Australian Government
Great Barrier Reef Marine Park Authority

FACT SHEET

Coral Bleaching

What is coral bleaching?

Bleaching is a sign that corals are under stress.

Corals are able to cope in a limited range of environmental conditions but when these limits are exceeded (e.g. temperature), they experience stress.

Most corals have microscopic marine algae (called zooxanthellae) living inside their tissue. These photosynthetic organisms give corals much of their colour and also provide up to 90 per cent of the energy corals need to grow and reproduce.

When corals are under stress, this symbiotic relationship breaks down, and corals expel the zooxanthellae and begin to starve.

As zooxanthellae leave the corals, the corals become paler and increasingly transparent. However, corals also contain fluorescent proteins (green, yellow, red and cyan) that may help minimise damage from ultraviolet light.

When corals lose their zooxanthellae (bleach), these fluorescent proteins become more visible and the coral can display striking fluorescent hues of pink, yellow or blue. Not all of these fluorescent proteins are visible in daylight though, so corals can also look completely white.

Above: Variations in the appearance of severely bleached corals (*fluorescent yellow, pink, and stark white).*

What causes coral bleaching?

The most common cause of coral bleaching is sustained heat stress, which is occurring more frequently as our climate changes and oceans become warmer.

Other stressors that cause bleaching include freshwater inundation (which results in low salinity), poor water quality from sediment or pollutant run-off, and ocean acidification.

Bleaching can occur whenever sea surface temperatures exceed the long-term average. Severity of bleaching will vary depending on how warm the water becomes (measured as how many degrees Celsius above the long-term average) and how long it remains warm (days to weeks). Importantly, if heat stress is severe enough, corals can die without ever bleaching.

Shallow areas experiencing high temperatures and high exposure to sunlight are most at risk.

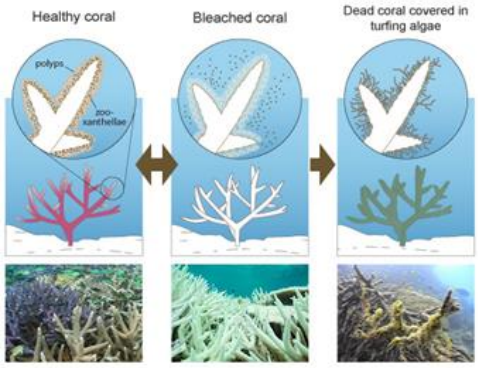
Do corals die from coral bleaching?

Bleaching does not automatically mean affected corals will die. If conditions return to normal, corals can slowly repopulate their tissues with zooxanthellae and recover.

During their recovery, however, they are likely to experience reduced growth and reproduction, and are more susceptible to disease.

If the stress is severe or prolonged, such as increased temperatures for several weeks, bleached corals can die. Coral reefs that have high rates of coral death from bleaching can take many years or decades to recover.

If not kept in check by herbivorous fish, algae can soon overgrow dead corals leaving no suitable place for new corals to colonise. If recovery if impeded in this way, we might see coral-dominated reefs changing to algae-dominated reefs, causing changes in the species of fish and other animals living on the reef.



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What is the current bleaching situation on the Reef?

In 2016, the Great Barrier Reef suffered the worst ever bleaching event due to record breaking summer sea surface temperatures. This was due in part to a strong El Niño combined with the ongoing effect of climate change. An estimated 22 per cent of coral on the Great Barrier Reef died as a result of bleaching, mainly from reefs in the northern section.

In 2017, the Great Barrier Reef, along with other reefs around the world, suffered a second consecutive year of mass coral bleaching, driven predominantly by ocean warming due to climate change. The effects of this event are being monitored and will continue to unfold for several months.

When else has mass coral bleaching occurred on the Great Barrier Reef?

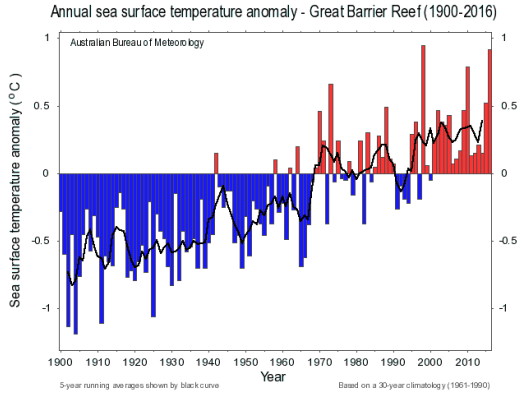
In 1998, the first global mass bleaching event occurred due to record breaking sea surface temperatures. Reefs around the world lost up to 90 per cent of their coral cover. Approximately 50 per cent of the Reef was affected by bleaching.

Mass bleaching also occurred on the Reef in 2002, with 60 per cent of reefs affected. This was the largest coral bleaching event on the Reef on record prior to 2016.

In both the 1998 and 2002 events, the vast majority of corals on the Reef survived, as sea temperatures came back down again in time for them to recover. About five per cent of the Great Barrier Reef's coral reefs experienced high coral die-off in both these events.

What is happening to average sea surface temperatures?

Climate change is responsible for increasing temperatures on land and sea.



Sea surface temperature anomalies for the Great Barrier Reef, 1900–2016 Source: Bureau of Meteorology 2017

The average sea surface temperature in the Great Barrier Reef has risen substantially over the past century.

Since instrumental records began, most of the warmest years have been in the past two decades. This is due to an increase in carbon dioxide in the atmosphere, which produces a greenhouse effect, trapping heat within our atmosphere. The frequency and severity of coral bleaching is projected to increase as global temperatures rise.

How does the Great Barrier Reef Marine Park Authority respond to coral bleaching?

The Great Barrier Reef Marine Park Authority (the Authority) has a Coral Bleaching Risk and Impact Assessment Plan in place.

The Authority and the Bureau of Meteorology work closely with the National Oceanic and Atmospheric Administration (NOAA) to monitor, model, forecast and risk assess coral bleaching conditions each year.

If mass coral bleaching occurs, the Authority works with Queensland Parks and Wildlife Service and key science and industry partners to evaluate the extent and impacts of the event, and looks to promote recovery through targeted actions that reduce pressures on the ecosystem.

Depending on the severity of the bleaching, pressures may need to be alleviated at a local, regional or Reef-wide level.

Compliance with Reef-wide zoning, including a network of highly protected no-take areas, is important to the Reef's resilience. A dedicated control program is also underway to protect coral cover from an outbreak of the coral-eating crown-of-thorns starfish.

Through the Australian and Queensland governments' Reef 2050 Long-term Sustainability Plan, significant investment is being made to improve water quality, in addition to work that has been taking place since 2003 to reduce nutrients, pesticides and sediments in farm run-off. Research shows improving water quality would support recovery of coral reefs.

Actions contained in the plan are also designed to improve the overall health of the Reef, which will build its resilience to impacts such as climate change.

Information current as at 5 May 2017 – refer to www.gbrmpa.gov.au for updates