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Climate change threatens survival of Scotland's maerl beds

The survival of one of Scotland's most important ecosystems could be severely threatened by climate change, with up to an 84% decline in its distribution by the end of the century.

Red coralline algal beds, commonly called maerl or rhodolith beds, are formed by the skeletons of a red seaweed, creating a three-dimensional structure similar to coral reefs.

The nooks and crannies formed within the bed make it an ideal home for a huge number of other marine life, including commercially important species like juvenile pollack, hake and scallops.

Maerl beds are found all over the world, but Scotland's west coast and islands are European strongholds.

Until now, scientists had only conducted small-scale experiments on the maerl, meaning very little was known about how they might respond to climate change at a regional scale.

A team of scientists from the Lyell Centre, Heriot-Watt University, the Royal Botanic Garden Edinburgh, the University of St Andrews and NatureScot has now developed a computer model to project how the multiple changes to Scotland's climate will affect the distribution of maerl beds over the coming century.

Cornelia Simon-Nutbrown, a PhD student at the Lyell Centre, a strategic partnership between Heriot-Watt University and the British Geological Survey, said: "What's astonishing is that, even in a climate change best-case scenario, where emissions significantly fall from present-day levels, we predict maerl bed distribution will shrink by 38% by the year 2100.

"Worryingly, when we considered a 'business as usual' scenario for climate change, we predicted an 84% decline in maerl bed distribution.

"Maerl beds' survival depends on us making major changes to our greenhouse gas emissions and protecting the beds from anthropogenic activities."

Professor Peter Hollingsworth from the Royal Botanic Garden Edinburgh said: "Maerl beds are found throughout the world, but are one of the most poorly-studied marine ecosystems.

"These beds are vital for the survival of huge numbers of other plants and animals, so without them, we may also see comparable declines in these associated species."

Professor John Baxter, Honorary Professor at the University of St Andrews and Heriot-Watt University says "We found that the biggest changes are likely to happen between now and 2050, making the need for conservation action to protect maerl beds even more urgent, not only to protect biodiversity but also their potential to capture and store blue carbon, which is important for climate change mitigation."

But it's not all bad news, according to Simon-Nutbrown: "Despite large declines across Scotland, we have identified some key areas where populations are most likely to persist, including Loch Laxford, mainland Orkney and mainland Shetland

“This is important for conservation as protecting these refuge areas will not only increase their chances of long-term survival but also that of the many species they support which may otherwise be lost.”

Dr Lisa Kamphausen, NatureScot marine ecology adviser, said: “Scotland was one of the first countries in the world to declare a climate emergency, and as Scotland’s nature agency our priority is an effective response to these challenges to ensure a nature-rich future for all.

“This kind of research is invaluable to this work, providing us with vital information that gives us the best chance to maximise resilience and reverse biodiversity loss in our seas so that we can meet these challenges over the next 50 years and beyond.”

This research has been published in *Frontiers in Marine Science* (<https://www.frontiersin.org/articles/10.3389/fmars.2020.575825/abstract>) and was funded by the Natural Environment Research Council.

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Media contact: Sarah McDaid (sarah@mcdaidpr.co.uk/ 07866789688)

Notes to editors

The climate change scenarios used

These are based on the IPCC projections from the CMIP 5 model: Representative Concentration Pathway 2.6 (best case - a significant reduction in greenhouse gas emissions) and RCP 8.5 (worst case - emissions continue at current levels). Projections for seabed temperature, salinity and water current velocity were used; projections were not available for other environmental variables, so present-day datasets were used.

The Lyell Centre

The Lyell Centre is a strategic partnership between Heriot-Watt/the University and the British Geological Survey, funded by the Natural Environment Research Council (NERC), the Scottish Funding Council and Heriot-Watt University. The partnership enables them to work together combining their expertise in geoscience. Exploring themes ranging from geology and geophysics to marine ecosystems, the centre’s combination of pure and applied expertise employs innovative methods and technologies to society’s most important environmental science and energy challenges.