Great Southern Reef to lose huge seaweed habitat to ocean warming

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Research into the future of Australia's "other reef" – the Great Southern Reef – shows that even under the most optimistic carbon emission scenarios, ocean warming is likely to cause substantial loss of critical habitat-forming seaweeds by 2100.

The research, by UWA Oceans Institute Associate Professor Thomas Wernberg and a team of international and Australian colleagues, was published today in *Diversity and Distributions*. The Great Southern Reef is a massive series of reefs with extensive kelp seaweed forests that extend around Australia's southern coastline, covering around 71,000sqkm from Brisbane to Kalbarri.

Professor Wernberg said that over the next 85 years our temperate coastlines were likely to experience substantial reductions of habitat-forming seaweeds, which are the biological engine of the Great Southern Reef.

"We looked at the present and future distribution of 15 large dominant seaweed species and found they would lose between 30-100 per cent of their current area to ocean warming even under the optimistic most scenario where we aim to limit global warming to less than 2C," Professor Wernberg said.

"This is bad news because these seaweeds support our globally unique marine biodiversity and important recreational and commercial fisheries such as abalone and rock lobster, Australia's most valuable fisheries."

All but two of the 15 species were predicted to contract southwards before 2100. Currently dominant species such as common kelp and strapweed were predicted to lose nearly half of their present distribution to become compressed in pockets on the south coast. Other seaweeds such as giant kelp, bull kelp and crayweed were predicted to become extinct from the Australian continent.

Professor Wernberg said it was well known how climate change was causing ocean temperatures to increase in many regions. This was a problem for cool-water species such as temperate seaweeds and they would shift their distribution into cooler waters as a consequence, he said.

Co-author Dr. Ben Radford, an ecological modeller with the Australian Institute of Marine Science, said there was a very strong relationship between ocean temperature and the presence of different species.

"By determining this relationship, and combining it with projections of future ocean temperatures from climate models, it is possible to predict where certain species are likely to be found or not in the future," Dr. Radford said.

Professor Wernberg said the socio-economic as well as ecological consequences of these reductions of habitat-forming seaweeds could be devastating.

"These seaweeds are the trees of the oceans and the foundation of kelp forests that support ecosystem services such as biodiversity and fisheries resources worth more than $10 billion per year in Australia," he said.

"In response, our research focus is now changing from documenting kelp loss to discovering solutions to increase seaweed resilience and improve restoration of impacted kelp forests. These active solutions are the only

way forward if we want to maintain these unique and valuable ecosystems."

More information: Brezo Martínez et al. Distribution models predict large contractions of habitat-forming seaweeds in response to ocean warming, *Diversity and Distributions* (2018). DOI: 10.1111/ddi.12767

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