Reef Check Australia Magnetic Island Reefs Report

Who is 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 the standardised Reef Check scientific survey method.

2015 Findings & Patterns

RCA volunteers monitor the fringing reefs around Magnetic Island reefs and other Great Barrier Reef (GBR) sites to increase understanding of local reef dynamics and identify early warning signals of potential threats. Magnetic Island Reefs are near shore fringing reefs which are characterised as occurring along island and continental coastlines and are separated from the land by a narrow, shallow lagoon. Their proximity to the mainland may be subject to a variety of human pressures such as, high levels of sedimentation, nutrient loading and fishing. Long-term monitoring is important to understand how human and environmental impacts may be changing reefs over time.

Since the first RCA surveys around Magnetic Island in 2003, there have been documented declines in hard coral cover, particularly from 2007. However this year, hard coral cover remained stable on three sites, increased at two sites and decreased on one site (Table 1). The most common reef health impact recorded on surveys was coral bleaching. Other impacts included coral damage and unknown scars. *Drupella* snails and *Diadema* urchins were the most abundant indicator invertebrates found in Magnetic Island Reefs.

Magnetic Island Reef Sites	Site Summary 2015					Present Impacts						
	Hard Coral Cover (%)	Soft Coral Cover (%)	Macro Algae Count	Nutrient Indicator Algae Cover (%)	Silt Level	*Drupella* Scars	Unknown Scars	Crown-of-Thorns Starfish Scars	Coral Damage	Coral Disease	Coral Bleaching	Marine Debris
Alma Bay Site 1	29	1	46	1	Low	X	X	-	X	-	X	-
Nelly Bay Site 1	24	0	54	0	Medium	X	X	-	X	-	X	-
Florence Bay Site 2	23	0	31	10	High	X	X	-	X	X	X	X
Geoffrey Bay Site 1	23	0	1	17	Medium	X	X	-	X	-	X	-
Middle Reef Site 1	24	2	0	27	High	X	X	-	X	-	X	-
Middle Reef Site 2	36	0	6	28	High	X	X	-	X	X	X	-

Table 1. Summary of the basic site characteristics Magnetic Island Reefs: percentage of hard coral (HC) coverage and macroalgae (MA) comparing results from this year to lasts year. Other substrate data recorded includes percentage cover of Nutrient Indicator Algae (NIA), Silt levels (SI) which range from low to high and percentage cover of soft corals (SC). Reef health impacts documented include *Drupella* scars, coral damage, marine debris, coral debris and coral bleaching. Boxes with an X signify presence of an impact while – indicates no impact was documented.

Substrate Patterns

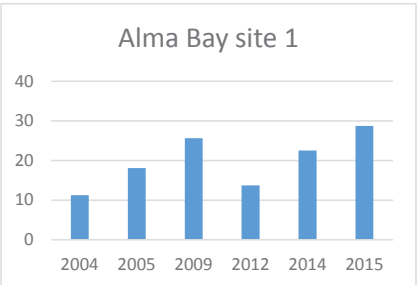
Hard coral is the foundation of tropical reef ecosystems and is often used as indicator of wider reef health. Numerous studies have documented the decline of hard coral across the GBR, particularly on inshore reefs closer to human threats such as dredge spoil and nutrient run off (GBRMPA 2014 - GBR Outlook Report 2014).

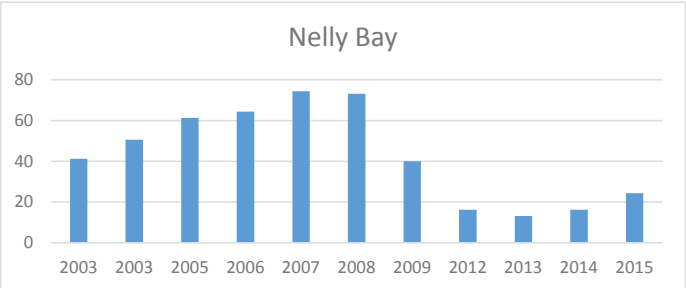
Magnetic Island reef sites (n=6) monitored by RCA in 2015 are dominated by hard coral (27% coverage) as compared to soft coral (0.5% coverage). Sponges were found in all sites albeit in very low abundance. There were no significant changes to sponge abundance from 2014 -2015. The most common non-living substrate encountered is rock, and this is often covered in either turf or coralline algae.

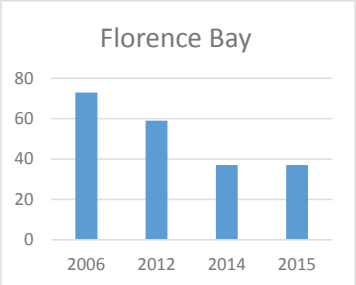
Hard coral cover has declined over the last 10 years with the sharpest declines seeming to correspond with cyclones events. On average, hard coral coverage has reduced by 40% around the island since initial Reef Check surveys (2003-2005). However, Middle Reef site 2 has experienced no overall change in hard coral cover since 2005 and Alma Bay site 1 has shown increased cover.

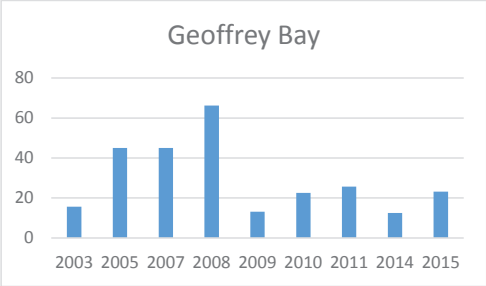
Seasonal macroalgae abundance has fluctuated at all sites since monitoring began. Macroalgal growth is highly dependent on water temperature, nutrient availability and herbivorous fish abundance. Phase changes from healthy to degraded reefs are often characterized by excess fleshy algae, which can suppress coral growth and reproduction (Hughes et al 2007). These changes are thought to be driven by poor water quality, overfishing and climate change impacts and are thought to reduce the resilience of the reef to recover from disturbances.

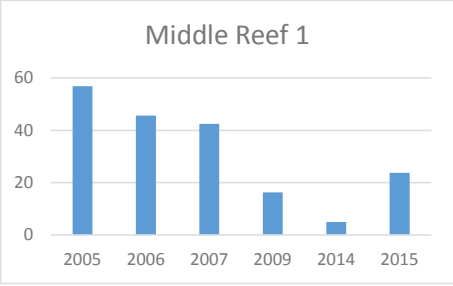
Siltation can be an issue for nearshore reefs. In 2015, silt cover averaged 15% acros the six sites surveyed, with the highest silt levels found at Middle Reef (18 and 45%).











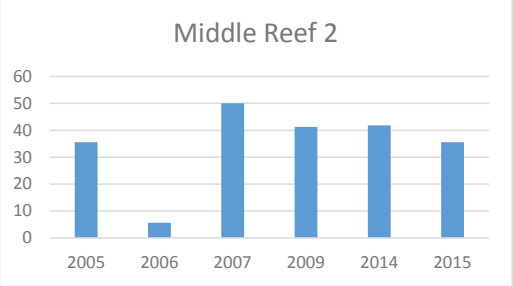


Figure 1. Time series graphs for percent hard coral cover at six Reef Check Australia monitoring sites around Magnetic Island.

Signs of Reef Stress

Visual signs of reef impacts were recorded on Magnetic Island Reefs (Figure 2). Coral bleaching, unknown scars and coral damage were the most commonly recorded impacts.

From 2014 – 2015 coral bleaching increased in all but one of the sites surveyed. The exception, Alma Bay site 1, has remained at stable low levels for the past few years. The pattern of increased bleaching in 2015 may be due to the strong El Nino event of 2015, which was the strongest recorded since 1997 (BOM). El Nino increases sea temperatures and it is the prolonged exposure to these high temperatures that causes corals to bleach.

Coral scars from unknown causes (30%) and physical coral damage (22%) were also notable impact types across surveys. Instances of unknown scars have increased at all sites from 14 -15, again with the exception of Alma Bay which has remained constant. Both Geoffrey Bay and Middle Reef site 1 have seen an increase in the number of unknown scars from 14 -15. Three of the six sites surveyed experienced damage by anchors in 2015, however only a few instances were recorded in each case. Other damage remains low at all sites, with some sites experiencing significant declines in the occurrences of damage from previous years. One site, Alma Bay, showed the highest occurrence of other damage since 2004.

Drupella scars were recorded on five of the six reefs in low abundance. Nelly Bay had the highest incidence of *Drupella* scarring, however this site often records a number of the scars year to year. Middle Reef site 1 was the only site which had no *Drupella* scarring and has not had a recorded scar since 2006.

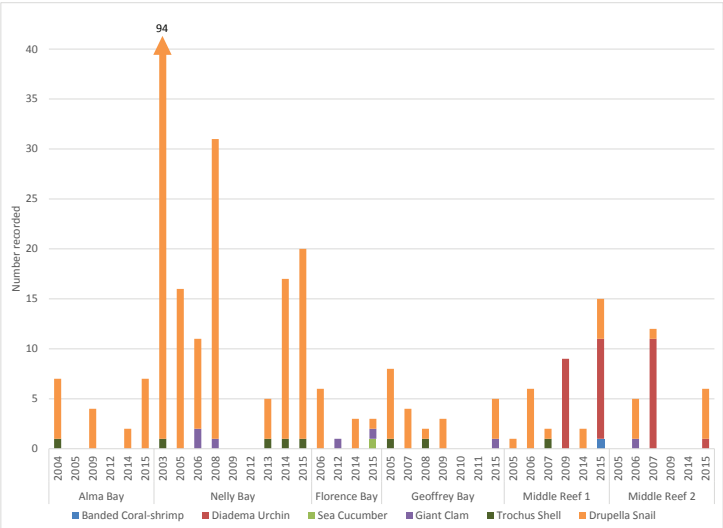


Figure 2. Time series graphs for average abundance of Reef Check Australia indicator invertebrates at six Magnetic Island monitoring locations.

Indicator Invertebrates

Invertebrates play an important role in key reef ecosystems processes. RCA monitors the abundance of indicator invertebrates as a method to identify potential changes in reef health or human use.

and *Diadema* urchins were the most prevalent invertebrates on Magnetic Island reefs in 2015, yet are still recorded in lower abundance than baseline surveys conducted in 2005-06. Giant clams and trochus shells were also reported.

Drupella snails are coral-eaters, and outbreak levels can result in extensive coral mortality (GBRMPA 2009). Most sites have shown an increase in *Drupella* counts from 2014-15, with some sites recording their highest ever count.

Algal feeding Diadema sea urchins were only found on the two Middle Reef sites this year. These urchins are important indicator invertebrates, as they graze on the algae which could otherwise smother corals.

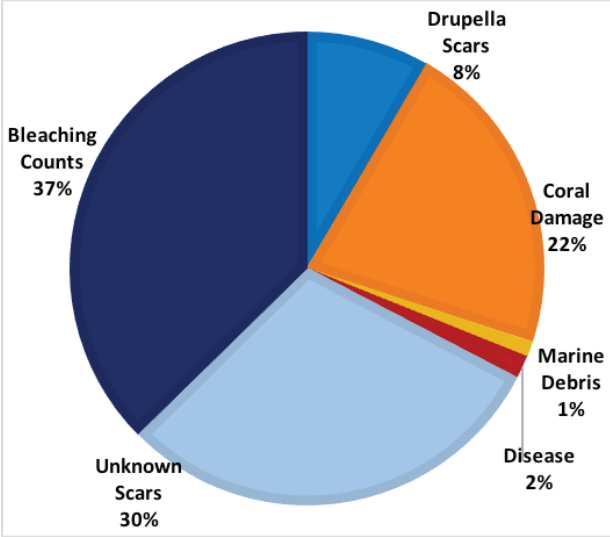
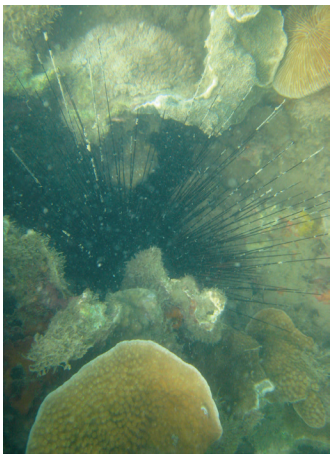


Figure 3. Relative average abundance of Reef Check Australia visual reef health indicators in 2015.

Below: *Drupella* snails (left) and *Diadema* long-spine urchin (right)



At a Glance: Magnetic Island Reef Surveys 2015

Reef Check Australia volunteers have been monitoring Magnetic Island Reefs since 2003. Sites monitored in 2015 include Nelly, Alma, Florence and Geoffrey Bay. Middle reef (located between Townsville and Magnetic Island) was also surveyed.

- Since 2003, volunteers have surveyed 27,200m^2 of reef area on 11 sites around Magnetic Island reefs.
- Average hard coral cover on Magnetic Island sites was 27% in 2015.
- Middle Reef site 2 had the highest hard coral coverage (36%), featuring foliose hard corals.
- Foliose hard coral was the most common form of hard coral observed, then encrusting corals. Next were the massive corals and "other" hard corals. Plate corals and branching corals were the least common.
- Long term trends indicate declines in hard coral on Magnetic Island since 2006. There are evident fluctuations with some sites demonstrating potential decline and recovery patterns.
- Coral bleaching was observed on all sites (average of 9.5% population affected).
- *Drupella* snails were the most abundant invertebrate with 40 individual spotted in 2015.
- *Diadema* were the next abundant invertebrate. *Diadema* are an important herbivore for keeping turfing algae at low levels.
- Interesting animals such as moray eels, epaulette sharks, green turtles and 'near threatened' spotted lagoon rays.

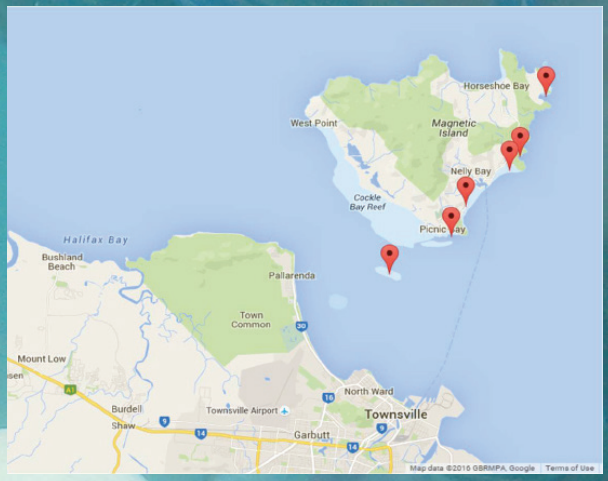


Figure 4. Loation of Reef heck Australia monitoring sites around Magnetic Island. Note Picnic Bay not surveyed in 2015.

RCA monitors sites with the support of Industry Champions in the tourism industry, therefore reef sites tend to Represent some of the best reefs of the area and may not be representative of the wider reef environment.

Magnetic Island survey activities were supported by a Together Townsville grant in partnership with Townsville City Council and Townsville Airport.

Special thanks to all our amazing team of Survey Volunteers who supported Magnetic Island surveys in 2015: Claire Bisseling, Jules Lim, Tom Bridges, Katerina McPherson, Briony Stephenson and Paul Faulkner.

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