CORAL MONITORING PROGRAM

SUMMARY

Coral reef communities of hard and soft corals exist in Cleveland Bay and southern Halifax Bay as shallow fringing reefs around Magnetic Island; the reef platform at Middle Reef; and smaller, less developed nearshore patch reef areas (Virago Shoals) and to the north in Halifax Bay and its islands and shoals. As the coral reef communities in Cleveland Bay survive in turbid coastal areas, these coral communities can be more susceptible to the attenuation of light quality and quantity from suspended sediments in the water column.

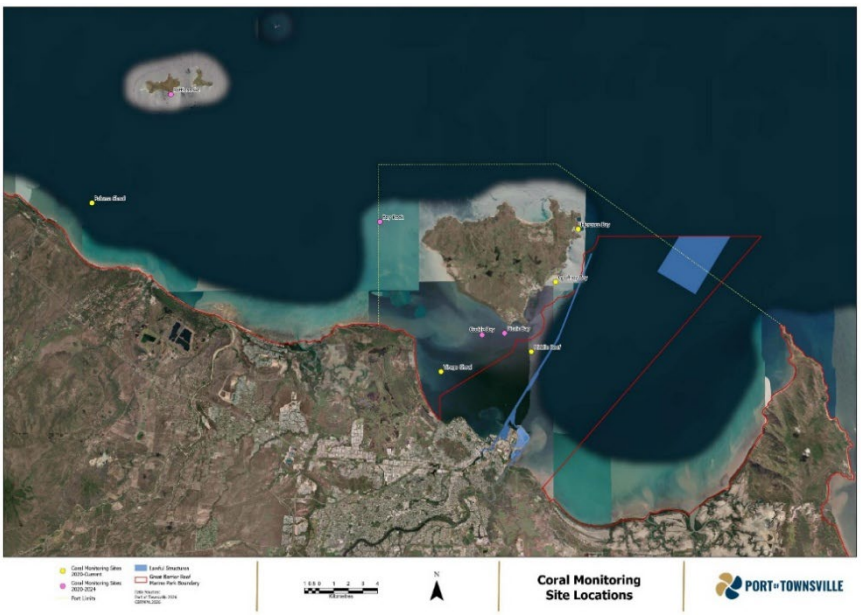
While reefs in Cleveland Bay have been monitored periodically since 2005, the Port of Townsville established an annual coral monitoring program in 2020 to monitor the condition of coral communities in Cleveland Bay as part of the Channel Upgrade (CU) project.

Post the CU project, the Port reviewed the coral monitoring program with specialist consultants and determined that the coral monitoring program provided valuable insights and information to understand coral habitat condition in Cleveland Bay in proximity to Port operations. As such the program is continuing to be implemented.

MONITORING PROGRAM

The coral monitoring program comprised of quarterly surveys at nine (9) reef locations from 2020 to 2024, reduced to biannual surveys at five (5) key reef locations from 2025. The monitoring locations are as follows:

LOCATION	DOMINANT CORAL	TIME PERIOD
Middle Reef	Acropora, Montipora, Dipsastraea, Porities	2020 – current
Virago Shoal	Goniastrea, Montipora	2020 – current
Florence Bay	Acropora, Montipora, Dipsastraea, Galaxea	2020 – current
Geoffrey Bay	Acropora, Montipora, Porites	2020 – current
Paluma Shoal	Montipora, Turbinaria	2020 – current
Picnic Bay	Acropora, Montipora	2020 – 2024
Cockle Bay	Monitpora, Porites	2020 – 2024
Bay Rock	Acropora, Montipora, Soft Coral	2020 – 2024
Rattlesnake Island	Turbinaria, Acropora, Montipora	2020 – 2024



Reef Ecologic

Surveys were carried out by a specialist contractor at each reef as follows:

- Line intercept transects (LIT): four, 20 m line intercept transects were undertaken at each site and used to estimate the percentage cover of organisms or features along a transect. By measuring the length of the transect line intercepted by a specific benthic category, enables quantification of community structure and track changes over time.
- Repeat colony analysis: approximately 20 coral colonies per transect (~80 per location) were repeatedly assessed for different coral health variables - Bleaching, sedimentation and partial mortality. Repeat colony analysis was used as a secondary assessment to understand drivers for changes in the LIT, rather than parameters to be measured and analysed independently.

INSIGHTS FROM THE CORAL MONITORING PROGRAM

Typical of marine ecosystems, the results of the coral monitoring showed the state of coral communities are complicated in space, time, biology and significantly impacted by extreme weather events. Key insights regarding coral communities in Cleveland Bay:

- By mid-2024, six of the nine coral monitoring sites (Virago Shoals, Paluma Shoals, Picnic Bay, Cockle Bay, Rattlesnake Island and Florence Bay) were dominated by algae; two of the nine sites (Middle Reef and Geoffrey Bay) were dominated by hard coral and one site (Bay Rock) dominated by soft substrate (sand and muds) and other invertebrate cover.
- The percentage of hard coral cover across the 5 years of monitoring varied from a high of 84.1% (Middle Reef) to a low of 3.4% (Picnic Bay). Middle Reef is characterised as a high coral cover site, Geoffrey Bay as a moderate coral cover site and Picnic Bay and Rattlesnake Island as combination of coral and algae.
- Across the monitoring period (2020-2024), average hard coral cover at all sites reduced about 1% with this small decline largely attributed to damage of coral by Tropical Cyclone Kirrily in February 2024 at Middle Reef, Bay Rock and Florence Bay.
- Tropical Cyclone Kirrily in early 2024 had the most profound impact on corals at a number of reefs, with hard coral cover at Middle Reef significantly decreasing in early 2024 (~85% - 59%), highlighting the impact cyclones and extreme weather can have on individual reefs. Middle Reef is dominated by Acropora spp. and Montipora spp., which are fast growing but fragile species of coral, and susceptible to impacts from cyclones.
- Coral health was assessed at up to 700 individual coral colonies. None of the coral health indicators reached high stress thresholds, although most reefs showed low to moderate health stress at different occasions across the 5 years of monitoring. Most revealing, a total of 147 (of the 705) sentinel corals (~20%) were missing in mid-2024, due to the impact of Tropical cyclone Kirrily in early 2024. The majority of the missing corals were from two sites: Florence Bay and Bay Rock.
- The biannual surveys of five key reefs since mid-2024 has shown a general trend of increasing algal dominance across all reefs.
- Hard coral cover has remained relatively unchanged across Florence Bay, Geoffrey Bay, Virago Shoals and Paluma Shoals between June 2024 and November 2025, with Middle Reef hard coral cover declining between 2024 and 2025.
- Overall, across the five years of the Port's coral monitoring program, it was determined by the specialist contractor undertaking the program that the minor changes observed in corals were attributed to natural variability and extreme climate events. While all reefs were found to respond differently to weather events, Tropical cyclone Kirrily in early 2024 had the most profound impact on corals around Magnetic Island, highlighting the impact cyclones and extreme weather can have on individual reefs. Although changes were detected across time for coral health (e.g. coral bleaching, sediment deposition and partial mortality), these changes occurred across all sites indicating that the observed increase is likely attributable to broader temporal or environmental factors.

The Healthy Waters Partnership for the Dry Tropics has prepared an ArcGIS StoryMap about corals in Cleveland Bay. For further information please see the following link: [Learn | Healthy Waters Partnership Dry Tropics]