

Reef Check Australia

Cairns and Port Douglas Season Report 2016



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This report should be cited as: M. Welch, J. Salmond and J. Loder (2016)
Reef Check Australia Cairns and Port Douglas Season Report 2016.
Reef Check Foundation Ltd.



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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 separated by 5m intervals.

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).

Special thanks to all our amazing team of trained surveyors who supported the Cairns and Port Douglas surveys in 2016: Gemma Molinaro, Kristy Brown, Samantha Joworski, Carlie Marshall, Jules Lim, Claire Biesling, Annie Bauer, Matt Roscher and Briony Stephenson.

Thank you to our Reef Check Industry Champions who provided in-kind donations to support the 2016 survey season: Reef Magic, Down Under Dive and Calypso Snorkel & Dive.



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Monitoring Sites

In 2016, Reef Check Australia volunteers visited five sites across four reefs in the Cairns and Port Douglas region. Around Cairns, sites included Hastings Reef, Moore Reef and Norman. In the Port Douglas region, Bashful Bommie and South North Opal (SNO) were each surveyed at Opal Reef.

Surveys began in various years, with the earliest sites established in 2003 (Hastings Reef and Bashful Bommie), and the latest in 2014 (Norman Reef). Hastings Reef and Norman Reef are back reef walls, while Moore Reef and both sites at Opal Reef are back reef slopes.



Figure 1. Location of Reef Check Australia monitoring sites near Cairns and Port Douglas. Note that Agincourt and Low Isles were not surveyed in 2016.

Table 1. Overview of basic site characteristics and presence of reef health impacts in 2016. 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; and none (N), where there is no silt cover.

		Site Summary					Present Impacts						
		Hard Coral Cover (%)	Soft Coral Cover (%)	Macro Algae Count	Nutrient Indicator Algae Cover (%)	Silt Level	<i>Drupella</i> Scars	Crown-of-Thorns Starfish Scars	Unknown Scars	Coral Damage	Coral Disease	Coral Bleaching	Marine Debris
Cairns Reefs	Hastings Reef, North Hastings A	36	7	0	0	L	-	-	-	x	-	x	-
	Moore Reef, Reef Magic Pontoon	21	16	0	0	L	x	-	x	x	-	x	x
	Norman Reef, Middle Mooring	23	11	0	0	L	-	-	-	x	x	x	-
Port Douglas Reefs	Opal Reef, Bashful Bommie	38	6	0	8	N	-	-	-	x	-	x	-
	Opal Reef, South North Opal (SNO)	36	3	0	10	N	-	-	x	x	-	x	-

Cairns Summary



Substrate patterns

- Sites in the Cairns region were on average dominated by hard coral (27%) compared to soft coral (11%) (Fig 2). North Hastings A had the highest live coral cover of any Cairns RCA site, with 43% recorded on the transect. Rock was the next greatest contributor to the substrate, attributing an average of 25% cover across all sites. This encompassed rock with turf algae (15%), rock with coralline algae (0.2%) and bare rock (10%). Note that these averages are for specific transect areas and may not be representative of the reef as a whole.
- Recently killed corals were recorded across all sites in 2016, accounting for 24% of the substrate at North Hastings A and 14% on average across the three sites. This is higher than levels recorded in 2015 with 1% RKC on average between Moore Reef and Norman Reef.
- Coral morphologies in the Cairns region were dominated by branching corals (15%) in 2016. North Hastings A and Norman Reef also had high abundances of massive corals (13% average cover between the two sites). Live hard coral cover for sites monitored in both 2015 and 2016 declined from an average of 24% cover in 2015 to 12% cover recorded in 2016.

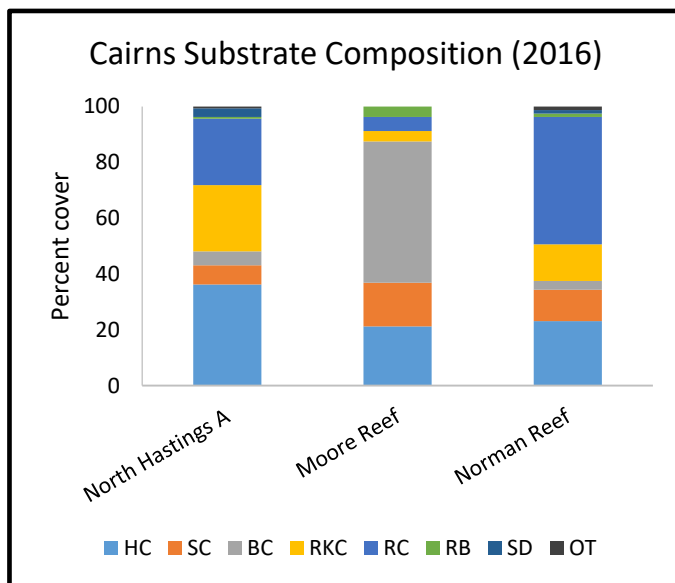
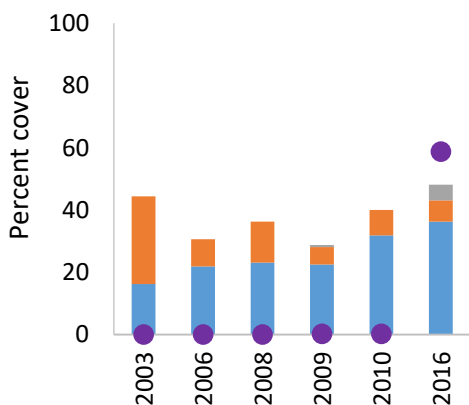


Figure 2. Substrate cover at all Cairns sites for the 2016 season, including hard coral (HC), soft coral (SC), bleached coral (BC), recently killed coral (RKC), rock (RC), rubble (RB), sand (SD) and other (OT). Note that BC is composed of bleached hard and soft corals.

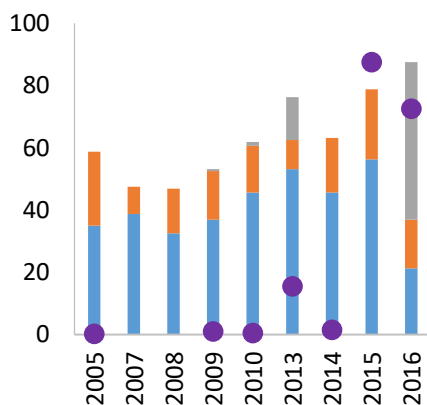
Cairns Coral Trends During Monitoring

■ Hard Coral ■ Soft Coral ■ Bleached Coral ● Population Bleaching Percent

North Hastings A



Moore Reef



Norman Reef

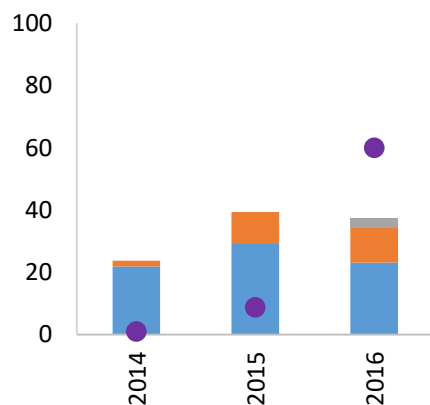


Figure 3. Percent cover of hard coral (blue), soft coral (orange), and bleached coral (grey) by survey year at Cairns Reef Check Australia reef health monitoring sites, as per point-intercept substrate surveys for benthic composition. Percentage of coral colonies exhibiting bleaching (purple dot), as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

Cairns Summary



Signs of Reef Stress

- Coral bleaching was recorded on all sites in 2016 (Fig 3). Moore Reef exhibited the highest extent of bleaching, with approximately 73% of the coral population affected, and an average of 61% of affected colony surfaces bleached. North Hastings A and Norman Reef also exhibited high levels of bleaching with 59% and 60% of coral populations affected (and 71% and 72% of colony surfaces affected), respectively. This is the highest average bleaching of population and colony surface recorded at these sites since Reef Check Australia started monitoring these sites in 2003. Population bleaching levels recorded for 2016 were approximately 18% greater than the 2015 population on average, and 65% more affected than in 2014.
- '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 recorded at Moore Reef, and may be caused by a myriad of causes, such as *Drupella* or COTs, but without direct evidence, must be attributed to unknown causes.



Indicator Invertebrates

- The most abundant invertebrate recorded in 2016 were *Drupella* snails (13 recorded; Fig 5); however, they were only found at Moore Reef.
- Giant clams were the next most abundant RCA indicator invertebrate (a total of 7 recorded), and were present at all sites in the Cairns region.
- Anemones were seen at both Moore Reef and Norman Reef, yet none were recorded at the North Hastings A site.
- One RCA indicator sea cucumber was found at North Hastings A.

Cairns Reef Impact Abundance (2016)

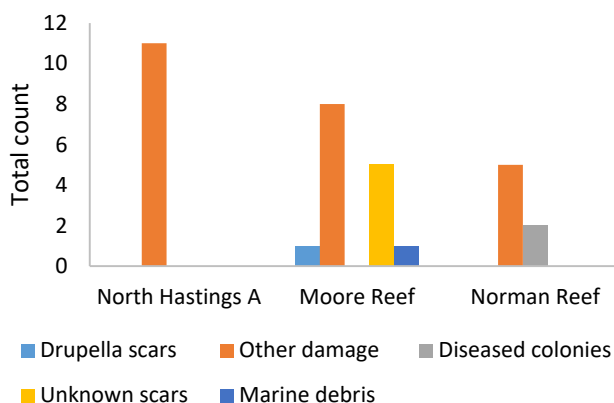


Figure 4. Total number of impacts (per 400m²) at available sites in the Cairns region. For bleached coral, see Figure 2.



Image: Bleached anemone with fish, Moore Reef

Cairns Invertebrate Abundance (2016)

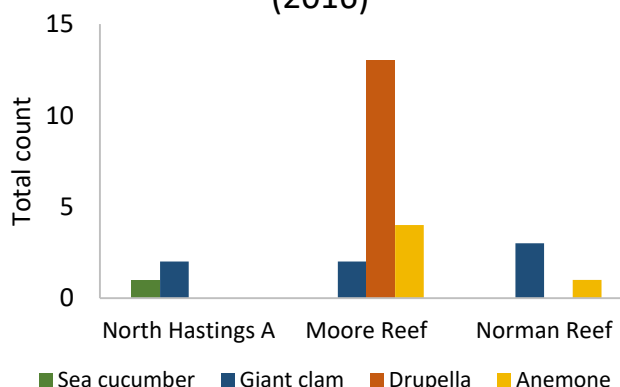


Figure 5. Total abundance of indicator invertebrates at each of the Cairns sites sampled in 2016.

Port Douglas Summary



Substrate patterns

- Port Douglas sites were dominated by hard coral (37% cover) in 2016 (Fig 6). Soft coral, on average, accounted for approximately 4% cover. Rock was the second greatest contributor to the benthos, attributing 22% of the substrate. Rock was predominantly covered with turf algae (19%), with the remaining 3% of rock covered in coralline algae.
- Nutrient indicator algae (NIA) was found at both Port Douglas sites, making up 9% of the substrate composition on average.
- Massive corals were the predominant growth form in 2016 (26%). A few encrusting and foliose corals were present in the remaining 11% of hard corals at both sites.
- Live coral cover has decreased by approximately 5-10% at both sites over the last 3-7 years (Fig 7).

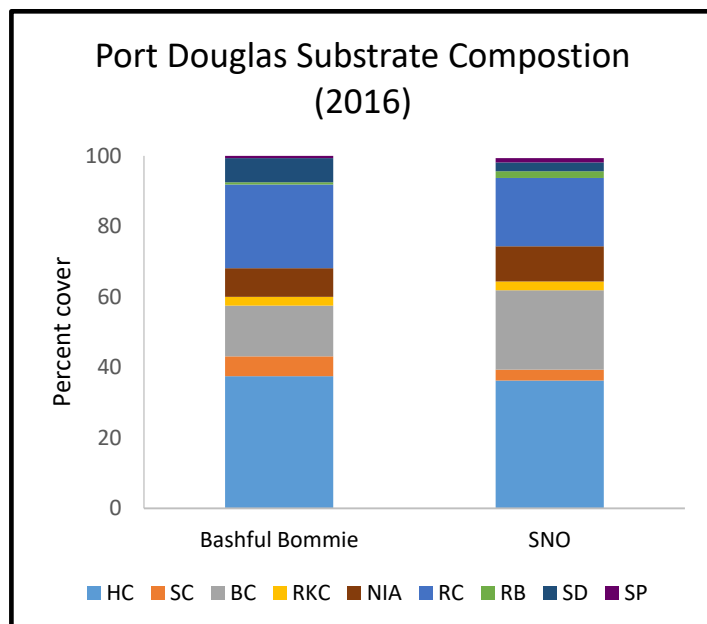


Figure 6. Substrate cover at all Port Douglas sites for the 2016 season, including hard coral (HC), soft coral (SC), bleached coral (BC), recently killed coral (RKC), nutrient indicating algae (NIA), rock (RC), rubble (RB), sand (SD) and sponge (SP). Note that BC is composed of bleached hard and soft corals.

Port Douglas Coral Trends During Monitoring

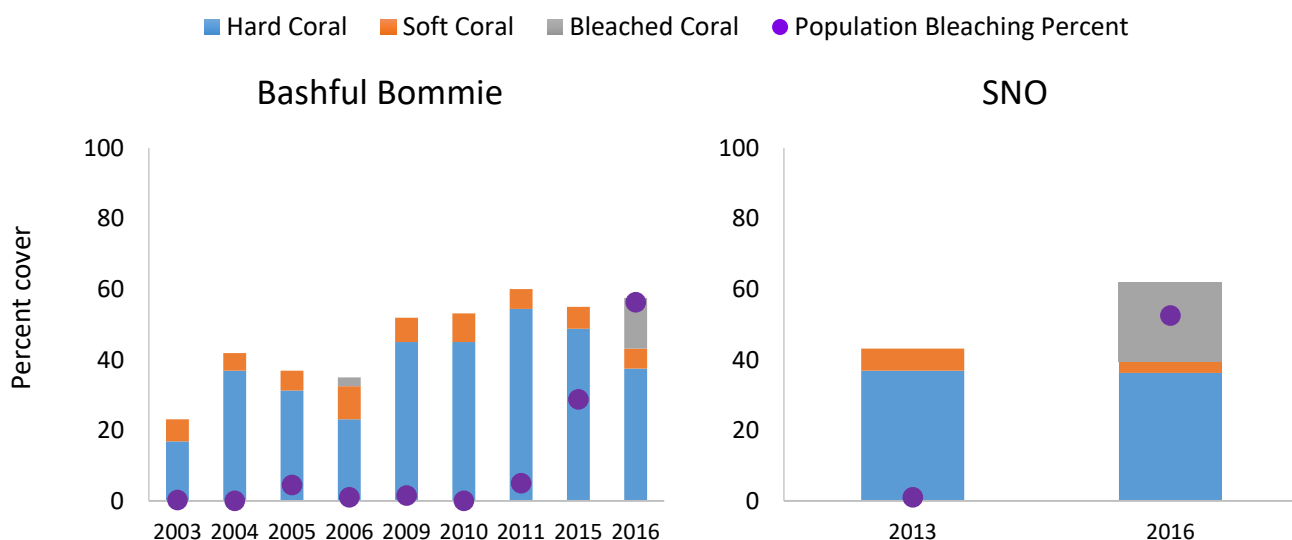


Figure 7. Percent cover of hard coral (blue), soft coral, (orange), and bleached coral (grey) at all Port Douglas sites, as per point-intercept substrate surveys for benthic composition. Percentage of coral colonies exhibiting bleaching (purple dot), as documented on belt transect survey for reef health impacts, is included where available.

Port Douglas Summary



Signs of Reef Stress

- Coral bleaching levels impacted more than 50% of the coral population at both Port Douglas sites (56% at Bashful Bommie; 53% at SNO) (Fig 7). On average, 59% of coral surfaces exhibited bleaching on affected colonies. This level of bleaching represents an increase of approximately 50% at both sites over the past 3-5 years.
- ‘Other coral damage’ was the most common coral impact to corals at both sites (Fig 8). These records of physical damage could be due to a number of causes (such as storms or careless diver/snorkeler damage), however could not be specifically attributed.
- One unknown coral scar was recorded at SNO in 2016. These scars may be attributed to a myriad of causes, such as *Drupella* or COTS, however without direct evidence, such impacts are attributed to unknown causes.



Image: Bleached Hard Coral at Opal Reef



Indicator Invertebrates

- Invertebrates were rare in the Port Douglas region, with a total of 11 giant clams recorded over the two sites (5 at Bashful Bommie and 6 at SNO) (Fig 9). No other invertebrates were recorded on the survey.

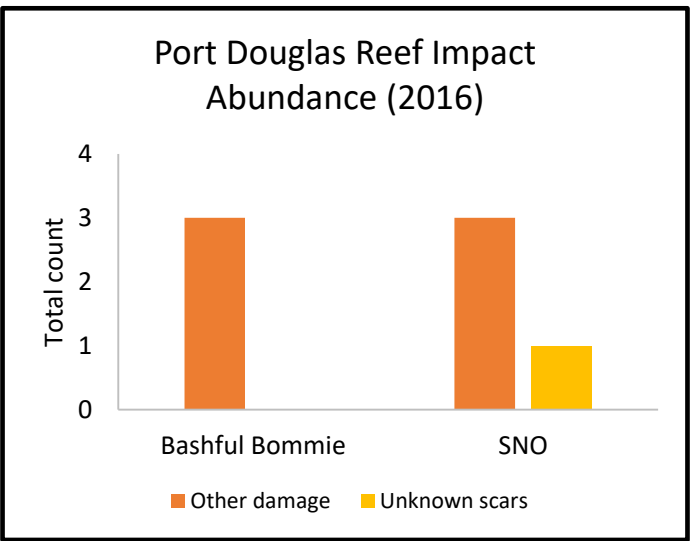


Figure 8. Total number of impacts at available sites in the Port Douglas region. For bleached coral, see Figure 6.

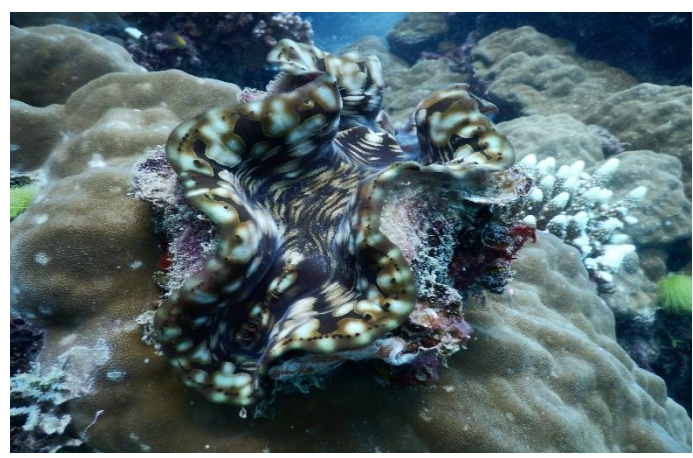


Image: Giant Clam at Opal Reef

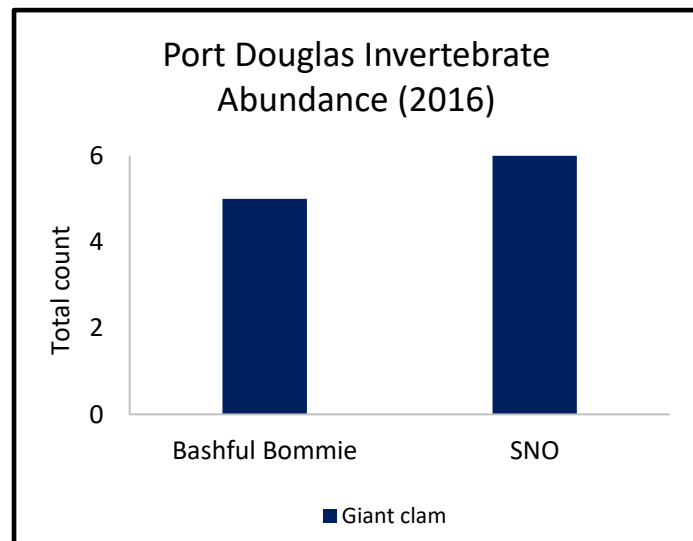


Figure 9. Total abundance of indicator invertebrates at each of the Port Douglas sites sampled in 2016.

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Survey Images



Images: Top to bottom, left to right: Survey diver at North Hastings; Bleached Hard Coral at Bashful Bommie; Napoleon Wrasse at Moore reef; Sea turtle at Moore reef; Survey site at Norman reef, Soft coral at Moore reef.

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