Reef Check Australia

Moreton Bay
Season Summary Report 2022-2023

REEF CHECK AUSTRALIA

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This project was made possible by a network of dedicated volunteers, generous dive operators, wise advisors, innovative collaborators and the Port of Brisbane.

Thank you to the dedicated citizen scientists who have contributed to survey activities within Moreton Bay and assisted with data entry: Ilha Byrne, Phil Dunbavan, Felicia Sutjahjo and Jodi Salmond.

Many of the images used within this document were taken by Reef Check Australia General Manager Jodi Salmond. The image on the front was taken in Moreton Bay at Goat Island by Gary Cranitch.

Project activities were conducted on the traditional lands of the Quandamooka People, Kabi Kabi First Nation and Yugambeh People. We acknowledge the Traditional Custodians of the land, of Elders past, present and emerging.

This project is supported by Reef Check Australia, through funding from the Port of Brisbane.

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Also a big thank you to GO Dive Brisbane for supplying the boat and crew to access the sites.

REEF CHECK AUSTRALIA

Moreton Bay

Season Summary Report 2022-2023

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1.0 PROJECT INTRODUCTION

This report outlines the survey results documented at six (6) Reef Check Australia Monitoring sites located at Mud Island (2), St Helena Island (2), Green Island (2), (Figure 1). Reef Check Australia has been monitoring these sites seasonally to detect changes related to seasonal variation and changes to substrate composition.

Figure 1.0 Location of Reef Check Australia monitoring sites: Mud Island, St Helena Island, Green Island.

1.1 KEY FINDINGS FROM 2022-2023 SURVEYS

1.1.1 SURVEY CONDITIONS

Unfavourable weather conditions again delayed our surveys. Fortunately, we were able to complete surveys at all six sites over the two agreed seasons; summer and winter. Dense nutrient indicator algae was observed during both survey periods however the levels of macroalgae reduced considerably during the winter surveys. Visibility was limited during both seasons. Although somewhat expected in summer, this is unusual for winter.

1.1.2 SUBSTRATE

Hard coral cover remained consistent at most sites however no hard coral was recorded at Green Island West during the September (winter) survey (down from 5.6% in summer). Soft coral cover has remained relatively consistent with silt levels predominantly medium to high.

1.1.3 IMPACTS

Levels of impact remain low with counts of one to two incidents only where observed (refer Table 1 below for details). Low levels of coral bleaching were observed at all sites on all except one survey (Mud Island, Rubble Patch, Summer). The highest level of marine debris recorded was six counts in summer and three in winter at Green Island North.

1.1.4 INVERTEBRATE ABUNDANCE

Invertebrate abundance remains low across all sites. *Drupella* snails were the main target invertebrate observed during our surveys, with the most recorded during winter (14 at Mud Island Rubble Patch and 10 at Mud Island Coral Galore). However, one lobster was observed at St Helena, Palindrome and one Trochus at Green Island North during the summer surveys. A higher number of nudibranchs and flatworms were recorded over the past 12 months than previously recorded on any of these sites with several species being recorded at single sites.

1.1.5 FISH ABUNDANCE

Numbers of target fish were low, with butterflyfish being the most sighted, followed by snapper. The highest observation was 13 butterflyfish at St Helena Ray of Sunshine during the summer survey.

Refer to Table 1 for summary of site data and section 2 for individual site reports.

Table 1: Summary table of RCA monitoring findings for surveys conducted in Inner 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. at 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)	*Drupella* Scar (#)	Unknown Scar (#)
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
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

2.0 SITE REPORTS

2.1 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. Again, weather was the limiting factor with access to these survey locations, however we were able to complete surveys in 2 different seasons; summer and winter.

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 2.1.1).

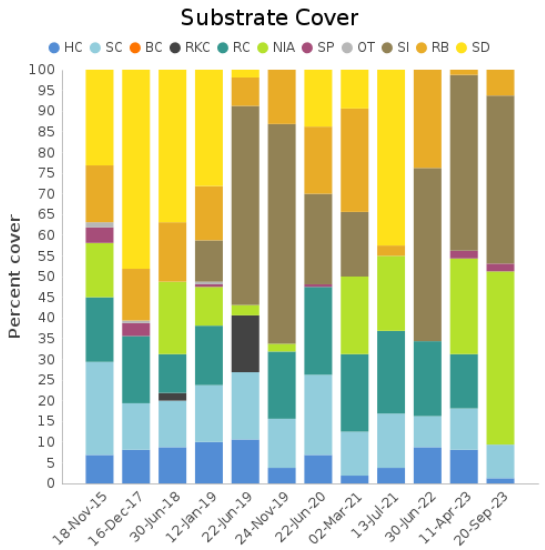

Figure 2.1.1. Benthic type and percent cover: Green Island North, Site 1, 2015 - 2023

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.

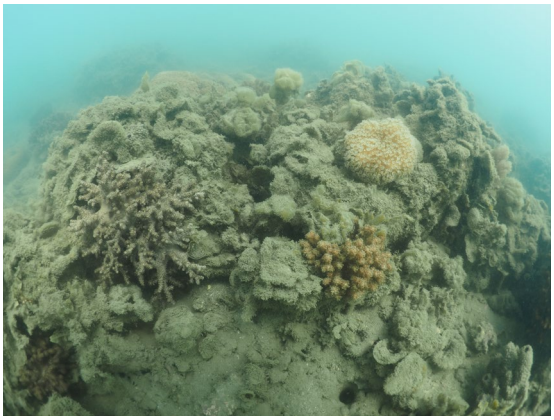

Image 2.1A Site photo

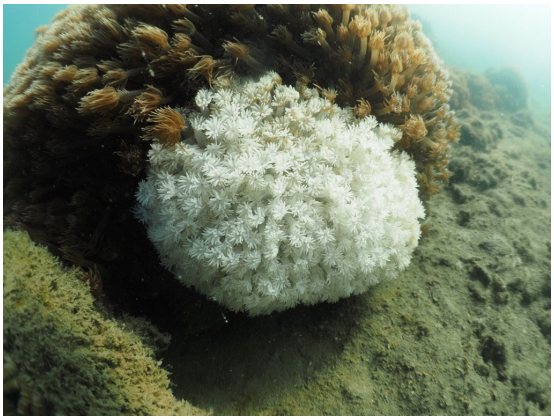

Image 2.1B Bleached coral

Image 2.1C Small shark

2.2 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 2.2.1).

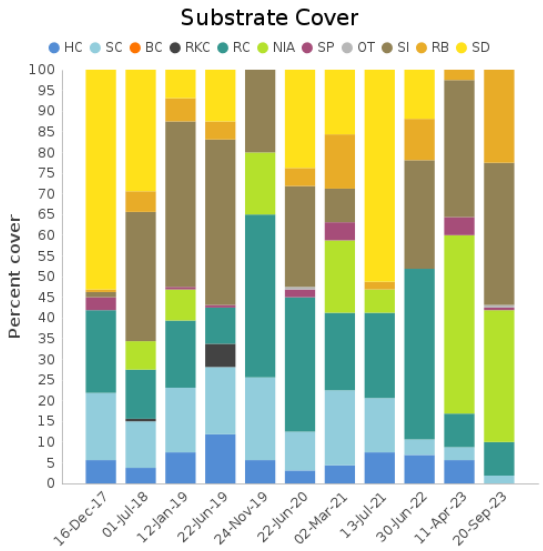

Figure 2.2.1. Benthic type and percent cover: Green Island West, Site 1, 2017 - 2023

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, although nudibranchs and flatworms (non-target invertebrates) were also recorded.

One butterflyfish was observed during the summer fish survey.

Image 2.2A Green Island West Site Photo

Image 2.2B Dominant algae – *Sargassum* spp.

Image 2.2C Flatworm

2.3 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 2.4).

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 2.3.1).

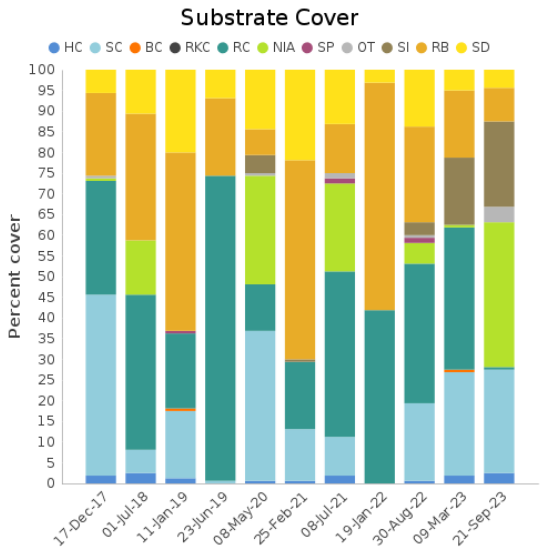

Figure 2.3.1. Benthic type and percent cover: Mud Island, Coral Galore, 2017 - 2023

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.

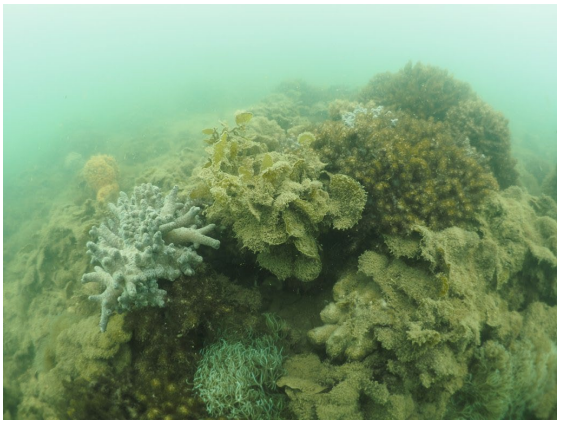

Image 2.3A Site photo

Image 2.3B Sponge

Image 2.3C Soft coral

2.4 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 2.4.1).

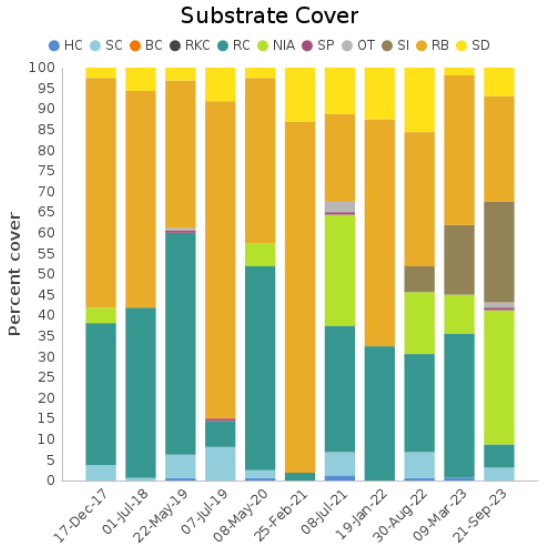

Figure 2.4.1. Benthic type and percent cover: Mud Island, Rubble Patch, 2017 - 2023

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 2.4A Site photo

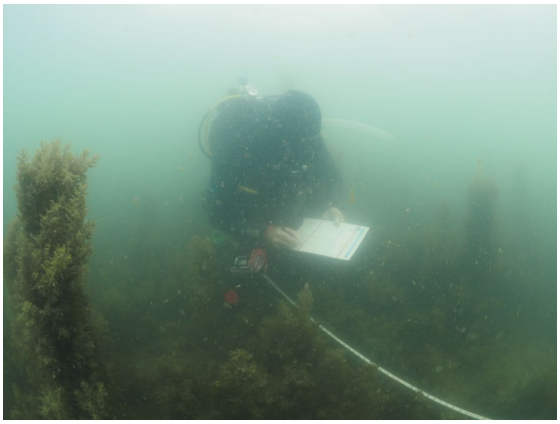

Image 2.4B Surveyor in action - summer

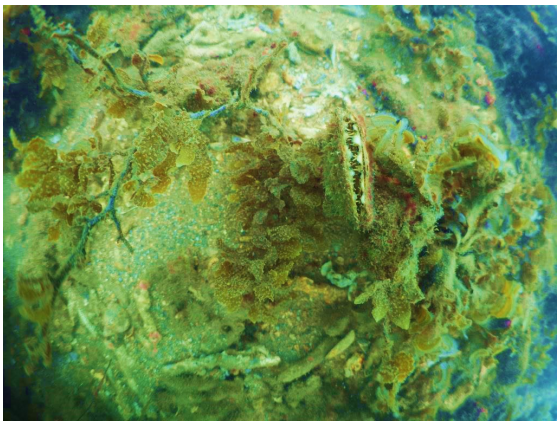

Image 2.4C Non-target invertebrate

2.5 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 2.5.1).

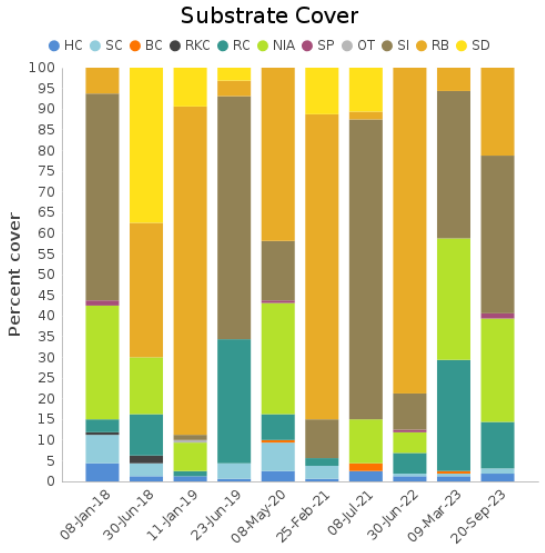

Figure 2.5.1. Benthic type and percent cover: St Helena Island, Palindrome, 2018 – 2023.

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.

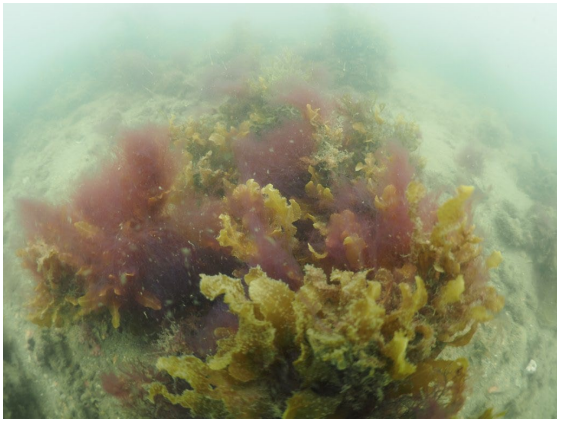

Image 2.5A Site photo showing purple NIA

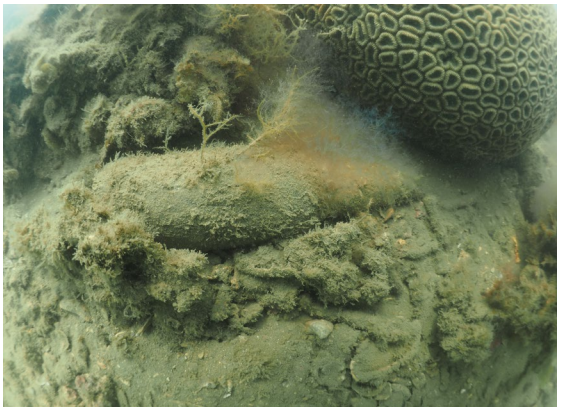

Image 2.5B Trash

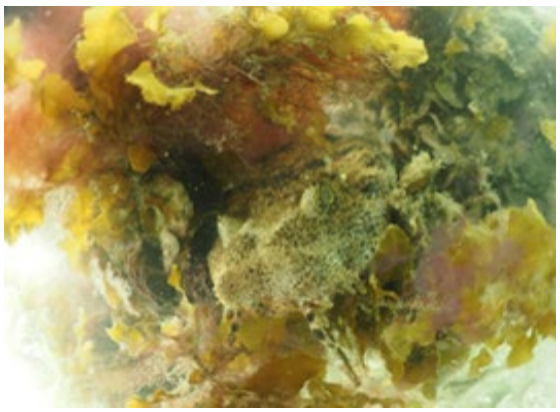

Image 2.5C Wobbegong shark amongst algae

2.6 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 2.6.1).

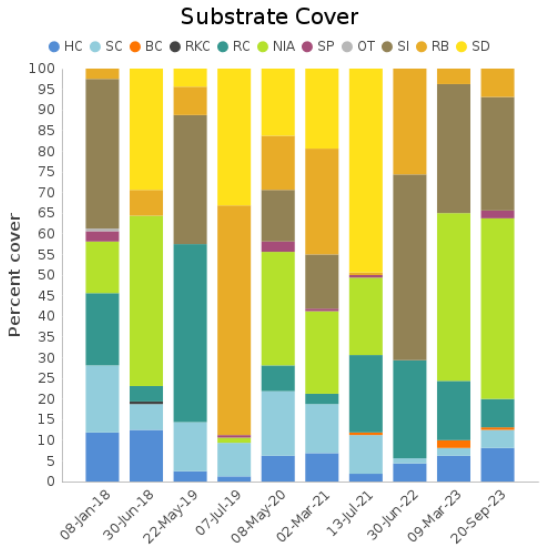

Figure 2.6.1. Benthic type and percent cover: St Helena Island, Ray of Sunshine, 2018 - 2023

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 2.6A Site photo and bleached coral

Image 2.6B Macroalgae; Padina

Image 2.6C Soft coral

3.0 DISCUSSION, NOTES AND RECCOMENDATIONS

Weather continued to create havoc with reef health monitoring plans in Moreton Bay for the 2022-2023 season. The floods from February 2022 saw thousands of tonnes of debris exit the Brisbane River, making its way north to the Fraser and Sunshine Coasts, south to the Gold Coast, and east throughout Moreton Bay. In October 2022, the Logan River also flooded, with local experts expressing concern about the amount of sediment and debris making its way into Moreton Bay from the South as well. Coastal development and runoff lead to sedimentation, which directly impacts coral recruitment, growth, mortality, and the ecosystem services that coral reefs provide. Moreton Bay reefs lie within mere kilometres of the Brisbane River mouth, and previous floods have had devastating effects on the ongoing health of these reefs, so it was important for Reef check Australia to take the opportunity to monitor and document changes in the health of Moreton Bay reefs prior to and shortly after this natural disturbance.

In the past 12 months, the amount of Algae recorded on all sites has increased substantially. Nutrient Indicator Algae counts were much higher, and algal species not recently recorded in these particular areas such as purple filamentous algae, and oyster thief (*Colpomenia sinuosa;* spotted covering old coral populations at Goat Island within weeks after the 2022 floods but nowhere else until now) have been found covering large areas of both rock and coral on sites further north (such as Mud Island). Both of these types of algae smother coral, causing reduced resilience, and eventual death.

From the surveys conducted during the 2022-2023 season, unusual conditions have been observed over an extended period including reduced visibility and increased turbidity. Winter is historically known for colder, clearer waters and less turbidity; associated with better weather, more sun and less storms. This winter proved an anomaly; or perhaps a new normal; in which weather conditions provided an increase in the number of storms in the region resulting in higher runoff (from the Brisbane River as well as the Logan River further south). Visibility has remained poor from July to October, across all sites (and sites further south) with the exception of Myora Springs which receives extensive tidal flushing. We will continue to monitor turbidity over the coming months.

Hard and soft coral populations continue to remain low in number. Corals of Moreton Bay continue to show great resilience over time, thriving on 'the edge' of tolerable conditions. However, survey results from 2022-2023 surveys show similar results to those from surveys conducted after the February 2022 floods; longer lasting impacts including increased sediment loading, increased turbidity (less availability of light), increased incidence of coral bleaching, and an increase in Nutrient Indicator Algal growth.

Sediment can affect corals throughout their life cycle. High levels of sediment exposure can depress coral health, condition, and survival. A reduction in light reduces photosynthesis by symbiotic algae, thus limiting corals' primary energy source. Corals also divert available energy toward sediment clearance behaviours such as mucus production/sloughing and tentacle movement, which can interfere with filter feeding. Thus, sediment may lead to sublethal responses, such as reduced rates of growth, productivity, and calcification, as well as bleaching, disease susceptibility, physical damage, and inability to regenerate following tissue damage. If the stress level continues and/or intensifies, corals may experience lethal effects including tissue necrosis and colony death, which if widespread, may lead to changes in coral-reef community structure and ecosystem health.

Conversations with researchers working on rubble stabilisation and sedimentation offer valuable insights into additional information to potentially be collected as a part of these reef health monitoring surveys in the future, and we look forward to implementing new data collection methods for the next season.

4.0 FURTHER INFORMATION

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

5.0 ADDITIONAL IMAGES