Reef Check Australia

Reef Check Australia (RCA) is an environmental charity dedicated to protecting Australia’s reefs and oceans by engaging the community in hands-on citizen science and education initiatives. Survey teams are part of a worldwide network of trained volunteers that regularly monitor and report on reef health in more than 90 countries using a standardized scientific survey method.

The goal of Reef Check monitoring is to determine broad-scale trends of how our reefs are changing over time on both local and global scales. RCA data can be passed on and used by scientists and managers as an early warning system to supplement other monitoring programs that document changes and disturbances on the reef.

Reef Check surveys

Reef Check surveys are conducted along a transect line marked by a graduated tape measure that is laid along a constant depth and reef habitat. The transect length that is surveyed is 80m, divided into four 20m sections or transect replicates.

A set of biological indicators was chosen for Reef Check, to serve individually as indicators of specific types of human impacts, and collectively as a proxy for ecosystem health. These indicators fall into the following categories:

- Benthic composition is surveyed using a “point sampling” method is used for this survey. The team records the substrate type that is directly below the tape measure every 0.5m along each of the four 20m sections interval to estimate percent cover of 25 substrate categories.

- Abundance of invertebrate, reef health impact, and fish (when logistically suitable) are documented using a 5m wide belt transect area using a u-shaped search pattern to search for target indicators on the same transect as the substrate survey.

For additional detail on monitoring methodology, please see the Reef Check Australia Monitoring Methods (Hill & Loder 2013).

This initiative is proudly supported by Reef Catchments, through funding from the Australian Government’s National Landcare Programme.

Special thanks to all our amazing team of trained surveyors who supported the Whitsundays and Mackay surveys in 2016:

Thank you to our Reef Check Industry Champions who provided in-kind donations to support the 2016 survey season:
Daydream Island Resort, Explore Whitsundays & Explore Hamilton, Cruise Whitsundays & Dive Safaris, Megaforce Charters, Mackay Dive Club.
Monitoring Sites
In 2016, Reef Check Australia volunteers visited nine sites across seven reefs in the Mackay and Whitsundays region. In the Whitsundays sites included Bait Reef (1), Daydream Island (2), Hardy Reef (3), Hayman Island (4), and Hook Island (5). In Mackay, four new sites were established at Keswick Island (6) and Wigton Island (7).

Surveys began at various years, with the earliest site established in 2001 (Blue Pearl Bay Site 1), and the latest in 2016 (Mackay sites). All sites are fringing reefs except for Bait Reef, which is a back reef crest, and Hardy Reef, which is a back reef wall.

Table 1. Overview of basic site characteristics and presence of reef health impacts. Boxes with “x” signify presence of impact/invertebrate. Blacked out boxes indicate no data, due to insufficient time to complete surveys. Silt loading was categorized as low levels (L), where a light layer of silt is visible on occasional surfaces; medium level (M), where silt covers most surfaces; and high level (H), where silt covers all surfaces.
Substrate patterns

- On average, sites in the Whitsundays region were dominated by hard coral (31%) compared to soft coral (11%), except for Daydream Island, where soft corals dominated (32%) (Fig. 1).

- At the sites with the longest monitoring (Blue Pearl Bay 1 (2001) and Hardy Reef 1 (2002)) hard coral cover has consistently been recorded over 45% and 35% respectively (Fig 2).

- Sites in the Whitsundays showed a wide diversity in coral morphologies. Encrusting corals were the most common at Bait Reef sites, branching corals at Hardy Reef, and massive corals at Hook Island and Blue Pearl Bay Site 3. Blue Pearl Bay site 1 had near equal abundance of massive and branching corals.

- After hard coral, rock was the next most abundant substrate type, accounting for an average of 27% of the benthos (average over all Whitsunday and Mackay sites). This encompassed both rock with turf algae (22%), rock with coralline algae (4%), and bare rock (1%).

Whitsunday Coral Trends during monitoring

- Figure 1. Cover of most abundant substrates at all Whitsunday Sites for the 2016 season, including hard coral (HC), soft coral (SC), bleached coral (BC), rock (RC), nutrient indicating algae (NIA), rubble (RB), and silt (SI).

- Figure 2. Percent cover of hard coral (blue), soft coral, (orange), and bleached coral (grey) by survey year at Whitsundays Reef Check Australia reef health monitoring sites, as per point-intercept substrate surveys for benthic composition. Percentage of coral colonies exhibiting bleaching (purple dot), as documented on belt transect survey for reef health impacts, is included where available.
Signs of Reef Stress

- In 2016, coral bleaching was recorded on all sites, with the highest bleaching at Blue Pearl Bay Site 1, where approximately 40% of the hard coral population were affected, with an average of 37% of affected colony surfaces bleached. This is an increase from only 5% (66% surface) of the population in 2015. Hardy Reef Site 1 also exhibited high bleaching, with 33% of the hard coral population affected, with an average of 30% of surfaces bleached on affected colonies.

- At most sites, ‘other damage’ was the most common impact to corals. These examples of physical damage could be due to a number of causes (such as storms or damage from fins), but could not be specifically attributed. Coral scars were also recorded on multiple sites. These areas of coral mortality on colony may be caused by a myriad of causes, such as Drupella or COTs, but without direct evidence, must be attributed to unknown causes.

- Coral disease counts were highest at Hardy Reef sites, with 43 incidents recorded in total (25 at S1 and 18 at S2)

Indicator Invertebrates

- By far the most abundant invertebrate recorded at RCA Whitsundays research sites were giant clams (Fig. 3) with a total of 98 recorded over the 6 sites.

- For the first time on an RCA survey in the region, a banded coral shrimp was recorded (Blue Pearl Bay site 1).

- One crown of thorns starfish (COTS) was found at Gary’s Inlet North.

- Drupella snails were found at all Whitsunday sites, except Blue Pearl Bay, with 23 Drupella found in total.

Figure 3. Total number of impacts at available sites in the Whitsundays. Apart from bleached coral (see Fig 2), no additional impacts were recorded at Luncheon Bay.

Figure 4. Total abundance of indicator invertebrates at each of the Whitsundays sites sampled in 2016.
The Mackay sites were newly established sites in 2016, establishing baseline RCA data about these reefs. Mackay sites had the same average hard coral cover (31%) and soft coral cover (11%) as the Whitsundays sites (Fig. 5).

The two Mackay reefs had comparable hard coral cover (average of 29% at Keswick Island and 33% at Wigton Island), however the large majority of soft coral recorded was found at Wigton Island Reefs with an average of 32% soft coral cover, in comparison to 3% found at Keswick Island reefs.

At Keswick Island, the greatest contributor to substrate (after hard and soft coral) consisted of rock at Connie Bay (49%) and nutrient indicator algae at Coral Gardens (34%). The rock at both of these locations was predominately covered in turf algae (Fig. 5).

Wigton Island did show colonies with recently killed coral (6% at Adi’s Critters and 9% at Pioneer Reef). This was potentially a result of the recent bleaching activity found at both of these locations.

Figure 5. Cover of most abundant substrates at all Mackay sites for the 2016 season, including hard coral (HC), soft coral (SC), bleached coral (BC), rock (RC), nutrient indicating algae (NIA), rubble (RB), and silt (SI).

Figure 6. Percent cover of hard coral (blue), soft coral, (orange), and bleached coral (grey) at all Mackay, as per point-intercept substrate surveys for benthic composition. Percentage of coral colonies exhibiting bleaching (purple dot), as documented on belt transect survey for reef health impacts, is included where available. No long-term trend data available, as all sites were established in 2016.
Mackay Summary

![Image: Giant clam at Bait Reef Gary’s Inlet North]

Signs of Reef Stress

- In Mackay, Pioneer reef (Wigton Island) had the highest number of impacts recorded, with 66 counts of unknown damage and 14 unknown scars. Unknown Damage may potentially be attributed to storm damage, fin kicks, or boat/anchor damage, however without visual confirmation of the impact in motion, it is difficult to attribute a direct cause.

- *Drupella* snails were found at Adi’s Critters (2), Wigton Island. No *Drupella* scars were recorded at any Mackay reefs (Fig. 7) in 2016.

- Coral bleaching affected an average of 13% of the coral population of surveyed Mackay sites, with an average of 46% of coral surfaces bleached. Pioneer Reef (Keswick Island) had the highest coral population bleaching, with 25% of colonies exhibiting some degree of bleaching (83% surface bleaching). Connie Bay (Wigton Island) had the lowest, with 7% coral population bleached (29% surface bleaching).

- Only four diseased colonies were recorded at Mackay Reefs, with 2 colonies each at Coral Gardens and Adi’s Critters.

Indicator Invertebrates

- Invertebrates were rare at all Mackay sites (Fig. 8), with only three of the RCA indicator invertebrates recorded, and all in low abundance.

- Like the Whitsundays, giant clams were the most abundant (although in lower numbers), with a total of 16 being recorded in total. Pioneer Reef hosted the highest number of giant clams (8) and anemones (4).

![Image: Giant clam at Bait Reef Gary’s Inlet North]

Figure 7. Total number of impacts at available sites in Mackay.

Figure 8. Total abundance of indicator invertebrates at each of the Mackay sites sampled in 2016.
Survey Images


For more information on Reef Check Australia, survey methods, sites and previous reports, please go to www.reefcheckaustralia.org.