



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 temperature range and when the temperature exceeds this limit, they experience heat stress.

Most corals have microscopic marine algae (called zooxanthellae) living inside their tissue — these give corals much of their colour. They 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.

Stressed corals may initially display a striking fluorescent hue in pink, yellow or blue — this can be the first sign of bleaching.

Without zooxanthellae, the coral's tissue becomes transparent and the coral's bright white skeleton is revealed.

Bleached corals also begin to starve without zooxanthellae.



Above: At the onset of coral bleaching, corals may appear fluorescent yellow, pink or blue, before appearing white as their skeleton is revealed.

### What causes coral bleaching?

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

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.

Temperature increases of only one degree Celsius above normal summer maximum temperatures for just four weeks can trigger bleaching.

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

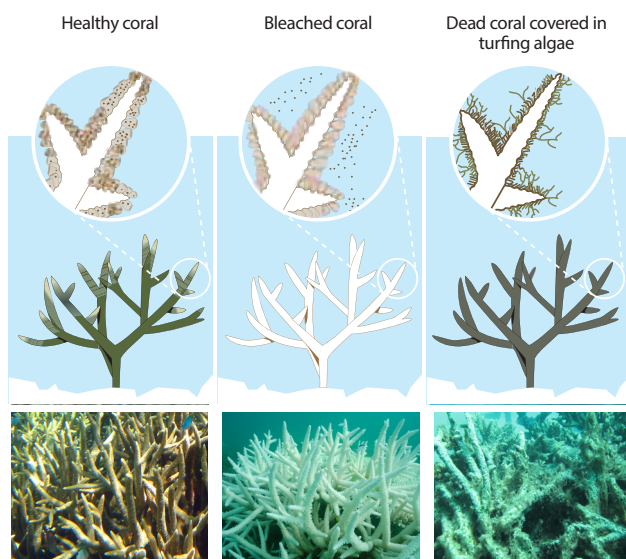
### Do corals die from coral bleaching?

Bleaching does not automatically mean affected corals will die.

If conditions return to normal, corals can slowly repopulate their tissues with zooxanthellae and recover.

However, even if they recover they are likely to experience reduced growth and reproduction, and are more susceptible to disease.

If the stress persists, 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.





## What risk does an El Niño–Southern Oscillation pose?

An El Niño–Southern Oscillation is characterised by unusually warm temperatures in the equatorial Pacific — this poses a high risk of heat stress to coral on the Great Barrier Reef.

El Niños typically result in drier and hotter conditions than usual for eastern Australia.

However, local weather conditions can have a big influence on sea surface temperatures. For example, high cloud cover and wave action can greatly reduce sun exposure and heat absorption by the sea, thereby mitigating bleaching.

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

In 1998, there was a global mass bleaching event. This affected 50 per cent of the reefs on the Great Barrier Reef. At this time, sea temperatures on the Reef were the highest ever recorded.

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

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 coral die-off in both these events.

## What is happening to average sea surface temperatures?

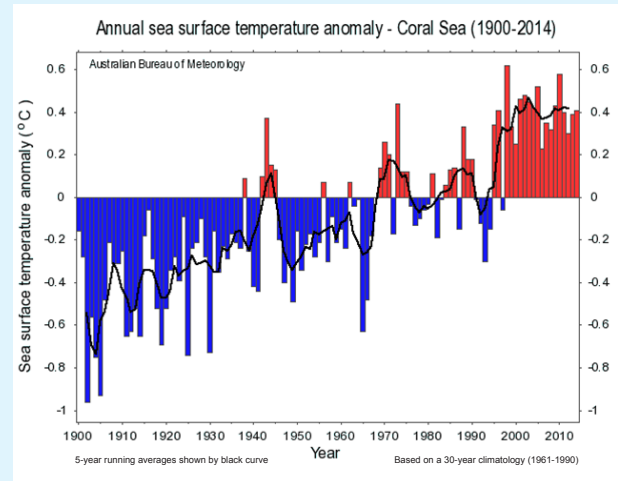
The average sea surface temperature in the Coral Sea has risen substantially over the past century.

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

This is due to an increase in carbon dioxide in the atmosphere, which produces a greenhouse effect, trapping heat within our atmosphere.

Since instrumental records began, 15 of the 20 warmest years have been in the past 20 years.

The frequency and severity of coral bleaching is projected to increase as global temperatures rise.



Sea surface temperature anomalies for the Coral Sea, 1900–2014.  
Source: Bureau of Meteorology 2015

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

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

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

If mass coral bleaching occurs, GBRMPA will evaluate the extent and impacts of the event, and look 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.

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 increase the Reef's tolerance to heat pressures.

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.