

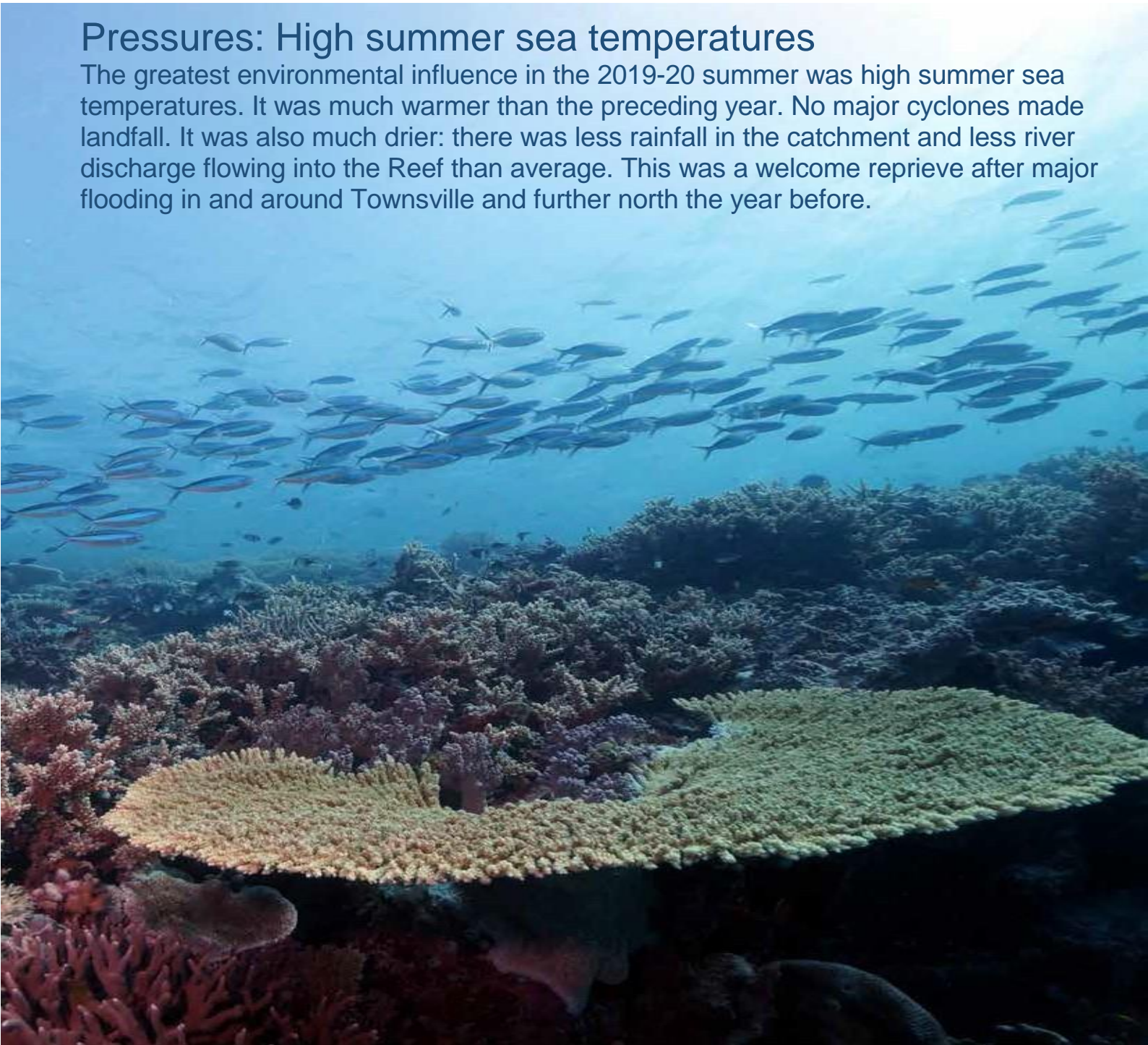


# Great Barrier Reef Marine Monitoring Program 2019-20 Overview

Every year the Great Barrier Reef Marine Monitoring Program ([MMP](#)) assesses the condition of water quality within the inshore Reef, and surveys coral and seagrass habitats to determine how they are responding to a range of pressures. This Overview synthesises their condition throughout 2019-20, and describes trends since 2005.

## Pressures: High summer sea temperatures

The greatest environmental influence in the 2019-20 summer was high summer sea temperatures. It was much warmer than the preceding year. No major cyclones made landfall. It was also much drier: there was less rainfall in the catchment and less river discharge flowing into the Reef than average. This was a welcome reprieve after major flooding in and around Townsville and further north the year before.



## Seagrass remained poor in 2019-20

Inshore seagrass meadow condition remained poor for the eighth year in a row, and remained poor in all six NRM regions. However, trends were not uniform, with some improvement, especially in the Mackay-Whitsunday region.

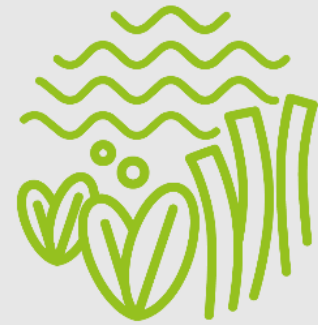
Seagrass abundance declined in many NRM regions. Declines in the Burdekin region (a legacy of the floods and low light experienced in the preceding 2018-19 summer) were the main contributor to poor overall abundance score for this year.

The resilience of seagrass meadows is also declining. Specifically the ability of plants to reproduce sexually was very poor, with few flowers, fruits, and spathes present in most meadows. In fact these reproductive structures were completely absent at half of the sites surveyed.

Germination from seeds is important for recovery after disturbances, but seed banks were absent from two-fifths of sites. Low reproductive capacity is contributing to low resilience. This makes the meadows very vulnerable.

After considering all indicators together, seagrass in Cape York, Fitzroy and Burnett Mary regions are in the poorest state across the Region.

The Reef's seagrass meadows are naturally dynamic. However, poor recovery rates and recovery potential at many locations indicate that seagrass meadows are being overwhelmed by ongoing cumulative impacts. Water quality improvement from land management initiatives (e.g. [Reef 2050 Water Quality Improvement Plan 2017–2022](#)) are essential to reduce one key pressure on seagrass meadows.



Seagrass

### What is monitored?

Seagrass abundance, nutrient status, reproductive potential and pressures.

Where? [Sixty-nine inshore seagrass sites at 30 locations in six NRM regions](#)

More info: [Seagrass Watch website and detailed Annual seagrass report](#)

Photo: School of small fish above a shallow seagrass meadow (mainly *Halodule uninervis*), taken near the Green Island jetty © Dieter Tracey



## Inshore coral remained poor in 2020

Inshore corals remained in an overall 'poor' condition, primarily due to prior storms and recent high sea temperatures. However signs of recovery are occurring, with both coral cover and juvenile density increasing last year.

High seawater temperatures caused widespread coral bleaching in the 2019-20 summer. Although many reefs bleached (especially in the Burdekin and Fitzroy regions) the resulting coral mortality observed in mid-2020 was low.

Since 2016, cumulative pressures have contributed to coral decline across the inshore Reef but trends vary within regions:

- Corals in the Wet Tropics, Burdekin and Fitzroy region have shown an ability to recover. Last year, reefs in the Wet Tropics remained in a moderate condition with a stable trend. Coral in the Burdekin and Fitzroy continued to improve, remaining moderate and poor respectively
- In contrast, coral remained poor and continued to decline in the Mackay-Whitsunday since 2017, following cyclone Debbie.

Impacts from storms and elevated sea temperatures, and effects of poor water quality, especially during high rainfall years, are influencing the condition and recovery of inshore corals.

Since cyclone Debbie affected the Mackay-Whitsunday region in 2017, high macroalgal cover has inhibited coral recovery, especially at Double Cone Daydream and Hook Islands. The brown algae (*Sargassum* and *Lobophora* species) also appeared at Dent Island and Shute Harbour in 2020. These macroalgae have proved to be persistent at other reefs once established.



Corals

### What is monitored?

Coral cover, macroalgal cover, density of juvenile corals, coral cover change, community composition and pressures

Where? 31 inshore coral reefs (and 8 LTMP) in four NRM regions

More info: Survey results are online at AIMS and in detailed Annual coral reports



Photo: The severity of bleaching, in response to high water temperatures in early 2020, varied among corals at Halfway Island, May 2020 © Australian Institute of Marine Science, Photographer: Johnston Davidson

# Water quality trends since 2005

Exposure to turbid water discharged from rivers during the 2019-20 wet season was close to the long-term average.

Individual water quality indicators are monitored annually for compliance with water quality guideline values. The good news is that in general, concentrations of chlorophyll a and total suspended solids are improving or are stable. Both parameters met guideline values in most regions last year.

In contrast, nutrient indicators and Secchi depth exceeded guideline values in most or all regions.

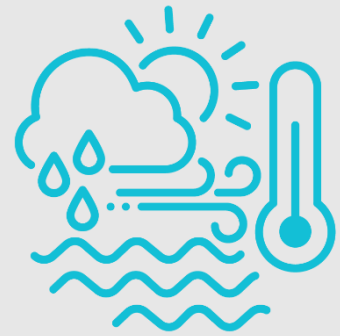
Other indicators which do not have established guideline values are also monitored. For example, organic material has increased in past years, but was stable or declining in 2019-20.

Water quality in the Reef generally improves with distance from the coast and major rivers, but is also influenced by ecological processes and forces like winds, currents and tides.

Removing the variability associated with wind, tide and season statistically reveals a 15+ year trend in water quality. Inshore water quality has been relatively stable in the Wet Tropics and Burdekin, remaining good or moderate throughout.

However, inshore water quality has declined steadily in the Mackay Whitsunday since 2008, and has been poor for the last four years.

The data will inform updates to the [Reef 2050 Water Quality Improvement Plan 2017–2022](#) and the [2017 Scientific Consensus Statement](#).



## Water quality

### What is monitored?

Nutrients, sediment, pesticides, physical and chemical indicators

Where? [Sites extending from major river mouths in four NRM's:](#)

- Cape York
- Wet Tropics
- Burdekin
- Mackay Whitsunday

More info: online at [AIMS](#) and JCU and detailed [Annual water quality reports](#)



Photo: Beach north of the mouth of the Pascoe River, Cape York, © GBRMPA, Photographer: D. Cameron

Indicator*		Regional summary
Cape York	Weather conditions	Sea temperatures resulted in high heat stress. Tropical cyclone Gretel affected the central region of Cape York in March 2020. River discharge was about the long-term average.
	Water quality ■	Water quality monitoring occurs along 4 transects. Concentrations of chlorophyll a and TSS decreased significantly compared to the previous year, probably because it was relatively dry.
	Seagrass ■	Inshore seagrass grades remain poor. Abundance declined from moderate to poor, leaf tissue nutrient content remained poor, while reproductive effort was zero for the second year in a row.
Wet Tropics	Weather conditions	Sea temperatures resulted in high heat stress. River discharge from the region overall was the lowest for more than 15 years.
	Water quality ■	Water quality declined gradually in the Wet Tropics region from 2008–2018 but has recently improved back to good.
	Seagrass ■	Seagrass condition varied across the region; however, abundance and reproductive effort decreased from moderate to poor overall, and leaf nutrient status remained poor.
Burdekin	Coral ■	Coral remained moderate overall. In the Barron-Daintree and Herbert Tully it remained moderate and good respectively, and it improved to good in the Johnstone Russell Mulgrave.
	Weather conditions	Sea temperatures resulted in high heat stress. The annual discharge from the Burdekin region was nearly half the long-term median.
	Water quality ■	From 2015–2020 both Chl-a and TSS have decreased and now comply with guideline values at all sites. Secchi depths have remained stable and currently exceed their guideline value.
Mackay Whitsunday	Seagrass ■	Seagrass remained in poor condition. Abundance declined to poor, following the preceding year's floods. Reproductive effort improved to poor, and leaf nutrient status remained moderate.
	Water quality ■	From 2015–2020, TSS has remained stable, while Chl-a declined slightly. Both currently exceed guideline values. Secchi depth has remained stable and exceeds its guideline value.
	Coral ■	Coral cover continued to recover following cyclone Yasi in 2011. This coincides with the slow return of species sensitive to poor water since then, and low flow from rivers in 2019-20.
Fitzroy	Weather conditions	Sea temperatures resulted in high heat stress. Annual river discharge for the Mackay-Whitsunday region was below long-term median levels.
	Seagrass ■	Seagrass condition improved slightly, but remained poor overall. All three indicators were poor, although seagrass reproductive effort improved from very poor.
	Coral ■	Inshore coral reefs remain poor, with limited recovery since severe cyclone Debbie in 2017. Cyclones have contributed to the majority of coral loss since 2005. Macroalgae cover is high.
Burnett Mary	Weather conditions	Sea temperatures resulted in high heat stress. Wet season rainfall and river discharge was below the long term average.
	Seagrass ■	Seagrass remains poor since 2015-2016. Seagrass reproductive effort remained at zero. The Fitzroy seagrass meadows remained highly vulnerable to future disturbances.
Burnett Mary	Weather conditions	Sea temperatures resulted in high heat stress. Wet season rainfall and river discharge was below the long term average.
	Seagrass ■	Floods, extreme temperatures and severe storms since 2006 led to the overall decline in coral condition. Coral is improving, although still in poor condition. Macroalgae remains very poor.
Burnett Mary	Weather conditions	Sea temperatures resulted in high heat stress. Wet season rainfall and river discharge was below the long term average.
	Seagrass ■	Inshore seagrass condition remained poor, as did abundance and leaf nutrient status. Seagrass reproductive effort declined to zero.

\* MMP does not monitor coral reefs in Cape York and Burnett Mary, or water quality in the Fitzroy and Burnett Mary. Grades: ■ = A, very good, ■ = B, good, ■ = C, moderate, ■ = D, poor, ■ = E, very poor, ■ = not determined