



# CAN-132- Catastrophic Die-Off-GBR

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Reprinted 4/26/18

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**The Great Barrier Reef experienced a catastrophic die-off following marine heat wave, study shows**  
**By [Amanda Schmidt](#), AccuWeather staff writer**

**April 24, 2018, 9:17:51 AM EDT**

**HEAT WAVE CAUSED SEVERE BLEACHING EVENTS IN THE**

A three-year marine heat wave extended from June 2014 to May 2017, with warm ocean waters wreaking havoc on some of the world's most valuable ecosystems: the coral reefs.

For the [Great Barrier Reef](#), located off the coast of Australia, the marine heat wave resulted in severe bleaching events in 2016 and 2017. It was the first time consecutive events have been observed at the Great Barrier Reef. More than two-thirds of the reef was reported to be damaged.



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A study published online on [Nature](#), the International Journal of Science, on

Thursday, April 19, shows that corals on the northern Great Barrier Reef experienced a catastrophic die-off following the 2016 marine heat wave.

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*A diver surveys coral near Orpheus Island in March of 2017. (Photo/ARC Centre of Excellence for Coral Reef Studies/Greg Torda)*

“The study goes beyond measures of bleaching that occurred. It looks at the amount of mortality and the impact that it had on the coral reef ecosystems,” said Dr. Mark Eakin, study co-author and NOAA Coral Reef Watch coordinator.

The study is a follow-up to previous work done on the 2016 coral bleaching event. The 2016 event was the worst coral bleaching event that has been documented on the Great Barrier Reef, according to Eakin.

Coral bleaching events occur when corals are stressed by changes in conditions, such as temperature, nutrients or light. Stressed coral expel microscopic algae, known as zooxanthellae, living in their tissues causing the coral to turn white.

Bleaching leaves coral starving, injured and more susceptible to disease, Eakin said.

“When corals bleach from a heatwave, they can either survive and regain their color slowly as the temperature drops, or they can die,” Professor Terry Hughes, director of the [ARC Centre of Excellence for Coral Reef Studies](#), said in a [media release](#).

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The amount of coral deaths they measured was closely linked to the amount of bleaching and level of heat exposure.

The study found that 29 percent of the 3,863 reefs comprising the Great Barrier Reef lost two-thirds or more of their corals. This high mortality rate threatens the ability of these reefs to sustain full ecological functioning.

There was a major change in coral reef communities. Some of the most diverse communities were becoming flattened or homogenized, according to Eakin.

“The coral die-off has caused radical changes in the mix of coral species on hundreds of individual reefs, where mature and diverse reef communities are being transformed into more degraded systems, with just a few tough species remaining,” study co-author Prof. Andrew Baird, coral CoE at James Cook University, said in the media release.

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The northern third of the Great Barrier Reef was the most severely impacted during the heat wave of 2016. This area had not previously experienced this kind of severe marine heat waves.

The results showed that not only was there catastrophic bleaching and mortality, but also that it occurred at a lower level of heat stress than normal, Eakin said.

*The different colour morphs of Acropora millepora, each exhibiting a bleaching response during mass coral bleaching event. (ARC Centre of Excellence for Coral Reef Studies/ Gergely Torda)*

While global climate action through the the Intergovernmental Panel on Climate Change (IPCC) aims to limit warming by 2 degrees C, temperatures need to stay within 1.5 degrees C for coral reefs to survive.

"What we saw in the marine heatwave in the northern Great Barrier Reef is a demonstration of what happens to these areas that have never been hit by that kind of heat stress. They're more sensitive than some of the other reefs around the world," Eakin said.

Corals can adapt to some extent. Their ability to adapt is through simple Darwinian fitness; it's the survival of the fittest.

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“But, that still leaves a billion or so corals alive, and on average, they are tougher than the ones that died. We need to focus urgently on protecting the glass that’s still half full, by helping these survivors to recover,” Hughes said.



*There are 'winners' and 'losers' among corals as they respond to the accumulating impacts of climate change. (ARC Centre of Excellence for Coral Reef Studies/ Mia Hoogenboom)*

Biodiversity is one of the most important hallmarks of coral reefs. While covering less than one percent of the ocean floor, coral reefs contain 25 percent of marine species during some portion of their life, according to Eakin. These heat waves can contribute to the loss of many corals, causing the reef to lose biodiversity.

"Part of the way that coral reefs become less sensitive to heat stress and adapt to these conditions is that a lot of those corals die. You're losing something when that happens," Eakin said.

Model estimates indicate that we could lose up to about 90 percent of the world's coral reefs by mid-century. The oceans are continuing to warm, and models predict that future warming is going to be significant until we get climate change under control, according to Eakin.

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“The Great Barrier Reef is certainly threatened by climate change, but it is not doomed if we deal very quickly with greenhouse gas emissions. Our study shows that coral reefs are already shifting radically in response to unprecedented heatwaves,” Hughes said.

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