

Reef in recovery window after decade of disturbances

For 35 years, the Australian Institute of Marine Science has surveyed the condition of selected reefs across the Great Barrier Reef (GBR). This program, called the Long-Term Monitoring Program (LTMP), comprises an essential resource for governments and agencies involved in the management and protection of the GBR.

Results are published annually. The latest edition, *Long-Term Monitoring Program - Annual Summary Report of Coral Reef Condition 2020/2021*, has just been released.

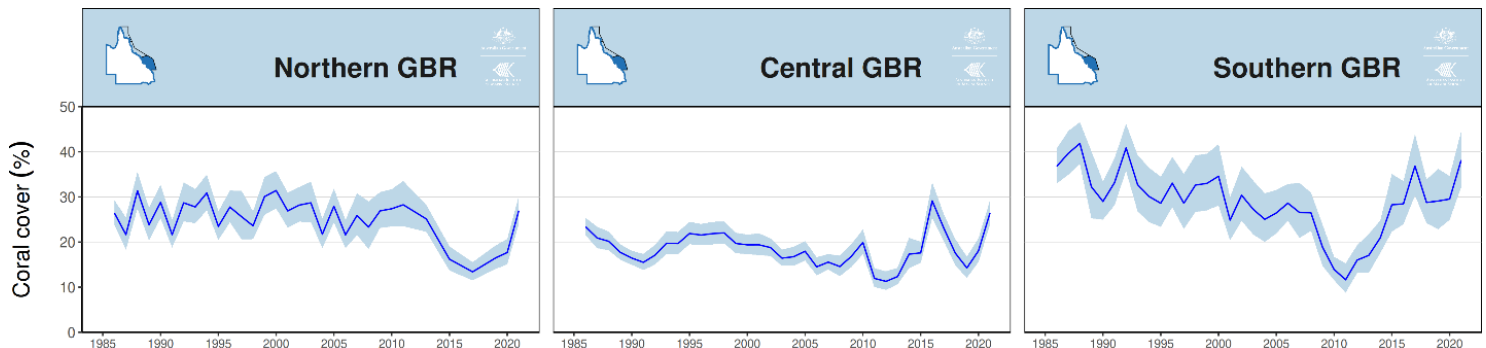
Researchers use hard coral cover as an indicator of the condition of each reef. The LTMP also estimates crown-of-thorns starfish populations, coral bleaching levels and fish numbers, including the commercially and recreationally important coral trout.

For this report, the perimeters of 127 reefs were surveyed between August 2020 and April 2021. Survey reefs are primarily on the mid to outer shelf of the GBR.

Overall findings

After a series of severe and widespread disturbances over the last decade, most of the coral reefs surveyed by AIMS this year are currently in a recovery window.

Hard coral cover increased across all three regions (Northern, Central and Southern) of the GBR since last year, indicating widespread recovery was underway.



Trends in the percentage of hard coral cover on the Northern, Central and Southern Great Barrier Reef from underwater surveys from the AIMS Long-Term Monitoring Program.

There were no major cyclones or prolonged heat stress events during the survey period, resulting in very little coral bleaching and, despite ongoing crown-of-thorns starfish outbreaks in the Southern region, outbreaks decreased across much of the GBR, providing time for the reefs to continue recovery.

Increases in the percentage of hard coral cover across the GBR has largely been driven by fast-growing branching and table corals (*Acropora* species).

Percentage of hard coral cover was variable across the GBR:

- 15 reefs had low (>0% - 10%) coral cover
- 59 reefs had moderate (>10% - 30%) coral cover
- 36 reefs had high (>30% - 50%) coral cover
- 17 reefs had very high (>50% - 75%) coral cover

Impact of the 2020 mass bleaching event

In the summer of 2020, the GBR experienced a marine heatwave, which resulted in mass coral bleaching across much of the Marine Park. However, heating across the Marine Park was not uniform. Most of the survey reefs (101 out of 127) experienced accumulated heat stress likely to cause bleaching, but not mortality.

This agrees well with the LTMP observations that most reefs surveyed in 2021 appear to have undergone minimal coral mortality following the 2020 bleaching event.

The LTMP surveys a representative but small proportion of GBR reefs. There are reefs not surveyed which experienced levels of accumulated heat stress in 2020 where coral mortality would be expected.

What do our findings mean for the Great Barrier Reef?

This year's results show that recovery continues on the GBR, indicating coral reefs still have the capacity to recover during periods of low disturbance.

The current rate of recovery has been observed previously during the 35 years of the LTMP. However, over the past decade, instances of recovery have been arrested or reversed by frequent disturbances.

The predicted consequences of climate change, including more severe cyclones and more frequent and intense marine heatwaves, are now a reality as seen between 2014 and 2020. Periods of low disturbance, such as that seen in 2021, are becoming shorter, reducing the time for recovery. The recovery to date will be easily undone by the next severe tropical cyclone or widespread bleaching event.

Complementary detailed fixed site SCUBA surveys of reefs by the LTMP show much of the increase in coral cover is due to fast-growing table and branching corals (*Acropora* species). This group of corals are dominant on many reefs of the GBR and are important for creating habitats for fish and other marine life. However, they are also more susceptible to cyclones and coral bleaching and are the preferred food source of crown-of-thorns starfish. Future disturbances may quickly remove table and branching corals and cause a rapid decline in coral cover.

There are early indications that coral communities on some reefs are changing. In the Northern and Central regions, some outer shelf reefs that were once dominated by branching and table corals (*Acropora*) are now dominated by slower growing 'cauliflower' corals (*Pocillopora*), which may have implications for rates of recovery and biodiversity.

The Northern region – from Cape York to Cooktown

- The survey covered 54 reefs.
- Average hard coral cover was estimated at 27%, an increase from its most recent low point of 13% in 2017. The historical high for coral cover in this region was 32%, recorded in 1988.

There was much variation in hard coral cover between reefs in the Northern region. Several reefs had low coral cover, most had moderate to high coral cover and a few had very high coral cover.

Out of 32 reefs surveyed within the last two years, only six had decreased in hard coral cover, suggesting mortality from the 2020 bleaching event was minimal in the region.

There was little evidence of crown-of-thorns starfish activity in this area.

Hard coral cover in this region is showing strong recovery after significant coral losses due to the cumulative effects of severe tropical cyclones in 2014 and 2015, crown-of-thorns starfish outbreaks and the 2016 mass bleaching event. Despite the recovery, coral cover has not yet reached 2013 pre-disturbance levels.

The Central region – from Cooktown to Proserpine

- The survey covered 53 reefs.
- Average hard coral cover was estimated at 26%, an increase from the most recent average low of 14% in 2019. The highest regional average, recorded in 2016, was 29%.

Coral cover was variable among reefs in this region. Most reefs had low to moderate hard coral cover. There were many reefs with high hard coral cover and a few reefs had low or very high hard coral cover. Of the 30 reefs surveyed within the last two years, all but two reefs had increased in coral cover.

Large, rapid fluctuations in coral cover in this region are not unprecedented. In 2012, the region recorded its lowest coral cover of 11%, primarily due to Tropical Cyclone Yasi. By 2016, coral cover had reached a record high (29%), but then decreased to a record low in 2019 (14%), largely due to mass coral bleaching in 2016 and 2017 and crown-of-thorns starfish outbreaks.

Despite outbreaks of crown-of-thorns starfish on many reefs in recent years, there were no outbreaks recorded on the survey reefs in the region this year, likely due to active removal of substantial numbers of starfish by the Crown-of-thorns Control Program in this area.

The Southern region – from Proserpine to Gladstone

- The survey covered 20 reefs.
- Average hard coral cover was estimated at 39%, up from the lowest level of 12% in 2011.

Coral cover between individual reefs was variable; however, there was a greater proportion of reefs with high coral cover than low or moderate, in contrast to the Northern and Central regions.

The Southern region has experienced the largest changes in coral cover since the start of the LTMP. Tropical Cyclone Hamish in 2009 decreased coral cover to a record low in 2011. A period of recovery brought coral cover to 37% in 2017, but this was reduced again in 2018 by crown-of-thorns outbreaks. The Southern GBR, which escaped the bleaching events of 2016 and 2017, was affected by the mass bleaching in 2020, but minimal coral mortality was observed on the survey reefs.

More information

- The full *Annual Summary Report of Coral Reef Condition 2020/2021* is available [online](#)
- Learn more about the AIMS [Long-Term Monitoring Program](#).
- Access the [survey reports on the AIMS website](#).

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