Reef Check Australia

Magnetic Island Season Report 2016

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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. Divers record 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.
- Invertebrate, reef health impact and fish (when logistically suitable) abundance are documented using a 5m wide u-shaped search pattern across the transect line to search for target indicators.

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

This initiative is proudly supported by a Together Townsville grant in partnership with Townsville City Council and Townsville Airport.

Special thanks to all our amazing team of trained surveyors who supported the Magnetic Island surveys in 2016: Gemma Molinaro, Annie Bauer, Jules Lim, Samantha Joworski, Adrianna Campili, Rhys Cornish and Carlie Marshal.

Thank you to our Reef Check Industry Champions who provided in-kind donations to support the 2016 survey season: Adrenalin Dive, Dive Patrol, Fantasea Magnetic Island and Magnetic Dive.

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Monitoring Sites

In 2016, Reef Check Australia volunteers visited six sites across five reefs in the Magnetic Island region. Sites included Florence Bay (1), Geoffrey Bay (2), Middle Reef (3), Nelly Bay (4) and Alma Bay (5,6) (Fig 1).

Surveys began in various years, with the earliest site established in 2003 (Geoffrey Bay and Nelly Bay), and the latest in 2006 (Florence Bay). All sites are fringing reefs at shallow depths except Alma Bay Site 1, which lies at a medium depth of 6 meters.

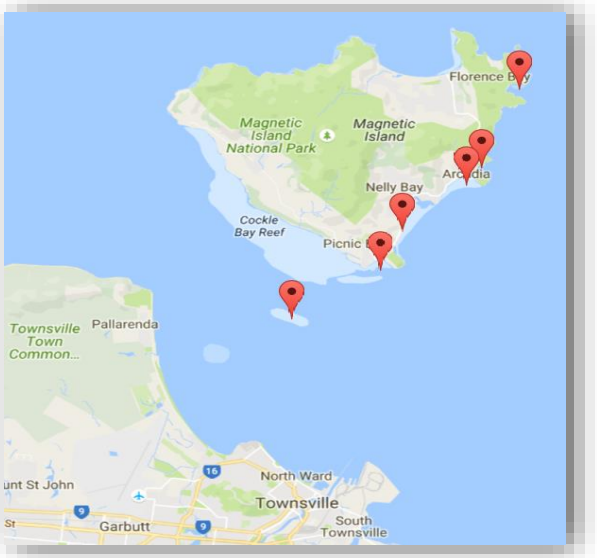

Figure 1. Location of Reef Check Australia monitoring sites around Magnetic Island. Note that Picnic Bay was not surveyed in 2016.

Table 1. Overview of basic site characteristics and presence of reef health impacts. Boxes with "x" signify presence of impact/invertebrate. 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.

Magnetic Island Reefs	Site Summary					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
Florence Bay	21	0	20	12	M	x	x	-	x	-	x	-
Geoffrey Bay	39	1	0	28	M	-	x	-	x	-	x	-
Middle Reef	22	1	24	18	H	-	x	-	x	-	x	-
Nelly Bay	22	6	48	41	M	x	x	-	x	x	x	x
Alma Bay Site 1	6	1	24	32	L	x	x	-	x	x	x	-
Alma Bay Site 2	22	2	31	27	M	-	x	-	x	-	x	x

Magnetic Island Summary

Substrate patterns

- On average, sites were dominated by nutrient indicator algae (NIA) (27%) (Fig 2). Rock was the next most abundant substrate, attributing 23% on average across all sites). This encompassed both rock with turf algae (11%), rock with coralline algae (8%), and bare rock (5%).
- The total average hard coral cover for all sites around Magnetic Island was 22%, consistent with 2015 survey results (21%).
- Most sites had low levels of soft coral (present at 4 of the 6 sites, averaging <1%) and sponge (present at 4 of the 6 sites, averaging 1%).
- Coral morphologies at the Magnetic Island sites were dominated by foliose and encrusting corals in 2016. Foliose predominated Geoffrey Bay, Middle Reef, Nelly Bay and Alma Bay Site 2. Encrusting corals were most abundant at Florence Bay. Alma Bay Site 1 had an equal abundance of foliose and encrusting corals.
- At all monitoring sites, coral cover (hard and soft) has consistently been under 40% in the last 4 years (Fig 3).

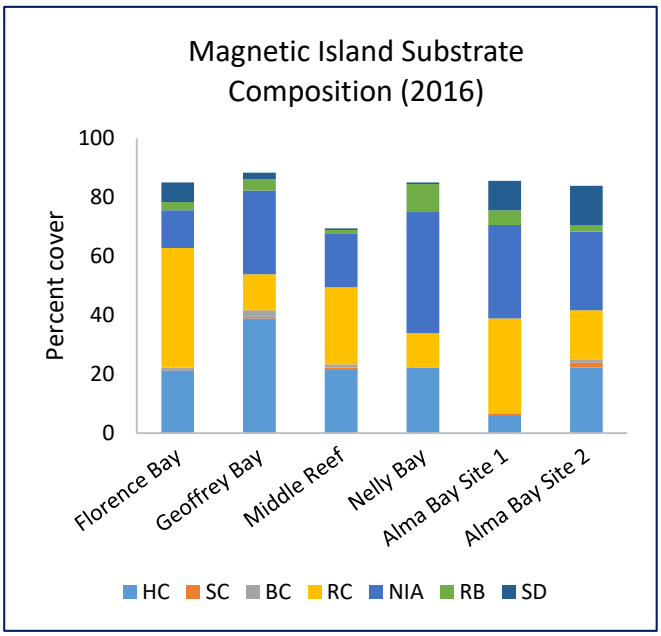

Figure 2. Cover of most abundant substrates at all Magnetic Island Sites for the 2016 season, including hard coral (HC), soft coral (SC), bleached coral (BC), rock (RC), nutrient indicating algae (NIA), rubble (RB), and sand (SD).

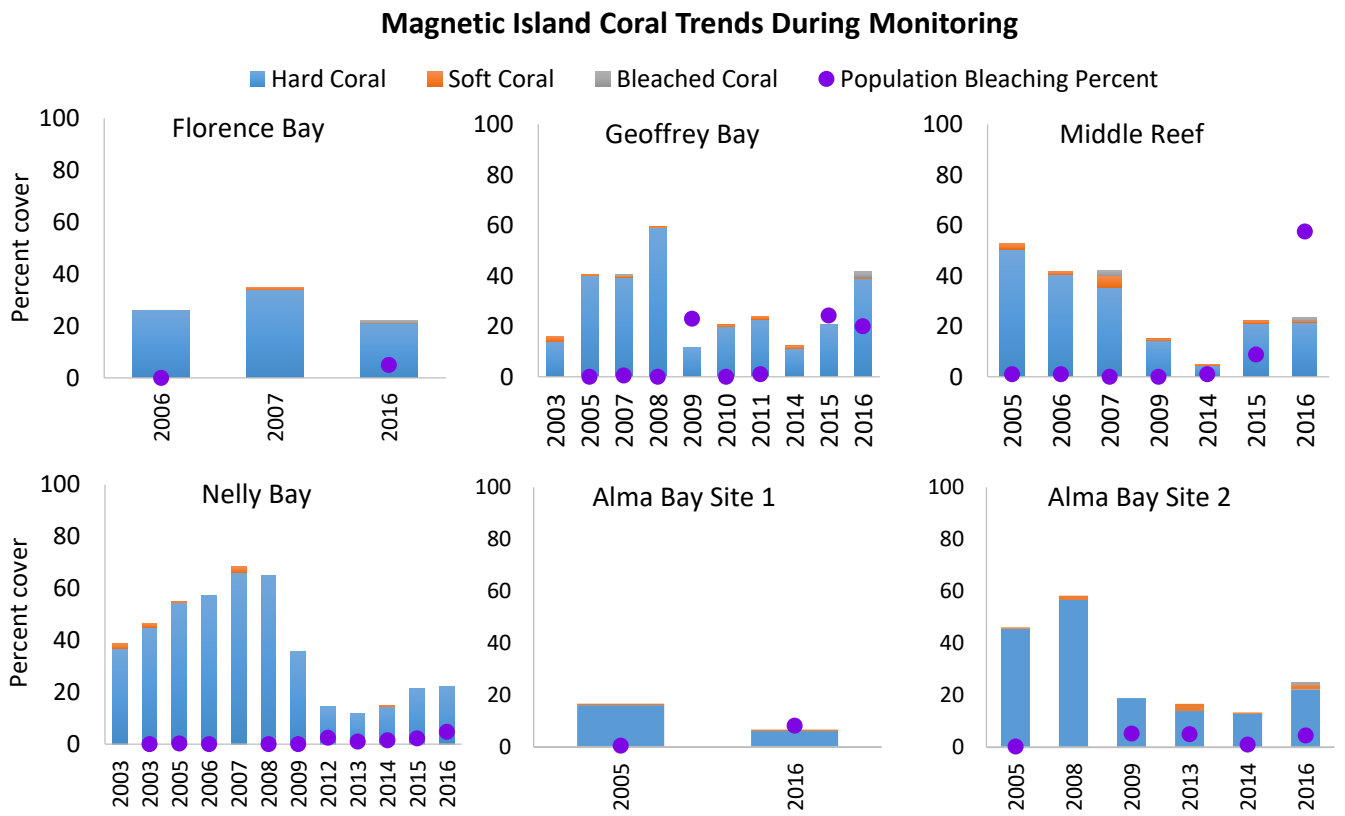

Figure 3. Percent cover of hard coral (blue), soft coral, (orange), and bleached coral (grey) by survey year at Magnetic Island Reef Check Australia reef health monitoring sites, as per point-intercept substrate surveys for benthic composition. Percentage of coral colonies exhibiting bleaching (purple dot), as documented on belt transect survey for reef health impacts, is included where available.

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Signs of Reef Stress

- Coral bleaching was recorded on all sites in 2016, but mostly in low levels. The highest bleaching documented was at Middle Reef, (site 1) with approximately 58% of the hard coral population (and 24% of colony surfaces) affected. This is a near 49% increase from only 9% (7% surface) of the population in 2015. Geoffrey Bay exhibited the next highest bleaching in 2016, with 20% of the hard coral population affected, and an average of 23% of surfaces bleached on affected colonies.
- 'Other coral damage' was the most common impact to corals on average across all sites (Fig 4). These records 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 at all Magnetic Island sites in 2016. These scars may be attributed to a myriad of causes, such as *Drupella* or COTS, but without direct evidence, must be attributed to unknown causes.
- Nelly Bay had the highest record of coral disease across the 6 sites, with 10 incidents recorded. Nelly Bay also had the highest count of *Drupella* scars (20) recorded on the transect. Marine debris, including fishing nets, fishing line and other rubbish were also documented at Nelly Bay and Alma Bay Site 2.

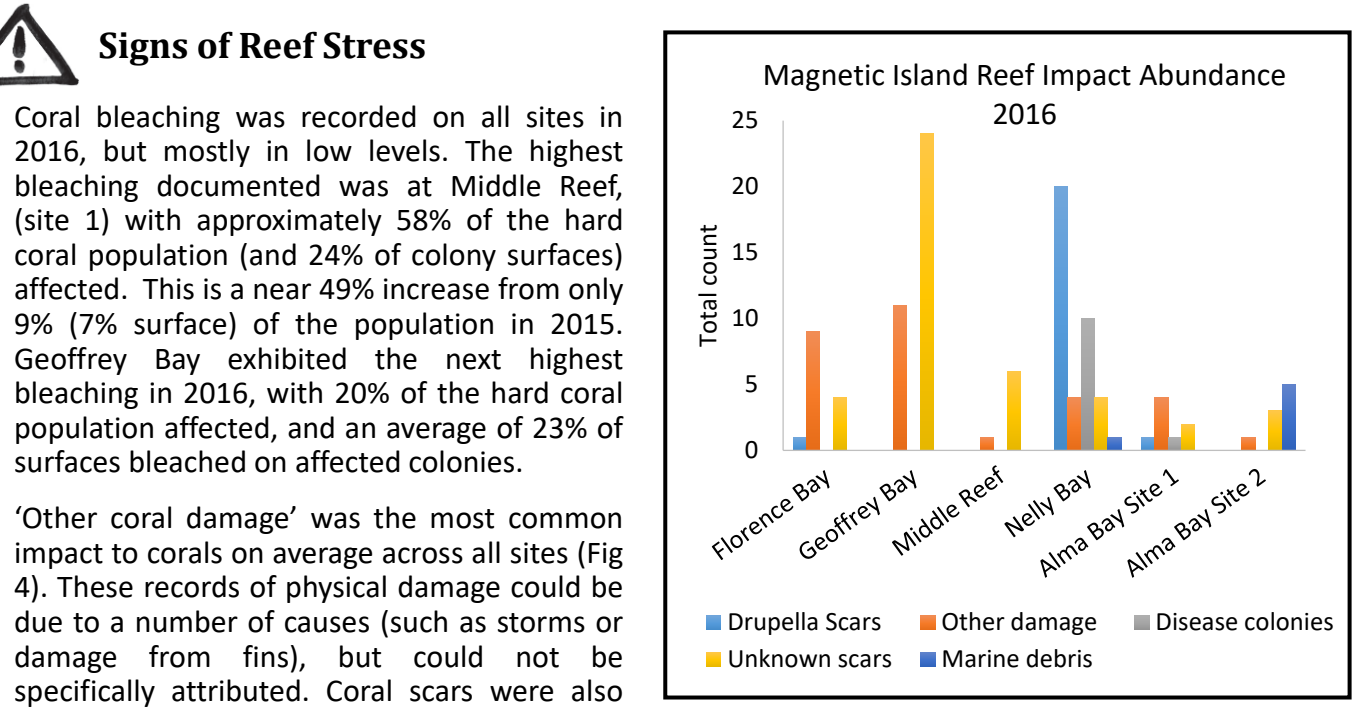

Figure 4. Total number of impacts at available sites around Magnetic Island. For bleached coral, see Figure 2.

Indicator Invertebrates

- By far the most abundant invertebrate recorded at RCA Magnetic Island sites were *Drupella* snails (Fig 5) with a total of 43 recorded over the 6 sites.
- Three *Trochus* snails were present at Nelly Bay.
- One RCA indicator lobster and one RCA indicator sea cucumber were recorded at Florence Bay.

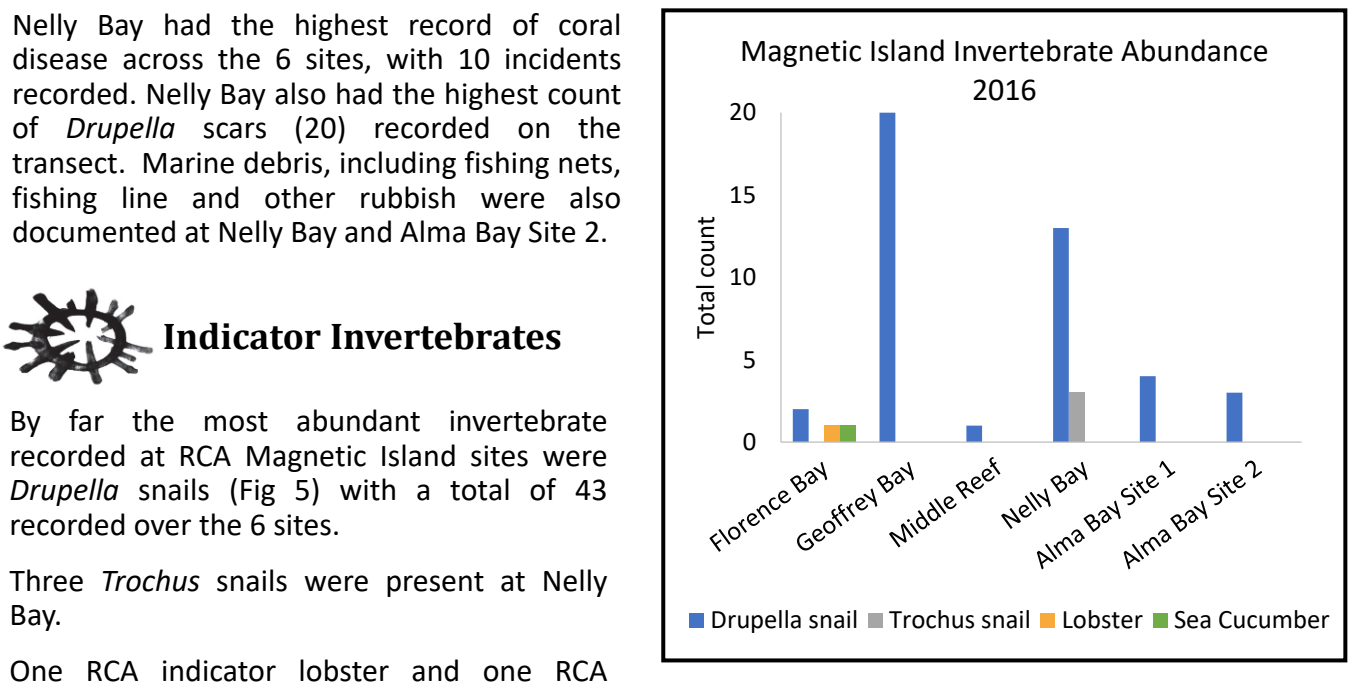

Figure 5. Total abundance of indicator invertebrates at each of the Magnetic Island sites sampled in 2016.

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Survey Images

Images: Top to bottom, left to right: *Drupella* scar with *Drupella* snail, Nelly Bay. Geoffrey Bay Reef Scene. Bleached coral, Alma Bay. Surveyor in Action, Middle Reef. Foliose hard coral recruit, Middle Reef. Painted crayfish, Florence Bay.

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