# REEF SNAPSHOT

# SUMMER 2024–25











Australian Government

# Acknowledgement of Country

We acknowledge the continuing sea country management and custodianship of the Great Barrier Reef by Aboriginal and Torres Strait Islander Traditional Owners, whose rich cultures, heritage values, enduring connections and shared efforts protect the Reef for future generations.

Nautilus Shell Artwork © 2023 by Laurence Gibson, Yalanji Arts, Mossman Gorge



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### This snapshot draws on various types of information, including:

Climate time series data Cyclone wave damage predictions Eye on the Reef program data Crown-of-thorns Starfish Control Program dashboard Protecting Great Barrier Reef resilience through effective management of crown-of-thorns starfish outbreaks Long-term monitoring Program survey reports NOAA 5km Satellite Coral Bleaching Heat Stress Degree Heating Week Sentinel-3 water type composite data

### About this snapshot

Summer is a critical time for the health of coral with increased likelihood of exposure to stressors (e.g. elevated temperatures). This snapshot provides a summary of conditions on the Great Barrier Reef (the Reef) from December 2024 to March 2025, how these conditions impact coral, and actions underway to help coral reefs. The snapshot focuses on coral and does not present information on the health of other habitats or species.

Each year, towards the end of summer, the snapshot is prepared by the three main Australian Government agencies with responsibilities for Reef management and science: the <u>Great Barrier Reef Marine Park Authority</u> (Reef Authority), <u>Australian Institute of Marine Science</u> (AIMS), and <u>CSIRO</u>.

This snapshot is based on the latest information available at the time of writing and sets the scene for the more comprehensive reports released later in the year, such as the mid-year <u>Long-Term Monitoring Program</u> reports by AIMS, and reports from the <u>Marine Monitoring Program</u> managed by the Reef Authority.



The four management areas (regions) of the Great Barrier Reef

### **Coral monitoring programs**

Monitoring the health of the Reef is a joint effort with our monitoring partners.

The AIMS Long-Term Monitoring Program (LTMP) monitors the Great Barrier Reef focusing on the status and trends in indicators of reef condition. Researchers examine between 80 and 130 representative coral reefs annually.

A further 30 inshore reefs are monitored as part of the <u>Reef Authority's Marine Monitoring Program</u> (MMP). Additional observations are gathered by the multiple organisations and people contributing to the Eye on the Reef program, including through the Reef Joint Field Management Program, Crown-of-thorns Starfish Control Program, and by <u>Traditional Owners</u> and the Reef-based tourism industry.

Learn more about how we assess coral bleaching events on the Great Barrier Reef and explore the science used in this report through the Reef Knowledge System, the portal for the <u>Reef Integrated Monitoring</u> and <u>Reporting Program (RIMReP)</u>.



### Summary of summer 2023–24

In the summer of 2023–24, the Reef experienced wide-ranging disturbances, most notably from marine heatwaves driven by climate change, leading to severe and widespread coral bleaching. It was also impacted by cyclones, crown-of-thorns starfish (COTS) outbreaks, freshwater inundation and coral disease. While the Reef started the summer of 2023–24 with high coral cover (an indicator of reef condition), subsequent in-water surveys (between May 2024 and March 2025) have recorded serious impacts from these disturbances.

In the lead up to summer 2024–25, coral cover in the Far Northern, Northern and Southern regions had declined, although the extent of this decline varied among reefs. For example, inner and mid-shelf reefs in the Cooktown–Lizard Island sector were heavily affected by coral bleaching caused by the marine heatwave, with one inner shelf reef losing almost three-quarters of its hard coral cover. In contrast, the outer shelf reefs surveyed in the same region experienced little to no coral loss. Reefs in the Capricorn Bunker and Swains regions had also suffered losses of coral cover due to coral bleaching, disease, storms and COTS outbreaks.

The full assessment of outcomes of the 2023–24 summer on coral cover will be delivered through the AIMS LTMP report in August 2025. The most up-to-date data on reef surveys can be found on the <u>AIMS Reef</u> <u>dashboard</u>.



# Summary of summer 2024–25

### Elevated temperatures

Prolonged exposure to higher-thanaverage water temperatures (marine heatwaves) this summer has caused regional coral bleaching in the Far Northern and Northern regions of the Reef. The coral bleaching and its consequences are currently under assessment, a process that will continue over the coming months.

### Cyclones



No cyclones crossed the Reef this summer. However, it is likely that the seaward slopes of outer shelf reefs in the Southern region were exposed to prolonged damaging swell caused by Tropical Cyclone Alfred, a cyclone which formed outside the Great Barrier Reef Marine Park.

### Rainfall





### Crown-ofthorns starfish



Crown-of-thorns starfish (COTS) outbreaks are currently most <u>severe</u> on reefs in the Southern region (Swain Reefs) and in the Northern region between Port Douglas and Lizard Island. COTS are persisting in low numbers offshore Townsville and the Whitsundays, with most reefs currently below outbreak levels.

# What has the Reef experienced?

The Reef goes through cycles of disturbance and recovery, just like any natural system. Given the Reef is very large, disturbances can affect it at local and regional scales. This means conditions on the Reef can be variable across different locations. The Reef has demonstrated its capacity to recover from previous coral bleaching events, severe tropical cyclones, freshwater inundation and crown-of-thorns starfish outbreaks if given enough time.

Climate change remains the greatest threat to the Reef. It influences weather patterns and the ocean's temperature, pH level and currents, as well as intensifying the effects of other threats. The <u>World Meteorological Organization</u> confirmed that 2024 was the hottest year on record. Coral reefs around the world are currently experiencing the biggest ongoing global coral bleaching event, which began in April 2024. Prolonged heat stress throughout the Far Northern and Northern regions of the Reef caused widespread bleaching, the sixth event since 2016.

A tropical low in the Northern and Central regions also saw record rainfall in several areas. This resulted in freshwater exposure and nutrients from flood plumes impacting coral. Tropical Cyclone Alfred, while not crossing into the Great Barrier Reef Marine Park, provided a cooling effect on the Southern region of the Reef. Additionally, some seaward slopes were likely exposed to prolonged damaging waves. The full extent of these cumulative impacts is still being assessed. Current information can be found on the <u>Reef</u> <u>Authority's Reef Health page</u>.



## **Recent conditions across the Reef**

Graphical overview of the key stressors and their variation across the Reef over recent months.



### **Freshwater exposure**

The maximum turbidity extent measured during the flood event of February 2025 (6-17 February 2025) based on Sentinel-3 water type composite. The brownish colours represent turbid waters from flood plumes, and sediment resuspension in shallower areas of the Reef. The greenish colours represent waters where conditions can favor productivity due to excess nutrients and increased light. The blueish colours represent waters with higher light penetration and very low concentrations of water quality constituents. Refer to data from Reef Authority's MMP synthesis reports for details on colour classes.

# Cumulative potential cyclone wave exposure

Estimated cumulative exposure to destructive waves (significant wave height of four metres or greater) from tropical cyclones that influenced the Reef between 1 July 2024 and 14 March 2025. The blue line highlights the areas of seaward facing outer shelf reef slopes that are likely the most exposed to big and long-lasting swells generated by Tropical Cyclone Alfred - where damage could be expected. *Data from AIMS*.

### Heat stress exposure

Spatial patterns of heat stress using Degree Heating Weeks (DHW) as of 14 March 2025. The map shows DHW accumulation over the Reef during the period of 20 December to 14 March 2025 using data from the NOAA Coral Reef Watch (Version 3.1 daily 5km data). Coral bleaching risk increases above 4°C-weeks and severe bleaching risk increases above 8°C-weeks. *Data from NOAA*.

# Crown-of-thorns starfish outbreak status

Outbreak status is defined as the average number of COTS recorded by manta tow surveys (between 1 July 2024 and 7 March 2025). The most severe outbreaks occur in the Northern and Southern regions. While most surveyed reefs are classified as No outbreak, COTS are often still present at specific sites on these reefs and culling is required to supress numbers and protect coral. Descriptions of outbreak status can be found <u>here</u>. *Data from the Reef Authority and AIMS*.

# What does this mean for coral?

During summer, surveys were conducted on the Great Barrier Reef to help us see how corals have been faring. The information below summarises what we know about coral condition as of the end of March 2025. Results of aerial and in-water surveys completed to date suggest the Reef has experienced a widespread coral bleaching event. This event is the sixth since 2016. While less extensive than the bleaching event in 2023–24, it is the second time the Reef has experienced consecutive events. More comprehensive analyses and summaries will be available later in the year. The coral bleaching impact framework will be used to further describe how coral reefs fared this summer. Aerial and in-water surveys contribute to our assessment of coral bleaching impact across four key factors: exposure, colony response, spatial extent, and prevalence.





### From the sky

Aerial surveys are a crucial tool for measuring the spatial extent of a coral bleaching event across this large ecosystem. They capture the shallow coral reef community bleaching response to heat stress and flooding. The aerial surveys were focused on the Far Northern and Northern regions of the Marine Park, which had the greatest exposure to thermal stress.

Survey flights were not conducted across the Southern region as heat stress did not reach levels with elevated risk for thermal coral bleaching and flooding exposure was comparatively less.

Patterns of bleaching were largely consistent with regional scale heat patterns, with widespread impacts in the shallows of reefs across the Far Northern and Northern regions. Coral bleaching prevalence ranged from no bleaching to very high bleaching. Forty-one per cent of the 162 inshore and mid-shelf reefs surveyed recorded medium to high bleaching prevalence. The majority (99



Aerial surveys conducted by AIMS and Reef Authority, March 2025.

per cent) of the 96 offshore reefs surveyed recorded low to medium bleaching prevalence. The higher levels of coral bleaching were more frequently recorded on reefs surveyed from Cooktown to Cape York. Only nine per cent of the 258 reefs surveyed in the Marine Park had very high prevalence of coral bleaching and no reefs surveyed had extremely high bleaching prevalence.

### **Below the surface**

Aerial survey prevalence of bleached reefs will now be combined with in-water surveys to further assess bleaching among different coral types, habitats, and depths. In-water surveys are critical to quantify coral mortality due to flooding and heat stress over the coming months.

Preliminary in-water surveys indicate there are low levels of coral bleaching on surveyed reefs in the Central and Southern regions. Some Central areas of the Reef have been impacted by flood plumes causing coral bleaching. In the worst affected areas, mortality has been recorded on shallow-water corals at several inshore reefs, particularly in the Palm and Family islands groups. At the time of writing, in-water data was not yet available for the Far Northern region where higher levels of coral bleaching were observed in aerial surveys.

In-water surveys and observations will continue through the year by our partners.

# What are we doing to help coral?

Supporting coral reef resilience and recovery is vital. <u>Resilience-based management</u> builds on foundational management programs, such as the zoning plan and field management. It places a strong emphasis on using the best available information and forecasting tools to adjust management actions to improve Reef health and recovery.

A combination of preventative and restorative actions, as well as ongoing research and management, are important for protecting coral and the species and communities that depend on it.

The following are three examples of actions taken to help protect the Reef.



### Monitoring from 'ridge to reef'

When it comes to monitoring the Great Barrier Reef's water quality, researchers need to be ready to respond to the large rainfall events that transport water and sediment from the 'ridge to reef'.

This was the case in February 2025, when flood plumes, caused by severe weather, extended into the inshore, midshelf, and outer shelf regions between Cairns to Mackay. During this time, much of the CSIRO's water quality sampling was taking place in the Upper Burdekin catchment which drains into the Reef south of Townsville.

The Upper Burdekin was by far the largest contributor of sediment to the Reef and this was the largest flood event in the Burdekin since 2009.

When sediment makes its way to the sea via waterways, it can have severe impacts on water clarity and coral resilience.

While CSIRO researchers were monitoring on land, the Marine Monitoring Program water quality teams at AIMS and James Cook University's (JCU) Tropwater were at sea. The teams undertook water quality monitoring across 1000 kilometres of Queensland coastline.

CSIRO and AIMS are now processing their water quality samples, which will provide information on sediment discharge and how corals are likely to be impacted.

CSIRO water sampling work is conducted in conjunction with the Marine Monitoring Program, a partnership between the Reef Authority, AIMS, JCU Tropwater, and the Cape York Water Partnership with important contributions from Traditional Owners.

### Crown-of-thorns Starfish (COTS) Control Program

The Reef Authority delivers the COTS Control Program in collaboration with research and management partners and Reef stakeholders. This ensures that the Program is informed by the best available science and knowledge.

The primary objective of the program is to protect coral by suppressing COTS numbers to sustainable levels at which coral growth and recovery can out-pace starfish predation.

Strategically targeted surveillance and manual control of COTS outbreaks is a proven effective, adaptive, and scalable management action that delivers coral protection across entire reefs and regions.

Dedicated vessels with specialised dive teams are deployed to monitor reef health, detect COTS outbreaks, and conduct cull operations across approximately 200 reefs per year.

The COTS Control Program is an internationally recognised coral protection program that augments the benefits of Marine Park zoning to support the health and resilience of the Great Barrier Reef.

Operations and outcomes 2024–25 (as at early April)



960 days on-water delivered by a 6-vessel fleet



16,200+ diver hours deliveredby 100+ divers



197 reefs actioned for surveillance and culling



Outbreaks supressed and coral protected across 281,000+ hectares of reef habitat

### People power brings reef restoration out of the lab and into the field

Traditional Owners, tourism operators, aquarium trade and maritime services groups working together, brought large-scale reef restoration closer to reality during mass coral spawning.

Led by AIMS experts, teams collected spawn, raised larvae and transferred young corals to reefs using approaches developed in the <u>Reef Restoration and Adaptation Program</u>, which aims to upscale restoration from small numbers to potentially millions of corals. These real-world exercises, led by Traditional Owners on Heron Island, and based from industry vessels in the Whitsundays and the Cairns region, facilitated knowledge sharing and capacity building. They also assessed the practicality, safety, efficiencies, and costs of these interventions.

Next summer, expanded trials through the Pilot Deployments Program will focus on moving interventions to a higher readiness level to meet future needs.

These trials were funded by the Australian Government's Reef Trust and AIMS, the Reef Trust Partnership with the Great Barrier Reef Foundation (GBRF), GBRF Reef Islands Initiative and with support from Qantas through its partnership with the GBRF.



### How can you help?

Spanning over 2300 kilometres, the Great Barrier Reef, a hub of unparalleled biodiversity, urgently requires our protection through reduced carbon emissions, water conservation, and the avoidance of pollutants. Ways to reduce your consumption habits include transform your transport (walk, ride or use an electric vehicle), rein in your power use at home and in the workplace and reduce food waste. Such collective actions are essential for ensuring the Reef's preservation for future generations.

Visit the <u>Reef Authority</u> website for actions you can take to help love the Reef.

### See the Reef. Love the Reef. Protect the Reef.

#### When heading out on the water

- Know your zones
- <u>use responsible reef practices</u>
- know where to anchor and use public moorings
- download the Eye on the Reef app
- choose a <u>High Standard Tourism Operator.</u>

#### **Take action**

- how to help protect the Reef
- contribute your ideas to better look after the Reef and have your say in how it's managed.

### **Reef health monitoring and updates**

Each year, data on the health of the Reef's corals are collected, analysed, and shared. The timing of surveys, report releases and related workshops are shown below.

	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun
Marine Monitoring Program surveys (inshore reefs)				
Long-Term Monitoring Program annual survey report				
Marine Monitoring Program reports (annual)				
Pre-summer workshop (annual)				
<b>Long-Term Monitoring Program surveys</b> (mainly mid and outer shelf reefs)				)
Post-summer Reef Snapshot (annual)				
<b>Eye on the Reef</b> (surveys/submissions)				
Reef health updates				
Outlook Report		Every S	5 years	

Information and data for the above is available on the Reef Knowledge System.











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