Reef Check Australia

Moreton Bay
Season Summary Report 2023-2024

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, Pablo Fuenzalida, Jodi Salmond and Gabriella Scata.

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 Myora 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 and Wet Boat Hire for supplying the boat and crew to access the sites.

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Table of Contents

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 2023-2024 SURVEYS

1.1.1 SURVEY CONDITIONS

This season we were able to complete surveys at all six sites over the two agreed seasons; summer and winter. Nutrient indicator algae was observed during both survey periods however the levels were higher during winter, whilst counts of macroalgae were higher in summer. This year visibility on most sites improved over winter which is what we normally expect.

1.1.2 SUBSTRATE

Hard and soft coral cover remains low over all sites, but very high levels of silt loading were recorded this summer. St Helena, Palindrome topped the list at 95% of the substrate in summer, followed by Mud Island – Coral Galore where it made up 89%, fortunately these levels decreased during winter. Nutrient indicator algae levels were highest at St Helena – Ray of Sunshine during winter at 66%, followed by St Helena – Palindrome at 47%.

1.1.3 IMPACTS

Levels of impact remain low with only one incident recorded at Mud Island – Coral Galore (refer Table 1 below for details). Coral bleaching was observed at all sites but reduced during winter. The highest level of marine debris recorded was ten counts in summer at St Helena - Palindrome.

1.1.4 INVERTEBRATE ABUNDANCE

Invertebrate abundance remains low across all sites. *Drupella* snails were once again the main target invertebrate observed during our surveys, with the most recorded during summer (16 at Mud Island Rubble Patch). However, two lobsters were observed at St Helena during the summer surveys.

1.1.5 FISH ABUNDANCE

Numbers of target fish were low, with snapper and butterflyfish being the most sighted. The highest observation was four butterflyfish at St Helena - Ray of Sunshine during the summer survey, down from 14 last summer and four snapper at Green Island – North, also 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 2023-2024 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	12.5	60	2	H	11.25	0	1	1	0	0	0	0
Green Island, North, Site 1 (Winter)	5.6	10	4	31	H	5	0	0	0	0	0	0	0
Green Island, West (Summer)	9.4	10	47	12	H	10.25	0	1	2	0	0	0	0
Green Island, West (Winter)	1.9	2.5	4	23	H	2.25	0	1	2	0	0	0	0
Mud Island, Coral Galore (Summer)	0	0	124	0	H	21.25	0	0	0	0	0	0	0
Mud Island, Coral Galore (Winter)	7.5	19	3	21	M	1.25	0	2	0	0	0	0	1
Mud Island, Rubble Patch (Summer)	0	1.88	52	0	H	39.75	0	0	0	0	0	0	0
Mud Island, Rubble Patch (Winter)	0	0	3	16	M	0	0	0	0	0	0	0	0
St Helena, Palindrome (Summer)	3.1	1.25	44	0	H	22.5	0	0	10	0	0	0	0
St Helena, Palindrome (Winter)	1.2	0.63	1	47.5	M	0	0	0	1	0	0	0	0
St Helena, Ray of Sunshine (Summer)	6.2	1.25	37	14	H	27.5	0	0	0	0	0	0	0
St Helena, Ray of Sunshine (Winter)	6.2	1.25	7	66	M	4.75	0	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.

During the summer survey hard coral made up 8% of the substrate but again silt (72%) dominated (this is a significant increase in silt from last summer) followed by soft coral (12%), rubble (4%), nutrient indicator algae (2%) and bleached coral just under 2%. During the winter survey silt (41%) dominated with nutrient indicator algae also high at 31%. Soft coral made up 10%, rubble 6%, hard coral 6%, rock 5% and sand <1% (Figure 2.1.1).

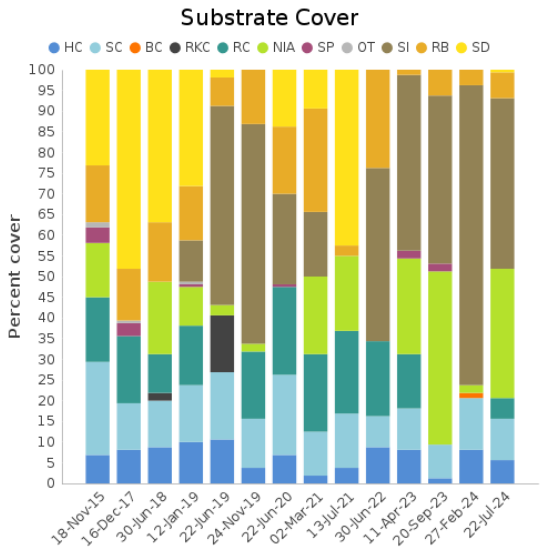

Figure 2.1.1. Benthic type and percent cover: Green Island North, Site 1, 2015 – 2024.

Coral population bleaching was higher this year at 12% and 5% of the coral population, with an average of 84% of any individual colony bleached in summer and 36% of any individual colony bleached in winter.

Coral damage was not recorded in either season. One item of fishing and one item of general marine debris were recorded in summer.

One *Drupella* snail in summer was the only target invertebrate observed over both surveys.

During the fish surveys, three butterflyfish and four snapper were recorded in summer, with no target fish observed in winter

Image 2.1A Site photo - summer

Image 2.1B Sponge

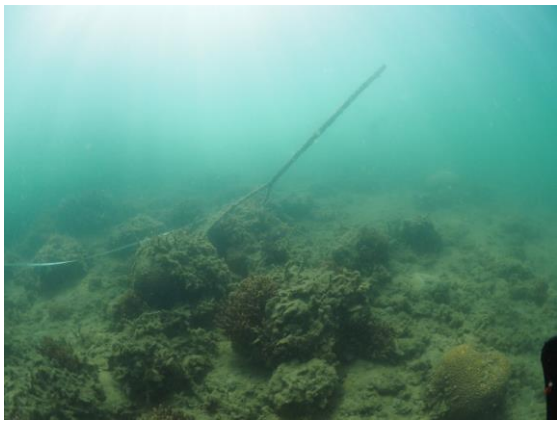

Image 2.1C Trash

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.

Silt (63%) was the dominant substrate during the summer survey, followed by Nutrient Indicator Algae (12%). Hard coral (9%), soft coral (10%), sponge (3%), rock (1%), with bleached coral and rubble at just under 1% each made up the balance. During the winter survey rock (29%) was the dominant substrate followed by sand (25%), nutrient indicator algae (23%), silt (14%), sponge (3%), hard coral (2%), soft coral (2%) and rubble (1%) (Figure 2.2.1).

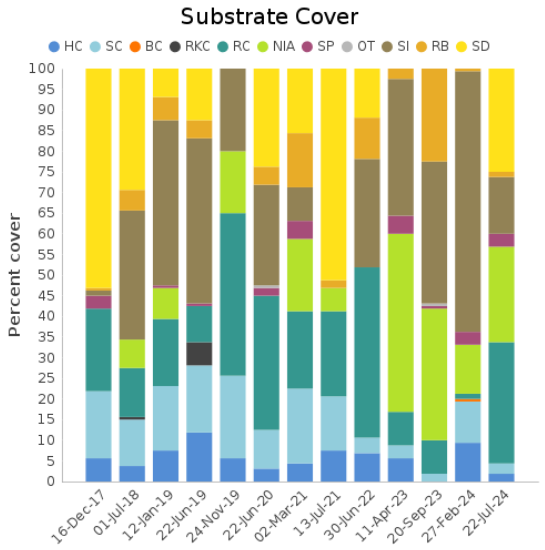

Figure 2.2.1. Benthic type and percent cover: Green Island West, Site 1, 2017 - 2024

Coral bleaching averaged 11% of the coral population bleached in summer and 3% of the population bleached in winter, with an average 82% and 55% of each colony observed as bleached respectively.

Damage and disease were not observed. Three items of trash (including fishing and general trash) were recorded during each survey.

Four *Drupella* snails were recorded during the winter invertebrate survey.

One butterflyfish was observed during each survey, with two snapper also observed in summer.

Image 2.2A Site Photo - winter

Image 2.2B Hard coral.

Image 2.2C Algae with thick layer of silt.

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).

Coral was not recorded on the point intercept line transect during the summer survey. Silt was the dominant substrate at 89%, followed by rubble (8%) and rock just over 3%. During the winter survey levels of silt reduced to 14%, with rock the dominant substrate at 33%. Soft coral and nutrient indicator algae were both 19%, with hard coral at 7%. Sand (4%), other (2%), and rubble and bleached coral each at just over 1% made up the balance of the substrate. (Figure 2.3.1).

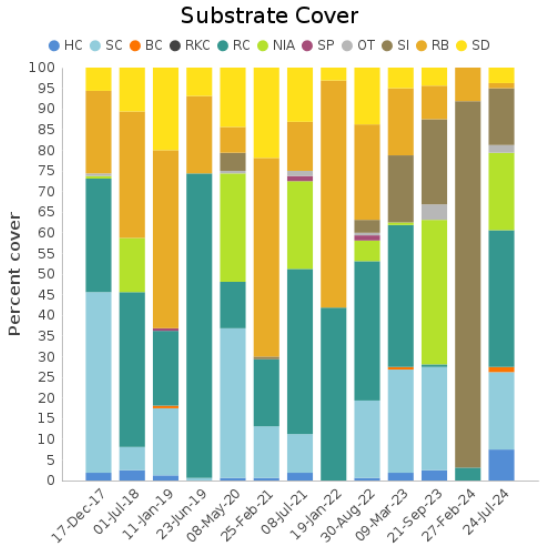

Figure 2.3.1. Benthic type and percent cover: Mud Island, Coral Galore, 2017 - 2024

Bleaching of 22% of the population was recorded in summer, decreasing to 2% in winter. Other impacts were not recorded in summer, but one unknown scar and two items of marine debris were recorded in winter.

Three *Drupella* snails were recorded in summer, with seven recorded in winter.

Fish surveys were conducted in both seasons but no target fish were recorded.

Image 2.3A Site photo - winter

Image 2.3B Drupella snail

Image 2.3C Dominant algae - summer

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 was not recorded during the point intercept line transect in either season but was observed on site. Silt at 72% was the dominant substrate in summer, with rubble at 24%, soft coral 2% and rock and sponge each just under 1%. During the winter survey, rubble dominated at 54%, followed by rock (24%), nutrient indicator algae (14%), sand (6%) and sponge (1%) (Figure 2.4.1).

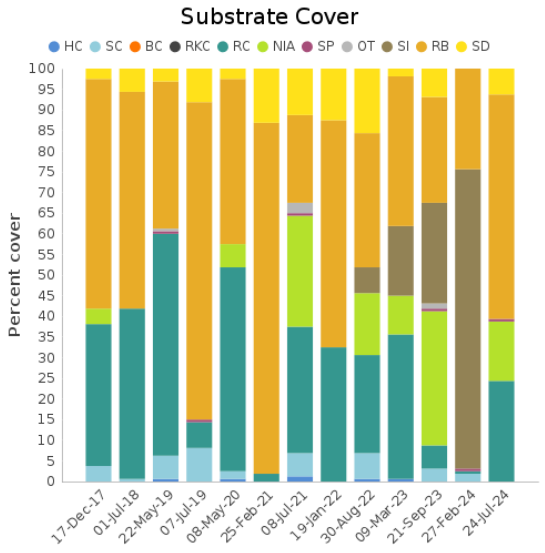

Figure 2.4.1. Benthic type and percent cover: Mud Island, Rubble Patch, 2017 - 2024

Bleaching was observed at 40% of the population and an average of 4% of an individual colony during the summer survey. No bleaching was recorded in winter. During the winter survey one item of marine debris was observed. Invertebrates were again limited to 16 *Drupella* in summer with four *Drupella* recorded in winter during the invertebrate surveys.

Fish surveys were conducted and three butterflyfish were recorded in summer but no target fish were recorded in winter.

Image 2.4A Site photo

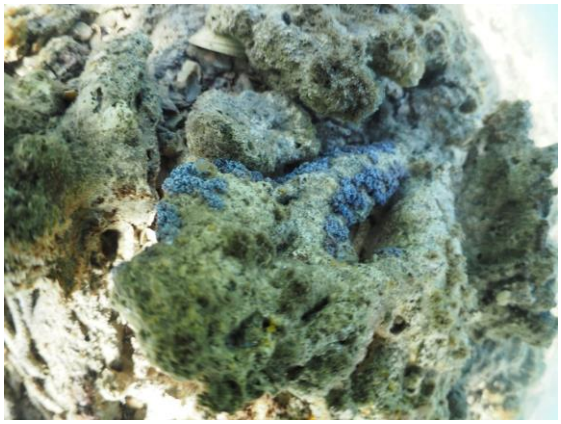

Image 2.4B Hard coral

Image 2.4C Dominant algae

2.5 ST HELENA, PALINDROME

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

Silt at 95% (the highest ever recorded here) dominated during the summer survey. Hard coral made up 3% with soft coral at 1% and bleached coral just under 1%. Silt reduced significantly to 26% during winter but nutrient indicator algae levels were up to 47%. This was followed by rock (15%), sand (7%), rubble (2%), hard coral just over 1% and soft coral just under 1% (Figure 2.5.1).

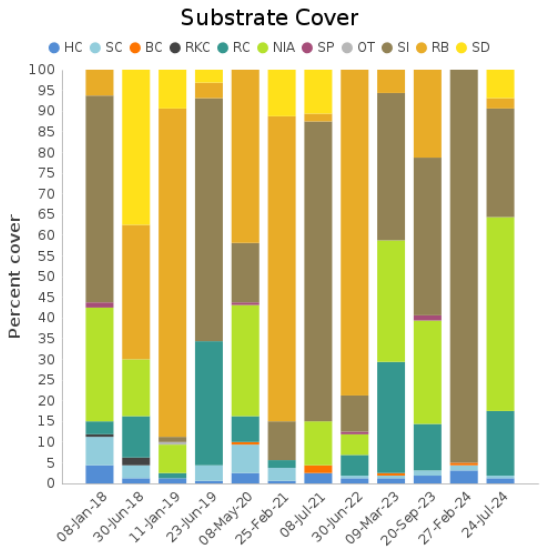

Figure 2.5.1. Benthic type and percent cover: St Helena Island, Palindrome, 2018 – 2024.

Bleaching of coral populations averaged 23% in summer with none recorded in winter. An average of 84% bleaching of individual coral colonies was recorded in summer. Ten items of marine debris were recorded in summer and one item in winter. No other impacts were observed.

Two lobster and one *Drupella* snail were recorded in summer with five *Drupella* snails recorded in winter.

Fish surveys were conducted with only four butterflyfish recorded during the summer survey and no target fish observed in winter.

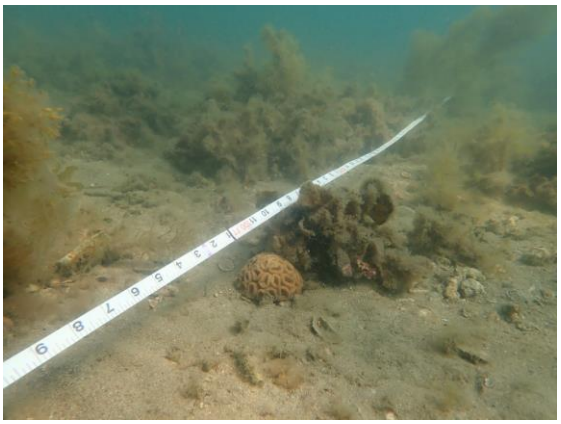

Image 2.5A Site photo - winter

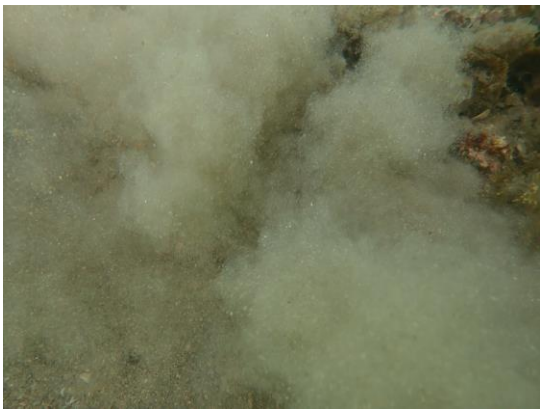

Image 2.5B High silt load - summer

Image 2.5C Hard coral

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.

Silt (71%) dominated the summer survey. Nutrient Indicator Algae (14%) and hard coral (6%), along with sponge (5%) were the main substrate with rock, soft coral and bleached coral at just over 1% each making up the balance. During the winter survey nutrient indicator algae dominated at 66%. Silt was down to 8% of the substrate, with rock (9%), hard coral (6%), sand (6%), rubble (3%), soft coral (1%) and sponge (<1%) making up the balance of the substrate. (Figure 2.6.1).

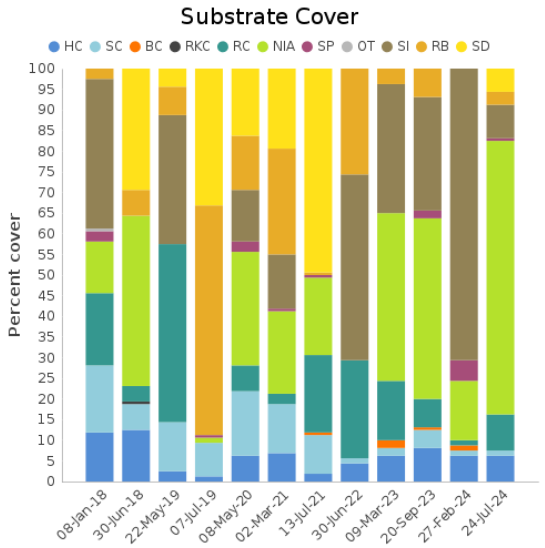

Figure 2.6.1. Benthic type and percent cover: St Helena Island, Ray of Sunshine, 2018 – 2024.

Total coral population bleaching averaged 28% in summer and 5% in winter with an average of 58% of any individual colony being bleached in summer and 30% in winter. No other impacts were observed. Again target invertebrates were limited to three *Drupella* snails in winter.

Fish surveys were conducted and three snapper and one grouper were recorded in summer but no target fish were recorded in winter.

Image 2.6A Site photo (winter)

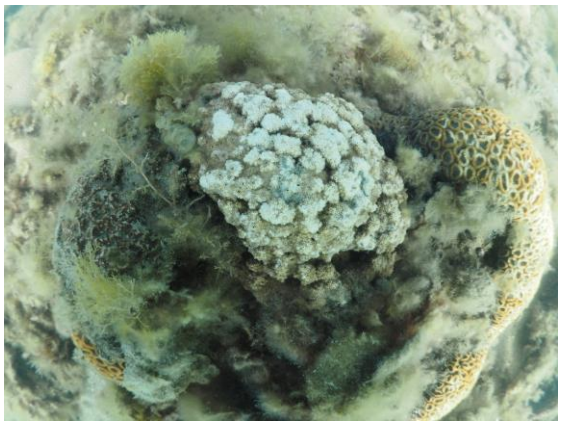

Image 2.6B Bleached coral

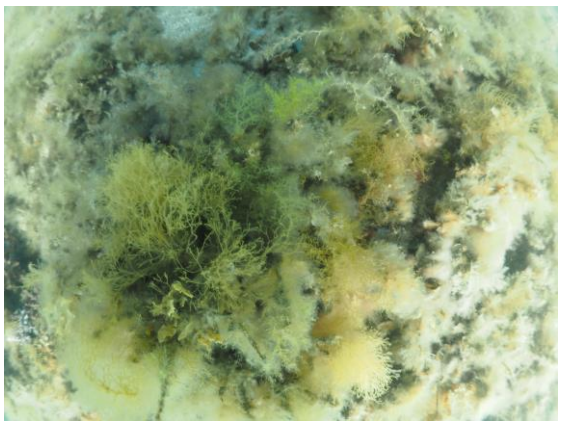

Image 2.6C Nutrient indicator algae – dominant in winter

3.0 DISCUSSION, NOTES AND RECOMMENDATIONS

The 2023-2024 reef health monitoring season in Moreton Bay presented a mix of challenges and interesting observations. Unlike the previous season, where adverse weather conditions and flood events significantly impacted the monitoring process, this year provided gaps in weather events allowing for the successful completion of surveys across all six designated sites during both the summer and winter periods. The slightly improved weather conditions facilitated more consistent data collection, though the long-term impacts of sedimentation and nutrient loading remain evident.

Algal Growth and Sedimentation: Nutrient indicator algae continue to be a significant concern, with levels fluctuating between seasons. The winter surveys revealed higher concentrations of nutrient indicator algae at most sites, notably St Helena – Ray of Sunshine, where coverage peaked at 66%. While macroalgae counts were higher in summer, the persistent presence of nutrient indicator algae across both seasons suggests ongoing nutrient enrichment issues. High levels of silt loading were also recorded, particularly in summer, with sites like St Helena – Palindrome experiencing silt coverage as high as 95%. Although these levels decreased during winter, the ongoing presence of high sediment loads is a critical concern for coral health and ecosystem stability.

Coral Health: Hard and soft coral cover remains low across all sites, consistent with the findings from the previous season. The effects of sedimentation, combined with nutrient indicator algae growth, continue to challenge the resilience of coral populations. Coral bleaching was observed at all sites, though a notable reduction occurred during the winter months. The highest levels of bleaching were recorded at St Helena – Ray of Sunshine, where 28% of the coral population was affected during the summer. These observations underscore the ongoing stress that corals in Moreton Bay are experiencing, likely exacerbated by sedimentation and nutrient influx.

Invertebrate and Fish Abundance: Invertebrate abundance remains low, with *Drupella* snails being the most frequently observed target species. The summer surveys recorded up to 16 *Drupella* at Mud Island – Rubble Patch, while only a few were observed during the winter. The presence of lobsters at St Helena during the summer survey was a rare positive note in an otherwise low-abundance season. Fish abundance also remained low, with butterflyfish and snapper being the most commonly sighted species. However, the overall decline in fish numbers, particularly the decrease in butterflyfish sightings compared to last summer, raises concerns about the health of the fish community and its potential implications for reef health.

Recommendations:

1. **Enhanced Monitoring of Algal Growth and Sedimentation:** Given the persistently high levels of nutrient indicator algae and silt, it is essential to continue closely monitoring these parameters. Collaborating with researchers focusing on water quality and sediment sampling could provide valuable insights into changes in algal growth and composition, and offer additional information to guide mitigation efforts further upstream.
2. **Targeted Coral Conservation Efforts:** The ongoing stress on coral populations requires targeted conservation actions. These could include initiatives to reduce sediment runoff from nearby rivers and coastal developments, as well as potential restoration projects aimed at boosting coral resilience through the introduction of artificial reef structures. Reef Check Australia currently has a promising reef restoration project off Peel Island, helping corals stay above rising silt levels and

creating a habitat for both coral substrates and fish species. This study will continue for another year, but expanding such structures may prove beneficial in protecting more corals in the area.

3. **Fish Population Studies:** The low abundance of key fish species underscores the need for further research into the factors affecting these populations. While low fish numbers have been recorded at many shallow sites, this is the first year that five of the six sites showed no fish in winter, with only one butterflyfish recorded on the sixth site. Additional research and conservation strategies could focus on protecting critical habitats and implementing measures to reduce fishing pressure in vulnerable areas.
4. **Collaboration with Research Initiatives:** Ongoing collaboration with other researchers in the region is crucial. Discussions have begun on various topics, including coral health, changes in siltation over time, and fish studies. Strengthening collaboration is key to better understanding the changing dynamics of the region, and integrating these findings into reef monitoring efforts could lead to more effective conservation strategies and improved outcomes for the health of Moreton Bay's reefs.

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