

# Reef Check Australia

## South East Queensland Season Summary Report 2022-2023



REEF CHECK AUSTRALIA

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## SEQ Season Summary Report 2022-2023



This project was made possible by a network of dedicated volunteers, generous dive operators, wise advisors, innovative collaborators and supportive funding agencies.

Thank you to the dedicated citizen scientists who have contributed to survey activities and entered data: Ilha Byrne, Jenni Calcraft, Kade Chambers, Philip Dunbavan, Terry Farr, Toni Massey, Lisa McComb, Jodi Salmond, Gabriella Scata, Julie Schubert, Felicia Sutjahjo, Breanne Vincent, Lucy Wells.

A special note of acknowledgement to our trainers, professional volunteers and staff: Ilha Byrne, Philip Dunbavan, Jodi Salmond and Julie Schubert.

Many of the images used within this document were taken by Reef Check Australia General Manager Jodi Salmond, with additional images by our team leaders. The image on the front was taken in Moreton Bay by Guillaume Marques (@mrqs\_g).

Project activities were conducted on the traditional lands of the Quandamooka People, Kabi Kabi First Nation and Yugambeh People. We acknowledge and pay respect to the past, present and future Traditional Custodians and Elders of this nation and the continuation of cultural, spiritual and educational practices of Aboriginal and Torres Strait Islander peoples.

This project is supported by Reef Check Australia, through funding from the City of Gold Coast, Port of Brisbane, Sunshine Coast Council, Noosa Council and Department of Environment and Science Community Sustainability Action Grant.



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### Message from our General Manager

South East Queensland (SEQ) reefs are home to a diverse collection of living organisms and is a transitional area where tropical, sub-tropical and temperate species all exist within the same habitat area. With pressures from a rapidly growing population, sedimentation from catchments, coastal development and climate change, this transitional area has gained recognition as an important area to study and protect. But SEQ reefs, and coral reefs around the world, are some of the most vulnerable ecosystems on the planet and they continue to be under pressure from pollution, development, heavy human use of ocean environments and climate change. Affected by changes in environmental conditions above and below the waves, these vital habitats are at the mercy of water temperature, oceanic currents, cloud cover, rainfall, cyclones and storms.

In September this year, an El Niño event was formally declared by the Bureau of Meteorology. El Niño and La Niña are climate patterns in the Pacific Ocean that can affect weather worldwide. During normal conditions in the Pacific Ocean, trade winds blow west, taking warm water from South America towards Asia. To replace that warm water, cold water rises from the depths — a process called upwelling. El Niño and La Niña are two opposing climate patterns that break these normal conditions. El Niño and La Niña events typically occur every two to seven years, on average, but they don't occur on a regular schedule.

We have just had three consecutive summers with cooler, wetter La Niña conditions, meaning this is the first El Niño event in a number of years. As El Niño typically brings warmer, drier atmospheric conditions and reduced cloud cover, this also means hot, dry weather over summer and an increased risk of droughts, bushfires, marine heatwaves and coral bleaching. This is a reminder that our world is changing, and the importance of understanding how such changes impact our environments and our communities. A reminder of just how important long-term monitoring such as the work we do, is.

The 2022-2023 season had challenges. Changing weather conditions made long-term planning difficult, resulting in often small teams of trained volunteers, and days or hours' notice to activate and deploy. The season had a high intensity and frequency of heavy rainfall, increased winds and the after affects that come from them, including flooding, pollution, increased sedimentation and nutrient and reduced visibility, all leading to changes in local reef community assemblages.

This year our small team of amazing, dedicated long term citizen science volunteers achieved an array of exciting and important outcomes including completing over 40 reef health surveys, more than 20 events, and the implementation of the first reef restoration project for Moreton Bay Marine Park.

We are still seeing the effects of the 2022 floods that saw thousands of tonnes of debris exit the Brisbane and Logan Rivers. Polystyrene is still washing up on our beaches and has since become embedded in coastal environments in areas not regularly cleaned. Coral populations decreased at key locations over the past 12-18 months, and algal growth has increased across the region at many of our reef monitoring locations across the Sunshine Coast, Moreton Bay and Gold Coast.

As we look back on the past year, and start planning for the next one, I want to take a moment to say thank you. Climate change continues to be the greatest threat to the future of coral reefs around the world, and with your help, we continue to do what we can to inspire, educate and engage those around us to make the best possible choices for the health of our oceans, and the future of our planet.

So thank you to every individual, community group, business and volunteer that has helped us all get to where we are. It is due to the outstanding support of funding partners, and the dedicated efforts of everyone behind the scenes that make up Reef Check Australia that we are able to continue to do what we all love; better understand, appreciate and work to protect our marine ecosystems. I am truly thankful to be surrounded by such an amazing team, and community. Thank you to each and every one of you for your support, kind words and dedication to our reefs and oceans.

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To find out more about our activities, how you can be involved, or how to donate, please visit our website: [www.reefcheckaustralia.org](http://www.reefcheckaustralia.org).

*Jodi Salmond*

**General Manager, Reef Check Australia**

A big Thank you to industry supporters who provided in-kind support during this survey season for surveys, volunteer training events and advice including: GO Dive Brisbane, Blue Tortuga and Gold Coast Dive Adventures.





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### 1.0 PROJECT INTRODUCTION

Since 2001, Reef Check Australia (RCA) has supported citizen science reef monitoring projects on reefs around Australia. For the past 23 years, our surveys have helped with the collection of long-term data relating to reef health at a local, national and global scale.

RCA's survey methods collect quantitative data for substrate cover, key invertebrate species, target fish species, as well as anthropogenic and natural impacts in reef habitats.

This report presents a summary of the findings for surveys conducted in South East Queensland (SEQ) during the 2022-2023 season. Teams of trained volunteers monitored a total of 41 locations on 24 different reefs, which included survey sites ranging from Noosa on the Sunshine Coast to Kirra Reef on the southern end of the Gold Coast. Of these 41 locations, 3 reefs were surveyed twice annually (Mud Island – Coral Galore and Rubble Patch, St Helena Island – Palindrome and Ray of Sunshine, Green Island – North and West), all remaining sites were only surveyed once. 16,400m<sup>2</sup> of reef habitat was surveyed in total during the 2022-2023 season (where one survey covers 400m<sup>2</sup>), resulting in more than 6,560 pieces of substrate data collected, and more than 1,968 hours donated by trained volunteers.



Image 1A Just one of the Seastar species – Kings Beach



Image 1B Moray eel – Mudjimba Island

The SEQ region is divided into the five sub-regions: Noosa, Sunshine Coast, Outer Moreton Bay, Inshore Moreton Bay and Gold Coast. Some existing RCA monitoring locations were not visited during the 2022-2023 survey season due to a down-turn in funding resources. Survey site locations are documented in Table 1 below and those not surveyed in 2022-2023 are shown in *italics*.

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**Table 1.** List of all RCA survey reefs in South East Queensland by Sub-region. Reefs not visited during the 2022-2023 survey season are represented in *italics*.

| NOOSA                 | SUNSHINE COAST              | INSHORE MORETON BAY   | OUTER MORETON BAY        | GOLD COAST                        |
|-----------------------|-----------------------------|-----------------------|--------------------------|-----------------------------------|
| <i>Granite Bay</i>    | Bulcock Reef                | Amity Point           | Flat Rock Island         | <i>Cook Island</i>                |
| <i>Hancocks Shoal</i> | Currimundi Reef             | Goat Island           | <i>Flinders Reef</i>     | Gold Coast Seaway                 |
| Jew Shoal             | <i>Dead Mans Reef</i>       | Green Island          | <i>Hutchinsons Shoal</i> | Kirra Reef                        |
| Little Halls Reef     | Inner Gneerings             | <i>Macleay Island</i> | <i>Marietta Dal</i>      | Narrowneck Reef                   |
| The Caves             | Kings Beach                 | Mud Island            | Shag Rock Island         | Palm Beach Reef                   |
|                       | Mooloolah River             | Myora Reef            |                          | <i>Palm Beach Artificial Reef</i> |
|                       | Mudjimba (Old Woman) Island | Peel Island           |                          | Scottish Prince                   |
|                       |                             | St Helena Island      |                          | Wavebreak Island                  |



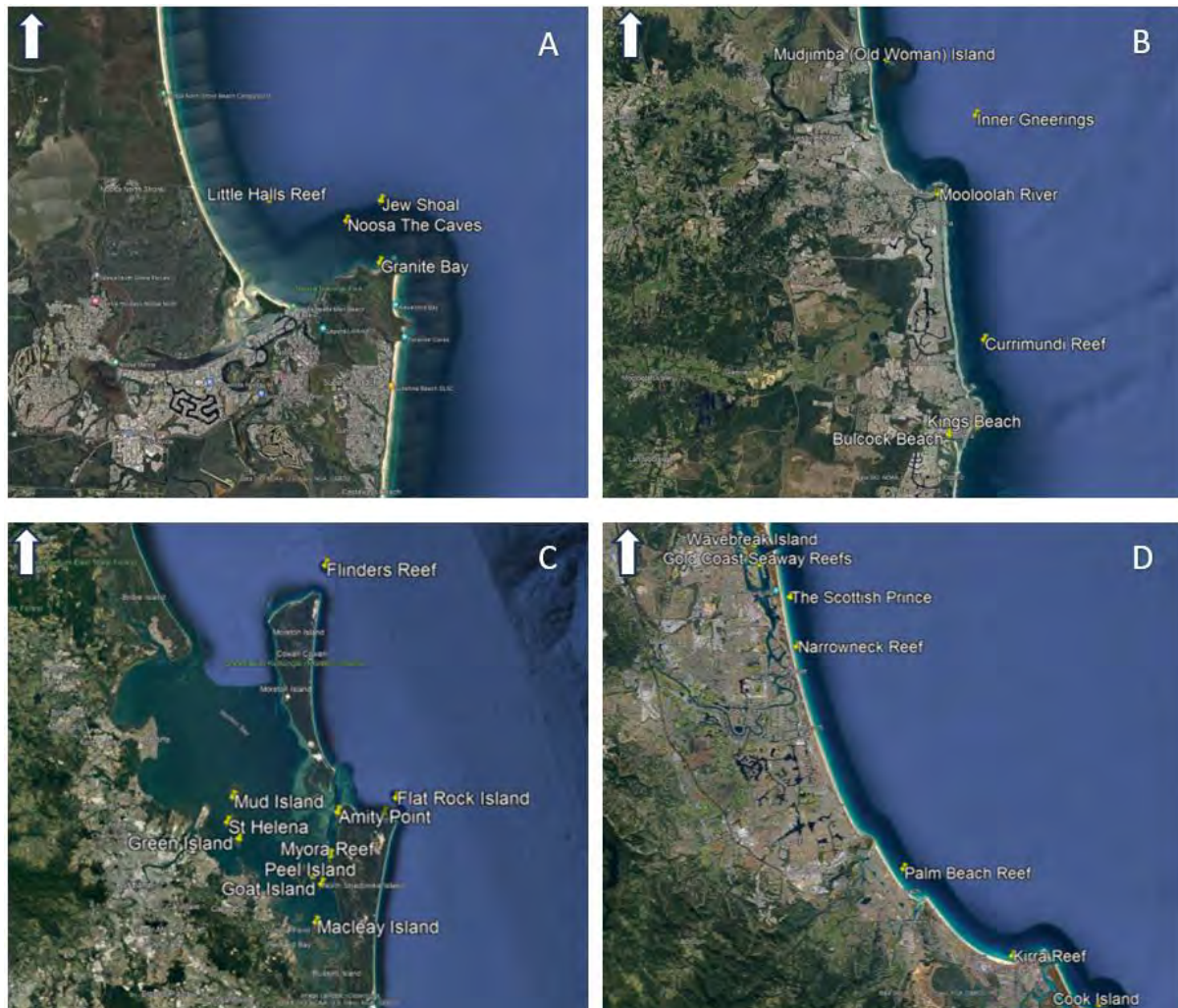
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### 1.1 MONITORING SITES

In the 2022-2023 season, RCA monitored sites along the SEQ coast from Noosa on the Sunshine Coast all the way to Kirra Reef on the southern end of the Gold Coast (see Figure 1.1 for map locations). Reef habitats at the survey sites varied from inshore to offshore areas, and included reef flats, crests and slopes. Sites also spanned protected (marine national park, no-take zones) and non-protected areas. Of the 24 reefs surveyed, 11 were within the Moreton Bay Marine Park.



**Figure 1:** Map of South East Queensland survey sites from Google Earth, A: Noosa; B: Sunshine Coast; C: Moreton Bay; D: Gold Coast. Note that Flinders Reef, Macleay Island and Cook Island sites were not surveyed this season due to funding constraints.

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**Table 2:** Table of RCA monitoring locations from Mudjimba Island to Gold Coast visited in the 2022-2023 SEQ season, including site number, location, depth, year of initial survey and site designation. Site designation includes four zones within the Moreton Bay Marine Park: Marine National Park (MNP), Conservation Park (CP), Habitat Protection (HP) and Ramsar Wetland site status (Ramsar).

| LOCATION             | SITE # | SITE                           | DEPTH (m) | 1 <sup>st</sup> SURVEY | SITE ZONING |
|----------------------|--------|--------------------------------|-----------|------------------------|-------------|
| Sunshine Coast       | 1      | Bulcock Beach, Boardwalk       | 4         | 2018                   | MNP, Ramsar |
| Sunshine Coast       | 1      | Currimundi Reef                | 9         | 2009                   |             |
| Sunshine Coast       | 2      | Currimundi Reef                | 9         | 2009                   | MNP, Ramsar |
| Sunshine Coast       | 1      | Inner Gneerings, The Caves     | 9         | 2009                   |             |
| Sunshine Coast       | 2      | Inner Gneerings, The Caves     | 9         | 2013                   |             |
| Sunshine Coast       | 1      | Kings Beach                    | 5         | 2009                   |             |
| Sunshine Coast       | 1      | Mooloolah River, La Balsa      | 5         | 2018                   |             |
| Sunshine Coast       | 1      | Mudjimba Island, NW Reef       | 9         | 2013                   |             |
| Sunshine Coast       | 1      | Mudjimba Island, The Ledge     | 5         | 2007                   |             |
| Sunshine Coast       | 2      | Mudjimba Island, The Ledge     | 9         | 2013                   |             |
| Sunshine Coast       | 3      | Mudjimba Island, The Ledge     | 6         | 2013                   |             |
| Sunshine Coast       | 1      | Noosa, Jew Shoal, The Pinnacle | 9         | 2009                   |             |
| Sunshine Coast       | 2      | Noosa, Jew Shoal, The Pinnacle | 9         | 2013                   | CP, Ramsar  |
| Sunshine Coast       | 1      | Noosa, Little Halls            | 9         | 2011                   |             |
| Sunshine Coast       | 2      | Noosa, Little Halls            | 14        | 2019                   |             |
| Sunshine Coast       | 1      | Noosa, The Caves               | 14        | 2019                   |             |
| Inshore Moreton Bay  | 2      | Amity Point                    | 5         | 2016                   |             |
| Inshore Moreton Bay  | 1      | Green Island, North            | 5         | 2015                   |             |
| Inshore Moreton Bay  | 1      | Green Island, West             | 5         | 2017                   |             |
| Inshore Moreton Bay  | 1      | Mud Island, Coral Galore       | 5         | 2017                   |             |
| Inshore Moreton Bay  | 1      | Mud Island, Rubble Patch       | 5         | 2017                   |             |
| Inshore Moreton Bay  | 1      | St Helena, Palindrome          | 5         | 2018                   |             |
| Inshore Moreton Bay  | 1      | St Helena, Ray of Sunshine     | 5         | 2018                   | MNP, Ramsar |
| Inshore Moreton Bay  | 1      | Goat Island, East              | 5         | 2009                   |             |
| Inshore Moreton Bay  | 1      | Goat Island, West              | 5         | 2014                   |             |
| Inshore Moreton Bay  | 1      | Peel Island, North-east        | 5         | 2014                   |             |
| Inshore Moreton Bay  | 1      | Peel Island, North             | 5         | 2009                   |             |
| Inshore Moreton Bay  | 1      | Myora Reef                     | 5         | 2009                   |             |
| Inshore Moreton Bay  | 2      | Myora Reef                     | 5         | 2014                   |             |
| Offshore Moreton Bay | 1      | Flat Rock, Shark Gulley        | 9         | 2009                   |             |
| Offshore Moreton Bay | 1      | Flat Rock, The Nursery         | 9         | 2008                   |             |
| Offshore Moreton Bay | 1      | Shag Rock, East                | 9         | 2008                   | HP          |
| Offshore Moreton Bay | 1      | Shag Rock, West                | 9         | 2009                   |             |
| Gold Coast           | 1      | Gold Coast Seaway, SW Wall     | 5         | 2007                   | MNP         |
| Gold Coast           | 1      | Gold Coast Seaway, The Pipe    | 5         | 2015                   |             |
| Gold Coast           | 1      | Palm Beach Reef                | 9         | 2007                   |             |
| Gold Coast           | 2      | Palm Beach Reef                | 9         | 2009                   |             |
| Gold Coast           | 1      | Wavebreak Island               | 9         | 2019                   |             |
| Gold Coast           | 1      | Narrowneck Reef                | 9         | 2007                   |             |
| Gold Coast           | 1      | Kirra Reef                     | 5         | 2016                   |             |
| Gold Coast           | 1      | Scottish Prince                | 9         | 2023                   |             |

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### 1.2 KEY FINDINGS FROM 2022-2023 SURVEYS:

The 2022-2023 season included surveys at 41 monitoring locations.

#### 1.2.1 SUBSTRATE

Of the 41 locations surveyed, most remained relatively stable in hard coral cover with most changes of less than 10%. The most notable changes were an almost 50% decrease at Mudjimba Island Northwest Reef and Mudjimba Island, The Ledge, Site 2; and above 50% at Mudjimba Island, The Ledge, Site 1, decreasing from 41% to 14%. Myora Reef, Site 1 improved from 34% to 60%. Goat Island East has also not recovered following the floods in 2020, however an improvement was recorded at Goat Island West, increasing from 2% to 19%. Soft coral remained relatively stable.

Hard coral cover ranged from 0% found at Bulcock Beach, Kings Beach, Gold Coast Seaway South West Wall & The Pipe; Kirra Reef; Narrownneck Artificial Reef, the Scottish Prince and Wavebreak Island to 60% at Myora Reef, Site 1. The average hard coral cover across all surveyed locations was 18% (not including sites with no hard coral recorded). This overall regional average is consistent with previous years.

The most predominant substrate type recorded across all 36 survey sites was rock, attributing 36% of the benthos surveyed (this includes all RCA rock categories; rock (RC), rock covered with coralline algae (RCCA) and rock covered with turf algae (RCTA), which is consistent with previous years. Silt (19%) and sand (18%) were the next dominant categories. Soft coral was only recorded at 26 sites, generally at low levels with the highest recorded being Mudjimba Island, The Ledge, Site 1 at 22%. These percentages are based on the number of sites on which these substrate categories were recorded. High levels of silt were recorded during the substrate point survey at Bulcock Beach (100%), St Helena, Palindrome (35%), St Helena Ray of Sunshine (31%), and Green Island West (33%).



Image 1.2.1A Happy survey divers – Gold Coast



Image 1.2.1B Nutrient Indicator Algae – St Helena Palindrome



Image 1.2.1C Amity Team ready to go!



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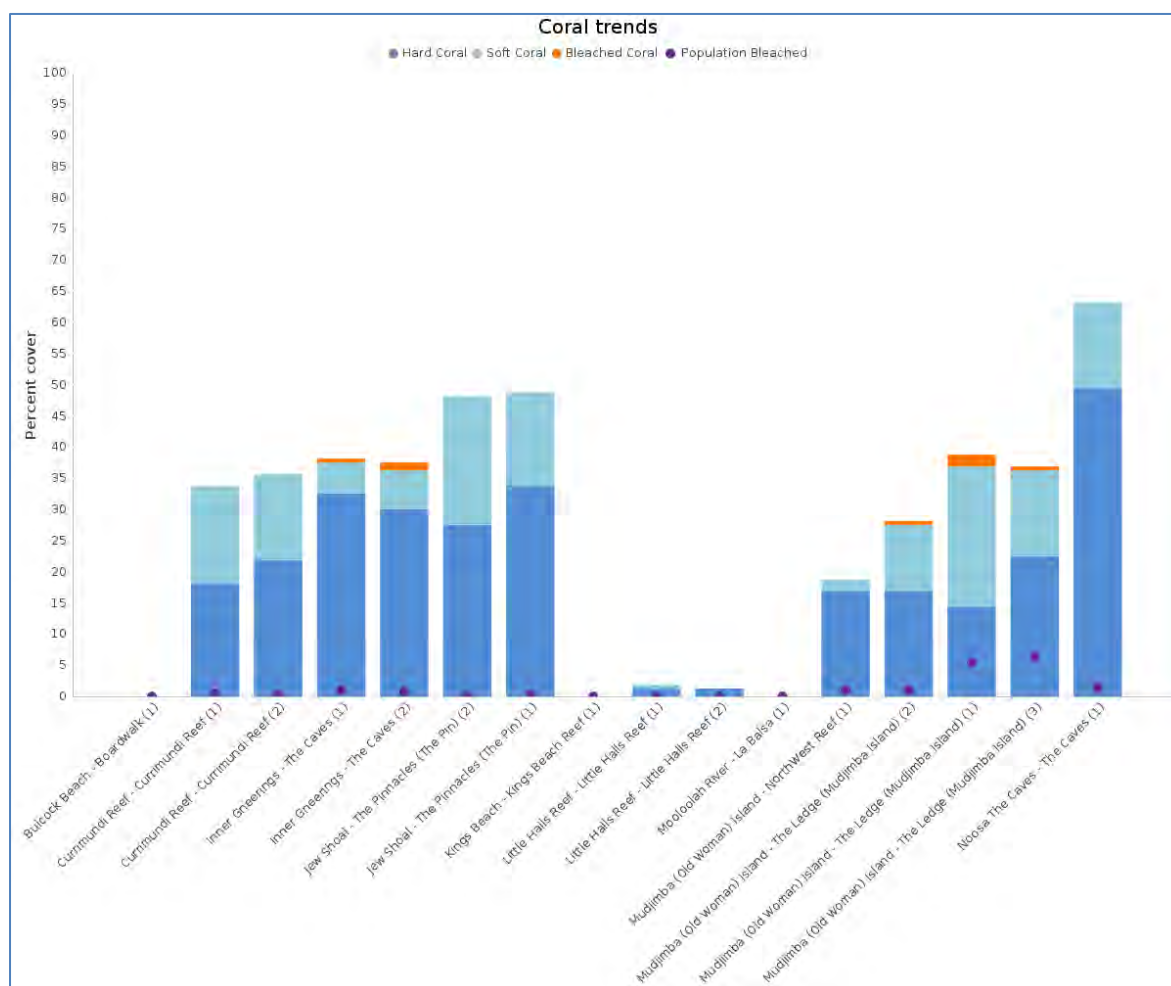
### 1.2.2 IMPACTS: CORAL BLEACHING

Coral bleaching was recorded on 29 of the 41 survey sites (70% of survey sites) which is an increase from last season (56%) and a continuing downward trend from previous years. On average, 3.3% of the coral population was affected, with individual colonies suffering an average of 27% surface bleaching. The highest population bleaching (33%) was recorded at Amity Point.

Figures 2 to 5 below depict changes in coral cover, and coral bleaching, over time at each site, and are categorised by sub-regions.

#### Sunshine Coast Regional Summary of Coral Trends and Bleaching

Hard coral coverage has remained relatively constant over the years on the Sunshine Coast. Mudjimba, The Ledge, Site 1 exhibited the highest percentage of coral bleaching recorded on the point-intercept substrate survey, at just under 2% of the population. Bleaching recorded on the impact survey ranged from 0% to 6.5% of the population, which is an increase from last year, whilst individual colonies ranged from 0% to 68% of the surface bleached.



**Figure 2:** Percent cover of hard coral (blue), soft coral (light blue) and bleached coral (orange) for current survey year at Sunshine Coast Reef Check Australia reef health monitoring locations, as per point-intercept substrate surveys for benthic composition. Percentage of the coral population exhibiting bleaching (purple dot) as documented on belt transect survey for reef health impacts, is included where available.



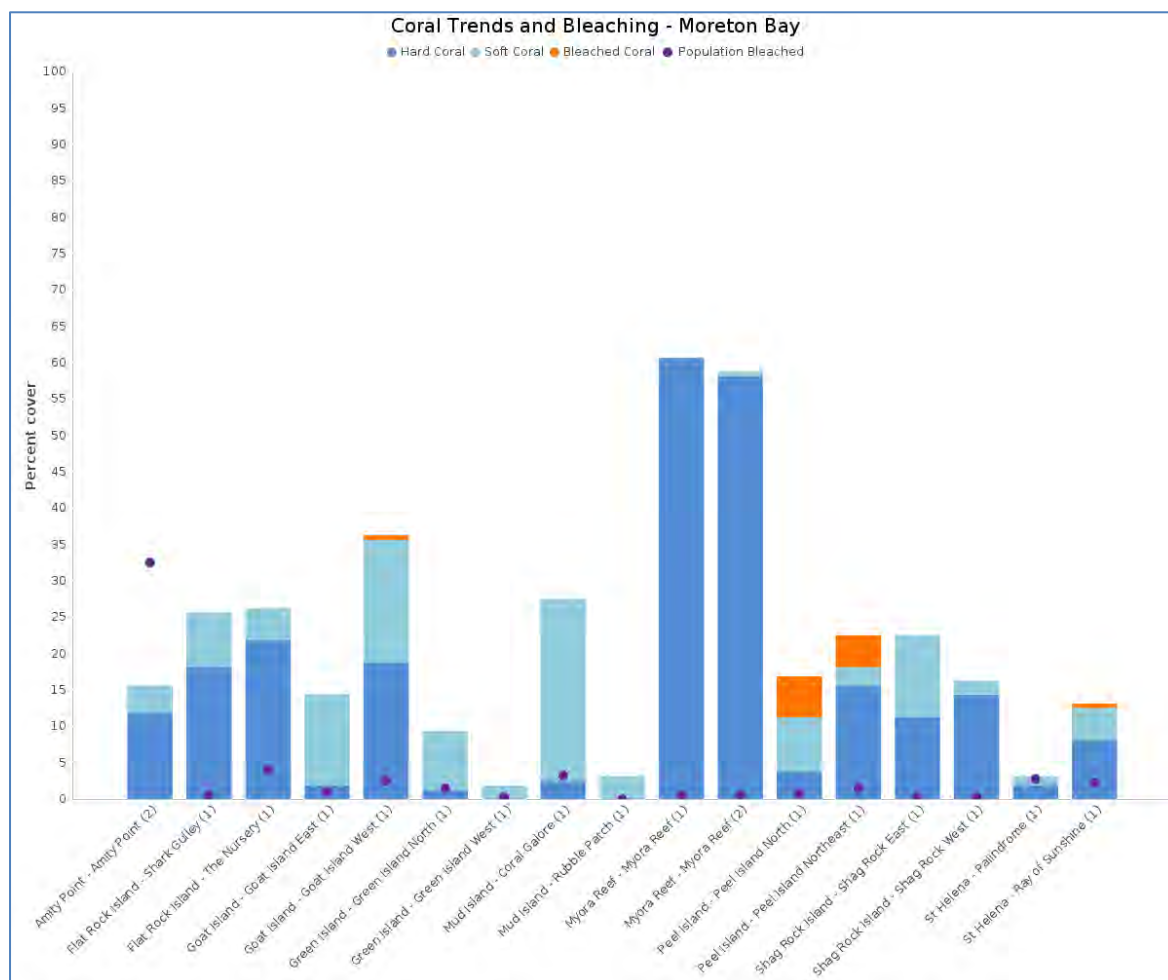
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### Moreton Bay Regional Summary of Coral Trends and Bleaching

Hard coral coverage has remained reasonably consistent at most sites in Moreton Bay. Whilst hard coral coverage at Goat Island East remains low at <2%, down from 36% in 2020, levels at Goat Island West have increased from <2% in 2022 to just over 18% in 2023. Levels of bleaching recorded during the impact survey ranged from 0% to 33% of the population bleached with individual colonies varying from 5% to 67% bleached.



**Figure 3:** Percent cover of hard coral (blue), soft coral (light blue) and bleached coral (orange) for current survey year at inner and outer Moreton Bay Reef Check Australia reef health monitoring locations, as per point-intercept substrate surveys for benthic composition. Percentage of the coral population exhibiting bleaching (purple dot) as documented on belt transect survey for reef health impacts, is included where available.

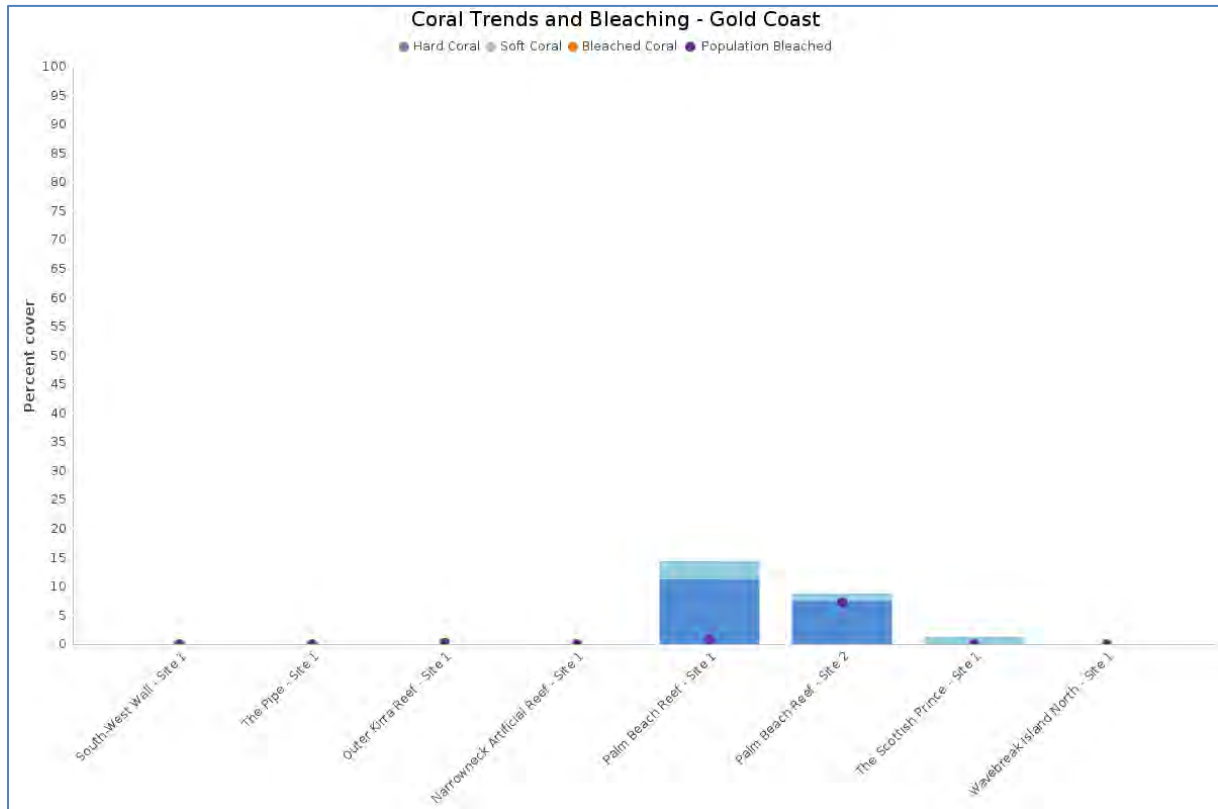
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### Gold Coast Regional Summary of Coral Trends and Bleaching

As in previous years, hard coral coverage was only found in noticeable quantities at Palm Beach S1 & S2, even then at low levels. Bleaching was not recorded at either of these reefs during the line intercept substrate survey but was during the impacts survey. Minor bleaching was also recorded at Kirra Reef during the impacts survey.



**Figure 5:** Percent cover of hard coral (blue), soft coral (light blue) and bleached coral (orange) for current survey year at Gold Coast Reef Check Australia reef health monitoring locations, as per point-intercept substrate surveys for benthic composition. Percentage of the coral population exhibiting bleaching (purple dot) as documented on belt transect survey for reef health impacts, is included where available.

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### 1.2.3 IMPACTS: CORAL DAMAGE

Coral damage (due to unknown causes) was recorded on 11 of the 41 survey sites. The highest recordings for coral damage was at Amity Point Site 2 at 12 counts, followed Mudjimba Island – The Ledge Site 3 at 8 counts. A total of 35 incidences of coral damage were recorded this season, which shows a declining trend (lower than last season (55)).

### 1.2.4 IMPACTS: CORAL DISEASE

A total of 38 incidences of coral disease were recorded over 12 sites during the season, similar to last season. Of these, the highest recording (9) was at Myora Reef Site 1.

### 1.2.5 IMPACTS: MARINE DEBRIS

There were 514 incidences of marine debris recorded this season, primarily fishing debris, down from last year. The highest recording of marine debris was 110 items and this was found at Gold Coast Seaway south-west wall, with 108 items recorded at Wavebreak Island.

### 1.2.6 IMPACTS: CORAL SCARRING

122 scars were recorded this season, up from 111 last season. Unknown scars accounted for 58 of the scars and *Drupella* accounted for the remaining 64. The highest recording of unknown *Drupella* scars (20) was at Mudjimba Island The Ledge Site 1.

*Tables 3 and 4 on the subsequent pages display these key findings by survey name and sub-region.*



Image 1.2.3 Coral damage



Image 1.2.4 Coral disease



Image 1.2.5 Trash

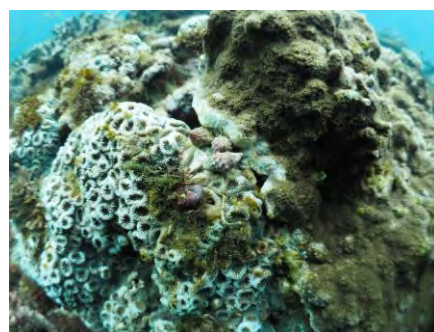


Image 1.2.6 *Drupella* snail and scar

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**Table 3: Summary table of RCA monitoring findings for surveys conducted on Inner Moreton Bay and Outer Moreton Bay in 2022-2023 season.** Information includes a basic site summary of average hard and soft coral cover (%), total macroalgae (MA) abundance, nutrient indicator algae (NIA) cover (%), and silt levels (N=none, L=low, M=medium, H=high), as well as a summary of the impacts at each site: average coral bleaching of the population (%) and abundance of reef impacts (coral disease, marine debris, coral damage, and scars). All figures showing a count, rather than a percentage, are a total across all 4 transects at the site (i.e. a total across 80m).

| Basic site summary                   |                         |                         |                                 |                              |              | Presence of Impacts            |                   |                  |                             |                   |                                   |                          |                  |
|--------------------------------------|-------------------------|-------------------------|---------------------------------|------------------------------|--------------|--------------------------------|-------------------|------------------|-----------------------------|-------------------|-----------------------------------|--------------------------|------------------|
|                                      | Hard Coral Coverage (%) | Soft Coral Coverage (%) | Macroalgae (#) per 80m transect | Nutrient Indicator Algae (%) | Silt Loading | Coral Population Bleaching (%) | Coral Disease (#) | Fishing Line (#) | Marine Debris (General) (#) | Anchor Damage (#) | Coral Damage (#) (Unknown Causes) | <i>Drupella</i> Scar (#) | Unknown Scar (#) |
| INNER MORETON BAY                    |                         |                         |                                 |                              |              |                                |                   |                  |                             |                   |                                   |                          |                  |
| Amity S2                             | 11.9                    | 3.7                     | 0                               | 0                            | M            | 32.50                          | 0                 | 26               | 0                           | 0                 | 12                                | 0                        | 0                |
| Green Island, North Site 1 (Summer)  | 8.1                     | 10                      | 0                               | 23.1                         | H            | 1.50                           | 0                 | 6                | 0                           | 0                 | 0                                 | 0                        | 1                |
| Green Island, North, Site 1 (Winter) | 1.3                     | 8.1                     | 2                               | 43.1                         | H            | 2.5                            | 0                 | 0                | 3                           | 0                 | 0                                 | 0                        | 0                |
| Green Island, West (Summer)          | 5.6                     | 3.1                     | 6                               | 46.9                         | H            | 0.25                           | 0                 | 2                | 0                           | 0                 | 0                                 | 0                        | 1                |
| Green Island, West (Winter)          | 0                       | 1.9                     | 10                              | 38                           | H            | 5.25                           | 0                 | 0                | 0                           | 0                 | 0                                 | 0                        | 0                |
| Mud Island, Coral Galore (Summer)    | 1.9                     | 25                      | 43                              | 27.5                         | M            | 3.20                           | 0                 | 0                | 0                           | 0                 | 1                                 | 0                        | 1                |
| Mud Island, Coral Galore (Winter)    | 2.5                     | 25                      | 4                               | 37.5                         | H            | 4.75                           | 0                 | 1                | 0                           | 0                 | 1                                 | 0                        | 0                |
| Mud Island, Rubble Patch (Summer)    | 0.6                     | 0                       | 39                              | 33.7                         | M            | 0                              | 0                 | 0                | 0                           | 0                 | 0                                 | 0                        | 0                |
| Mud Island, Rubble Patch (Winter)    | 0                       | 3.1                     | 9                               | 43.7                         | H            | 3.75                           | 0                 | 0                | 0                           | 0                 | 1                                 | 0                        | 0                |
| Myora Reef, S1                       | 61                      | 0                       | 0                               | 0                            | M            | 0.5                            | 9                 | 2                | 0                           | 0                 | 2                                 | 0                        | 0                |
| Myora Reef, S2                       | 58                      | 0.6                     | 0                               | 0                            | M            | 0.5                            | 3                 | 0                | 0                           | 0                 | 2                                 | 0                        | 2                |
| St Helena, Palindrome (Summer)       | 1.2                     | 0.6                     | 4                               | 31.9                         | M            | 2.75                           | 0                 | 0                | 1                           | 0                 | 0                                 | 0                        | 2                |
| St Helena, Palindrome (Winter)       | 1.9                     | 1.3                     | 0                               | 25                           | H            | 5                              | 1                 | 0                | 0                           | 0                 | 0                                 | 0                        | 0                |
| St Helena, Ray of Sunshine (Summer)  | 6.2                     | 1.9                     | 14                              | 49.4                         | M            | 2.25                           | 0                 | 65               | 0                           | 0                 | 0                                 | 0                        | 1                |
| St Helena, Ray of Sunshine (Winter)  | 8.1                     | 4.4                     | 0                               | 25                           | H            | 5                              | 1                 | 0                | 0                           | 0                 | 0                                 | 0                        | 0                |
| Peel Island, North                   | 3.7                     | 7.5                     | 0                               | 15                           | M            | 0.75                           | 5                 | 41               | 2                           | 0                 | 0                                 | 0                        | 1                |
| Peel Island, North-east              | 15.6                    | 2.5                     | 0                               | 12.5                         | H            | 1.50                           | 2                 | 18               | 9                           | 0                 | 0                                 | 0                        | 0                |
| Goat Island, East                    | 1.9                     | 12.5                    | 0                               | 0                            | M            | 1.00                           | 2                 | 11               | 0                           | 0                 | 0                                 | 0                        | 0                |
| Goat Island, West                    | 18.7                    | 16.9                    | 0                               | 0                            | M            | 2.50                           | 6                 | 1                | 5                           | 0                 | 0                                 | 0                        | 1                |
| OUTER MORETON BAY                    |                         |                         |                                 |                              |              |                                |                   |                  |                             |                   |                                   |                          |                  |
| Shag Rock, East                      | 11.2                    | 11.2                    | 0                               | 33.8                         | M            | 0                              | 0                 | 6                | 0                           | 0                 | 0                                 | 0                        | 0                |
| Shag Rock, West                      | 14.4                    | 1.9                     | 0                               | 7.5                          | L            | 0.25                           | 0                 | 12               | 0                           | 0                 | 1                                 | 6                        | 3                |
| Flat Rock, Shark Gully               | 18.1                    | 7.5                     | 42                              | 31.9                         | N            | 0.50                           | 2                 | 0                | 0                           | 0                 | 0                                 | 4                        | 0                |
| Flat Rock, The Nursery               | 21.9                    | 4.4                     | 10                              | 18.1                         | N            | 4.00                           | 1                 | 0                | 0                           | 0                 | 0                                 | 1                        | 0                |



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**Table 4: Summary table of RCA monitoring findings for surveys conducted on the Sunshine Coast and Gold Coast in 2022-2023 season.** Information includes a basic site summary of average hard and soft coral cover (%), total macroalgae (MA) abundance, nutrient indicator algae (NIA) cover (%), and silt levels (N=none, L=low, M=medium, H=high), as well as a summary of the impacts at each site: average coral bleaching of the population (%) and abundance of reef impacts (coral disease, marine debris, coral damage, and scars). All figures showing a count, rather than a percentage, are a total across all 4 transects at the site (i.e. a total across 80m).

| Basic site summary             |                         |                         |                                 |                              |              | Presence of Impacts            |                   |                  |                             |                   |                                   |                          |                  |
|--------------------------------|-------------------------|-------------------------|---------------------------------|------------------------------|--------------|--------------------------------|-------------------|------------------|-----------------------------|-------------------|-----------------------------------|--------------------------|------------------|
|                                | Hard Coral Coverage (%) | Soft Coral Coverage (%) | Macroalgae (#) per 80m transect | Nutrient Indicator Algae (%) | Silt Loading | Coral Population Bleaching (%) | Coral Disease (#) | Fishing Line (#) | Marine Debris (General) (#) | Anchor Damage (#) | Coral Damage (#) (Unknown Causes) | <i>Drupella</i> Scar (#) | Unknown Scar (#) |
| SUNSHINE COAST                 |                         |                         |                                 |                              |              |                                |                   |                  |                             |                   |                                   |                          |                  |
| Bulcock Beach                  | 0.0                     | 0.0                     | 0                               | 0                            | H            | 0                              | 0                 | 19               | 9                           | 0                 | 0                                 | 0                        | 0                |
| Currimundi S1                  | 18                      | 16                      | 54                              | 36                           | N            | 0.50                           | 0                 | 0                | 0                           | 0                 | 0                                 | 0                        | 0                |
| Currimundi S2                  | 22                      | 13.8                    | 47                              | 39                           | N            | 0.25                           | 0                 | 0                | 0                           | 0                 | 0                                 | 0                        | 1                |
| Inner Gneerings S1             | 32.5                    | 5                       | 29                              | 23.7                         | L            | 1                              | 0                 | 2                | 0                           | 0                 | 0                                 | 0                        | 8                |
| Inner Gneerings S2             | 30                      | 6.2                     | 36                              | 27.5                         | L            | 0.75                           | 2                 | 1                | 0                           | 0                 | 2                                 | 2                        | 3                |
| Kings Beach                    | 0                       | 0                       | 67                              | 42                           | N            | 0                              | 0                 | 1                | 0                           | 0                 | 0                                 | 0                        | 0                |
| Mooloolah River                | 0                       | 0                       | 0                               | 3.7                          | L            | 0                              | 0                 | 65               | 8                           | 0                 | 0                                 | 0                        | 0                |
| Mudjimba Island, North West S1 | 16.9                    | 1.9                     | 1                               | 17.5                         | M            | 1                              | 1                 | 4                | 0                           | 0                 | 0                                 | 1                        | 4                |
| Mudjimba Island, The Ledge S1  | 14.4                    | 22.5                    | 1                               | 0.6                          | N            | 5.5                            | 2                 | 4                | 1                           | 0                 | 2                                 | 20                       | 0                |
| Mudjimba Island, The Ledge S2  | 16.9                    | 10.6                    | 0                               | 5                            | M            | 1                              | 0                 | 1                | 1                           | 0                 | 0                                 | 3                        | 3                |
| Mudjimba Island, The Ledge S3  | 22.5                    | 13.7                    | 0                               | 0.6                          | N            | 6.5                            | 3                 | 0                | 0                           | 0                 | 8                                 | 8                        | 5                |
| Jew Shoal S1                   | 33.7                    | 15                      | 0                               | 5.6                          | N            | 0.25                           | 2.5               | 17               | 0                           | 0                 | 0                                 | 0                        | 6                |
| Jew Shoal S2                   | 27.5                    | 20.6                    | 0                               | 5.6                          | N            | 0                              | 0                 | 7                | 1                           | 1                 | 2                                 | 4                        | 4                |
| Little Halls S1                | 1.2                     | 0.6                     | 0                               | 8.1                          | L            | 0                              | 0                 | 8                | 3                           | 0                 | 0                                 | 0                        | 0                |
| Little Halls S2                | 1.2                     | 0                       | 0                               | 13.7                         | L            | 0                              | 0                 | 0                | 4                           | 0                 | 0                                 | 0                        | 0                |
| Noosa – The Caves              | 49.4                    | 13.7                    | 0                               | 0                            | N            | 1.5                            | 73                | 2                | 0                           | 0                 | 0                                 | 5                        | 8                |
| GOLD COAST                     |                         |                         |                                 |                              |              |                                |                   |                  |                             |                   |                                   |                          |                  |
| GC Seaway, SW Wall             | 0                       | 0                       | 0                               | 46.2                         | M            | 0                              | 0                 | 109              | 1                           | 0                 | 0                                 | 0                        | 0                |
| GC Seaway, The Pipe            | 0                       | 0                       | 0                               | 0                            | M            | 0                              | 0                 | 21               | 0                           | 0                 | 0                                 | 0                        | 0                |
| Palm Beach S1                  | 11.3                    | 3.1                     | 0                               | 10.6                         | N            | 1                              | 0                 | 2                | 0                           | 0                 | 0                                 | 0                        | 0                |
| Palm Beach S2                  | 7.5                     | 1.3                     | 3                               | 13.8                         | N            | 7.3                            | 0                 | 1                | 0                           | 0                 | 0                                 | 2                        | 0                |
| Narrowneck Reef                | 0                       | 0                       | 0                               | 0                            | N            | 0                              | 0                 | 0                | 0                           | 0                 | 0                                 | 0                        | 0                |
| Wavebreak Island               | 0                       | 0                       | 0                               | 6.3                          | N            | 0                              | 0                 | 91               | 16                          | 0                 | 0                                 | 0                        | 0                |
| Kirra Reef                     | 0                       | 0                       | 16                              | 30.1                         | N            | 0.3                            | 0                 | 0                | 1                           | 0                 | 0                                 | 0                        | 0                |
| Scottish Prince                | 0                       | 1.3                     | 0                               | 23.1                         | N            | 0                              | 0                 | 4                | 0                           | 0                 | 0                                 | 2                        | 0                |

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### 1.2.7 INVERTEBRATE ABUNDANCE

Invertebrate surveys were carried out at all locations visited. The most abundant indicator invertebrate were urchins (including pencil, collector and long-spined), with 716 individuals recorded this season. This is an increase from 265 last year. The vast majority of these were recorded at Palm Beach S2 (193), The Scottish Prince (146), and Shag Rock West (97).

*Drupella* snails were the second most abundant invertebrate with a total of 754 recorded. The highest numbers recorded were at The Scottish Prince (160) and Mudjimba Island - The Ledge S1 (110). Anemones totalled 581, with 339 recorded at Palm Beach Site 1 and 105 recorded at Palm Beach Site 2.

Across the 41 survey sites, 15 banded coral shrimp, 15 lobsters, six giant clams and one *Trochus* snail were recorded. No Crown of Thorns Starfish (COTS), target sea cucumbers or tritons were recorded on transect again during the 2022-2023 survey season.

### 1.2.8 FISH ABUNDANCE

Fish surveys were carried out on all surveys. Again, butterflyfish were the most abundant target fish species with a total of 332 sightings (up from 111) across all surveys. The highest number recorded was 32 at both Amity Point Site 2 and Myora reef Site 1. Also recorded were 123 snapper, 28 moray eels, 23 sweetlips, six grouper and eight parrotfish. Wobbegong sharks were also recorded at a large number of sites.

### 1.2.9 RARE ANIMALS

Many rare animals were sighted during the surveys this season, some of which include, stingrays, turtles and octopuses.



Image 1.2.7A Triton snail

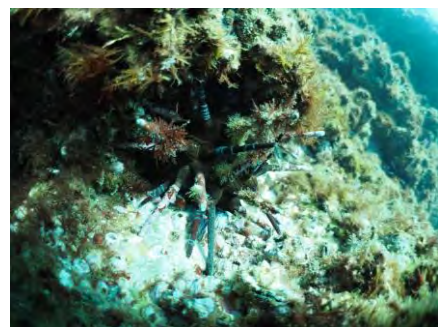


Image 1.2.7B Pencil urchin

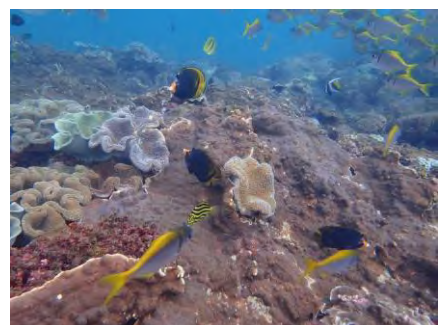


Image 1.2.8 Butterflyfish

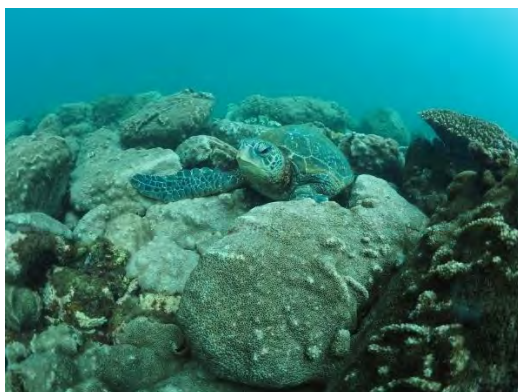


Image 1.2.9 Turtle

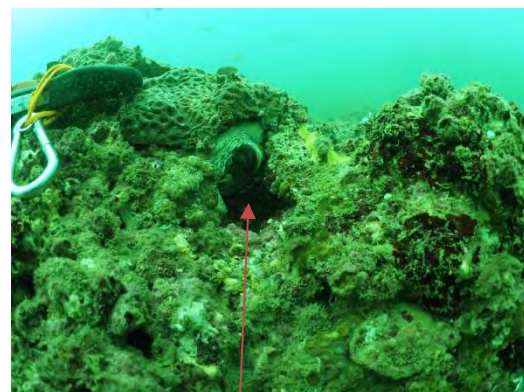


Image 1.2.10 Octopus



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## SEQ Season Summary Report 2022-2023



## 2.0 SUNSHINE COAST SITE REPORTS

### 2.1 BULCOCK BEACH, THE BOARDWALK

Bulcock Beach, The Boardwalk, Site 1, was surveyed for the first time in 2018. The boardwalk is a popular fishing spot located in Caloundra. This site sits along a rock wall slope in approximately 4m depth.

This site has undergone significant changes since the breakthrough on Bribie Island and alteration of the bar, leaving this site less prone to strong currents. The entire site was covered in a heavy layer of silt. (Figure 2.1.1), with just a few ascidians found scattered amongst bivalve covered rock. This is consistent with our observations last season.

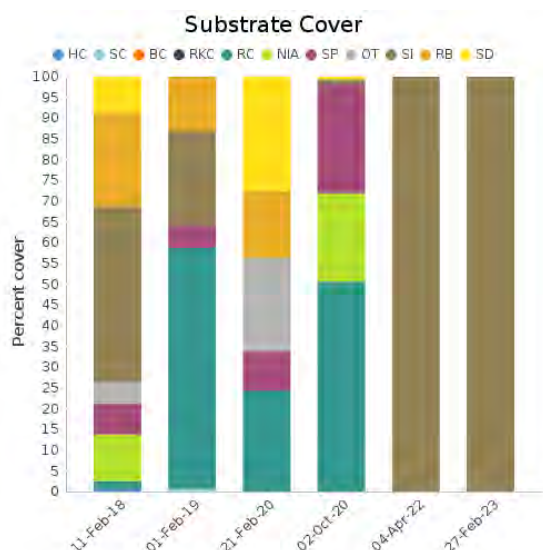


Figure 2.1.1 Benthic type and percentage cover, Bulcock Beach, The Boardwalk, Site 1, 2018-2023

Nineteen items of fishing debris and nine items of general rubbish were recorded. This included the large metal table that we have recorded on previous surveys. The amount of fishing line within the area was observed to be greater than that recorded on transect.

Four Collector Urchins and one *Drupella* snail were recorded on the invertebrate survey.

Despite the limited visibility, during the fish survey, eight butterfly fish and one moray eel, along with non-target fish (lionfish, stonefish and scorpionfish) were recorded.



Image 2.1A Substrate



Image 2.1B Collector Urchin



Image 2.1C Fishing debris

# REEF CHECK AUSTRALIA

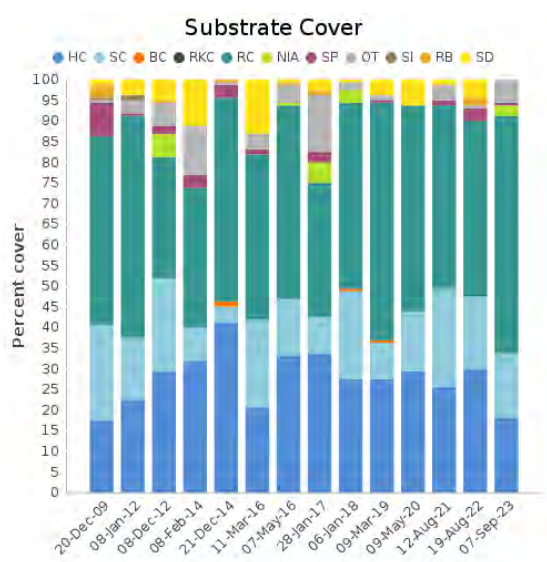
## SEQ Season Summary Report 2022-2023



### 2.2 CURRIMUNDI REEF, SITE 1

Currimundi Reef, Site 1, was surveyed for the first time in 2009. It is situated on the reef flat at nine metres on an exposed rocky outcrop. The reef in this area is reasonably flat although there are walls and rock pinnacles at various depths within the general area. This subtropical reef is not frequented by divers, however sections of Currimundi Reef are utilised by fishers.

Rock made up 57% of the substrate (including rock with turf algae and rock with coralline algae). Hard coral was down to 18% of the total substrate (Figure 2.2.1). Soft coral attributed 16% to the substrate composition, with the balance being “other” (Halimeda) (6%), nutrient indicator algae (2%), and sponge (1%). A large increase in macroalgae was recorded this year with 54 counts over the 80m substrate survey.



**Figure 2.2.1** Benthic type and percentage cover, Currimundi Reef, Site 1, 2009-2023

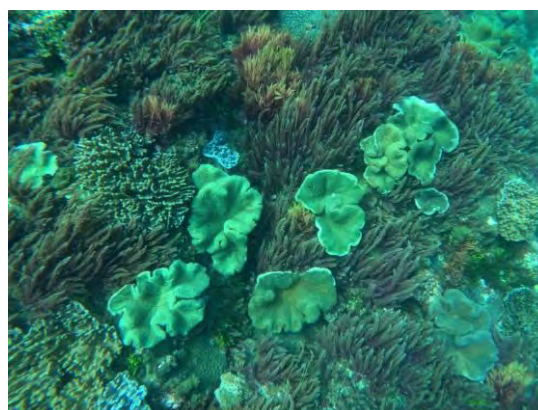
Bleaching affected 0.5% of the total coral population with an average of 25% of any individual colony being bleached. No other impacts were observed.

One anemone (without fish) and three *Drupella* snails were observed on the invertebrate survey.

A fish survey was conducted and 12 butterflyfish and three sweetlip were recorded.



**Image 2.2A** Site photograph and butterflyfish



**Image 2.2B** Soft corals



**Image 2.2C** Dominant algae



# REEF CHECK AUSTRALIA

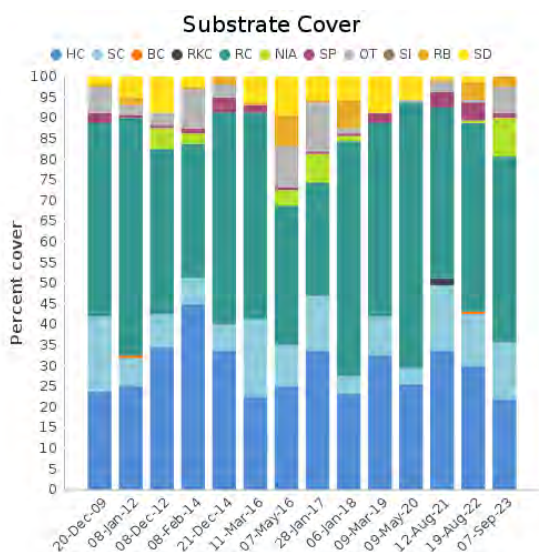
## SEQ Season Summary Report 2022-2023



### 2.3 CURRIMUNDI REEF, SITE 2

Currimundi Reef, Site 2, is located adjacent to Site 1 and has a similar topography.

Rock made up 45% of the substrate (including rock with turf algae and rock with coralline algae), with hard coral down to 22% of the total substrate (Figure 2.3.1). Soft coral attributed 14% to the substrate composition, with the balance being nutrient indicator algae (9%), other (6%), rubble (3%) and sponge just over 1%. Again macro algae count was high at 47 counts for the 80m substrate survey.



**Figure 2.3.1** Benthic type and percentage cover, Currimundi Reef, Site 2, 2009-2023

Bleaching affected less than 0.25% of the total coral population with an average of 2.5% of any individual colony being bleached. One unknown scar was the only other impact recorded on the impact survey. Items of marine debris were not recorded.

Four anemones without fish, one long spined urchin and 15 *Drupella* snails were observed on the invertebrate survey.

A fish survey was conducted and seven butterfly fish were recorded on transect.



**Image 2.3A** Site photograph



**Image 2.3B** Halimeda (OT)



**Image 2.3C** Unknown scar

# REEF CHECK AUSTRALIA

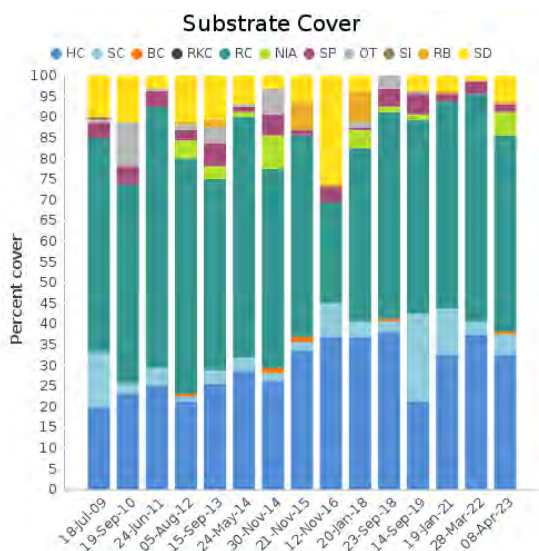
## SEQ Season Summary Report 2022-2023



### 2.4 INNER GNEERINGS, THE CAVES; SITE 1

Inner Gneerings, the caves, is situated directly offshore from Mooloolaba and covers a wide range of depths from 10 to 25 m. It is a popular site for recreational fishing and diving. Site 1 is located at a depth of 10 m on the reef floor and is characterised by scattered rocky outcrops surrounded by coral, sponges and a collapsed cave structure. This site has been surveyed annually since 2009.

Rock (48%) was the dominant substrate with hard coral at 33%. Soft coral (5%) was slightly higher than the previous survey. Sand attributed 6% to the substrate, nutrient indicator algae 6%, sponge 2% and bleached coral and rubble each at less than 1% (Figure 2.4.1). Macroalgae was recorded on all four transects.



**Figure 2.4.1** Benthic type and percentage cover, Inner Gneerings: The Caves, Site 1, 2009-2023

Eight *Drupella* snails and one banded coral shrimp were recorded during the invertebrate survey.

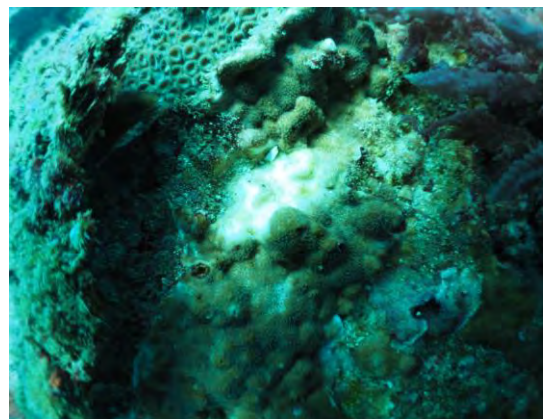
Coral bleaching was observed on all transects and affected 1% of the total coral population, with an average of 39% of each colony showing surface bleaching. Eight unknown scars were recorded.

Two items of fishing line debris were the only other impact recorded.

A fish survey was conducted and three butterfly fish, two moray eels and one parrotfish were recorded.



**Image 2.4A** Substrate



**Image 2.4B** Bleached coral



**Image 2.4C** Moray eel



# REEF CHECK AUSTRALIA

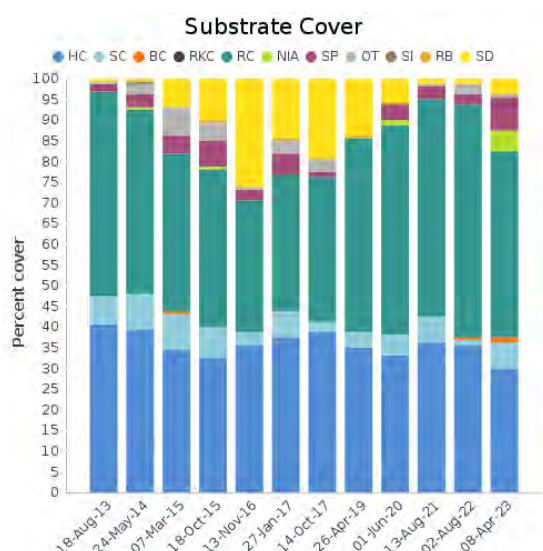
## SEQ Season Summary Report 2022-2023



### 2.5 INNER GNEERINGS, THE CAVES; SITE 2

Inner Gneerings, Site 2, was surveyed for the first time in 2013. It is situated on the reef flat at eight metres on an exposed rocky outcrop. The topography of the reef in this area is slightly varied with low walls and occasional large rocks. This subtropical reef is frequented by divers and fishers.

Rock made up 45% of the substrate (including rock with turf algae and rock with coralline algae). Hard coral made up 30% of the total substrate, with soft coral at 6% (an increase from last season) (Figure 2.5.1). Sponge (8%), nutrient indicator algae (5%), sand (4%), other (<1%) and bleached coral just over 1% made up the balance of the substrate composition. Turf algae and *Asparagopsis* continue to be the dominant algae.



**Figure 2.5.1** Benthic type and percentage cover, Inner Gneerings: The Caves, Site 2, 2013-2023.

Bleaching affected less than 1% of the total coral population with an average of 16% of any individual colony being bleached. Coral disease was observed on two coral colonies, whilst two *Drupella* scars and three unknown scars were recorded, along with two incidents of unknown damage on the impact survey. Marine debris was limited to one item of fishing line.

Sixteen *Drupella* snails and one giant clam were observed on the invertebrate survey.

A targeted fish survey was conducted, and six butterfly fish were recorded.



**Image 2.5A** Site photo



**Image 2.5B** Unknown scar



**Image 2.5C** *Drupella* snail

# REEF CHECK AUSTRALIA

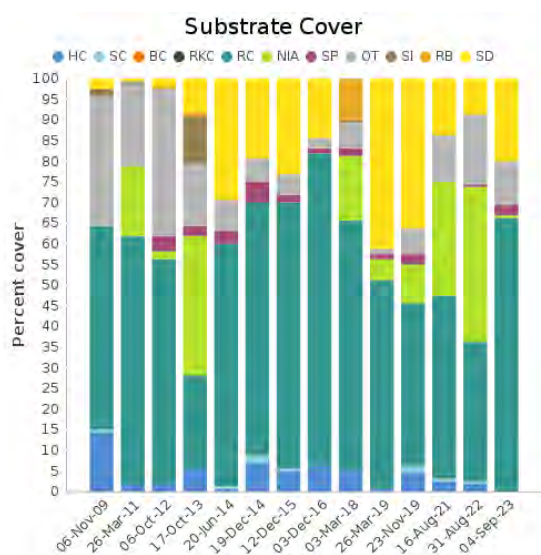
## SEQ Season Summary Report 2022-2023



### 2.6 KINGS BEACH

Kings Beach Reef is located approximately 100m offshore, close to a boat ramp and regular boat traffic, and near to Caloundra's popular beach front area. Water conditions at this site can be challenging (large surf, low visibility) but once suitable conditions were identified this year, we had a survey underway within one hour of confirming suitable conditions.

Rock (mostly with turf algae) (66%) was the dominant substrate followed by sand (20%). Other (ascidians and halimeda) made up 11% of the benthos (Figure 2.6.1). Several hard and soft corals were seen during the survey, however they did not fall under the point intercept substrate survey. Sponge made up just over 2% and nutrient indicator algae (NIA) <1%. This is a reduction in NIA from last year.



**Figure 2.6.1** Benthic type and percentage cover, Kings Beach, 2009-2023

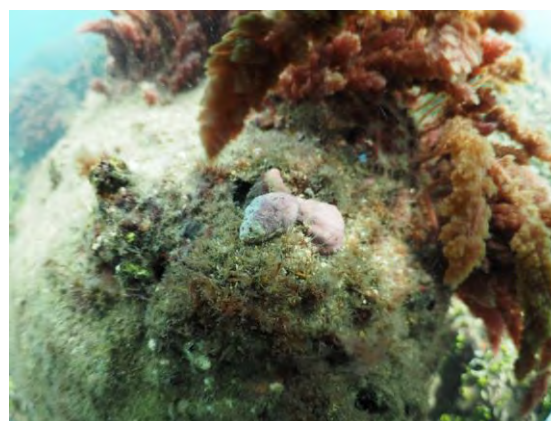
Coral bleaching was not observed, nor were other impacts to the corals. One item of fishing line was the only debris recorded on transect.

Forty seven *Drupella* snails and one collector and three long-spined urchins were recorded during the invertebrate survey.

A fish survey was conducted and one moray eel was recorded off transect, and other non-target fish were also observed.



**Image 2.6A** Site photo



**Image 2.6B** *Drupella* snails



**Image 2.6C** Encrusting hard coral



# REEF CHECK AUSTRALIA

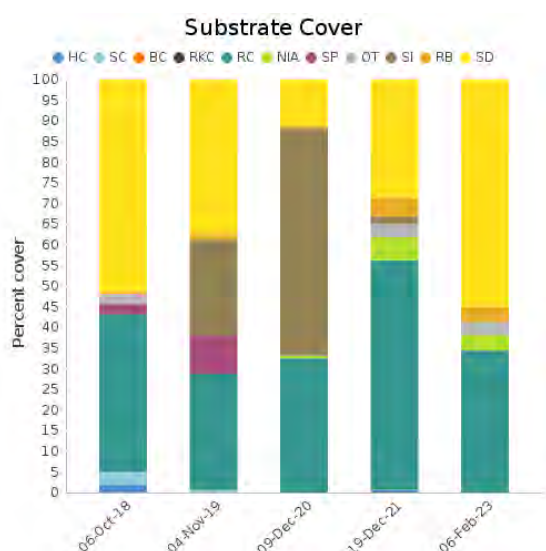
## SEQ Season Summary Report 2022-2023



### 2.7 MOOLOOLABA RIVER, LA Balsa NORTH

The Mooloolah River, La Balsa north, Site 1 was set up in 2018 due to growing interest in the area. The site runs parallel to the shore, at a depth of 5m. It has become a popular diving location for locals and visitors alike due to its easy access and protection from the wind. It is dominated by rock and sand, with hard and soft corals remaining absent on the transect.

Sand at 55% (an increase from 29% last season) and rock at 34% made up the major substrate groups with nutrient indicator algae and rubble recorded at just under 4% each. "Other" at 3% made up the balance of the substrate (Figure 2.7.1). Several hard corals and sponges were seen during the survey, however were not captured within the substrate survey. Macroalgae was not recorded on the transect.

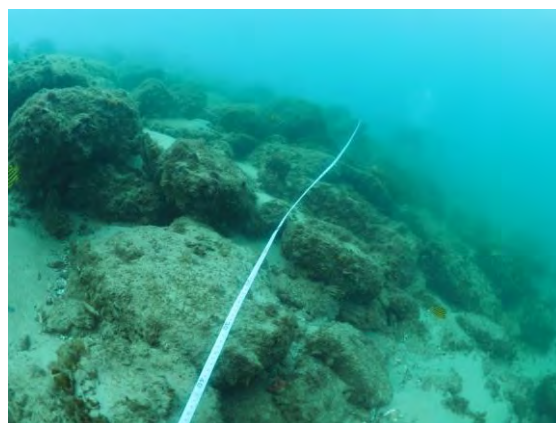


**Figure 2.7.1** Benthic type and percentage cover, Mooloolah River, La Balsa North, 2018-2023.

Impacts to coral were not recorded due to the absence of coral. However, 65 pieces of fishing line debris and eight pieces of general trash were recorded. Coincidentally this is similar to last year.

Two banded coral shrimp, one collector urchin and two *Drupella* snails were recorded during the invertebrate survey.

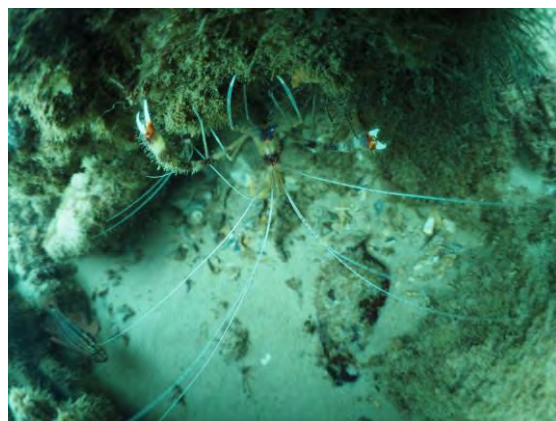
A fish survey was conducted, and 13 butterfly fish and 17 snapper were recorded. Numerous Morwongs and flatworms were observed during the survey.



**Image 2.7A** Site photo



**Image 2.7B** Butterflyfish and others



**Image 2.7C** Banded coral shrimp

# REEF CHECK AUSTRALIA

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### 2.8 MUDJIMBA ISLAND, NORTHWEST

Mudjimba Island is located just off the mainland, close to both the Maroochy and Mooloolah River Mouths on the Sunshine Coast. Mudjimba Island is a popular location for in-water activities including fishing, diving and surfing. The Northwest Reef site was established in 2013 to gather more information about this highly utilised area. Site 1 faces the Northwest side of the island and is situated at a depth of 8m. The site is a relatively flat terrain dominated by hard corals.

Rock was the dominant substrate (38%), followed by hard coral (17%), a decrease from last year (Figure 2.8.1). Soft coral was also lower at 2% of the substrate, with nutrient indicator algae at 17% (up from zero last season) sand (15%), rubble (9%), recently killed coral, other and silt at 1% each making up the rest. Laurencia and turf algae were the dominant algae.

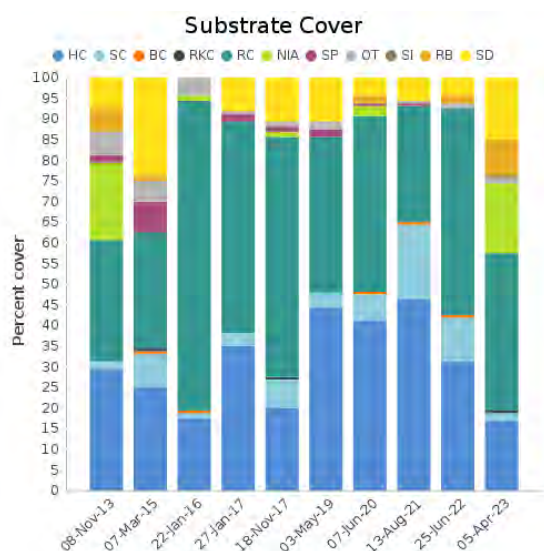


Figure 2.8.1 Benthic type and percentage cover, Mudjimba Island, Northwest Reef, Site 1, 2013-2023.

Impacts were lower this year with four unknown scars, one *Drupella* scar and one incidence of coral disease recorded. Four items of marine debris were observed. Coral bleaching was estimated to affect less than 2% of the total coral population, with an average of 39% per individual colony.

Twenty *Drupella* snails and one lobster were recorded during the invertebrate survey.

A fish survey was conducted and two butterfly fish were recorded.



Image 2.8A Site photo

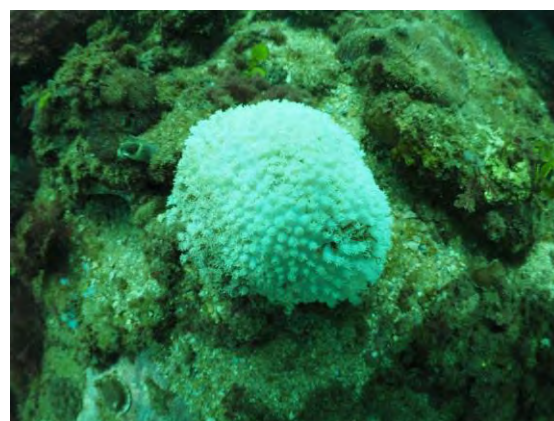


Image 2.8B Bleached coral

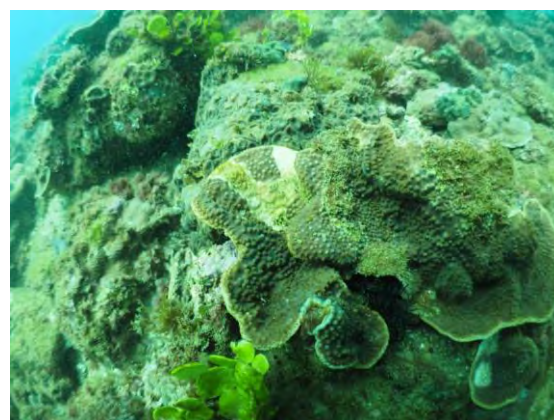


Image 2.8C Unknown scar



# REEF CHECK AUSTRALIA

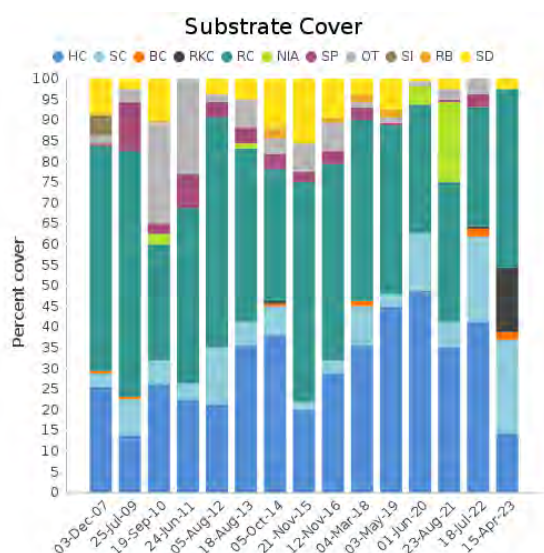
## SEQ Season Summary Report 2022-2023



### 2.9 MUDJIMBA ISLAND, THE LEDGE; S1

Mudjimba Island, The Ledge Site 1 was established in 2007 and is the shallowest site, located on the top of the reef flat. The other sites run parallel to this site on the southern side of Mudjimba Island. It is characterised by rock, and a variety of encrusting corals, soft corals and zoanthids. The location is a frequently used dive and snorkel site due to the availability of shallow reef and diversity of corals and fish.

Rock (43%) was the dominant substrate; followed by soft coral (22%) and recently killed coral (16%). Hard coral was down to 14%, with bleached coral (2%) and sand (2%) making up the balance of the substrate (Figure 2.9.1).



**Figure 2.9.1.** Benthic type and percent cover: Mudjimba Island, The Ledge, Site 1, 2007- 2023.

Coral bleaching affected around 5% of the total coral population, an increase from 1% last year but with a reduced average of 12% of each colony showing surface bleaching.

Two incidences of damage of unknown origin, two of disease and 20 *Drupella* scars were recorded, along with five items of marine debris, mostly fishing line.

Anemones without fish (4) and three anemones with fish, one giant clam, one urchin and one lobster were recorded on the invertebrate survey. *Drupella* snails were high with 110 recorded. A fish survey was conducted and seven butterflyfish, one moray eel and one snapper were recorded. Several wobbegong sharks and a small coral trout were also observed.



**Image 2.9A** Site photo



**Image 2.9B** Bleached soft coral



**Image 2.9C** Lobster



# REEF CHECK AUSTRALIA

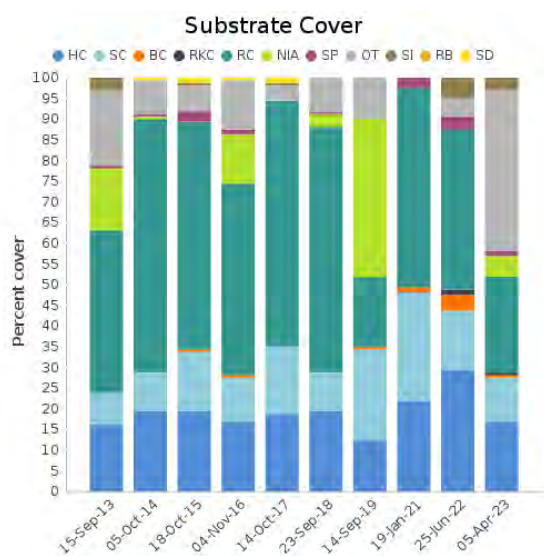
## SEQ Season Summary Report 2022-2023



### 2.10 MUDJIMBA ISLAND, THE LEDGE; S2

Mudjimba Island, The Ledge Site 2 was established in 2013 and is on the deepest section of the steep reef slope. This site sits parallel to Site 1 on the southern side of Mudjimba Island. This deeper location represents a different habitat type to the long-established research Site 1, and Site 3. It is characterised by rock, and a variety of encrusting corals and corallimorphs. The location is well known as a site inhabited by a variety of nudibranch species and turtles.

Other – calcareous algae and corallimorphs - (39%) was the dominant substrate; followed by rock (23%), hard coral (17%) and soft coral (11%) (Figure 2.10.1). Nutrient indicator algae (5%), silt (3%), sponge (1%) and bleached coral and recently killed coral at <1% each made up the balance. Macroalgae was not recorded on the transect. (Figure 2.10.1)



**Figure 2.10.1** Benthic type and percentage cover, Mudjimba Island, The Ledge, Site 2, 2013-2023.

Coral bleaching affected <1% of the total coral population, with an average of 69% of each colony showing surface bleaching.

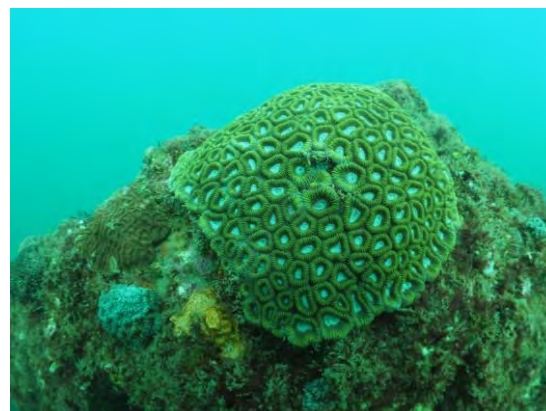
Three unknown scars, three *Drupella* scars and two items of marine debris were recorded.

One urchin and 12 *Drupella* snails were recorded on the invertebrate survey. A Triton snail (one of our target species) was observed off-transect.

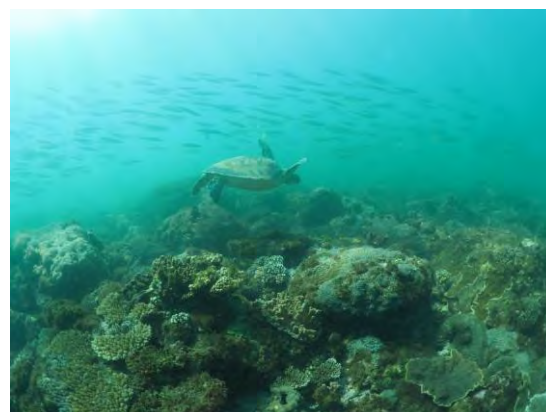
A fish survey was conducted and 11 butterfly fish, one snapper and one sweetlip were recorded.



**Image 2.10A** Site photo



**Image 2.10B** Healthy coral



**Image 2.10C** Turtle (off transect)

# REEF CHECK AUSTRALIA

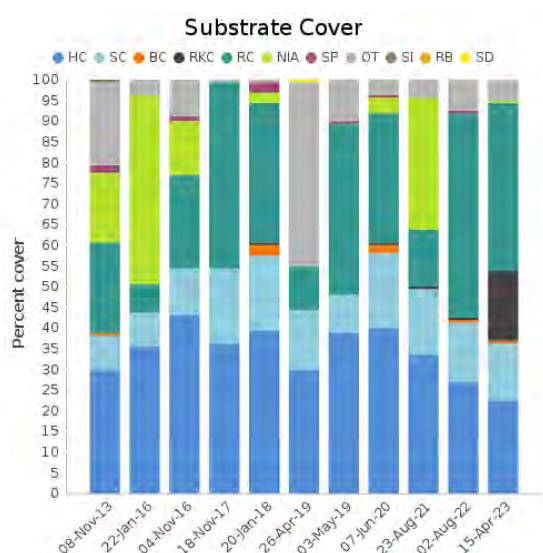
## SEQ Season Summary Report 2022-2023



### 2.11 MUDJIMBA ISLAND, THE LEDGE; S3

The Ledge Site 3 was established in 2013, to gather more information about this highly utilised area. Site 3 is situated on the reef slope and sits in between the shallower Site 1 and the deeper Site 2 on the southern side of the island. This additional location represents a different habitat type to Sites 1 and 2, despite their proximity to each other.

Rock (41%) dominated the substrate with hard corals accounting for 23% of the benthos. Recently killed coral (17%), soft coral (14%), other (5%), and bleached coral and nutrient indicator algae each making up <1%, were the balance of the substrate. Turf algae was the dominant algae recorded. (Figure 2.11.1)



**Figure 2.11.1** Benthic type and percentage cover, Mudjimba Island, The Ledge, Site 3, 2013-2023.

Coral bleaching affected 6% of the total coral population, with an average of 17% of the colony with surface bleaching.

Eight counts of damage, five unknown scars, eight *Drupella* scars and three incidents of coral disease were recorded on the impacts survey. Marine debris was not observed.

On the invertebrate survey, one urchin, one anemone (without fish) and 30 *Drupella* snails were recorded, a significant decrease in *Drupella* on last year, but consistent with previous years.

Eight butterflyfish and four snapper were recorded during the fish survey.



**Image 2.11A** Site photo



**Image 2.11B** Wobbegong shark



**Image 2.11C** Butterflyfish



# REEF CHECK AUSTRALIA

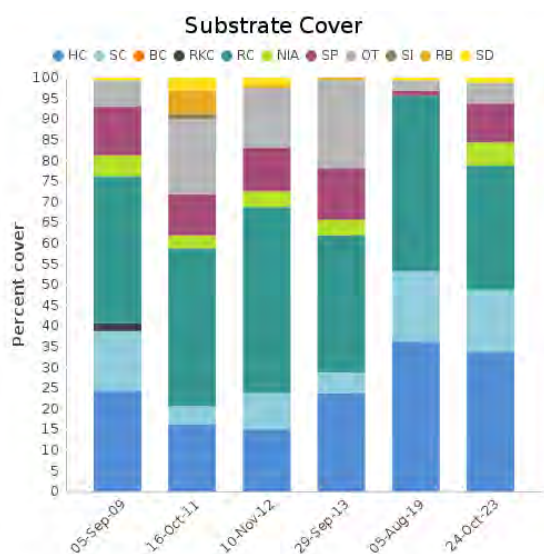
## SEQ Season Summary Report 2022-2023



### 2.12 JEW SHOAL, THE PINNACLE; S1

Jew Shoal, The Pinnacle, Site 1 was established in 2009 and hosts hard corals, soft corals, sponges and other benthic invertebrates. This site was last surveyed in 2019.

Hard coral (34%) dominated the substrate with rock accounting for 30% of the benthos. Soft coral (15%), sponge (9%), nutrient indicator algae (6%), "other" (5%) and sand just over 1% made up the balance of the substrate. Turf algae was the dominant algae recorded.



**Figure 2.12.1** Benthic type and percentage cover, Jew Shoal, The Pinnacle, Site 1, 2009-2023.

Coral bleaching affected 1% of the total coral population, with an average of 3% of the colony with surface bleaching.

Six unknown scars, and 17 items of marine debris (fishing line) were recorded.

On the invertebrate survey, three urchins, seven anemones (5 without fish) and 17 *Drupella* snails were recorded.

Six butterflyfish, five snapper and one sweetlip were recorded during the fish survey



**Image 2.12A** Site photo



**Image 2.12B** Unknown scar



**Image 2.12C** Fishing Line



# REEF CHECK AUSTRALIA

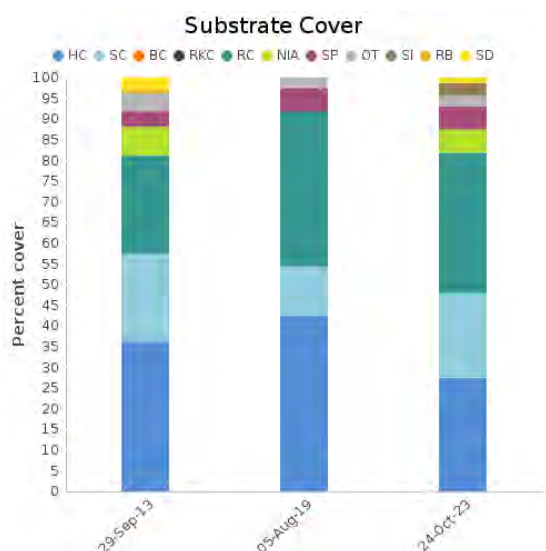
## SEQ Season Summary Report 2022-2023



### 2.13 JEW SHOAL, THE PINNACLE; S2

Site 2 was established in 2013 and runs parallel to Site 1. This site has only been surveyed twice before, in 2013 and 2019.

Rock (34%) dominated the substrate with hard corals accounting for 27% of the benthos. Soft coral made up 21%, with nutrient indicator algae and sponge at 6% each, followed by silt (3%), other (3%) and sand just over 1%, making up the balance of the substrate (Figure 2.13.1). Turf algae was the dominant algae recorded



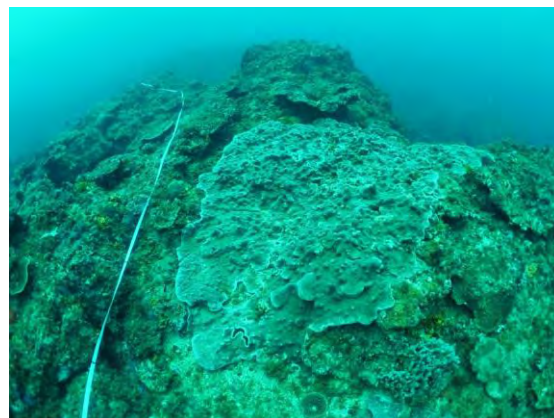
**Figure 2.13.1** Benthic type and percentage cover, Jew Shoal, The Pinnacle, Site 2, 2013-2023.

Coral bleaching was not observed on this site.

Three counts of damage, four unknown scars, four *Drupella* scars and eight counts of marine debris (mainly fishing line) were recorded on the impacts survey.

On the invertebrate survey, two urchins, one anemone (without fish), one banded coral shrimp, one lobster and 23 *Drupella* snails were recorded.

Nine butterflyfish, one sweetlip and one snapper were recorded during the fish survey.



**Image 2.13A** Site photo



**Image 2.13B** Slipper lobster



**Image 2.13C** Sweetlips

# REEF CHECK AUSTRALIA

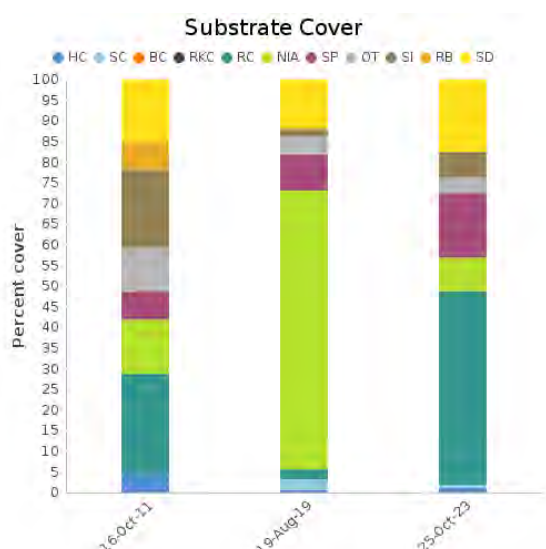
## SEQ Season Summary Report 2022-2023



### 2.14 LITTLE HALLS REEF; S1

Little Halls Reef Site 1 was established in 2011. It has only been surveyed once since then in 2019.

Rock (47%) dominated the substrate followed by sand at 17% and sponge at 16%. Nutrient indicator algae (8%), silt (6%), other (4%) and hard coral just over 1% and soft coral just under 1% were the balance of the substrate (Figure 2.14.1). Turf algae was the dominant algae recorded.

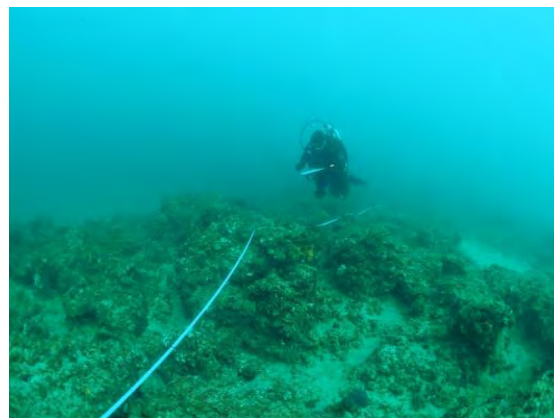


**Figure 2.14.1** Benthic type and percentage cover, Little Halls Reef, Site 1, 2011-2023.

Coral bleaching was not observed. Eleven counts of marine debris was the only impact observed and similar to previous surveys.

On the invertebrate survey, eight urchins and 32 *Drupella* snails were recorded.

One grouper, nine snapper and one sweetlip were recorded during the fish survey.



**Image 2.14A** Site photo



**Image 2.14B** Ascidians



**Image 2.14C** Fishing line



# REEF CHECK AUSTRALIA

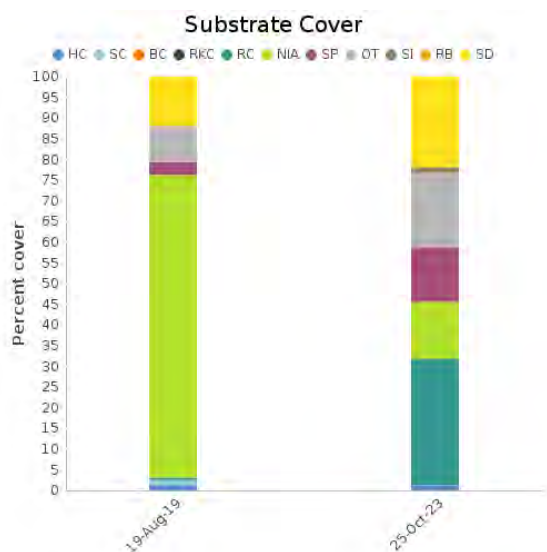
## SEQ Season Summary Report 2022-2023



### 2.15 LITTLE HALLS REEF; S2

Little Halls Reef Site 2 was established in 2019 and has not been re-surveyed since that date. This site sits at around 14m making it our deepest site that we monitor.

Rock (31%) dominated the substrate with hard corals only accounting for just over 1% of the benthos. Sand (22%), other (18%), nutrient indicator algae (14%), sponge (13%) and silt just over 1% were the balance of the substrate (Figure 2.15.1). Turf algae was the dominant algae recorded.



**Figure 2.15.1** Benthic type and percentage cover, Little Halls Reef, Site 2, 2019-2023.

Coral bleaching was not observed and four counts of marine debris was again the only impact observed

On the invertebrate survey, one urchin and 72 *Drupella* snails were recorded, a significant increase in *Drupella* since our last survey in 2019. One lobster was observed off transect,

One butterflyfish, four grouper, one parrotfish, ten snapper and three sweetlip were recorded during the fish survey.



**Image 2.15A** Site photo



**Image 2.15B** Sponge



**Image 2.15C** *Drupella* snails



# REEF CHECK AUSTRALIA

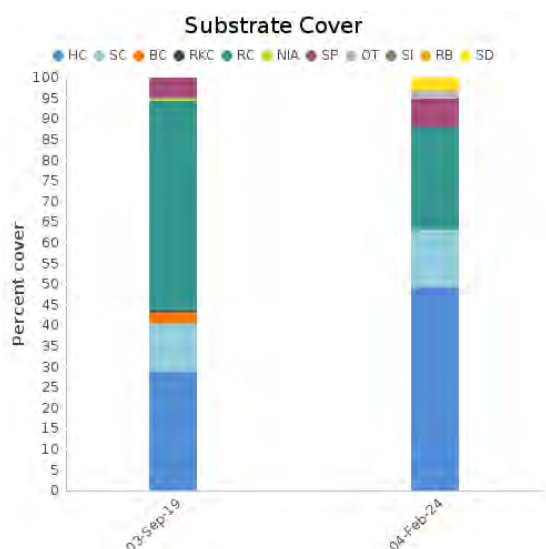
## SEQ Season Summary Report 2022-2023



### 2.16 NOOSA – THE CAVES; S1

Noosa, The Caves, Site 1 was established in 2019 and has not been re-surveyed since that date. This site sits at around 13m.

Hard coral (49%, up from 29% in 2019) dominated the substrate with rock accounting for 25% of the benthos. Soft coral (14%), sponge (7%), sand (3%) and “other” just under 2% were the balance of the substrate (Figure 2.16.1). Turf algae was the dominant algae recorded.



**Figure 2.15.1** Benthic type and percentage cover, Noosa, The Caves, Site 1, 2019-2023.

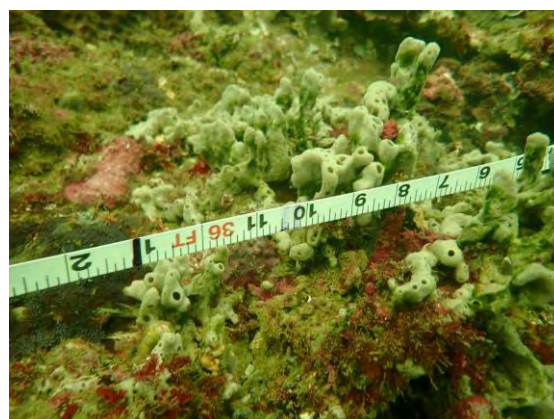
Coral bleaching was observed at an average of 74% per individual colony, but at only 2% of the population. Unknown scars (8) were the highest impact with five *Drupella* scars and two items of marine debris recorded.

On the invertebrate survey, two lobsters and 15 *Drupella* snails were recorded.

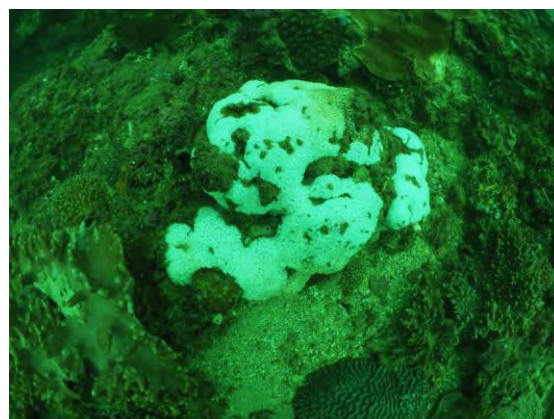
Twelve butterflyfish and two snapper were recorded during the fish survey. An octopus was also observed.



**Image 2.16A** Site photo



**Image 2.16B** Encrusting sponge



**Image 2.16C** Bleached coral

# REEF CHECK AUSTRALIA

## SEQ Season Summary Report 2022-2023



### 3.0 INNER MORETON BAY SITE REPORTS:

#### 3.1 AMITY POINT, SITE 2

This relatively sheltered site is located on the south-west end of North Stradbroke Island and is frequented by vast numbers of fishers, boaters and divers all year round. The relatively shallow site runs along the rock wall, commencing near the public boat ramp. The site is subject to strong tidal currents and the amount of growth on the rocks varies throughout the site.

Rock (59%) and silt (17%) remain the dominant substrate followed by hard coral (12%), sand (9%) and soft coral (4%) (Figure 3.1.1).

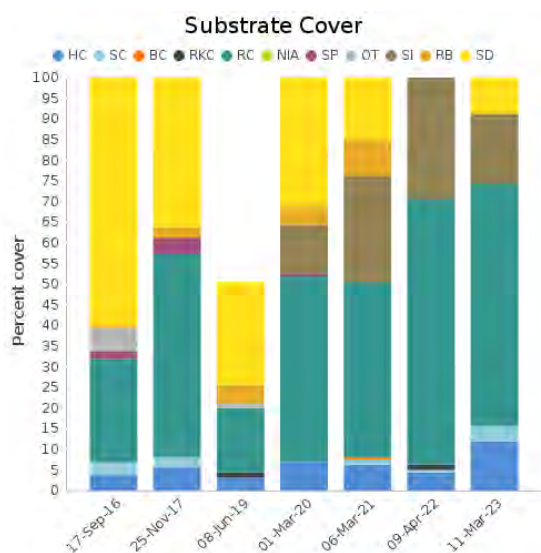


Figure 3.1.1. Benthic type and percent cover: Amity Point, Site 2, 2016- 2023.

Bleached coral was observed at an average of 29% of each colony, with an average of 32% of the population. These results may be influenced by the low amount of hard coral recorded.

Twelve counts of coral damage and 26 items of marine debris were recorded. Seventy-nine urchins, five anemones and one banded coral shrimp were recorded on the invertebrate survey.

During the fish survey, 32 butterfly fish and five moray eels were recorded. Wobbegong sharks and octopus were also observed in the area.



Image 3.1A Site photo with Wobbegong shark



Image 3.1B Octopus and urchin



Image 3.1C Butterflyfish



# REEF CHECK AUSTRALIA

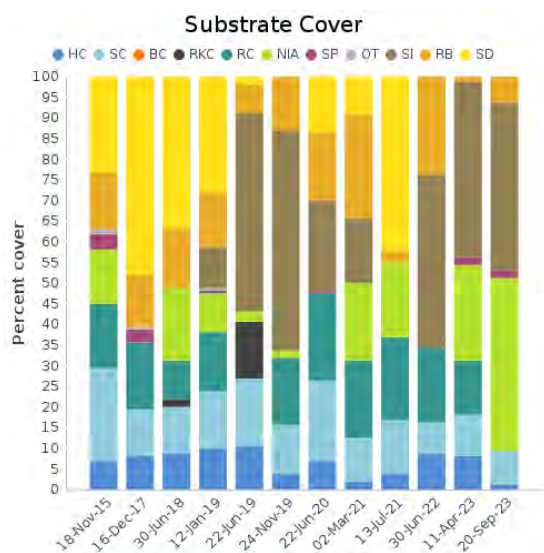
## SEQ Season Summary Report 2022-2023



### 3.2 GREEN ISLAND NORTH, SITE 1

This site is located on the northern side of Green Island. The site was established in 2015 and sits at a depth of 5m. Once again weather was the limiting factor with these surveys, however we were able to complete surveys in 2 different seasons.

During the summer survey hard coral made up 8% of the substrate but silt (43%) dominated followed by nutrient indicator algae (23%), rock (13%), soft coral (10%), sponge (2%) and rubble (1%). During the winter survey nutrient indicator algae was high at 42%, followed by silt 41%. Soft coral made up 8%, rubble 6%, sponge 2% and hard coral 1% (Figure 3.2.1).



**Figure 3.2.1.** Benthic type and percent cover: Green Island North, Site 1, 2015 - 2023

Coral bleaching was observed to be 2% and 3% of the coral population, with an average of 47% of any individual colony bleached in summer and 63% of any individual colony bleached in winter.

Coral damage was not recorded and only one unknown scar was recorded in summer. Six items of fishing line were recorded in summer and three items of general marine debris were recorded in winter. One Trochus shell was the only target invertebrate observed over both surveys.

Fish surveys were conducted with eight butterflyfish and six snapper recorded during the summer survey. Target fish were not recorded during the winter survey, however this may have been a result of the low visibility.



**Image 3.2A** Site photo



**Image 3.2B** Bleached coral



**Image 3.2C** Soft corals



# REEF CHECK AUSTRALIA

## SEQ Season Summary Report 2022-2023



### 3.3 GREEN ISLAND WEST, SITE 1

This site is located on the western side of green island on the edge of the reef flat. The site was established in 2017 and site at a depth of 5m. This site hosts patchy hard and soft coral on a soft sediment benthos.

Nutrient indicator algae (43%) was the dominant substrate during the summer survey, followed by silt (33%). Hard coral (6%), rock (8%), sponge (4%), soft coral (3%) and rubble (3%) made up the balance. During the winter survey silt (34%) was the dominant substrate followed by nutrient indicator algae (32%), rubble (23%), rock (8%), soft coral (2%) and sponge and other just under 1% each (Figure 3.3.1).

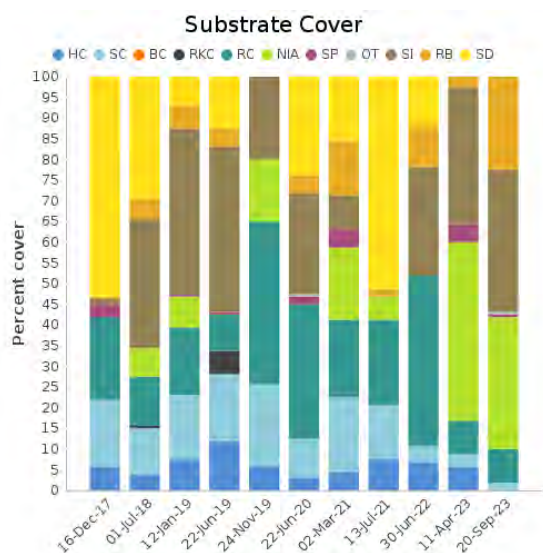


Figure 3.3.1. Benthic type and percent cover: Green Island West, Site 1, 2017 - 2023

Coral bleaching averaged 1% of the coral population bleached in summer and 6% of the population bleached in winter, with an average 20% and 33% of each colony observed as bleached respectively.

Damage and disease were not observed but one unknown scar was recorded in summer. Only two items of general trash were recorded, during the summer survey. Eight *Drupella* snails recorded during the winter survey were the only targeted invertebrates recorded.

One butterflyfish was observed during the summer fish survey.



Image 3.3A Massive hard coral



Image 3.3B Dominant algae – *Sargassum* spp.



Image 3.3C Trash

# REEF CHECK AUSTRALIA

## SEQ Season Summary Report 2022-2023



### 3.4 MUD ISLAND, CORAL GALORE

Mud Island is situated between the Port of Brisbane and Moreton Island and was historically used as anchorage for ships that were unable to access the shallow Brisbane River. This site is situated on a rocky slope and supports a population of corals, in contrast to the neighbouring survey site called Rubble Patch (See Section 3.5).

Hard coral made up 2% whilst rock made up 34% of the substrate during the summer survey. Silt and rubble each contributed 16%, with soft coral at 25%. Sand (5%) with bleached coral and nutrient indicator algae at just under 1% each made up the balance. During the winter survey levels of nutrient indicator algae increased to 35% whilst hard coral remained at 2% and soft coral remained at 25%. Silt (21%), along with rubble (8%), sand (4%) and other (4%) made up the balance of the substrate. (Figure 3.4.1).

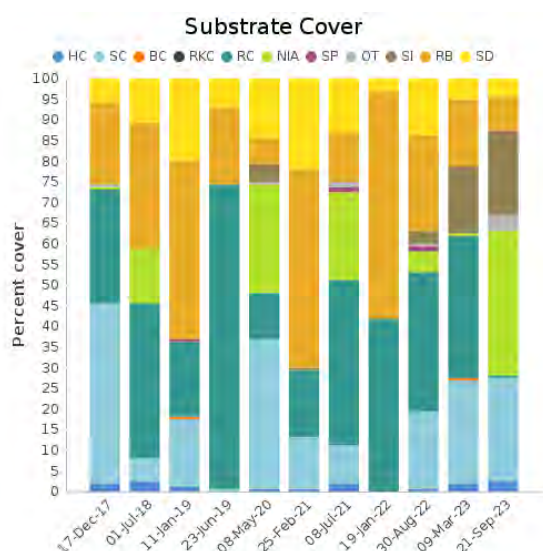


Figure 3.4.1. Benthic type and percent cover: Mud Island, Coral Galore, 2017 - 2023

One incident of coral damage was recorded in both surveys, with one unknown scar in summer and one item of marine debris recorded in winter. Bleaching of 4% of the population was recorded in summer, increasing to 5% in winter. Average percentages for individual colonies were 56% and 38% respectively.

Five *Drupella* snails were recorded in summer, with ten recorded in winter.

Fish surveys were conducted with seven butterflyfish and two snapper recorded in summer.



Image 3.4A Site photo



Image 3.4B Sponge



Image 3.4C Soft coral



# REEF CHECK AUSTRALIA

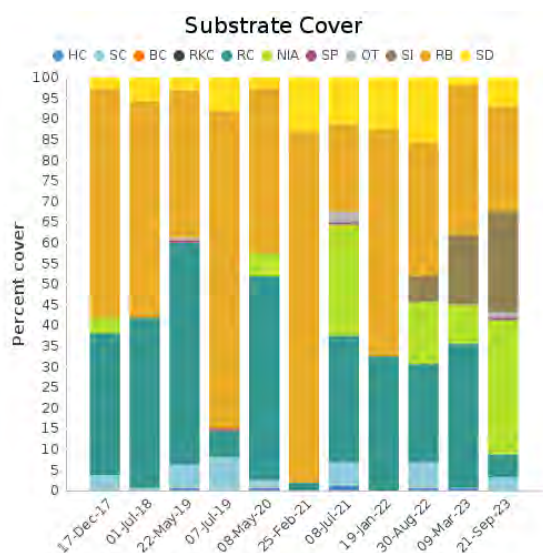
## SEQ Season Summary Report 2022-2023



### 3.5 MUD ISLAND, RUBBLE PATCH

This site at Mud Island consists primarily of unconsolidated coral rubble, sparse soft coral and algae fields. This site was first surveyed in 2017 after it was identified by Roelfsema et al (2017) as an area of interest.

Hard coral at less than 1% was detected during the summer substrate survey only and soft coral at 3% was detected during the winter survey only. Rubble made up 36% and 26% of the substrate respectively. Rock (35%), silt (17%) nutrient indicator algae (9%), and sand (2%) made up the balance in summer. During the winter survey, silt (24%), nutrient indicator algae (33%), sand (7%), rock (6%) and other (1%) made up the balance. (Figure 3.5.1).



**Figure 3.5.1.** Benthic type and percent cover: Mud Island, Rubble Patch, 2017 - 2023

Bleaching was observed at 4% of the population and an average of 7% of an individual colony during the winter survey. No bleaching or impacts were recorded in summer. The winter survey saw one incident of coral damage. Invertebrates were limited to six *Drupella* in summer and 14 *Drupella* recorded in winter during the invertebrate surveys.

Fish surveys were conducted but no target fish were recorded in either season.



**Image 3.5A** Site photo



**Image 3.5B** Surveyor in action - summer



**Image 3.5C** Non-target invertebrate

# REEF CHECK AUSTRALIA

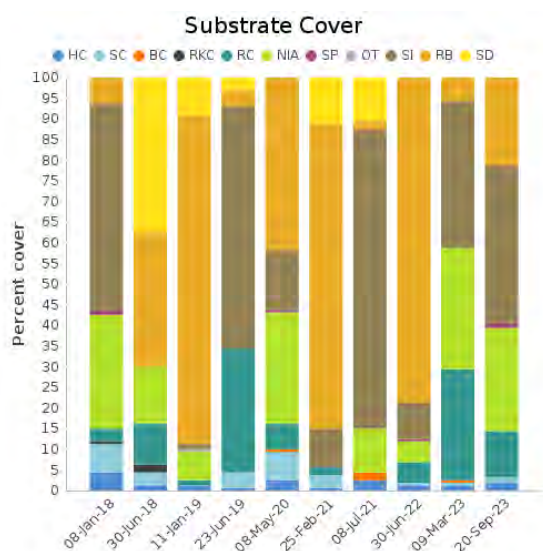
## SEQ Season Summary Report 2022-2023



### 3.6 ST HELENA, PALINDROME

This site at St Helena Island is located in close proximity to the jetty and runs parallel to the shore. The substrate is generally soft sediment and sand with patchy coral cover.

Silt dominated (36%) during the summer survey. Nutrient indicator algae was high at (30%), followed by rock (27%). Hard coral remained at 1% with soft coral and bleached coral at just under 1% each. Rubble (6%) made up the balance of the substrate in summer. Silt (38%) remained high in winter, followed by nutrient indicator algae (NIA) (25%). Rubble (21%), rock (11%), hard coral (2%), soft coral and sponge just over 1% each made up the balance (Figure 3.6.1).

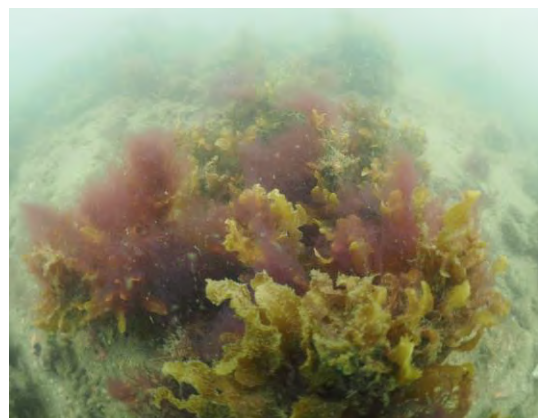


**Figure 3.6.1.** Benthic type and percent cover: St Helena Island, Palindrome, 2018 – 2023.

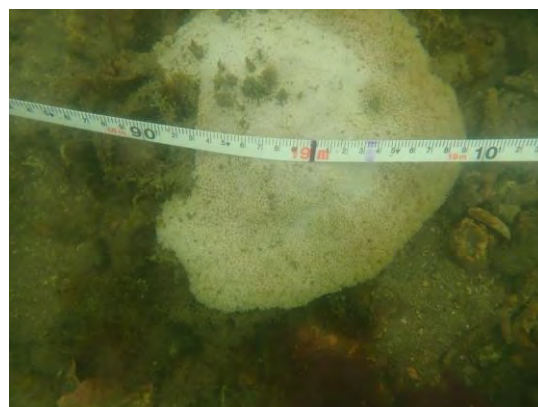
Bleaching of coral colonies averaged 3% in summer and 5% in winter. An average of 28% and 30% bleaching of individual coral colonies respectively was recorded. Two unknown scars were recorded in summer with one item of marine debris were also recorded. One incident of coral disease and five items of marine debris were recorded in winter.

One lobster and two *Drupella* snails were recorded in summer with no target invertebrates recorded in winter.

Fish surveys were conducted with only one butterflyfish recorded during the summer survey.



**Image 3.6A** Site photo showing purple NIA



**Image 3.6B** Bleached hard coral



**Image 3.6C** Wobbegong shark



# REEF CHECK AUSTRALIA

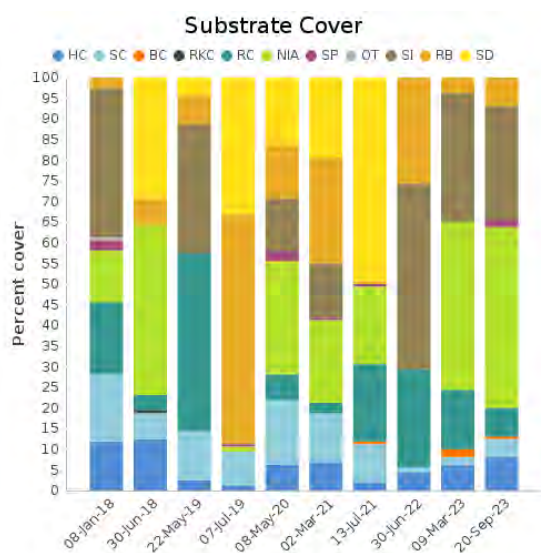
## SEQ Season Summary Report 2022-2023



### 3.7 ST HELENA, RAY OF SUNSHINE

This site at St Helena Island is located off the southern end of the island. The substrate is generally soft sediment and sand with patchy coral cover; however it has a greater cover of coral than Palindrome.

Nutrient indicator algae (41%) dominated the summer survey. Silt (31%) and rock (14%), along with hard coral (6%), rubble (4%) and soft coral and bleached coral at 2% each making up the balance. During the winter survey nutrient indicator algae remained high at 44%. Silt made up 28% of the substrate, with hard coral (8%), rock and rubble each 7%, soft coral (4%), sponge (2%) and bleached coral (1%) making up the balance of the substrate. (Figure 3.7.1).



**Figure 3.7.1.** Benthic type and percent cover: St Helena Island, Ray of Sunshine, 2018 - 2023

Total coral population bleaching averaged 3% in summer and 4% in winter, with an average of 65% of any individual colony being bleached in summer and 57% in winter. One unknown scar recorded in summer was the only other impact observed. Target invertebrates were limited to four *Drupella* snails in winter.

Fish surveys were conducted and 13 butterflyfish and one sweetlips were recorded in summer but no target fish were recorded in winter.



**Image 3.7A** Site photo and bleached coral



**Image 3.7B** Macroalgae



**Image 3.7C** Soft coral

# REEF CHECK AUSTRALIA

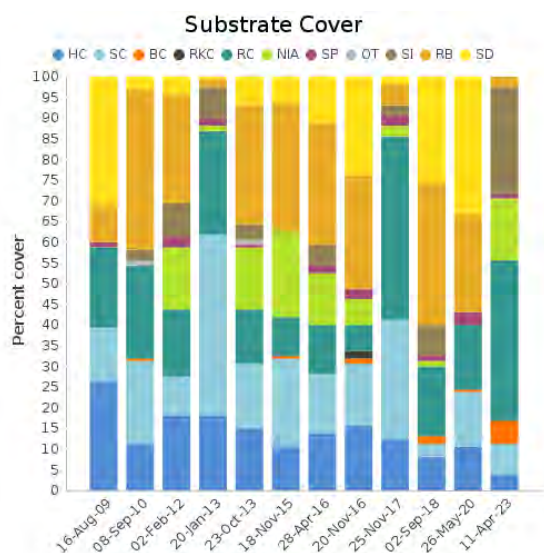
## SEQ Season Summary Report 2022-2023



### 3.8 PEEL ISLAND, NORTH

This site at Peel Island is an established Marine National Park and Green “No-Take” zone. This site hosts hard and soft coral communities and has been surveyed as funding allows since 2009.

This site was not surveyed in 2021/2 but hard coral cover has decreased since 2019, making up just under 4% of the substrate. Rock is the dominant substrate at 39%, with silt (26%) the next highest contributor. Nutrient indicator algae at 15% is an increase from previous surveys. Soft coral contributed 8%, with bleached coral (6%), rubble (3%) and sponge (1%) making up the balance of the substrate. (Figure 3.8.1).



**Figure 3.8.1.** Benthic type and percent cover: Peel Island, North, 2009 – 2023.

Bleaching affected less than 1% of the total coral population with an average of 57% of any individual colony being bleached.

We recorded five incidents of coral disease and one unknown scar, with eight items of marine debris also recorded. Target invertebrates were not recorded on the invertebrate survey.

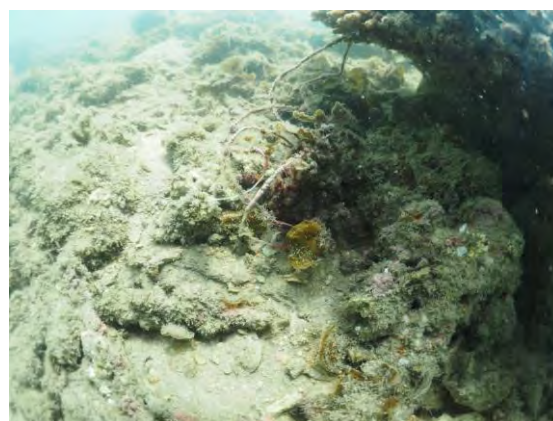
A fish survey was conducted and 13 butterflyfish and two snapper were recorded.



**Image 3.8A** Site photo



**Image 3.8B** Bleached hard coral



**Image 3.8C** Fishing line



# REEF CHECK AUSTRALIA

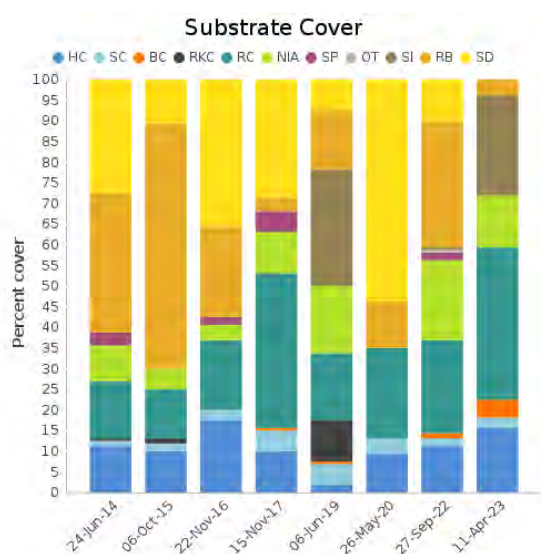
## SEQ Season Summary Report 2022-2023



### 3.9 PEEL ISLAND, NORTH-EAST

This site at Peel Island is located on a shallow fringing reef to the north of the Platypus wreck. It hosts patchy hard coral on a sandy rubble bottom and was established in 2014.

Rock dominated the substrate at 37% followed by silt (24%), hard coral (16%) and nutrient indicator algae (13%). Soft coral made up 2%, with bleached coral and rubble both at 4% making up the balance (Figure 3.9.1).



**Figure 3.9.1.** Benthic type and percent cover: Peel Island, North-east, 2014 - 2023

Bleaching affected 1.5% of the total coral population with an average of 67% of any individual colony being bleached. Two incidents of coral disease, 18 items of fishing line and nine of general marine debris, were recorded. Three *Drupella* snails were recorded during the invertebrate survey.

A fish survey was conducted and 11 butterfly fish were recorded.



**Image 3.9A** Site photo



**Image 3.9B** Foliose hard coral



**Image 3.9C** Fishing debris

# REEF CHECK AUSTRALIA

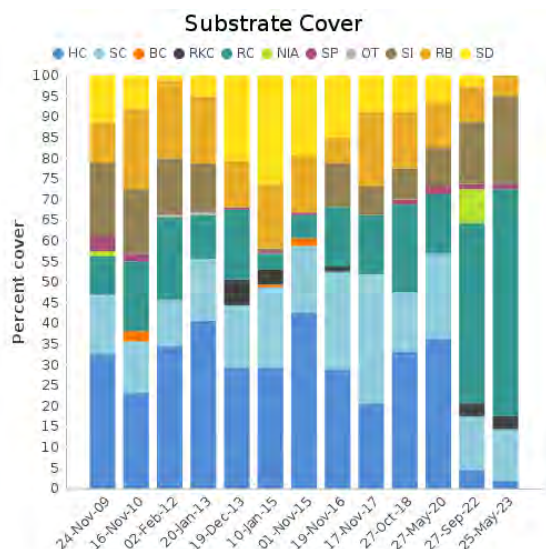
## SEQ Season Summary Report 2022-2023



### 3.10 GOAT ISLAND, EAST

This site sits on the eastern side of Goat Island, adjacent the channel used by the North Stradbroke Ferry. The site historically hosted between 20 and 30% hard coral, however much of this coral was observed to be dead and covered in turf algae in September 2022. The live hard coral cover has reduced from 4% in September to just under 2% in May 2023.

Rock (which includes dead coral covered in turf algae) dominated the substrate at 55%, up from 44%. Silt attributed 21%, soft coral 12%, rubble 5%, recently killed coral 3%, hard coral at just under 2% and sponge 1% of the substrate (Figure 3.10.1).



**Figure 3.10.1.** Benthic type and percent cover: Goat Island, East, 2009 - 2023

Bleaching affected less than 1% of the total coral population with an average of 42% of any individual colony being bleached. Two incidents of coral disease were recorded, along with 11 counts of marine debris (fishing line). No invertebrates were recorded.

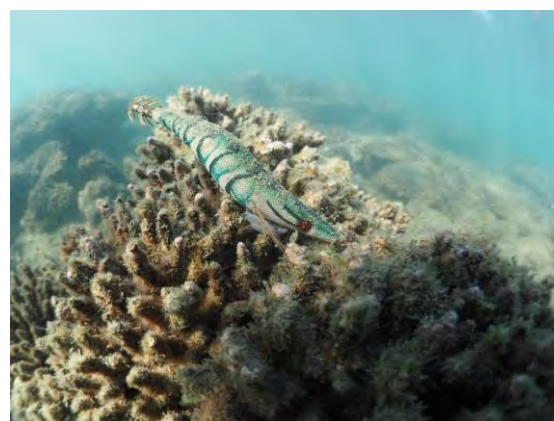
A fish survey was conducted and six butterflyfish and one moray eel were recorded.



**Image 3.10A** Site photo showing dead hard coral



**Image 3.10B** Site photo showing soft corals



**Image 3.10C** Fishing debris



# REEF CHECK AUSTRALIA

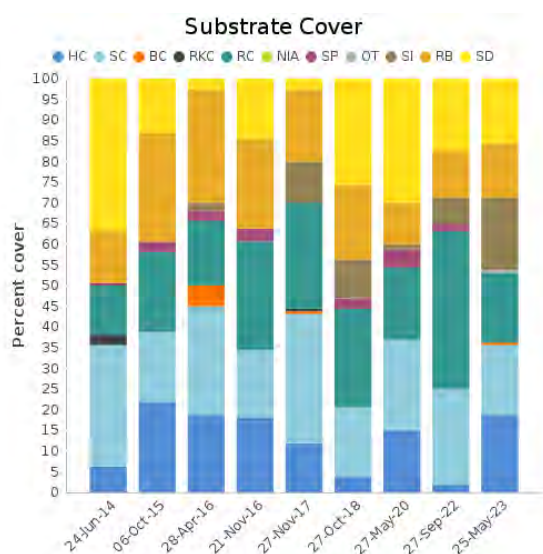
## SEQ Season Summary Report 2022-2023



### 3.11 GOAT ISLAND, WEST

This site sits on the western side of Goat Island and like the eastern side also suffered a decline in hard coral cover in September, reducing from 15% to less than 2%. However, during this survey we noted levels have returned to around 19% and soft coral communities remain at consistent levels.

Hard coral (19%) and soft coral, silt and rock at 17% each, made up the majority of the substrate. Sand (15%), rubble (13%), other (<1%) and bleached coral (<1%) made up the balance. (Figure 3.11.1).



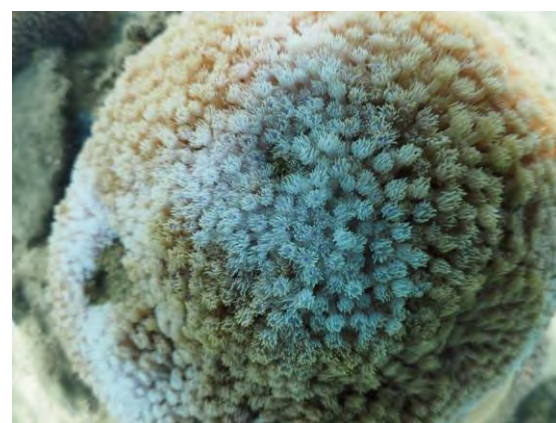
**Figure 3.11.1.** Benthic type and percent cover: Goat Island, West, 2014 - 2023

Bleaching was observed to affect 2.5% of the coral population, with an average of 31% of any individual colony bleached. Six incidents of coral disease and one unknown scar were recorded. One item of fishing line and five of general marine debris were recorded. No target invertebrates were observed.

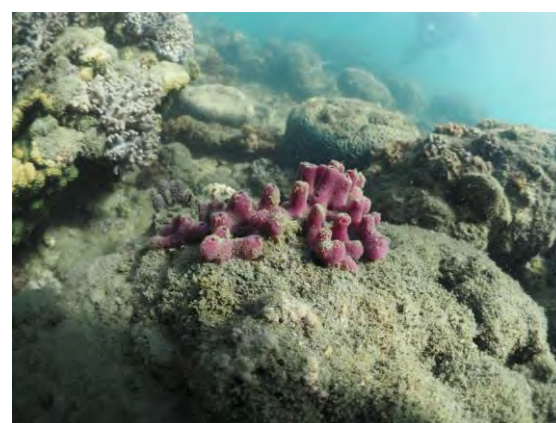
A fish survey was conducted and three butterflyfish were recorded.



**Image 3.11A** Site photo



**Image 3.11B** Bleached coral



**Image 3.11C** Sponge (off transect)

# REEF CHECK AUSTRALIA

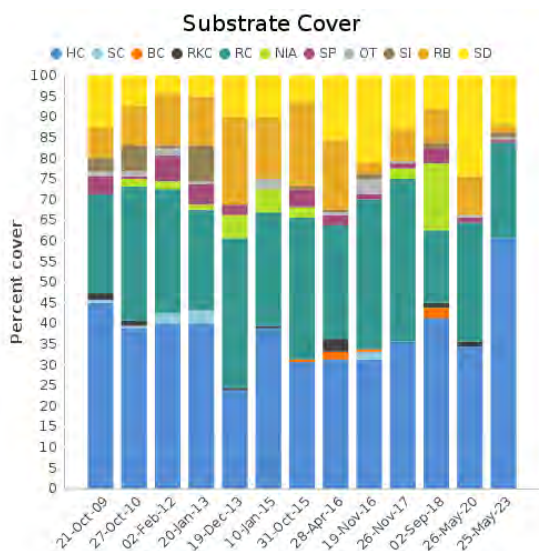
## SEQ Season Summary Report 2022-2023



### 3.12 MYORA REEF, S1

Site 1 was established in 2009 and is located on the reef flat. This fringing reef is located on the western side of North Stradbroke Island and is located within the green zone, which provides protection for this area. The site is surveyed as funding allows.

Hard coral (61%) made up the majority of the substrate, with rock contributing 23%. Sand (12%), rubble (2%), sponge (<1%) and other (<1%) made up the balance. (Figure 3.12.1).



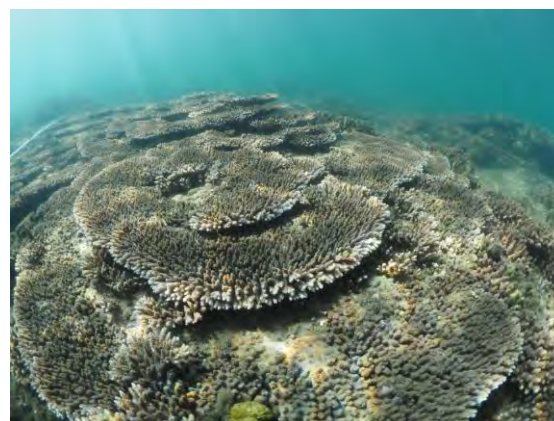
**Figure 3.12.1.** Benthic type and percent cover: Myora Reef, S1, 2009 - 2023

Bleaching was observed to affect 1% of the coral population, with an average of 30% of any individual colony bleached, which is consistent with our last survey in 2020. Nine incidents of coral disease and two of unknown damage were recorded. Two items of fishing line were recorded. Four long-spined urchins were the only target invertebrates observed.

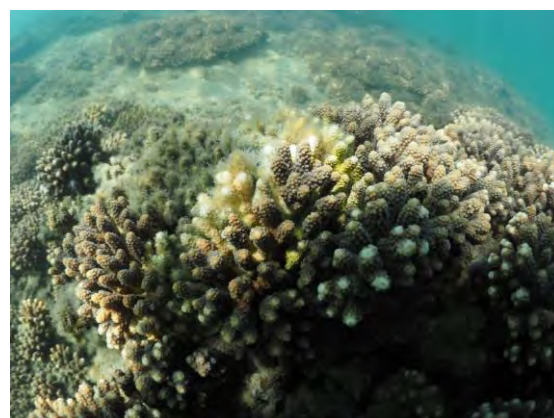
A fish survey was conducted and 32 butterflyfish and 24 snapper were recorded.



**Image 3.12A** Site photo



**Image 3.12B** Hard coral



**Image 3.12C** Coral disease



# REEF CHECK AUSTRALIA

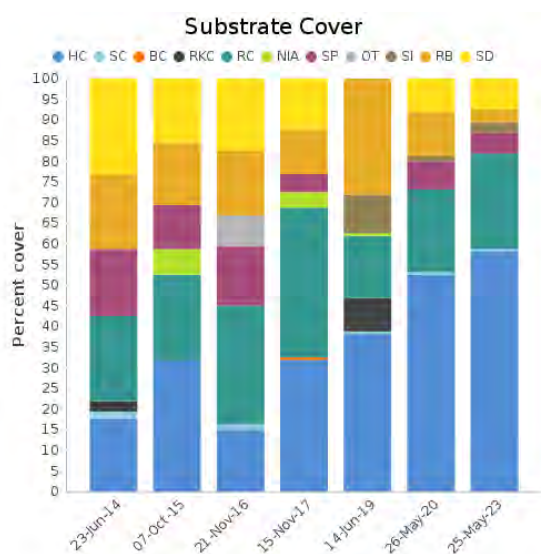
## SEQ Season Summary Report 2022-2023



### 3.13 MYORA REEF, S2

This site is shallower than site 1 and was established in 2014. The site commences approximately at the same location as site 1 but heads in a more south-easterly direction into the shallower section of the reef.

Hard coral (58%) made up the majority of the substrate. Rock (including rock with turf algae) made up 23%, whilst sand (7%), rubble (3%), silt (2%) and soft coral (<1%) made up the balance. (Figure 3.13.1).

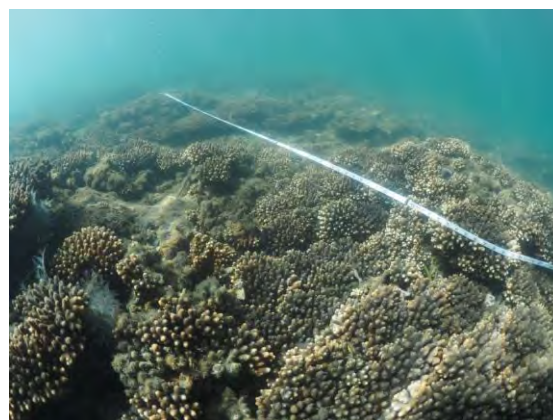


**Figure 3.13.1.** Benthic type and percent cover: Myora Reef, S2, 2014 - 2023

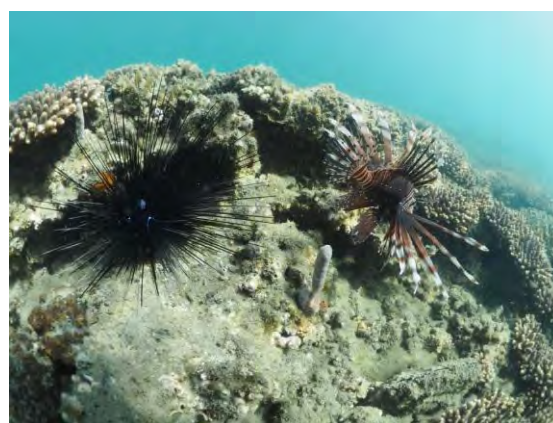
Bleaching was observed to affect 1% of the coral population, with an average of 5% of any individual colony bleached. This is a reduction to previous years.

Three incidents of coral disease two unknown scars and two counts of coral damage were recorded. Marine debris was not observed. Five long-spined urchins were observed during the invertebrates' survey.

A fish survey was conducted and 22 butterflyfish and 14 snapper were recorded.



**Image 3.13A** Site photo



**Image 3.13B** Long-spined sea urchin



**Image 3.13C** Bleached coral

# REEF CHECK AUSTRALIA

## SEQ Season Summary Report 2022-2023



### 4.0 OUTER MORETON BAY SITE REPORTS:

#### 4.1 SHAG ROCK, EAST

Shag Rock East is a relatively sheltered cove situated on the south-eastern side of Shag Rock and sits on the reef slope. It is dominated by branching and encrusting corals and was established in 2008.

Hard coral accounted for 11% of the benthos, a decrease from 2021 and soft corals 11% and increase from 2021. Rock made up the majority of the substrate at 28%. Sand (21%), nutrient indicator algae and “other” both at just over 9%, rubble (5%), sponge (2%) and silt (1%) made up the balance (Figure 4.1.1).

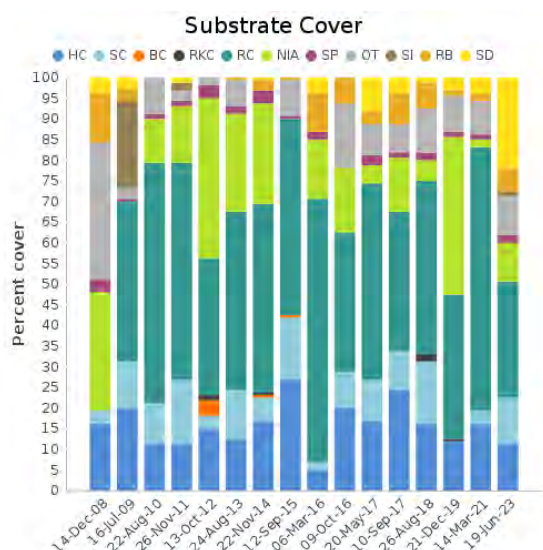


Figure 4.1.1. Benthic type and percent cover: Shag Rock, East, Site 1, 2008 - 2023

Coral bleaching was recorded on one transect at less than 1% of the population, with 20% of the individual colony bleached. One incident of coral damage and two unknown scars along with six items of marine debris were recorded.

Forty-six urchins, 47 Drupella snails, six anemones (five without fish) and one giant clam were recorded on the invertebrate survey.

One butterflyfish, two parrotfish, one snapper and three moray eels were recorded on the fish survey.



Image 4.1A Site photo with surveyor in action



Image 4.1B Corallimorphs – “other”



Image 4.1C Wobbegong shark



# REEF CHECK AUSTRALIA

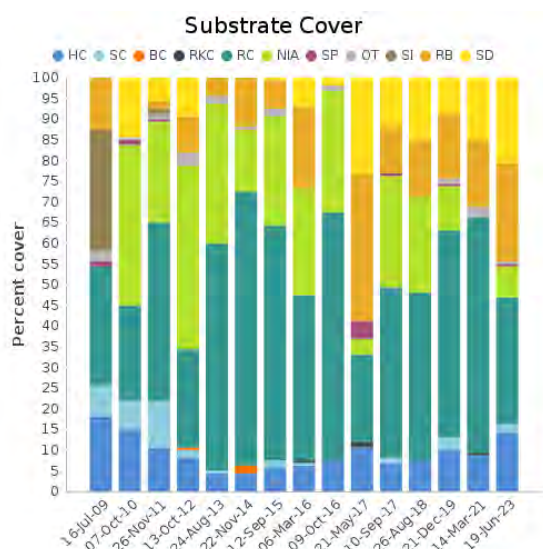
## SEQ Season Summary Report 2022-2023



### 4.2 SHAG ROCK, WEST

Shag Rock West is on the exposed northern side of Shag Rock and features a gentle rocky slope with patchy hard corals. This site was established in 2009 to gain a better understanding of the variety of habitats around Shag Rock.

Rock remained the dominant substrate at 31%. Hard coral accounted for 14% and soft coral 2%. Rubble made up 23%, followed by sand at 21%. Nutrient indicator algae (7%), sponge and other (<1% each) made up the balance of the substrate. (Figure 4.2.1).

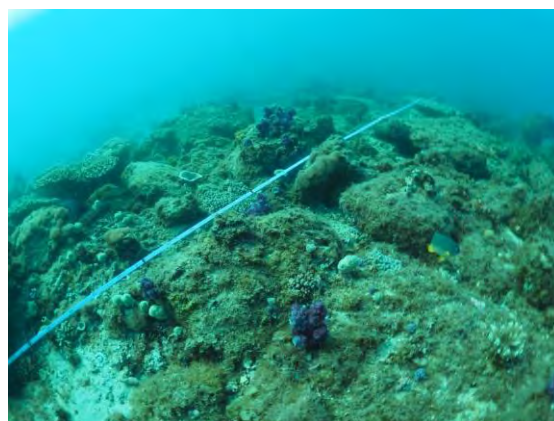


**Figure 4.2.1.** Benthic type and percent cover: Shag Rock, West, 2009 - 2023

Coral bleaching was recorded on one transect at 1% of the population, with 40% of any individual colony bleached. One incident of coral damage, three unknown scars and six *Drupella* scars were recorded. Twelve items of fishing debris were also recorded on the impacts survey.

Ninety-seven urchins, 84 *Drupella* snails and 17 anemones (all without fish) were recorded on the invertebrate survey.

Three butterflyfish were the only target fish observed during the fish survey, but wobbegong sharks and a moray eel were observed off-transect.



**Image 4.2A** Site photo



**Image 4.2B** *Drupella* snail and scar



**Image 4.2C** Collector urchin

# REEF CHECK AUSTRALIA

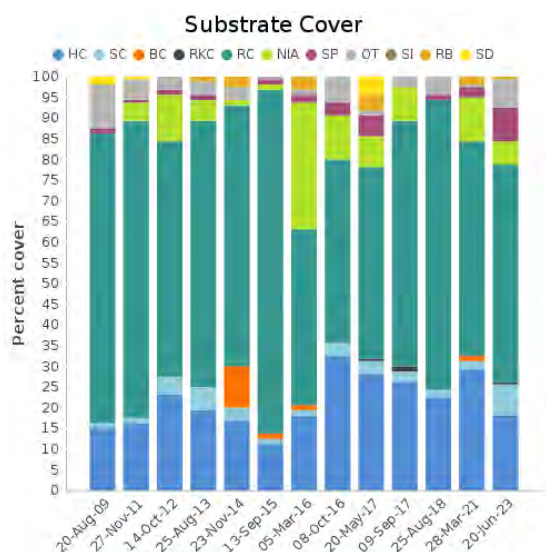
## SEQ Season Summary Report 2022-2023



### 4.3 FLAT ROCK, SHARK GULLEY

This site lays on the seaward side of the fringing reef at Flat Rock which is a popular diving and boating location, just offshore from North Stradbroke Island. It features rocky ridges and gullies and hosts branching and encrusting hard corals. This site was established in 2009.

Rock remained the dominant substrate at 52%. Hard coral accounted for 18% and soft coral 7%. Sponge made up 8%, followed by "other" at 7%. Recently killed coral and rubble (<1% each) made up the balance of the substrate. (Figure 4.3.1).



**Figure 4.3.1.** Benthic type and percent cover: Flat Rock, Shark Gulley, 2009 - 2023

Coral bleaching was recorded on two transects at 1% of the population, with an average of 50% of any individual colony bleached. Two incidents of coral disease and four *Drupella* scars were recorded. Marine debris was not recorded.

Eleven urchins, twelve *Drupella* snails and one giant clam were recorded on the invertebrate survey.

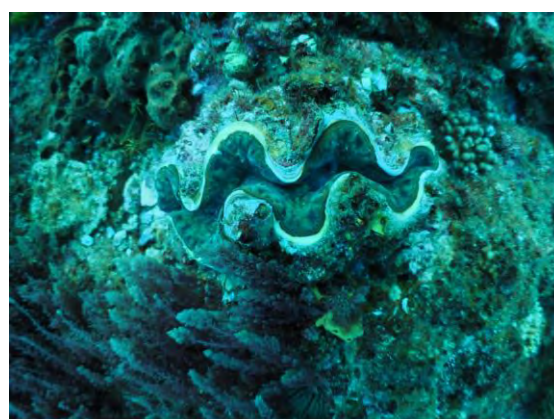
Seventeen butterflyfish and one sweetlip were observed during the fish survey.



**Image 4.3A** Site photo



**Image 4.3B** Soft coral



**Image 4.3C** Giant clam



# REEF CHECK AUSTRALIA

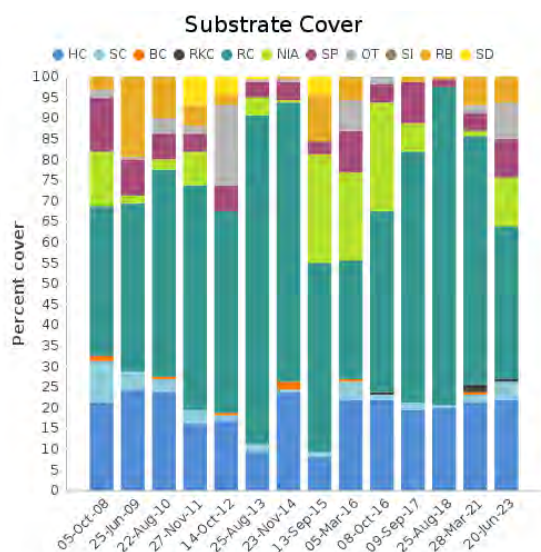
## SEQ Season Summary Report 2022-2023



### 4.4 FLAT ROCK, THE NURSERY

The Nursery is on the sheltered leeward side of Flat Rock where a flat rocky slope meets rocky boulders. This site was established in 2008 and sits at a depth of six metres.

Rock remained the dominant substrate at 37%. Hard coral accounted for 22%, consistent with previous years, and soft coral made up 4%. Nutrient indicator algae (12%), sponge (9%), other (9%), rubble (6%) and recently killed coral (<1%) made up the balance of the substrate. (Figure 4.4.1).



**Figure 4.4.1.** Benthic type and percent cover: Flat Rock, The Nursery, 2008 - 2023

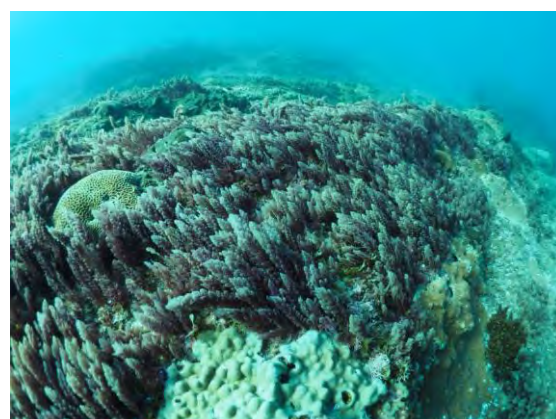
Coral bleaching was recorded on all transects at an average of 4% of the population, with an average of 19% of any individual colony bleached. One incident of coral disease and one *Drupella* scar were recorded. Items of marine debris were not recorded on the impacts survey.

Eighteen urchins, 17 anemones (2 with fish), four *Drupella* snails and two giant clams were recorded on the invertebrate survey.

Sixteen butterflyfish, one snapper and one moray eel were observed during the fish survey.



**Image 4.4A** Site photo



**Image 4.4B** Macroalgae – *Asparagopsis* sp.



**Image 4.4C** Turtle

# REEF CHECK AUSTRALIA

## SEQ Season Summary Report 2022-2023



### 5.0 GOLD COAST SITE REPORTS:

#### 5.1 PALM BEACH REEF, SITE 1

Palm Beach Reef is an extensive rocky reef made up of numerous ridges and gullies, located 800-1000 m offshore. The reef has patchy hard coral cover and hosts a high number of benthic invertebrates such as sponges, ascidians and a high abundance of anemones. It also has a notably high abundance of sea urchins. Site 1 was established in 2007 to gain a better understanding of the subtropical reefs in the Gold Coast sub-region. The site is situated on the reef flat.

Hard coral accounted for 11% of the benthos, similar to last year whilst soft coral was down to 3% (Figure 5.1.1). Rock made up much of the substrate at 49%. Other (anemones and ascidians) made up 13%, with nutrient indicator algae (11%), rubble at 9% and sponge at 4% making up the balance.

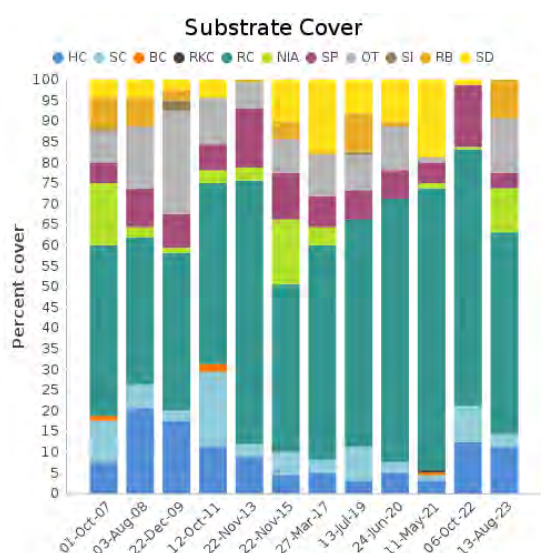


Figure 5.1.1. Benthic type and percent cover: Palm Beach Reef, Site 1, 2007 - 2023

Coral bleaching was observed to affect 1% of the population with an average of 3% of individual colonies bleached. One incident of unknown damage were recorded, along with two items of marine debris.

Three hundred and thirty nine anemones (all without fish), 36 *Diadema* urchins and 25 pencil urchins were recorded on the invertebrate survey. Six butterflyfish, five sweetlip and two moray eels were recorded on the fish survey, along with several wobbegong sharks.



Image 5.1A Site photo



Image 5.1B Encrusting hard coral



Image 5.1C Non-target fish



# REEF CHECK AUSTRALIA

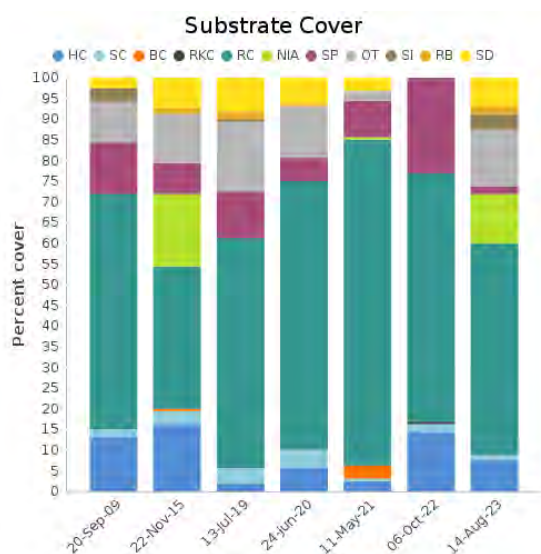
## SEQ Season Summary Report 2022-2023



### 5.2 PALM BEACH REEF, SITE 2

Palm Beach Reef, Site 2 is located in close proximity to the long-established Palm Beach Reef, Site 1 and was established in 2009. This site is located on the reef flat.

Rock remained the dominant substrate at 51%. Hard coral accounted for 7% and soft coral 1%, both a decrease from last season (Figure 5.2.1). Nutrient Indicator Algae made up 12% (an increase), "other" (14%), sand (7%), silt (4%), rubble (2%) with sponge (2%) making up the balance of the substrate.



**Figure 5.2.1.** Benthic type and percent cover: Palm Beach Reef, Site 2, 2009 - 2023

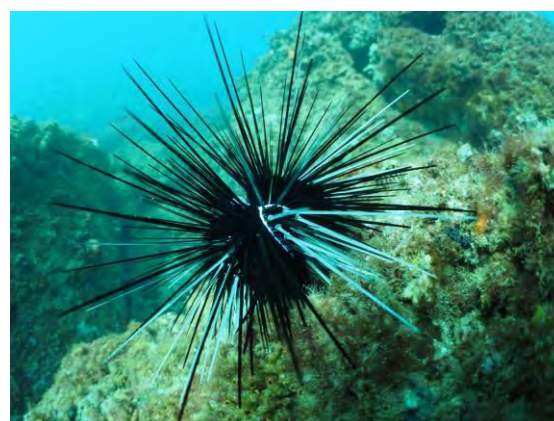
Coral bleaching was observed to affect an average of 8% of the coral population. Two *Drupella* scars, one unknown scar and one item of marine debris were recorded on the impacts survey.

One hundred and five anemones (four with fish) were recorded on the invertebrate survey. Five *Drupella* snails, 86 *Diadema* urchins and 107 pencil urchins were also recorded. This is an increase in urchins from previous years.

Five butterflyfish, one parrotfish, nine snapper and one sweetlip were observed during the fish survey.



**Image 5.2A** Site photo



**Image 5.2B** *Diadema* urchin



**Image 5.2C** Ascidians

# REEF CHECK AUSTRALIA

## SEQ Season Summary Report 2022-2023



### 5.3 GOLD COAST SEAWAY, SOUTHWEST WALL; SITE 1

The Gold Coast Seaway South-West Wall site was established in 2007 and was established to record the impacts upon this heavily utilised site. It is located on the sandy slope parallel to the rock wall. It is characterised by rocks and sand, with a variety of hydroids and algae. The location is frequently used by divers and snorkelers due to the availability of shallow habitat and diversity of fish.

This site is slowly recovering from the flooding experienced last year however nutrient indicator algae was recorded as the dominant substrate at 46%. Rock made up 18%, with rubble at 15%, sand at 16% and silt at 5% making up the balance. Macroalgae was not recorded on the transect, with turf algae dominating (Figure 5.3.1).

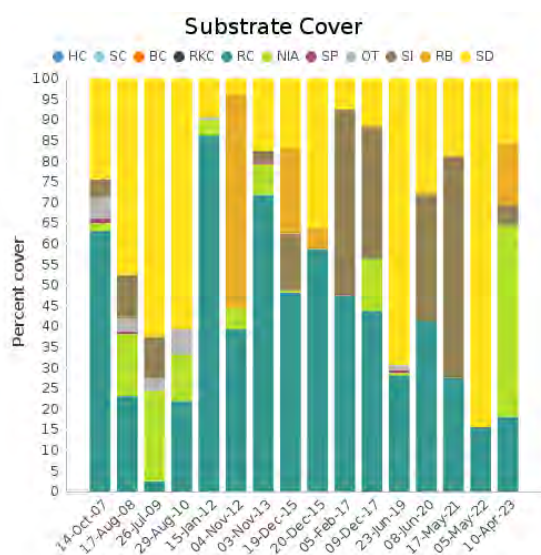


Figure 5.3.1. Benthic type and percent cover: Gold Coast Seaway, South-West Wall, 2007 - 2023

Coral was not recorded during the survey and hence coral bleaching was not recorded. Fishing line again represented the largest impact, with 109 incidences recorded and one observations of general trash.

During the invertebrate survey, seven lobsters, eight banded coral shrimp, two anemones and

seven urchins were recorded, a marked improvement on last year.

A fish survey was conducted and 12 butterflyfish, three moray eels and four snapper were recorded.



Image 5.3A Site photo



Image 5.3B Collector urchin



Image 5.3C Lobster



# REEF CHECK AUSTRALIA

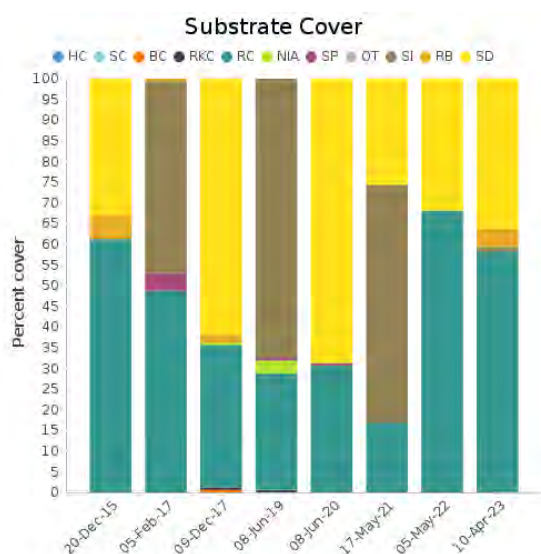
## SEQ Season Summary Report 2022-2023



### 5.4 GOLD COAST SEAWAY, THE PIPE; SITE 1

The Gold Coast Seaway - The Pipe site was established in 2015 to record the impacts upon this heavily utilised site. It is located on the sandy slope parallel to the rock wall. It is characterised by large rocks and sand, with scattered sponges and algae. The location is a frequently used dive and snorkel site due to the availability of shallow habitat and diversity of fish.

Rock (58%) was the dominant substrate; followed by sand (36%). Rubble made up 4%, with silt just over 1% (Figure 5.4.1).



**Figure 5.4.1.** Benthic type and percent cover: Gold Coast Seaway, The Pipe, 2015 - 2023

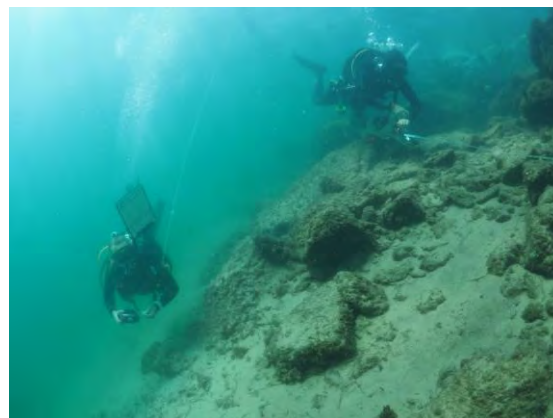
Coral bleaching was not recorded as coral was not observed during the survey.

Fishing line represented the largest impact, with 21 incidences recorded (down from last year), with no general trash observed.

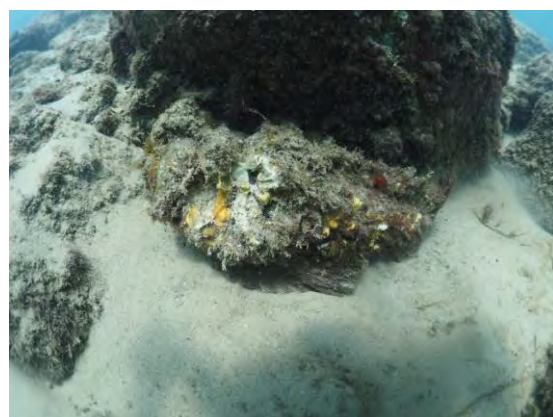
During the invertebrate survey, two urchins, two banded coral shrimp and one lobster were recorded.

A fish survey was conducted and five butterflyfish, four moray eels, one grouper, one snapper and one sweetlips were recorded.

Other non-target fish such as lionfish, stonefish and morwongs were also observed.



**Image 5.4A** Site photo



**Image 5.4B** Stonefish



**Image 5.4C** Non target fish

# REEF CHECK AUSTRALIA

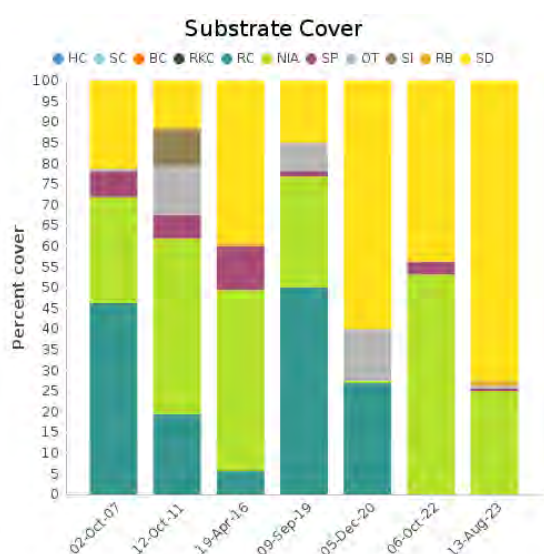
## SEQ Season Summary Report 2022-2023



### 5.5 NARROWNECK REEF; SITE 1

This artificial reef is characterised by high cover of various macro algae over the geotextile bags. It has lots of fish life and lots of black crinoids. The site is sensitive to wave action due to its proximity to the shore and surf zone.

Sand (including sand covered geotextile bags) (73%) was the dominant substrate; followed by rubble (1%) and sponge and other (<1% each) (Figure 5.5.1).



**Figure 5.5.1.** Benthic type and percent cover: Narrowneck Reef, 2007 - 2023

Coral bleaching was not recorded, and coral was not recorded during the survey. The site is dominated by macro algae.

Impacts were limited to 2 items of fishing line and no target invertebrates were recorded during the invertebrate survey.

A fish survey was conducted and no target fish were observed, but several wobbegong sharks and a tawny nurse shark were observed.



**Image 5.5A** Site photo



**Image 5.5B** Algae



**Image 5.5C** Ascidians and Bryozoans



# REEF CHECK AUSTRALIA

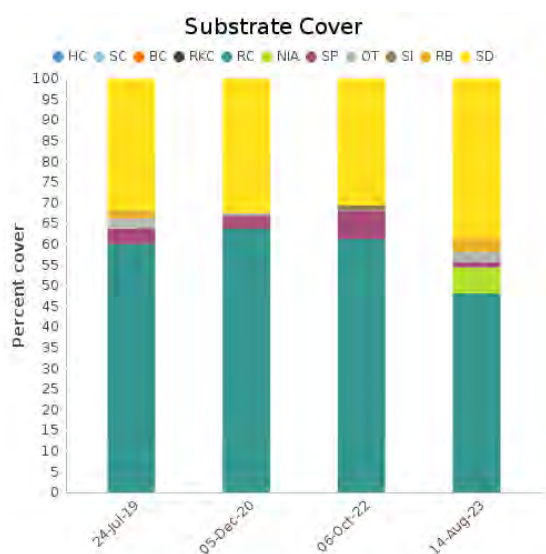
## SEQ Season Summary Report 2022-2023



### 5.6 WAVEBREAK ISLAND; SITE 1

Wavebreak Island is located within the seaway. The site is a rocky scree starting at 5m, to a depth of around 12m. The site wraps around the end of the rock groin and is characterised by sponges, small corals and a variety of fish.

Rock (48%) was the dominant substrate; followed by sand (39%), nutrient indicator algae (6%), "other" (3%), rubble (3%) and sponge (1%). This numbers have remained reasonably consistent over time (Figure 5.6.1).



**Figure 5.6.1.** Benthic type and percent cover: Wavebreak Island, 2019 - 2023

Coral was not recorded and therefore no coral bleaching was recorded during the survey.

Ninety two items of fishing line (which includes 4 fishing rods) and 16 of general trash (including a camp chair) were recorded on the impacts survey.

Three urchins were observed during the invertebrate survey.

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

Wobbegong sharks, stonefish and flathead were also observed during the survey.



**Image 5.6A** Site photo



**Image 5.6B** Collector Urchin



**Image 5.6C** Fishing rods.

# REEF CHECK AUSTRALIA

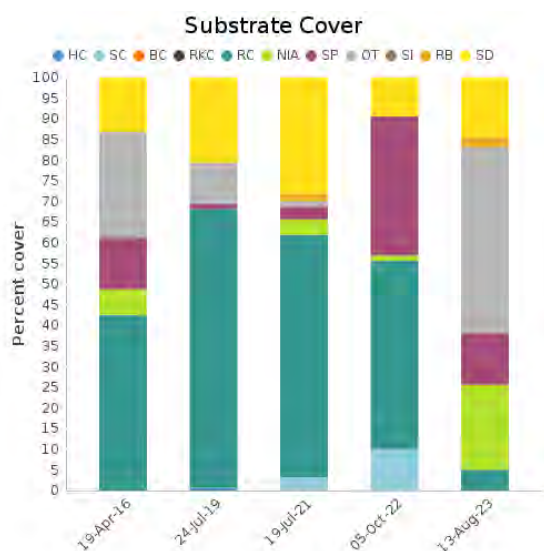
## SEQ Season Summary Report 2022-2023



### 5.7 KIRRA REEF; SITE 1

Kirra reef is a collection of nearshore rocky outcrops located a few hundred metres offshore from Kirra Beach. The site was included in our program in 2015 to monitor the condition of the reef due to exposure to increased sand levels from the Tweed River Entrance Sand Bypassing project since 1995.

“Other” (ascidians and anemones) (45%) was the dominant substrate; followed by nutrient indicator algae (21%), an increase from last year. Sand (14%), sponge (13%), rock (5%) and rubble (2%) made up the balance of the substrate (Figure 5.7.1).



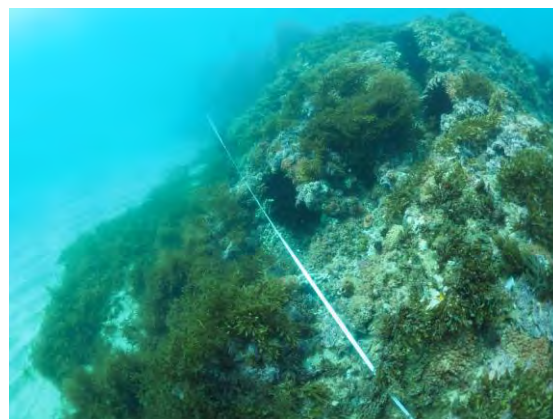
**Figure 5.7.1.** Benthic type and percent cover: Kirra Reef, 2016 - 2023

Coral bleaching was recorded, but at only 1% average for individual colonies and 1% of the population.

One item of general marine debris was recorded.

During the invertebrate survey, sixty-eight anemones (five with fish) were recorded, similar to last year, along with two long-spined urchins and 15 pencil urchins.

A fish survey was conducted and five butterfly fish, one moray eel, eight snapper and one sweetlip were recorded.



**Image 5.7A** Site photo



**Image 5.7B** Crustose algae and ascidians



**Image 5.7C** Soft corals and sponges



# REEF CHECK AUSTRALIA

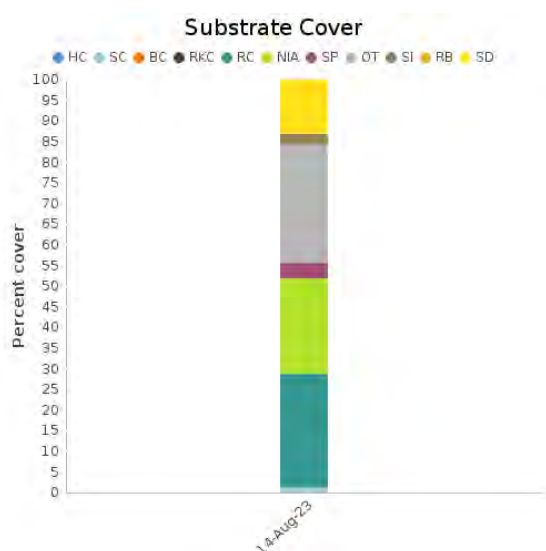
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### 5.8 THE SCOTTISH PRINCE; SITE 1

The monitoring site at The Scottish Prince was set up this year as an alternative to Cook Island. The survey site sits at 9m.

Ascidians (29%) were the dominant substrate; followed by rock (27%) and nutrient indicator algae (23%). Sand (13%), soft coral (1%), sponge (4%) and silt (3%) made up the balance of the substrate (Figure 5.8.1).

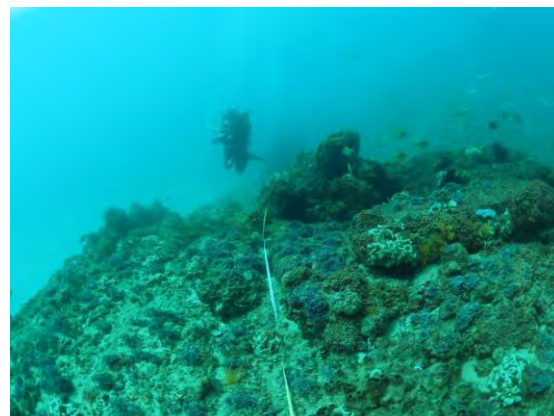


**Figure 5.8.1.** Benthic type and percent cover: The Scottish Prince, 2023

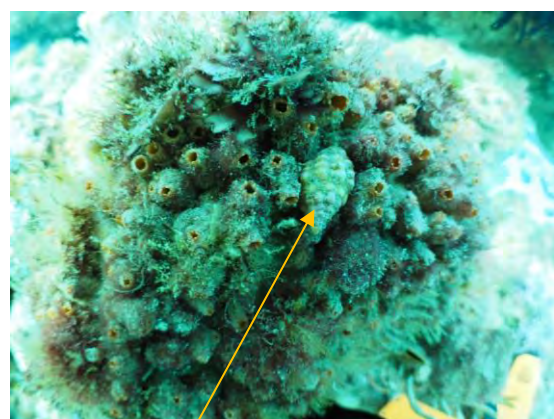
Coral bleaching was not recorded. Two *Drupella* scars and four items of marine debris were recorded.

During the invertebrate survey, 160 *Drupella* snails were recorded along with 145 collector urchins, one lobster and one long-spined urchin. The observation of the coral eating *Drupella* snail is of interest as there is very little hard coral on the wreck.

During the fish survey four butterflyfish, four moray eels, one parrotfish and three sweetlips were recorded, with wobbegong sharks and a bamboo shark also observed.



**Image 5.8A** Site photo



**Image 5.8B** *Drupella* snail on ascidian



**Image 5.8C** Wobbegong shark

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### 6.0 DISCUSSION AND NOTES

Southeast Queensland reefs are a balance of beauty and vulnerability on an ever-changing planet. The vibrant mosaic of life thriving that makes up South East Queensland (SEQ) reefs faces a precarious reality. This transitional zone, boasting a unique blend of tropical, sub-tropical, and temperate species, stands as a testament to nature's diversity. Yet, amid its beauty, a storm of challenges brews – a rapidly growing population, increased development, increased weather events and climate change.

This year's annual report paints a bittersweet picture. While dedicated volunteers conducted over 40 reef health surveys and launched restoration projects, the impact of environmental shifts is undeniable. The current El Niño event looms large, raising concerns about floods, droughts, and marine heatwaves – all potential triggers for devastating coral bleaching.

The past year was challenging. Changing weather patterns hampered planning, heavy rainfall brought increased sedimentation and pollution, and coral populations at key locations suffered large declines. While citizen science volunteers achieved remarkable milestones, the lingering effects of floods remind us of the interconnectedness of our ecosystems.

The call to action is clear. As we witness increased bleaching and coral die off, increased numbers of Drupella snails, and rising ocean temperatures, the urgency to protect our reefs intensifies. Each of us, from our homes to the broader community, plays a crucial role. This isn't just about scientific monitoring and understanding; it's about making informed choices, advocating for change, and fostering a collective responsibility for the future of our oceans.

So, let's embrace the knowledge gained through meticulous monitoring, translate it into action, and become guardians of this irreplaceable treasure. Let's ensure that the future narrative of SEQ reefs is one of resilience, adaptation, and collective triumph over adversity. It's time to turn the tide – together, we can.



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### 7.0 TEAM PHOTOS





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Our survey and associated activities are made possible by our trained citizen scientists who donate their time, energy and skills! Thank you all!



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### 8.0 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).

### 8.1 REFERENCES

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