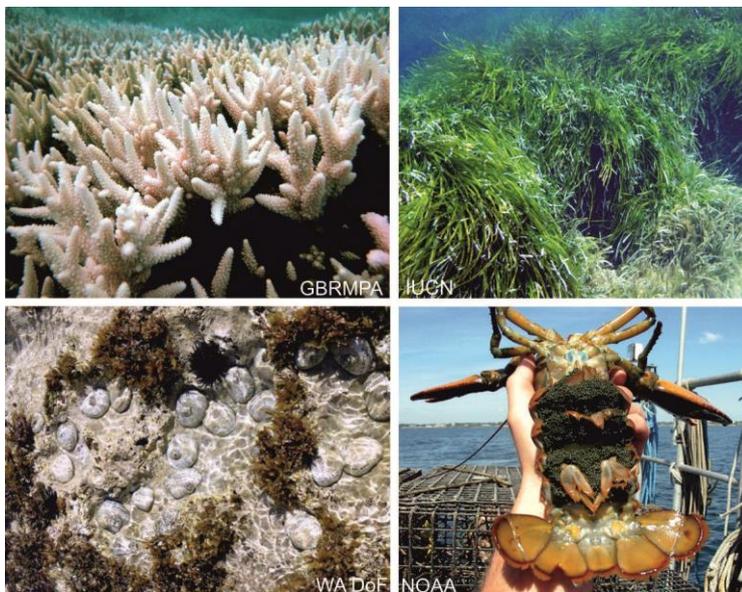


Figure 1. Marine heatwaves (MHWs) can have significant impacts on species, ecosystems and ecological processes. Extreme temperatures experienced during MHWs can cause widespread coral bleaching (top left) and loss of seagrass habitat (top right). MHWs have led to local extinctions of fisheries species such as abalone (bottom left) and shifts on the distribution and phenology of lobsters (bottom right)

The study, led by Dr Dan Smale of the Marine Biological Association (UK) and involving scientists from 7 different countries representing 19 different institutes, found that marine heatwaves vary in their physical manifestations, yet all affect key species and alter ecosystem structure and functioning.

The research team used the existing MHW framework to quantify trends and attributes of MHWs across all ocean basins, and examined their biological impacts from species to ecosystems. They found that multiple regions within the Pacific, Atlantic, and Indian Oceans are

particularly vulnerable to MHW intensification, due to the co-existence of high levels of biodiversity, a prevalence of species found at their thermal limit, or concurrent non-climate human impacts. Although the MHWs varied considerably, all were harmful across a range of biological processes and

organisms, including critical species like corals, seagrasses and kelps (Figure 1.).

Dr Smale said that extreme temperatures experienced during marine heatwaves can have adverse effects on marine organisms, leading to widespread mortality, species range shifts and changes to entire ecosystems and ecological processes.

“Ocean ecosystems currently face a number of threats, including overfishing, acidification and plastic pollution, but periods of extreme temperatures can cause rapid and profound ecological changes,



leading to loss of habitat, local extinctions, reduced fisheries catches and altered food webs” Dr Smale said.

“The major concern is that the oceans have warmed significantly as a consequence of manmade climate change, so that marine heatwaves have become more frequent and will likely intensify over the coming decades. Just as atmospheric heatwaves can destroy crops, forests and animal populations, marine heatwaves can devastate ocean ecosystems”.

The authors conclude that climate change will continue to increase the frequency of marine heatwaves and the associated impacts on marine biology could have broad reaching effects on ecosystems and the services they provide.

Ends

Notes for editors:

The study was conducted as part of a collaborative working group involving the Marine Biological Association, Aberystwyth University, Scottish Association of Marine Science, Dalhousie University, University of Tasmania, University of Canterbury, University of Tsukuba, University of New South Wales, Australian Institute of Marine Science, Barcelona Supercomputing Center, CSIRO Oceans and Atmosphere, University of Washington and Edith Cowan University.

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The Marine Biological Association (MBA) is a professional body for marine scientists with some 1,600 members world-wide. Since 1884 the MBA has established itself as a leading marine biological research organization contributing to the work of several Nobel Laureates and over 170 Fellows of the Royal Society. In 2013, the MBA was awarded a Royal Charter in recognition of its long and eminent history and its status within the field of marine biology. The award strengthens the Association’s role in promoting marine biology as a discipline and in representing the interests of the marine biological community. The Association is based at its world-class marine research laboratory in Plymouth.

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