

# Reef Check Australia



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# Reef Check Australia

## Heron Island Reef Health Report 2018



A huge thank you and congratulations to the 2018 Heron Reef Research Team: Chris Roelfsema, Douglas Stetner, Mitch Lyons, Emma Kennedy, Daniel Harris, Kat Markey, Josh Passenger, Eva Kovacs, Rodney Borrego, Jodi Salmond and Stuart Phinn. Image from Chris Roelfsema.



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### 1.0 PROJECT INTRODUCTION

Reef Check Australia's (RCA) monitoring program is a peer-reviewed, volunteer reef health monitoring program that trains volunteers to collect data on reef composition, abundance of indicator organisms (invertebrates and fish) and reef health impacts, using a globally standardized protocol (Done et al., 2017, Hill and Wilkinson, 2004).

RCA monitoring sites were established on Heron Island in 2011, as a joint annual collaboration with University of Queensland's Remote Sensing Research Centre (RSRC). The RSRC team has been cataloging the benthic composition of Heron Reef annually since 2001 via geo-referenced photo transects (Roelfsema et al 2010). This and other field data, in combination with satellite imagery, is used to create and validate benthic habitat maps. RCA survey data augments this substantial spatial dataset by offering further information on impact severity and abundance of key organisms, as well as allowing field-based comparisons of benthic composition.

Even though Heron's reefs are intensely studied, with hundreds of researchers visiting the University of Queensland's Research Station annually, there are limited programs that consistently document long-term reef health. Hence the RSRC and RCA initiative can offer a valuable perspective on these reefs, combining a variety of techniques for long-term, cohesive studies. Since the RCA Heron Reef program started in 2011 in partnership with the University of Queensland's RSRC, additional sites have been added to allow for a more representative collection of survey locations around the island. A total of 17 RCA Heron Reef Sites are now monitored as part of the long-term monitoring program.

Reef Check Australia's survey team monitored 15 of these 17 sites (eight reef slope sites and seven reef flat sites) around Heron Reef during the November 10 - 17, 2018 survey. Substrate line transects, in addition to invertebrate and impact belt transects, were conducted at each site. Fish surveys were completed at all 15 sites in 2018. Underwater cameras were used to document visual evidence of key site features, reef impacts and invertebrates. Summary findings for the 15 surveys conducted around Heron Island are presented in this report.

This project demonstrates the value of collaborative citizen-science initiatives as a powerful tool to contribute useful information for science, management and education initiatives. It is intended to continue the long-term monitoring program at Heron Island. This will provide important information in regards to the Health Status of the reef for Marine Park Managers, Island managers, researchers and resource users (including staff and guests), and the broader community.

The Heron Reef RCA dataset has been used as annual supplementary marine condition information for the Fitzroy Basin Report Card by the Fitzroy Partnership for River Health (<https://riverhealth.org.au/>). Environmental report cards are designed to distil complex scientific knowledge, and through long-term monitoring, determine status and trend of catchment and marine health. Additionally, the percent cover of hard and soft coral averaged across monitoring sites for each year has been scored using Reef Plan Reporting standardised scales, which provides regionally relevant reef health information for the Reef Plan Marine Monitoring Program (<https://eatlas.org.au/>).

## 2.0 SUMMARY OF FINDINGS

### 2.1 Key findings from the 2018 surveys:

- Total average hard coral cover across all sites was 42%; this is consistent with previous years (2017, 36%; 2016, 40%; 2015, 40%; 2014, 38%) results. Hard coral cover ranged from absent to 73% across monitoring sites. Eight sites had coral cover greater than 50%, two sites had between 25-50% cover and five sites had less than 25% coral cover.
- Most sites had low levels of soft coral (present at eight of 15 sites and averaging 2% coverage).
- One Crown of Thorns starfish was observed.
- Indicator sea cucumbers were recorded in higher abundances on sandy inshore reef flat sites. All snorkel sites (seven) had sea cucumbers. Six of the dive sites had sea cucumbers present.
- Giant clams were recorded on all but four sites. White Wedding and Heron Bommie had the highest abundance with 12 counts recorded per 400m<sup>2</sup>.
- Coral scarring from unknown causes was reported at 12 of the 15 sites, with the highest record of 19 counts per 400m<sup>2</sup> at Blue Pools. An average of 6.5 counts per 400m<sup>2</sup> were recorded for all sites.
- Of the 15 sites surveyed only one site had debris recorded; one piece of general rubbish at Harry's Bommie.
- Hard coral damage was recorded at ten of the 15 sites. The highest abundance (13 counts) was recorded at Jetty Flat. This is consistent with previous surveys (Jetty Flat had the highest abundance of hard coral damage in 2017 (49 counts), 2016 (29 counts), 2015 (23 counts), and 2014 (19 counts)).
- Coral bleaching was recorded on all sites, but in relatively low levels. The highest population bleaching was recorded at Stevo's Carbonara (15% of the population; 4% of each colony on average), and Research Zone (11% of the population; 17% of each colony on average)). Jetty Flat had the highest individual colony bleaching average (36%) with population bleaching levels of just 1%. Total average coral population bleaching across all sites was 3%, a decrease from 8% in 2017, and 5% in 2016.
- Coral disease was recorded at nine of the 15 sites. Of these, five had incidents of ten or less recorded. Harry's Bommie had the highest counts of disease, with 37 incidents recorded per 400m<sup>2</sup>. Heron Bommie, had the second highest count of coral disease, with 27 per 400m<sup>2</sup>. Average coral disease counts across all sites was 8.4 per 400m<sup>2</sup>.

### 3.0 INTRODUCTION

#### 3.1 Reef Check Australia Overview

Trained Reef Check Australia (RCA) volunteers have been monitoring reef health around Australia since 2001. Annual surveys provide long-term data sets that can be used for local and regional reef management that can be compared to Reef Check data around the world. This temporal information can help reveal important patterns over time.

The Reef Check program is intended to supplement government and academic monitoring efforts, filling spatial and temporal gaps in reef monitoring. It also provides an opportunity for community members to play an active role in reef monitoring, education and conservation. Broad-scale reef data from Reef Check can act as an early warning system for changes in the health of coral habitats.

#### 3.2 Reef Check Methodology

Reef Check uses a globally standardised protocol to collect data on 25 categories of substrate cover, as well as the abundance of 14 indicator invertebrates and 10 reef health impacts (Hill and Wilkinson, 2004). Reef Check surveys are conducted along a transect line marked by a graduated tape measure and laid at a constant depth. The transect length that is surveyed is 80 m, divided into four 20 m sections, each separated by 5 m (Figure 1a). This design allows for data comparisons within sites using the four independent replicates, as well as between sites.

The substrate survey collects information about the percentage cover of bottom-dwelling (benthic) organisms and substrate on the reef using a point-intercept method. A survey diver records the substrate type (Table 1) that is directly below the tape measure every 50 cm along each of the four 20 m sections interval (Figure 1b).

Invertebrate and impact surveys are conducted along the same transect line using a 5 m wide belt transect methodology. Divers search for indicator invertebrates and reef impacts on each 20 m replicate for 7 - 10 minutes using a u-shaped search pattern. The 14 invertebrate indicators have been selected based on their economic and/or ecological importance. Reef health indicators include ten reef impacts, focusing on issues that may be addressed through management strategies. Similarly, fish surveys are conducted along a 5 m tunnel (Figure 1c).



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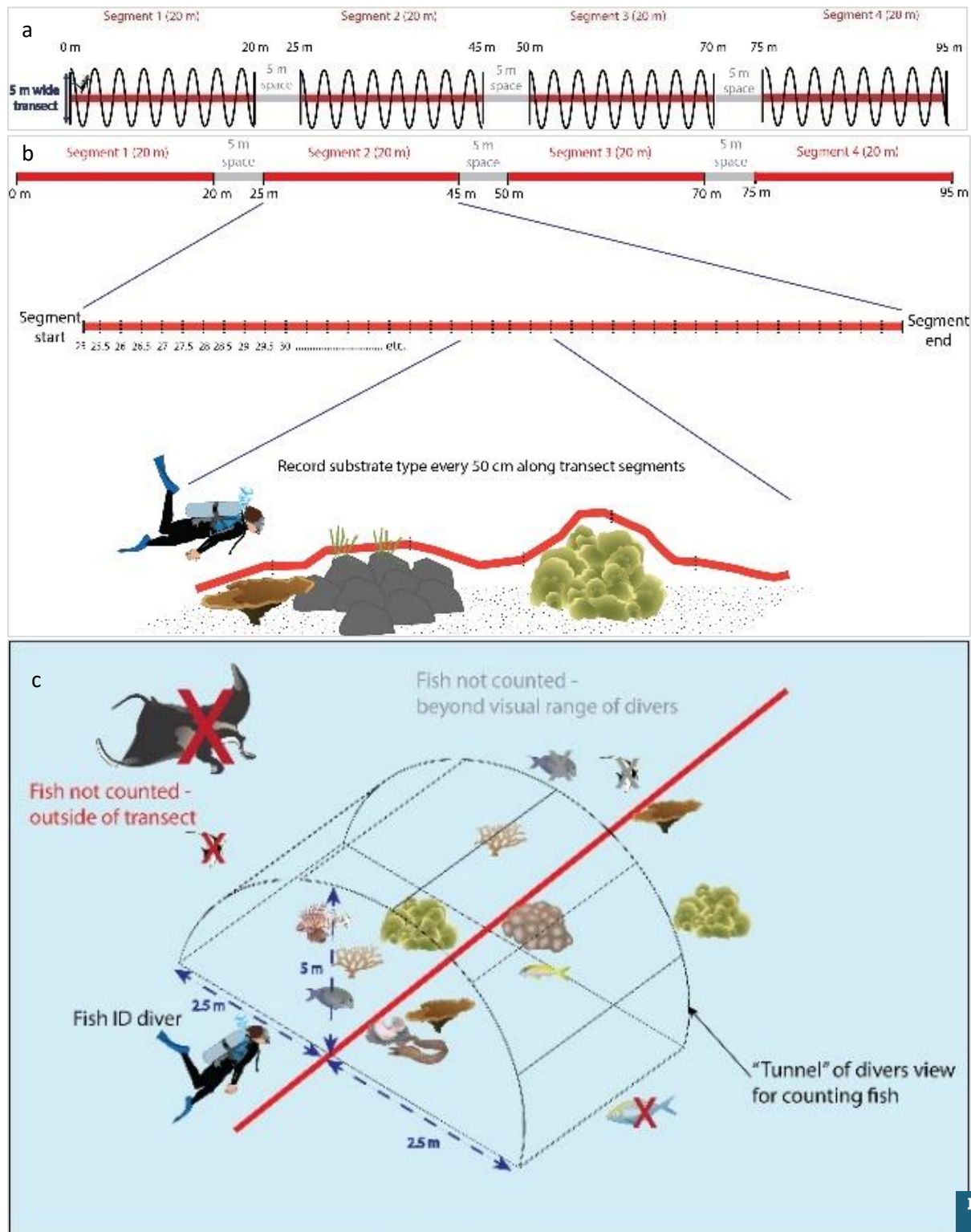


Figure 1: Reef Check survey methodology showing (a) line intercept and belt survey transect layout consisting of 4 x 20 m replicates, (b) line intercept substrate survey protocol showing data collection points at 50 cm intervals, and (c) diagram of the belt transect tunnel for fish surveys (Hill and Wilkinson, 2004).

Table 1. Codes for Reef Check Australia substrate categories

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<b>Hard Coral</b>	HCBR: Branching Hard Coral
	HCF: Foliose Hard Coral
	HCM: Massive Hard Coral
	HCE: Encrusting Hard Coral
	HCP: Plate Hard Coral
	HC: All other growth forms
	HCB: Bleached Hard Coral
<b>Soft Coral</b>	SCL: Leathery Soft Coral
	SCZ: Zooanthids
	SC: Other Soft Coral (ornate)
	SCB: Bleached Soft Coral
<b>Recently Killed Coral</b>	RKCTA: Recently killed coral with Turf Algae
	RKCNI: Recently Killed Coral with Nutrient Indicator Algae
	RKC: Recently Killed Coral (bare)
<b>Rock</b>	RCTA: Rock covered with Turf Algae
	RCCA: Rock covered with Coralline Algae
	RC: Rock (not covered with algae)
<b>Sponge</b>	SPE: Encrusting Sponge
	SP: All other Sponges

There are a total of 17 sites at Heron Reef monitored by Reef Check Australia which were established to allow for a detailed representation of Heron Island reef habitats, and were selected to represent diverse management and use areas - six sites are located in protected Green zones, six are located in general use areas, and five are located in a scientific research zone (allows extraction for experimental and educational purposes). During the 2018 RCA surveys, 15 of these 17 sites were revisited.

Reef Check transects are co-located with UQ Remote Sensing Research Centre survey sites. At these survey sites, geo-referenced benthic photo transects (Roelfsema et al 2010) are conducted annually as part of a coral reef monitoring research project that started in 2001. The research project involves using the collected benthic field data in combination with high spatial resolution satellite imagery to create and validate benthic community maps of Heron Reef (e.g. Roelfsema et al 2013).

Additionally, CoralWatch Coral Health Chart surveys were collected at survey sites to specifically assess coral colour as an indicator of coral stress (Siebeck et al 2006). Similarly, REEFSearch surveys were also conducted at the 15 survey locations to ensure the use of a diverse array of data collection tools.



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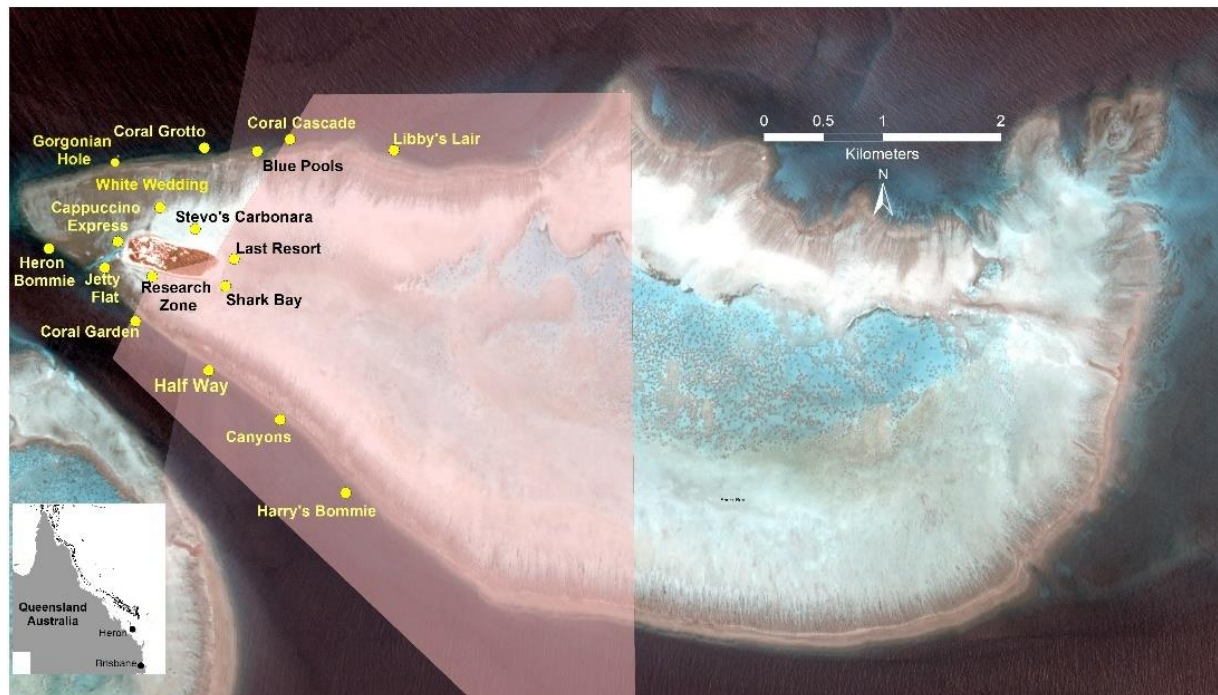
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### 3.3 Heron Island: Location and Demographics

Heron Island (0.62 km<sup>2</sup>) is a coral cay located on the southern section of the Great Barrier Reef, approximately 80 km off the coast of Gladstone, Queensland with a 27 km<sup>2</sup> platform reef. The surrounding waters are divided into one of three management designations, including Marine National Park (Green Zone), Conservation Park or Scientific Research zones (Figure 2).

Heron Island hosts the Heron Island Resort and the University of Queensland's Research Station (HIRS). Heron Island Resort is a popular location for scuba diving and snorkelling that accommodates up to 200 guests and 100 staff members. The HIRS is a heavily utilised research station with visiting universities, schools, and researchers from Australia and the world, accommodating up to 150 people. The fringing reefs are well-utilised for snorkel and dive tourism as well as reef research. However, these activities may be having some unintended impacts. Factors such as extensive development in the nearby Gladstone region, and similar to other coral reefs, global climate change, also pose threats to this marine ecosystem. Thus routine monitoring of this reef is essential. The 17 RCA surveys sites are shown in Figure 2 and a summary of site demographics is represented in Table 2.



Heron Island and Reef: Southern Great Barrier Reef, Australia

Acquisition: 9 November 2018 Image: Planet Dove Sensor: Multispectral, 4 m x 4 m pixels  
Source and Copyright: Image data: Planet  
Contact: Dr. Chris Roelfsema (c.roelfsema@uq.edu.au) or Prof. Stuart Phlips (s.phlips@uq.edu.au)

Figure 2. RCA field sites and the conservation zone overlaid on the Planet Dove image acquired on 9 November 2018 over Heron Reef (Image source: Planet Ltd).

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Table 2. RCA Heron Island monitoring locations, with depth, hard coral cover for the current survey year, designation of site (Marine National Park, Conservation Park, or Scientific Zone), habitat type and survey years.

Site	Depth (m)	HC %	Site Designation	Habitat Type	Year surveyed							
					2011	2012	2013	2014	2015	2016	2017	2018
Blue Pools	5	NA	Conservation Park	Reef slope								
Canyons	5	67.5	Scientific Zone	Reef slope								
Cappuccino Express	2	26.88	Marine Natl Park	Sandy reef flat with micro atolls								
Coral Cascade	6	53.13	Conservation Park	Reef slope								
Coral Garden	5	72.5	Marine Natl Park	Reef slope								
Coral Grotto	6	59.38	Conservation Park	Reef slope								
Gorgonian Hole	6	71.25	Conservation Park	Reef Slope								
Halfway	6	NA	Scientific Zone	Reef slope								
Harry's Bommie	9	73.13	Scientific Zone	Reef slope								
Heron Bommie	5	66.25	Marine Natl Park	Reef slope								
Jetty Flat	2	29.38	Marine Natl Park	Reef flat with micro atolls								
Last Resort	2	7.5	Conservation Park	Sandy reef flat								
Libby's Lair	6	62.5	Conservation Park	Reef slope								
Research Zone	1	6.88	Scientific Zone	Sandy reef flat								
Shark Bay	2	15.63	Scientific Zone	Sandy reef flat								
Stevos Carbonara	2	0	Marine Natl Park	Sandy reef flat with micro atolls								
White Wedding	1	10.63	Marine Natl Park	Sandy reef flat								

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### 4.0 SUMMARY 2018 SURVEY REPORT

A summary of the findings for the 2018 RCA monitoring is shown in Table 3. Information includes: average hard coral cover (%), total macro algae abundance, abundance of invertebrates (collector urchin, sea cucumbers, giant clams, Triton, *Trochus*, *Drupella* snails, anemones), abundance of reef impacts (*Drupella* scars, unknown scars, coral damage, average coral bleaching of population percentage average coral bleaching percentage for colony surface), and silt levels (N=none, L=low, M=medium, H=high). Categories are listed as abundance counts unless otherwise specified. The information represents data collected over a standard survey as described in section 3.2.

Table 3: Summarised RCA findings for Heron Reef survey sites in 2018.

Site	Substrate		Invertebrates						Impacts							
	Hard Coral Coverage (%)	Macro Algae Total (#)	Edible Sea Cucumbers (#)	Giant Clam (#)	Triton (#)	Trochus (#)	Drupella Snail (#)	Anemone (#)	Drupella Scar (#)	Unknown Scar (#)	Coral Damage (#)	Coral Disease (#)	Marine Debris (#)	Coral Bleaching Population (%)	Coral Bleaching Colony (%)	Silt Level
Canyons	67.5	0	0	6	0	0	0	1	0	7	0	14	0	1	14.5	N
Cappuccino Express	26.88	0	17	3	0	0	0	1	0	19	8	0	0	1	25.75	N
Coral Cascade	53.13	0	1	3	0	0	0	1	0	6	12	2	0	0.25	16.25	N
Coral Garden	72.5	0	0	0	0	1	0	0	0	14	1	24	0	1	36	N
Coral Grotto	59.38	0	2	5	0	0	4	2	0	5	7	6	0	1	22.25	N
Gorgonian Hole	71.25	2	2	0	0	0	4	3	3	3	2	10	0	1	13.25	N
Harry's Bommie	73.13	0	2	2	0	0	0	0	0	15	2	37	1	1	12.5	N
Heron Bommie	66.25	0	1	12	0	0	1	0	1	4	0	27	0	1	30.5	N
Jetty Flat	29.38	0	4	0	0	0	0	0	0	8	13	0	0	1	35.5	N
Last Resort	7.5	3	30	7	0	0	0	0	1	3	0	0	0	1	5	N
Libby's Lair	62.5	0	2	0	0	0	1	1	1	11	7	4	0	1	16	L
Research Zone	6.88	4	1	2	0	0	0	0	0	3	0	0	0	11.25	16.5	L
Shark Bay	15.63	3	38	7	0	0	0	0	0	0	0	2	0	0.5	5	N
Stevos Carbonara	0	2	2	1	0	0	0	0	0	0	5	0	0	15	4.25	L
White Wedding	10.63	4	2	12	0	0	0	0	0	0	9	0	0	3	23	L

\* N=none, L=low, M=medium, H=high

To illustrate broad-spatial scale trends in the RCA data collected during the 2018 surveys, the data from each individual site was overlaid on a high spatial resolution pan-sharpened WorldView-2 image. Firstly, the percentage of hard coral coverage and bleaching incidence are depicted in Figure 3.

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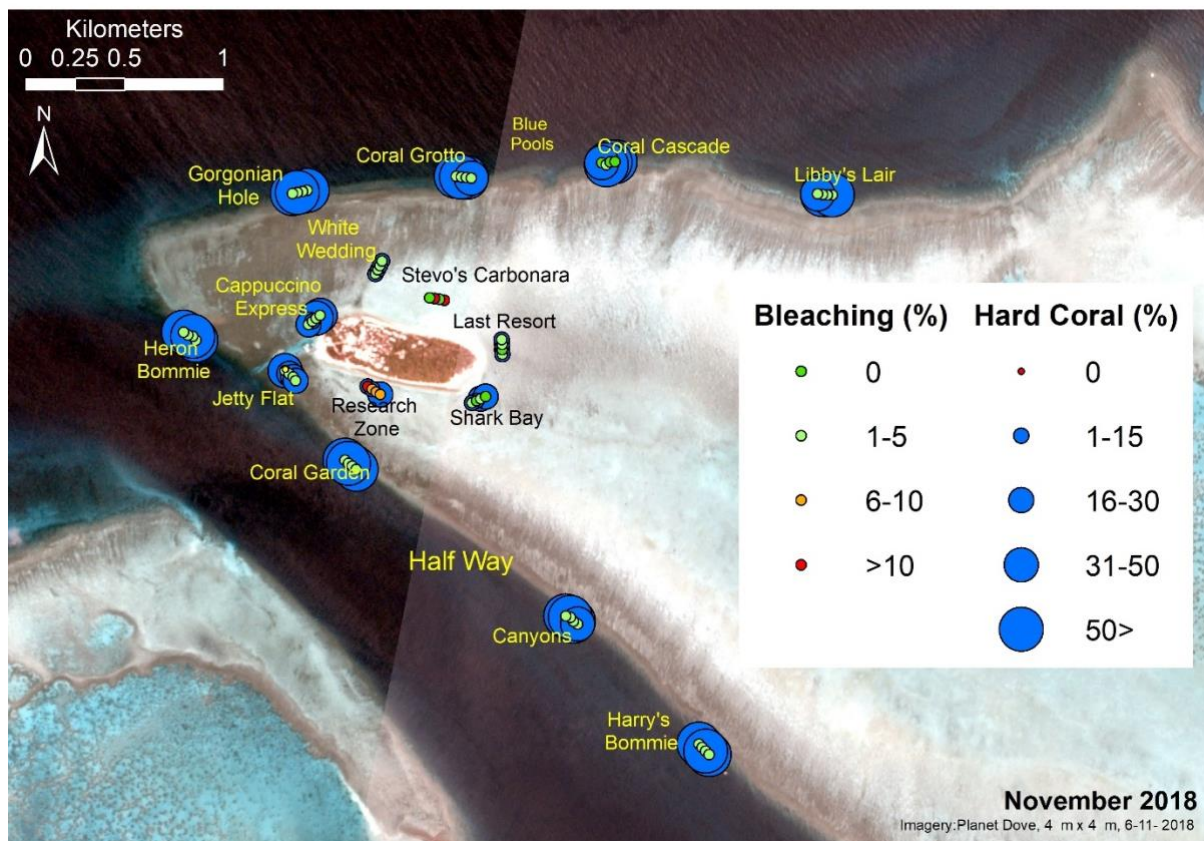


Figure 3. RCA hard coral cover and population level bleaching data for the 2018 surveys, overlaid on a Planet Dove image acquired on 9 November 2018 (Image source: Planet Ltd). Each survey site is represented by four circles, each displaying summary data for one of the four 100 m<sup>2</sup> areas that makes up a full 400 m<sup>2</sup> transect.

For 2018, bleaching was recorded at all 15 sites. Higher levels of coral population bleaching were recorded on the shallow inshore sites of Heron Island (average of 5%) However, higher average coral colony bleaching was detected on deeper reef slope offshore sites (average 20% compared to 16% for shallow reef flat inshore sites). The highest average bleaching across a single site was Stevo's Carbonara with 15%.

Figure 4 shows the hard coral data compared to the incidence of unknown scars.



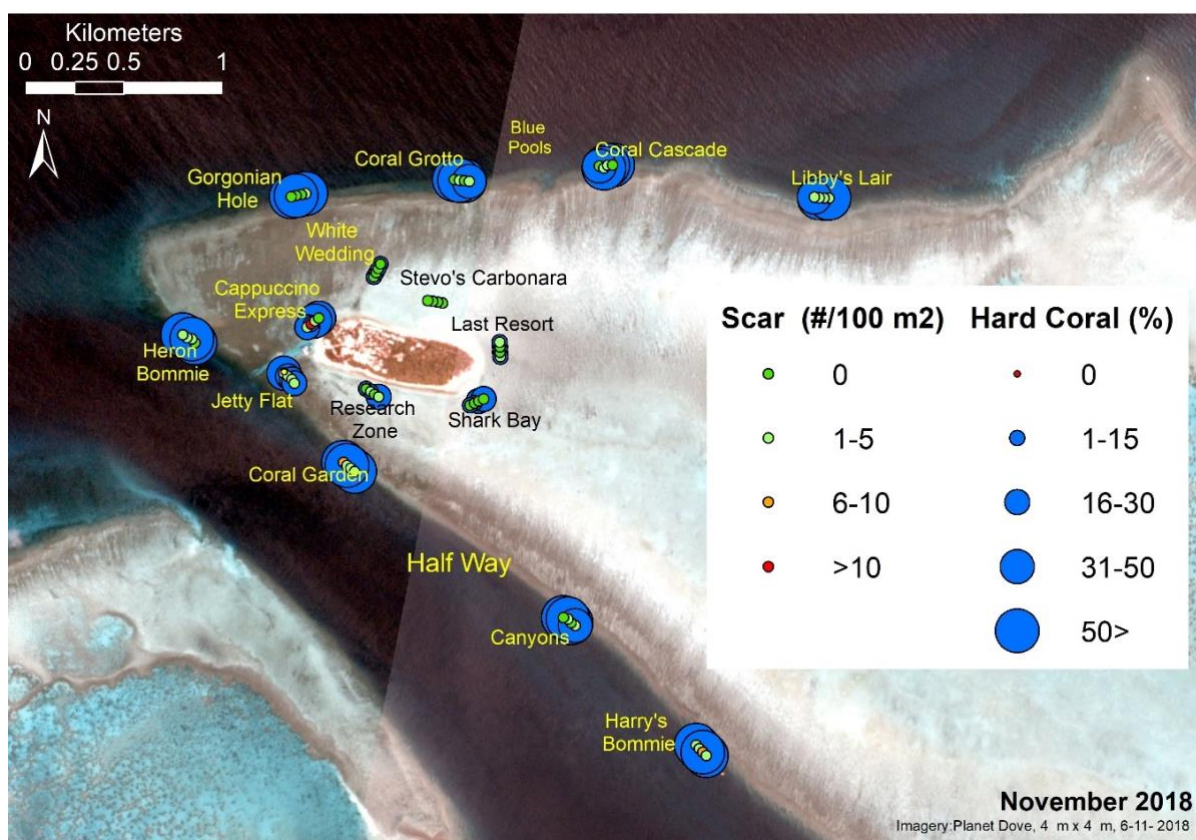


Figure 4. RCA hard coral cover and unknown scar data for the 2018 surveys, overlaid on a Planet Dove image acquired on 9 November 2018 (Image source: Planet Ltd). Each survey site is represented by four circles, each displaying summary data for one of the four 100m<sup>2</sup> areas that makes up a full 400m<sup>2</sup> transect.

Twelve of the 15 sites showed instances of unknown scars. Ten or more scars were recorded per 400m<sup>2</sup> for Libby's Lair, Harry's Bommie, Coral Garden and Cappuccino Express (11, 15, 14 and 19 respectively). The 2018 data indicates higher levels of coral scars on the southern side of Heron Island (average of 7 counts per 400m<sup>2</sup>) compared with the northern side (average of 6 counts per 400m<sup>2</sup>). Deeper, reef slope sites had a higher average of unknown coral scar occurrence (8 counts per 400m<sup>2</sup>) when compared to shallow inshore sites (5 counts per 400m<sup>2</sup>).

Figure 5 summarises the incidence of coral disease to hard coral cover recorded on the 2018 surveys.

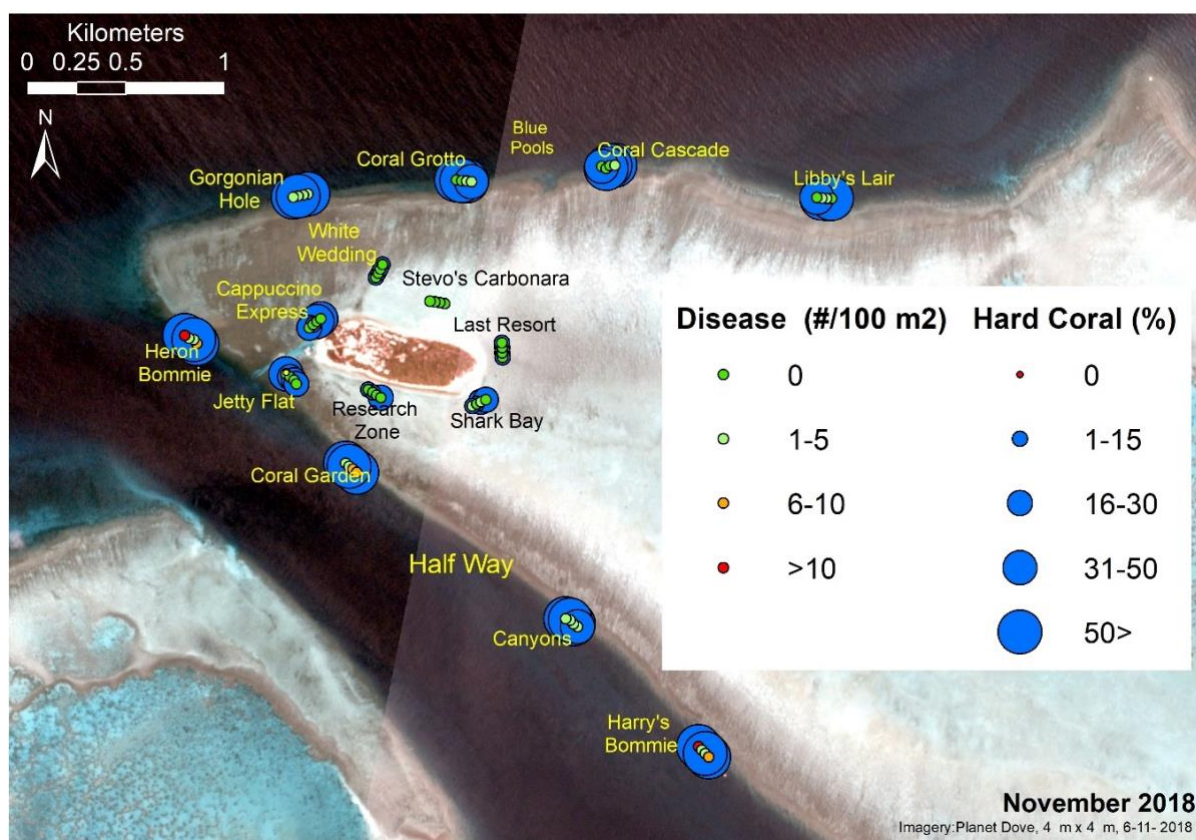


Figure 5. RCA hard coral cover and coral disease data for the 2018 surveys, overlaid on a Planet Dove image acquired on 9 November 2018 (Image source: Planet Ltd). Each survey site is represented by four circles, each displaying summary data for one of the four 100m<sup>2</sup> areas that makes up a full 400m<sup>2</sup> transect.

Nine of the 15 sites had instances of coral disease recorded on transect. The 2018 data indicated a greater proportion of coral disease at Harry's Bommie (37 counts), Heron Bommie (27 counts) and Coral Gardens (24 counts) than at other survey locations (average of 3 counts per 400m<sup>2</sup> for all other sites). Sites on the southern side of the island had a higher average incidence of disease (15 counts per 400m<sup>2</sup>) compared to the northern sites (3 counts per 400m<sup>2</sup>).

Shallow inshore, easily accessible sites had a much lower average of coral disease occurrence (average of <1 count per 400m<sup>2</sup>) when compared to deeper, reef crest/slope sites accessible only by boat (average of 16 counts per 400m<sup>2</sup>).

Coral damage is summarised relative to the percentage of hard coral cover in Figure 6.



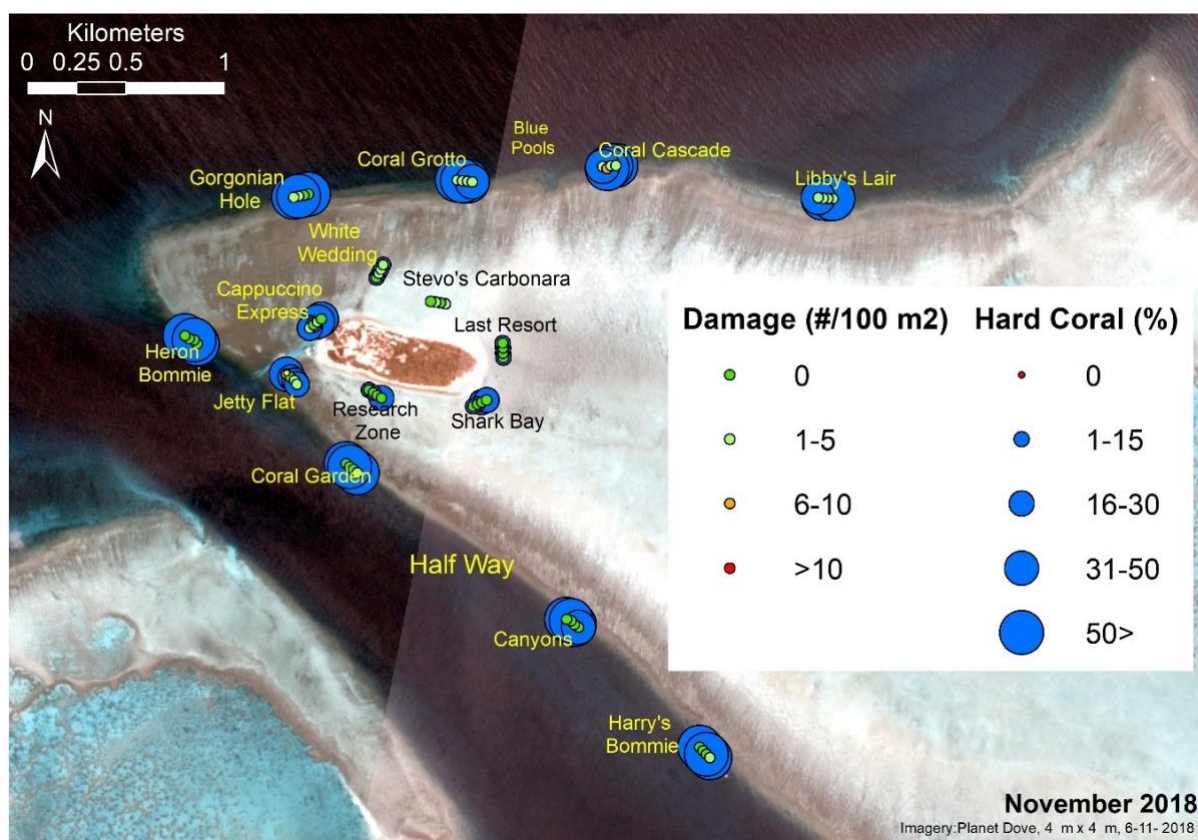


Figure 6. RCA hard coral cover and coral damage data, overlaid on Planet Dove image acquired on 9 November 2018 (Image source: Planet Ltd). Each survey site is represented by four circles, each displaying summary data for one of the four 100m<sup>2</sup> areas that makes up a full 400m<sup>2</sup> transect.

Ten of the 15 sites had instances of coral damage. The average coral damage for all 15 sites was four counts per 400m<sup>2</sup>. A higher than average proportion of coral damage was recorded for the Jetty Flat, Coral Cascades, White Wedding, Cappuccino Express, Libby's Lair, Coral Grotto and Stevo's Carbonara sites (13, 12, 9, 8, 7, 7 and 5 counts per 400m<sup>2</sup> respectively). In contrast, no coral damage was recorded for the Canyons, Heron Bommie, Research Zone or Shark Bay sites.

Invertebrate surveys record the abundance of indicator invertebrates along each transect. Figure 7 and Figure 8 show the abundance of giant clams and indicator sea cucumbers respectively, for each survey site.

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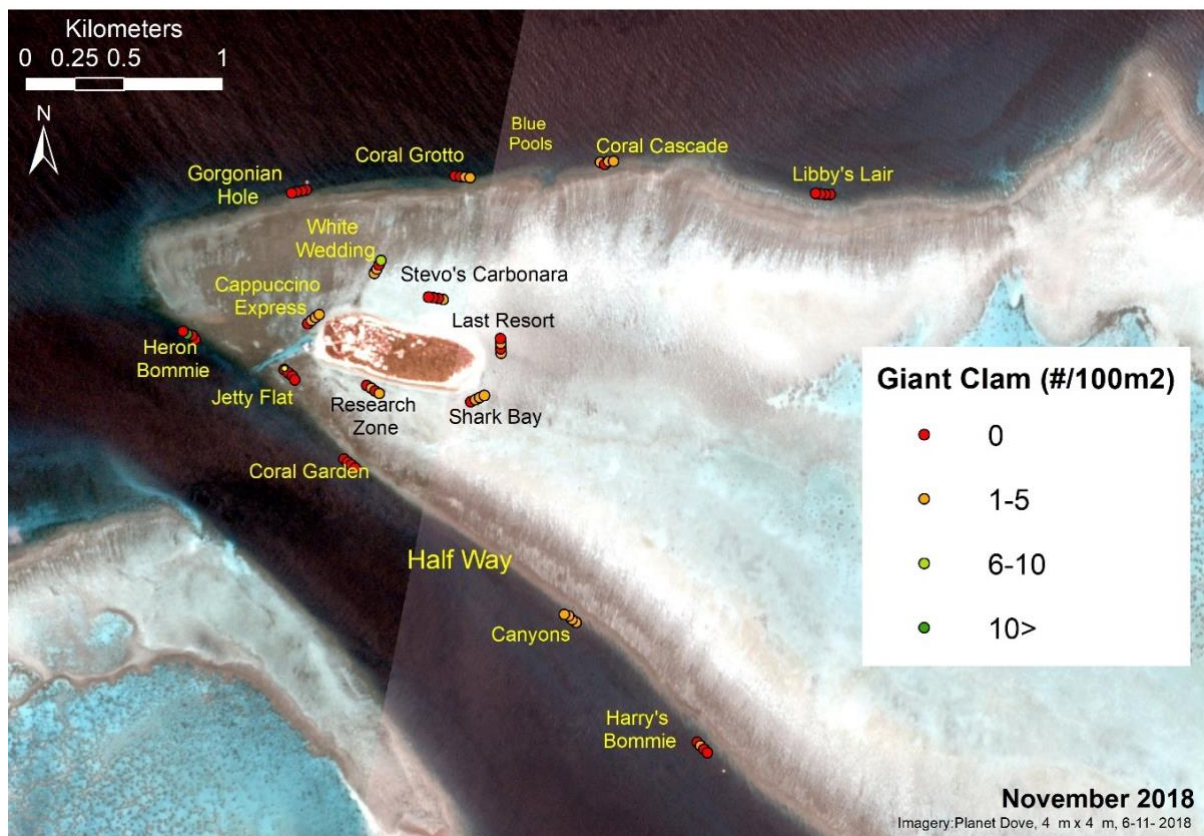


Figure 7. RCA Giant Clam abundance, overlaid on Planet Dove image acquired on 9 November 2018 (Image source: Planet Ltd) . Each survey site is represented by four circles, each displaying summary data for one of the four 100m<sup>2</sup> areas that makes up a full 400m<sup>2</sup> transect.

The distribution of giant clams was similar between inshore reef flat sites and deeper reef slope sites (4 and 5 counts per 400m<sup>2</sup> respectively). Heron Bommie (southern reef slope) and White Wedding (northern reef flat) had the highest recorded numbers of giant clams with 12 found on transect. Coral Gardens, Gorgonian Hole and Libby's Lair had no giant clams recorded on transect.



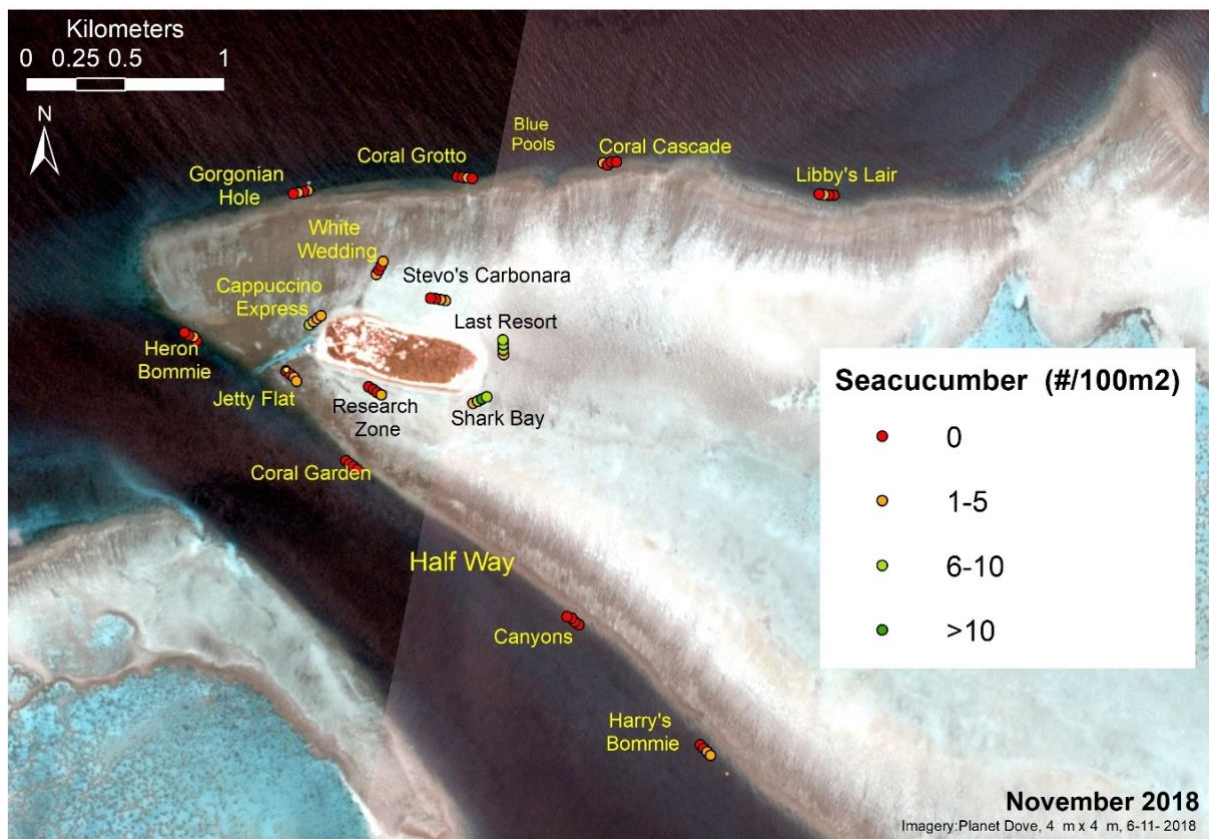


Figure 8. RCA abundance of sea cucumber, overlaid on Planet Dove image acquired on 9 November 2018 (Image source: Planet Ltd). Each survey site is represented by four circles, each displaying summary data for one of the four 100m<sup>2</sup> areas that makes up a full 400m<sup>2</sup> transect.

Target sea cucumbers were recorded at 13 of the 15. The 2018 data indicated higher numbers of sea cucumbers on shallow near shore, sandy reef flat areas, when compared with survey sites on the deeper reef slope sites - a finding consistent with all previous reports. Higher than average counts (> 8 per 400m<sup>2</sup>) of target sea cucumbers were found at Shark Bay (38 per 400m<sup>2</sup>), Last Resort (30 per 400m<sup>2</sup>) and Cappuccino Express (17 per 400m<sup>2</sup>). Sites found to the north of the island had a higher average count per transect with 8 target sea cucumbers recorded per 400m<sup>2</sup> compared with an average of 7 per 400m<sup>2</sup> recorded for southern sites, a finding consistent with 2017, 2016 and 2015 results.

### 5.0 INDIVIDUAL SITE REPORTS

#### 5.1 Canyons

Canyons is situated along the reef slope, on the southern side of Heron Island. This site is characterised by a series of shallow canyons cutting into the edge of the reef, with scattered bommies out deeper, away from these ridges (Images 1-3).

Hard coral represented 68% of the total substrate cover (Figure 10); one of the highest hard coral covers recorded in 2018 (and an increase from the 2017 level of 61%; Figure 10). Rock with turf algae was the next greatest contributor to substrate at 30% cover.

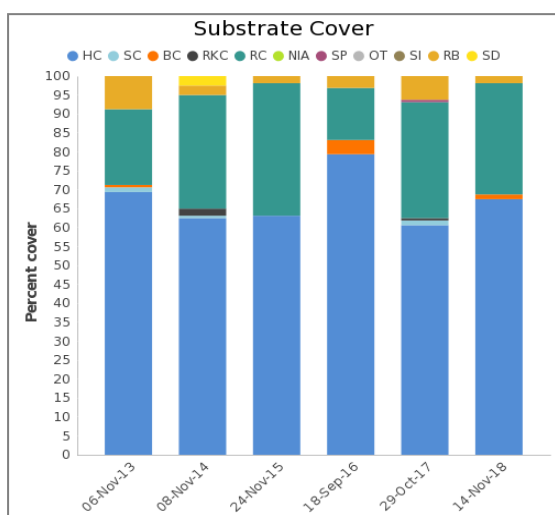


Figure 10. Benthic type and percent cover: Canyons, 2013- 2018.

Six giant clams and one anemone were recorded on the invertebrate survey.

Bleaching affected 1% of the coral population, with an average of 15% of each coral colony affected (a decrease from 1% population and 17% colony level bleaching in 2017).

Fourteen incidents of disease and seven unknown coral scars were recorded.

A fish survey was conducted and three parrotfish, nine snapper, 52 butterflyfish, one coral trout and one grouper were recorded.



Image 1: Site Photo



Image 2: Green Turtle



Image 3: Example of disease



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### 5.2 Cappuccino Express

Cappuccino Express is on the reef flat. The site is characterised by small coral atolls and sandy patches, and is prone to strong currents (Images 4-6). This reef area is easily accessible on snorkel and often visited by tourists as it is situated close to the resort.

Hard Coral represented 27% of the total substrate at this site (Figure 11). Rock was the greatest contributor to substrate, making up 46% and sand constituted 17%.

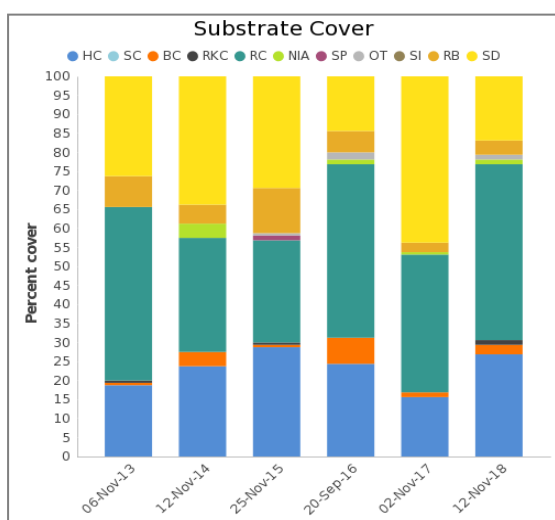


Figure 11. Benthic type and percent cover: Cappuccino Express, 2013- 2018.

Seventeen sea cucumbers, three giant clams and one anemone were recorded on the invertebrate survey.

Coral bleaching affected approximately 1% of the coral population, with an average of 25.8% of coral surfaces bleached; this is a decrease from 2017 in the percentage of coral population affected (18%), but an increase in individual colony beaching (16%).

Nineteen incidents of unknown scars and eight counts of coral damage were recorded. No coral disease was recorded.

A fish survey was conducted and 15 butterflyfish, 12 snapper, nine parrotfish, two grouper and one moray eel were recorded.



Image 4: Site Photo

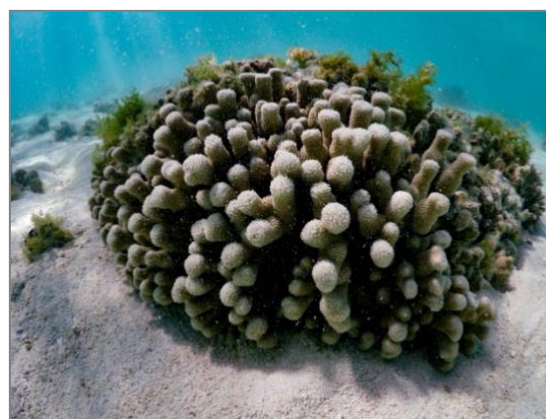


Image 5: Bleached Hard Coral



Image 6: Anemone with Fish



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### 5.3 Coral Cascades

Coral Cascades is situated on the reef slope on the northern side of Heron Reef. Coral Cascades is a dive site often utilised by tourists and researchers alike. It is characterised by a high abundance of hard coral, hence the name (Images 7-9, 47).

Hard coral cover represented 53% of the substrate at this site (Figure 12). Rock (including rock with turf algae and rock with coralline algae) constituted 33% of the substrate, and soft coral accounted for 3%.

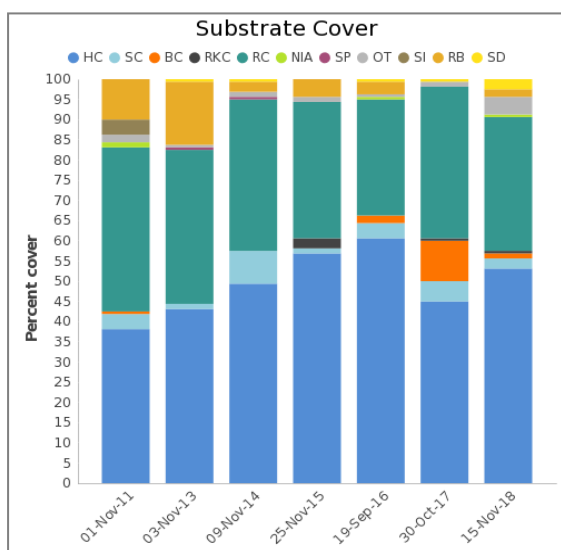


Figure 12. Benthic type and percent cover: Coral Cascade, 2013- 2018.

One sea cucumber, three giant clams and one anemone were recorded on the invertebrate survey.

Bleaching was recorded on 1% of the coral population, with an average 26% of each affected coral surface bleached; slightly lower than that observed in 2017 (4% of coral population; 30% coral colony).

Other reef impacts recorded at this site included two counts of coral disease, twelve incidents of coral damage and six unknown scars.

A fish survey was conducted and eight butterflyfish, six parrotfish, five grouper, and one snapper were recorded.



Image 7: Site photo



Image 8. Anemone with Fish



Image 9: Unknown Scar





### 5.4 Coral Gardens

Coral Gardens is located on the southern side of Heron Island on the reef slope. It is characterised by high hard coral cover; particularly branching growth forms (Images 10-13). It is a popular dive destination for the resort.

Hard coral accounted for 73% of the benthos at this site, and was made up almost exclusively of branching coral growth forms (Figure 13; Image 10). Rock (including rock with turf algae and rock with calcareous algae) accounted for 26% whilst soft coral constituted 1% of total substrate. No macro algae has been recorded at this site since 2011.

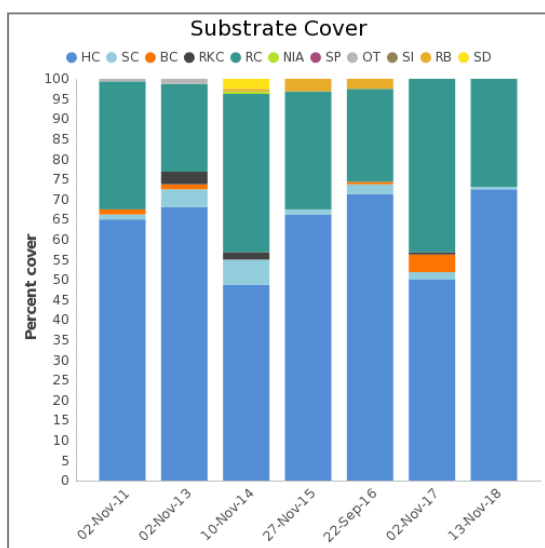


Figure 13. Substrate type and percent cover at Coral Gardens, 2011- 2018.

One *Trochus* was recorded (Image 12). Bleaching was recorded on 1% of the coral population, with an average 36% of each affected coral surface bleached. The colony level bleaching is higher than 2017 (29%).

Reef Impacts recorded at Coral Gardens include six incidences of coral disease, seven of coral damage, and 14 unknown scars.

A fish survey was conducted and eight snapper, five butterflyfish and four parrotfish, were recorded.



Image 10: Site photo



Image 11: Unknown Scar

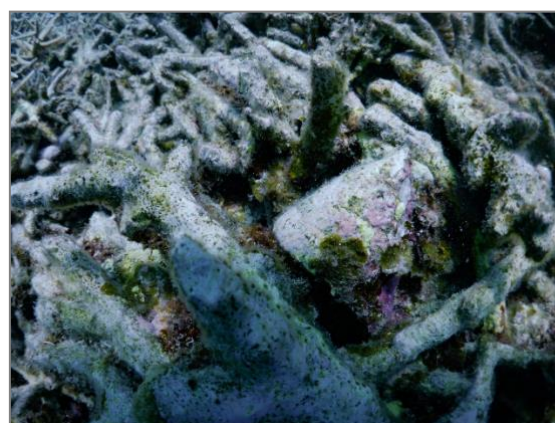


Image 12. Trochus shell

### 5.5 Coral Grotto

The Coral Grotto is located on the northern side of Heron Island on the reef slope. It is characterised by high hard coral cover (Images 13-15).

Hard coral accounted for 60% of the substrate (an increase from 2017 (47%); Figure 14), consisting of a mixed coral community (Image 13). Rock attributed 31%, rubble 6%, and soft coral 3%.

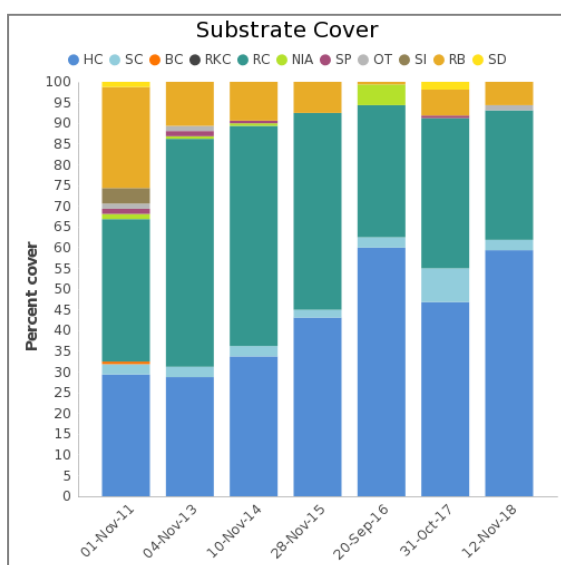


Figure 14: Benthic type and percent cover: Coral Grotto, 2011-2018.

Five giant clams, four *Drupella* snails, two anemones and two sea cucumbers were recorded during the invertebrate survey.

Coral bleaching was estimated to affect 1% of the total coral population and 22% of each colony surface, unchanged from 2017.

Additional impacts recorded include seven counts of coral damage, six counts of coral disease and five unknown scars.

A fish survey was conducted and nine butterfly fish, three grouper, three parrotfish and six snapper were recorded.



Image 13. Site Photo



Image 14. Flatworm

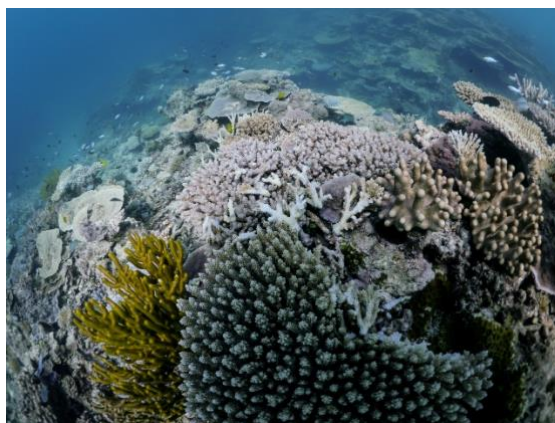


Image 15: Coral Damage, Other



### 5.6 Gorgonian Hole

Gorgonian Hole is located on the reef slope on the northern side of Heron Island. It is characterised by high hard coral cover, particularly branching growth forms (Images 16-18).

Hard coral accounted for 71% of substrate (Figure 15), consisting primarily of branching forms (Image 16). Rock constituted 23% of substrate cover, and soft coral 5%.

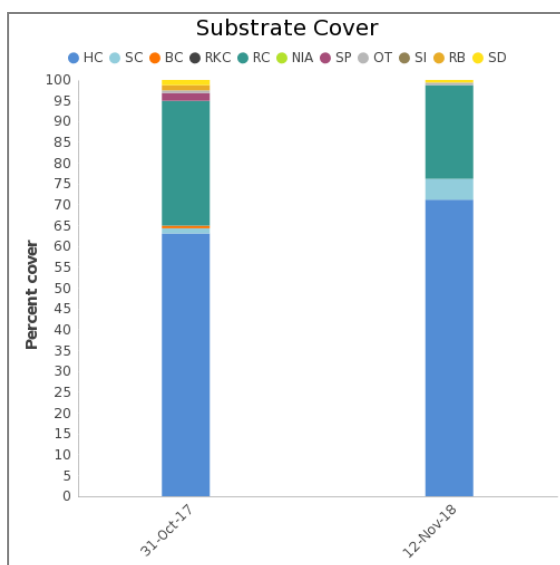


Figure 15: Benthic type and percent cover: Gorgonian Hole, 2017 - 2018.

Three anemones, four *Drupella* snails and two sea cucumbers were recorded for the invertebrate survey.

Coral bleaching was estimated to affect 1% of the total coral population and 13% of each colony surface, a decrease from 17% in 2017. Additional impacts recorded include ten counts of coral disease, three unknown scars, two counts of coral damage, and three *Drupella* scars.

A fish survey was conducted and 21 snapper, 22 butterfly fish, two grouper, and one humphead wrasse were recorded.



Image 16. Site Photo



Image 17. Prickly Greenfish

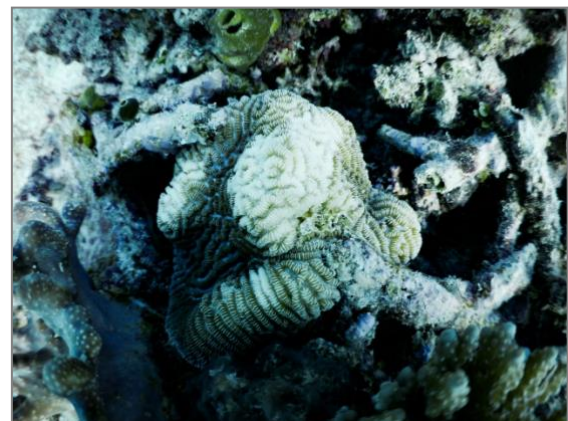


Image 18: Hard Coral Bleached

### 5.7 Harry's Bommie

Harry's Bommie is located on the southern side of Heron Island, on the reef slope. It is characterised by large coral bommies and high hard coral cover, particularly branching growth forms (Images 19-21).

Hard coral cover at this site accounted for 73% of substrate cover (Figure 16), consisting predominantly of branching coral (Image 19). Rock (rock with turf algae and rock with calcareous algae) accounted for 23% of the total substrate.

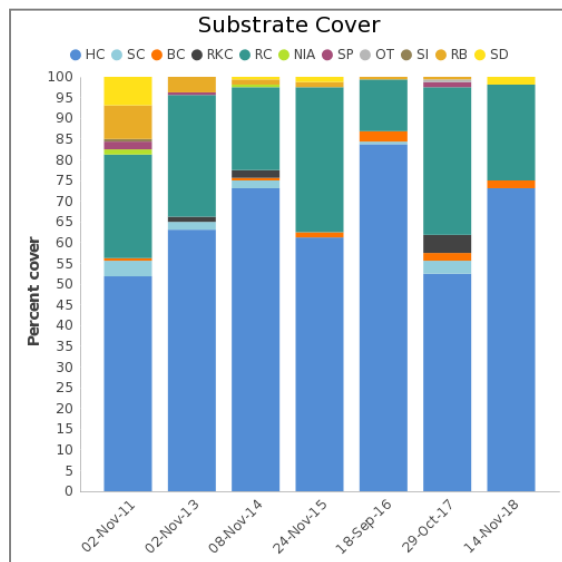


Figure 16. Benthic type and percent cover: Harry's Bommie, 2011- 2018.

Two giant clams, two sea cucumbers and one crown of thorns starfish were recorded during the invertebrate survey. One Crown of Thorns starfish was observed (Image 21).

Coral bleaching affected approximately 1% of the total coral population, with an average of 13% each colony showing surface bleaching. This is an increase in population level bleaching from 2017 (11%).

Thirty-seven incidents of coral disease (the highest recorded for 2018), 15 unknown scars, two incidents of coral damage, and one count of trash were recorded.

A fish survey was conducted and 22 butterflyfish, one coral trout, two grouper, one parrotfish and one snapper were recorded.



Image 19. Site photo

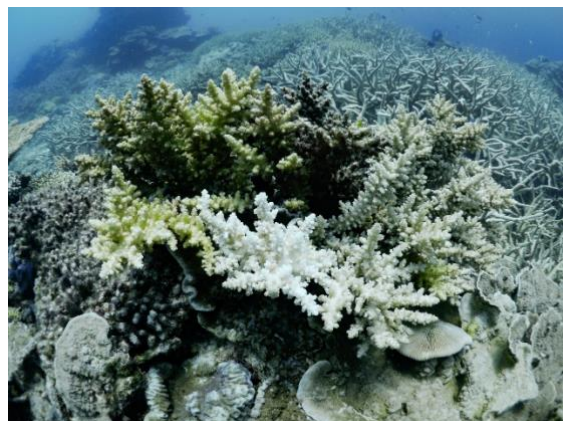


Image 20. Coral Disease



Image 21. Crown of Thorns Starfish



### 5.8 Heron Bommie

Heron Bommie is located on the south west of Heron Island fringing reef slope. It is characterised by a large coral bommie and high hard coral cover, particularly branching growth forms (Images 22-24, 46). Heron Bommie is a popular dive site with the resort due to its close proximity and high coral cover.

Hard coral represented 66% of the substrate (Figure 17), an increase from 2017 levels (54%). Rock (including rock with turf algae and rock with calcareous algae) constituted 23% of substrate cover, whilst soft coral constituted 6%.

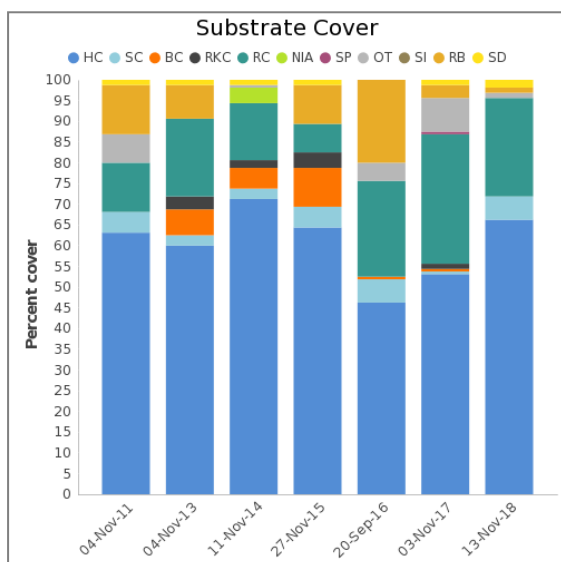


Figure 17. Benthic type and percent cover: Heron Bommie, 2011- 2018.

Twelve giant clams, one *Drupella* snail and one sea cucumber were recorded on the invertebrate survey.

Coral bleaching affected approximately 1% of the total coral population, with an average of 31% of each colony showing surface bleaching, down from 2017 (34%).

Twenty-seven incidents of coral disease, four unknown scars and one *Drupella* scar were recorded.

A fish survey was conducted and 26 butterfly fish, 15 snapper, seven coral trout and nine parrot fish were recorded.



Image 22. Site Photo



Image 23. Unknown Coral Scar



Image 24. Giant Clam

### 5.9 Jetty Flat

Jetty flat is located on the southern side of Heron Island, on the southeast reef flat near the boat channel. It is a shallow site often visited by snorkelers due to its location and ease of access. It is characterised by large areas of branching corals with flat, eroded tips (due to tidal extremes) and sandy patches (Images 25-27).

Hard corals accounted for 30% of the benthos (Figure 18). Rock (including rock, rock with turf algae and rock with calcareous algae) constituted 66% of the substrate, and sand 3%.

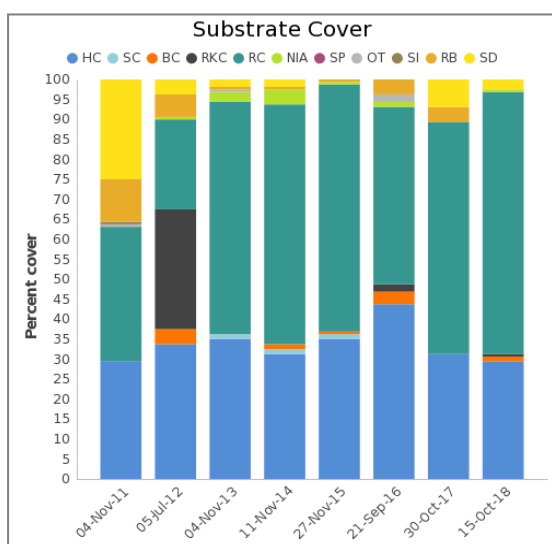


Figure 18. Benthic type and percent cover: Jetty Flat, 2011- 2018.

Four sea cucumbers were the only invertebrates recorded on the invertebrate survey.

Coral bleaching affected approximately 1% of the total coral population, with an average of 36% of each colony showing surface bleaching; a decrease in population bleaching but an increase in colony surface bleaching from that observed in 2017 (15% of the coral population bleached and 20% bleaching per coral surface).

Reef impacts recorded included 13 counts of coral damage, and eight counts of unknown scars.

A fish survey was conducted and six butterflyfish, one snapper, and three parrotfish were recorded.



Image 25. Site Photo



Image 26: Nudibranch



Image 27. Hard Coral Bleached



# Reef Check Australia

## Heron Island Reef Health Report 2018

### 5.10 Last Resort

Last Resort is a lagoonal site accessible on snorkel, located at the north-east corner of the island (Images 28-30). It is frequented by tourists as it is a popular spot for shark and ray sightings.

Hard corals accounted for 8% of the benthos (an increase from 4% in 2017, but down from the 2016 level of 21%) (Figure 19). Rock (including rock with turf algae and rock with calcareous algae) constituted 24% of the substrate, whilst sand contributed 33%. 24% of the substrate consisted of nutrient indicator algae (an increase from 13% in 2017), and three counts of macro algae were recorded.

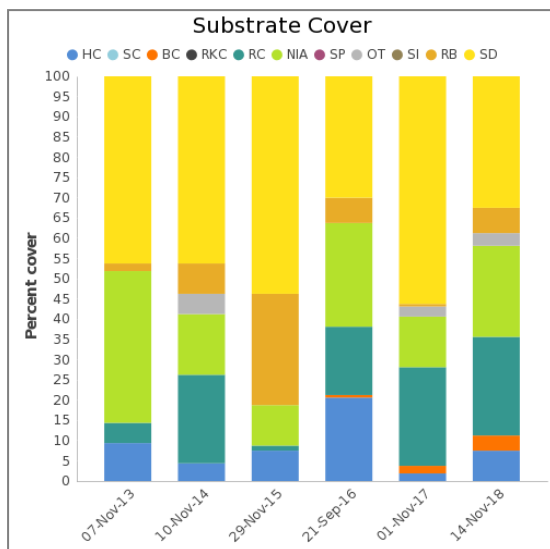


Figure 19. Benthic type and percent cover: Last Resort, 2013- 2018.

Seven giant clams, and 30 sea cucumbers were recorded on the invertebrate survey.

Coral bleaching affected 1% of the coral population at Last Resort, a decrease from 25% in 2017. Of these corals, an average of 5% of each coral surface was affected.

One *Drupella* scar, and three incidents of unknown scars were recorded.

A fish survey was conducted and four butterflyfish, one moray eel and two snapper were recorded.



Image 28. Site Photo

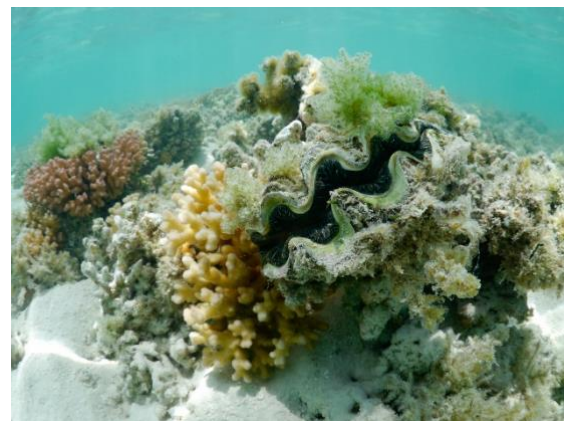


Image 29. Giant Clam



Image 30. Sea Hare





# Reef Check Australia

## Heron Island Reef Health Report 2018

### 5.11 Libby's Lair

Libby's Lair is located on the northern side of Heron Island, on the north east reef slope. It is characterised by high coral diversity and deep gullies (Images 31-33).

Hard coral accounted for 63% of the benthos, being of mixed coral forms (Image 31). Rock (encompassing both rock with turf algae and rock with coralline algae) made up 26% of the substrate, and soft coral 8%.

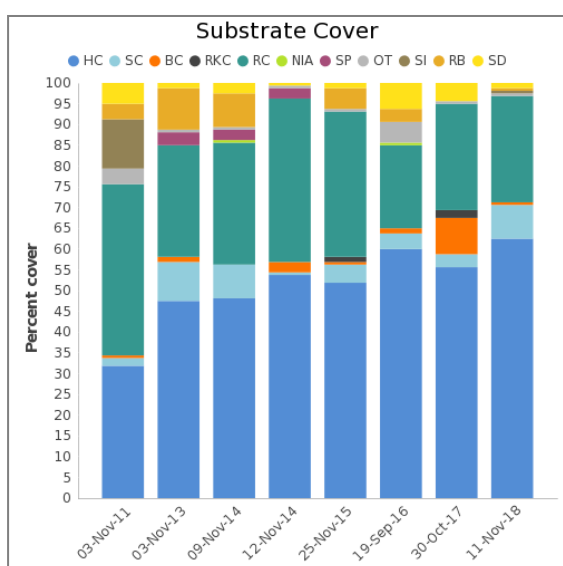


Figure 20: Benthic type and percent cover: Libby's Lair, 2011- 2018.

Two sea cucumbers, one *Drupella* snail and one anemone were recorded on the invertebrate survey.

Coral bleaching affected an average of 1% of the coral population, and an average of 16% of each colony was bleached (a decrease from 2017 of 4% of the coral population; and 26% surface bleaching).

Additional impacts recorded included four incidents of coral disease, seven incidents of coral damage, one *Drupella* scar and 11 unknown scars.

A fish survey was conducted and 20 butterfly fish, five coral trout, five parrotfish and four snapper were recorded.



Image 31. Site Photo



Image 32: Unknown Scar

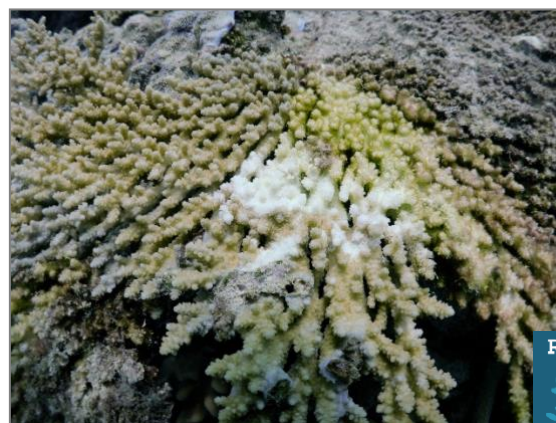


Image 33. Unknown Scar



# Reef Check Australia

## Heron Island Reef Health Report 2018

### 5.12 Research Zone

The Research Zone site is located on the southern side of Heron Island, within the scientific zone (Images 34-36). This area is designated for the harvesting of samples for scientific and educational purposes. It is a shallow site utilised by both researchers and tourists on snorkel due to its accessibility.

The majority of the substrate at this site is sand (69%), with hard coral constituting 7% of the benthos (Figure 21). Rock (including rock with turf algae and rock with coralline algae) was the second largest contributor, making up 17% of the substrate. Four counts of macro algae were recorded.

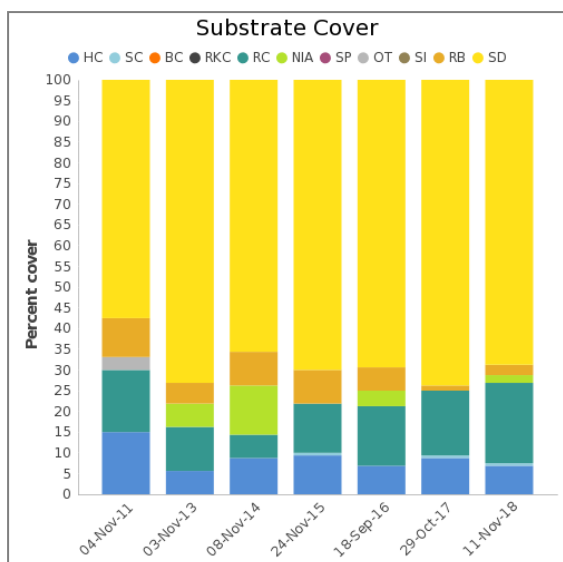


Figure 21. Benthic type and percent cover: Research Zone 2011- 2018.

Two giant clams and one sea cucumber were recorded on the invertebrate survey.

Coral bleaching affected 11% of the coral population, and an average of 17% of each affected coral; similar to the 2017 results (7% population bleaching, and 19% colony surfaces affected).

Three unknown scars were recorded on the impact survey.

A fish survey was conducted and 15 butterfly fish and one parrotfish were recorded.



Image 34. Site photo



Image 35. Unknown Scar

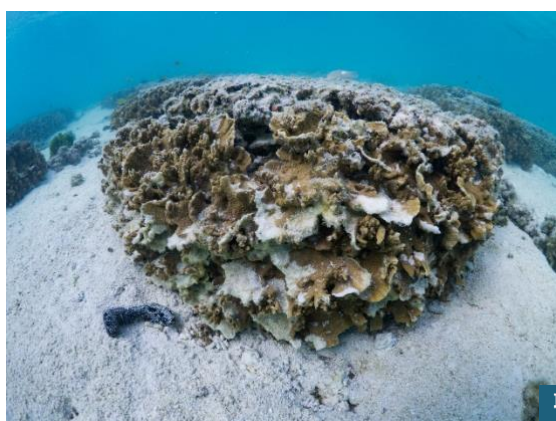


Image 36: Bleached hard coral





### 5.13 Shark Bay

The Shark Bay site is located on the eastern side of Heron Island. It is a shallow site frequented by tourists on snorkel due to its accessibility, and shallow depth. This reef area is a popular spot for shark and ray sightings (Images 37-39, 48).

Hard coral accounted for 16% of the benthos at this sandy (51%) reef flat location (Figure 22). Rock (including rock with turf algae and rock with calcareous algae) attributed 13%, whilst nutrient indicator algae made up 17% of the benthos. Three counts of macro algae were recorded.

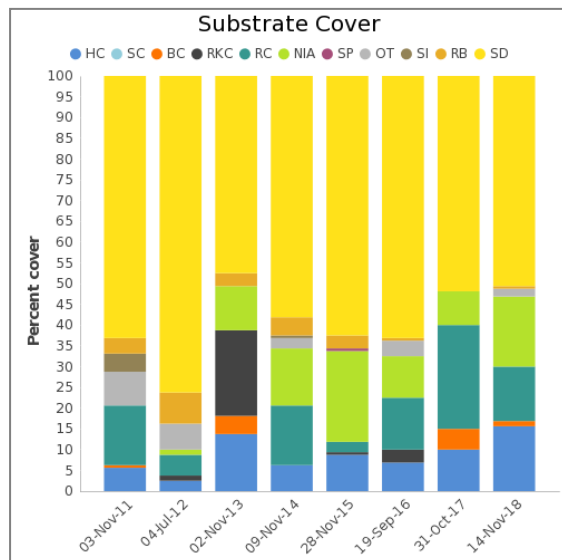


Figure 22. Benthic type and percent cover: Shark Bay, 2011- 2018.

Seven giant clams and 38 sea cucumbers were recorded during the invertebrate survey - the highest count for 2018.

Coral bleaching affected <1% of the coral population, and an average of 5% of each affected colony. This is a decrease from 2017 when 30% of the total coral population was affected.

Two counts of coral damage were recorded on the impacts survey.

A fish survey was conducted and 12 butterflyfish, two parrotfish and one grouper were recorded.



Image 37: Site Photo



Image 38: Macro Algae, Padina



Image 39: Stingray



### 5.14 Stevo's Carbonara

Stevo's Carbonara is located on the reef flat on the northern side of the island (Images 40-42). It is close to the resort and regularly frequented by tourists on snorkel and also reef walkers.

Hard coral was not recorded along the substrate transect, a decrease from 3% in 2017 (Figure 23). Sand constituted 93% of the substrate, and rock (including rock with turf algae and rock with calcareous algae) the other 7%. Two counts of macro algae were recorded.

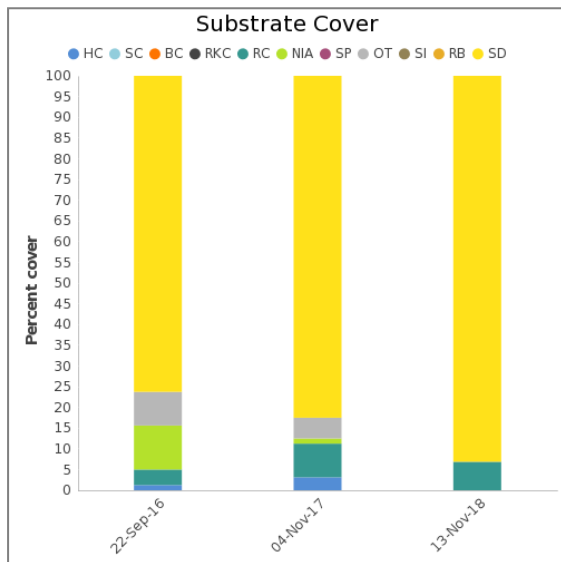


Figure 23. Benthic type and percent cover: Stevo's Carbonara, 2016 - 2018.

One giant clam and two sea cucumbers were recorded on the invertebrate survey.

On the impacts survey, coral bleaching was recorded as affecting 15% of the coral population, and 4% of the surface of coral colonies. Additionally, five counts of coral damage were recorded.

A fish survey was conducted but no indicator fish were recorded.



Image 40: Site photo



Image 41: Bleached hard coral



Image 42: Prickly Greenfish

### 5.15 White Wedding

White Wedding is located on the reef flat on the northern side of the island (Images 43-45). It is close to the resort and regularly frequented by tourists on snorkel and also reef walking.

Hard coral accounted for 11% of the benthic substrate (Figure 24). Sand constituted 65% of substrate, and rock (consisting of rock, rock with turf algae and rock with calcareous algae) 14%. 1% soft coral was recorded.

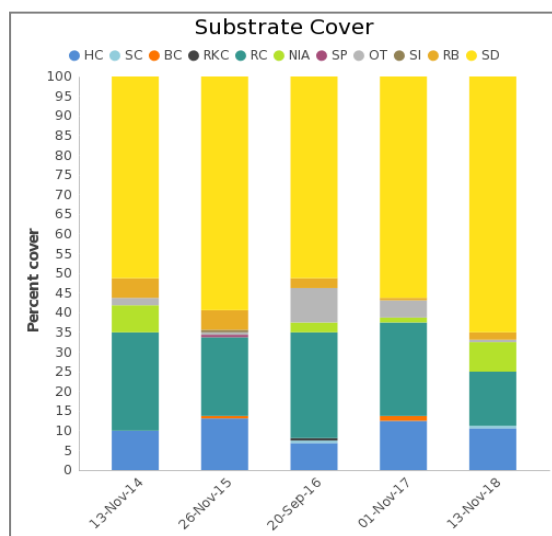


Figure 24. Benthic type and percent cover: White Wedding 2014-2018.

Twelve giant clams and two sea cucumbers were recorded on the invertebrate survey, equal highest with Heron Bommie. White Wedding has had the highest giant clam counts for 2017, 2016, 2015 and 2014.

Coral Bleaching affected 3% of the coral population and an average of 23% of the surface of affected coral colonies. This year the percentage of total population has decreased (from 13% in 2017), but the percentage of colony surface bleached has increased (12% in 2017).

Nine counts of coral damage were recorded. A fish survey was conducted and 12 snapper were recorded.



Image 43: Site photo



Image 44: Coral disease



Image 45: Bleached coral



### 6.0 FURTHER INFORMATION

For more information on Reef Check Australia, survey methods, sites and previous reports, please go to [www.reefcheckaustralia.org](http://www.reefcheckaustralia.org).

#### 6.1 References

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Image 46: Surveyor at Heron Bommie



Image 47: Turtle at Coral Cascades



Image 48: Shark Bay above and below