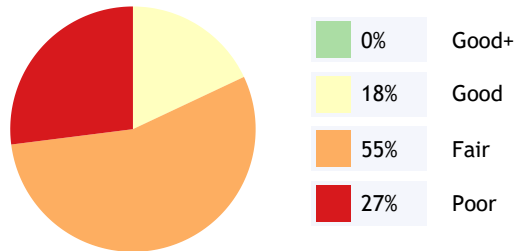


# HEALTHY REEFS REPORT

# At a Glance

CCMI's 2024 reef surveys of Little Cayman reveal the most severe decline in coral health and cover since monitoring began in 1998. Following the 2023 mass bleaching event, coral cover dropped from 28% to just 10% - the lowest on record.

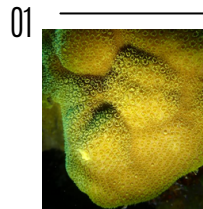
## Reef condition classifications reflect this shift



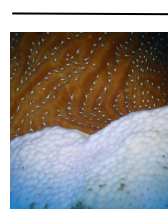
In 2023, more than 90% of reefs were in good to very good condition. In 2024, only 18% remained in good condition. This is only the third time any portion of reefs in Little Cayman has been classified as poor in 26 years.

## Why the coral declined

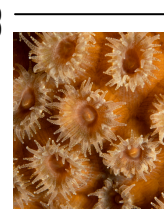
The weeds have withered



Lettuce coral in decline



Boulder corals take the lead



The decline is mainly due to the loss of heat-sensitive species like *Agaricia* spp., which often recover quickly. Key structural corals like *Siderastrea siderea* and *Orbicella annularis* remain present at many sites.

## Functional resilience at risk



The greatest long-term threat is a phase shift which is when coral reefs become dominated by macroalgae. This makes recovery extremely difficult and reduces the reef's ability to support fish, protect coastlines, and maintain biodiversity. Preventing this shift is essential to preserving the reef's ecological function.

## Fish populations offer hope



Despite coral losses, fish populations - especially herbivores such as parrotfish - increased significantly in 2024, marking the largest one-year rise ever recorded. These fish help limit algal overgrowth and are critical to reef recovery.

## Why Little Cayman still matters



Even now, Little Cayman's reefs remain among the healthiest in the region. They are vital for regional biodiversity, and their protection supports recovery and resilience across the Caribbean.

## Next steps

01

Protect remaining coral and fish populations

02

Reduce local stressors

03

Invest in conservation and restoration

04

Support deeper reefs and offshore biodiversity hotspots as refuges

The face of the reef is changing but its function, and its future, can still be protected.



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# Introduction

*In the summer of 2023, shortly after CCMI's annual health reefs monitoring, as a result of prolonged ocean warming, the world experienced the fourth global coral bleaching event. This was the most extensive on record and affected 77% of reefs globally.*

Through the Healthy Reefs campaign, CCMI has been monitoring the coral reefs of Little Cayman for 26 years. These data allow our researchers to study the changes on these reefs over time. This year's annual surveys were conducted in August 2024, which was the first opportunity to understand the reef-scale changes that have occurred in Little Cayman following the 2023 bleaching.





# Coral cover

Before the 2023 bleaching event, CCMI's surveys recorded average coral cover in Little Cayman at its highest since monitoring began in 1999 at 27.3%. Following the severe bleaching and subsequent mortality that followed, 2024 surveys indicated that coral cover in 2024 dropped to the lowest it has been since CCMI began monitoring 26 years ago. Coral cover reduced by 18% from 2023 to 2024 to approximately 10%. The previous all-time-low of coral cover was recorded in 2005, at 15%.

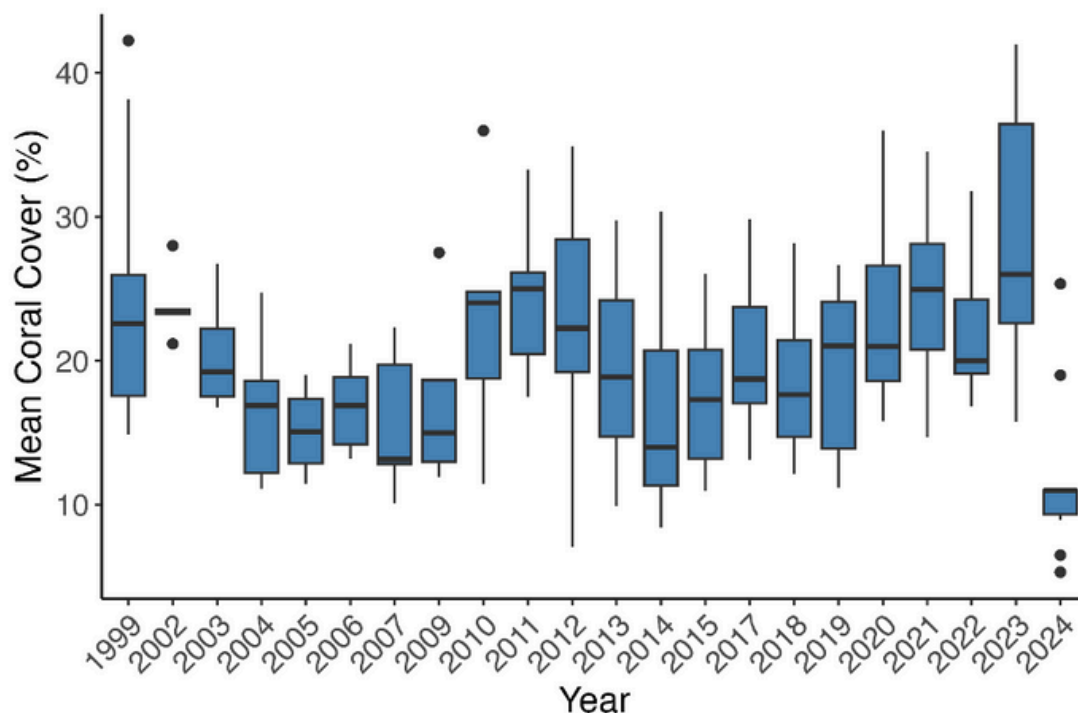
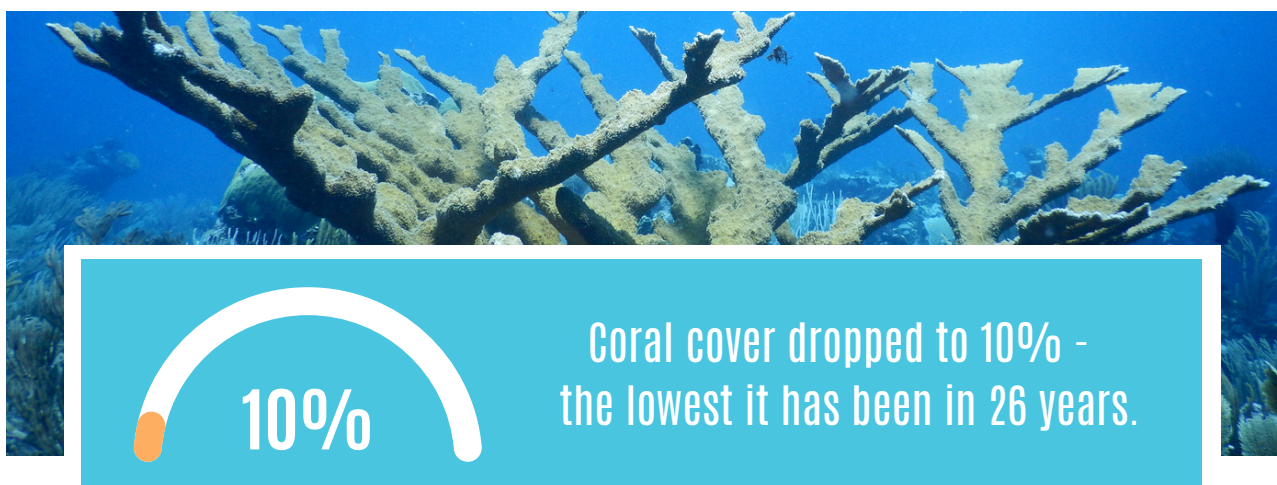


Fig. 1. Mean percent coral cover (+/- SE) over time from 1999 – 2024

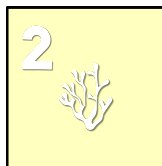
# Coral health

Between June 2023 and August 2024, coral health state changed substantially. In 2023, over 90% of reefs were recorded as between good to very good condition. In 2024...



**GOOD+**

0% were recorded as above good condition



**GOOD**

18% of reefs were categorised as good condition



**FAIR**

55% were in fair condition



**POOR**

27% were in poor condition

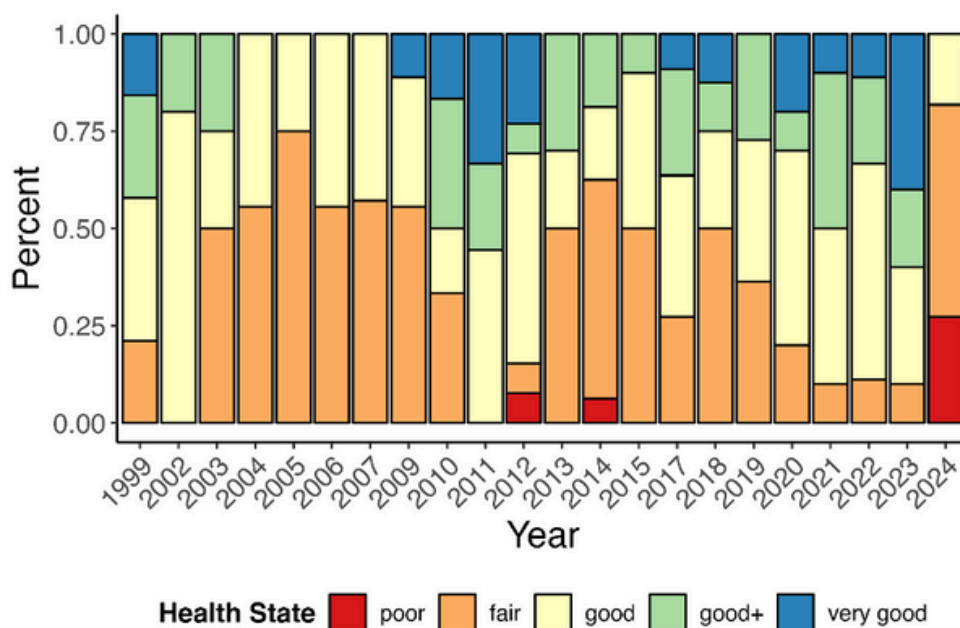


Fig. 2. Health state of surveyed reefs sites in Little Cayman from 1999 – 2024. Categories are based on percent coral cover using the following: Poor = 5 – 10 %, Fair = 10 – 18%, Good = 19 – 25%, Good+ = 25 – 30%, Very Good = 31 – 100%



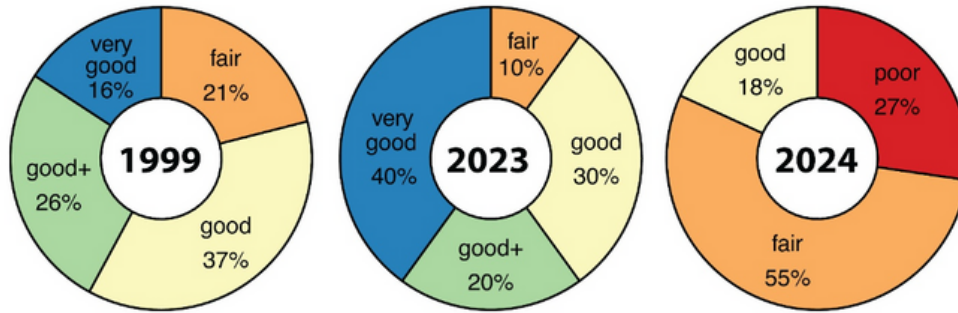


Fig. 3. Percent frequency by health state in 1999 (left), 2023 - pre 2023 bleaching event (middle), and 2024 - post 2023 bleaching event (right)

# Coral composition

01



## The weeds have withered

The substantial reduction in coral cover originates mostly from fewer ‘weedy’ coral species following the 2023 bleaching event, which typically have a lower thermal tolerance.

02



## Lettuce coral in decline

Corals such as *Agaricia* spp. have decreased substantially.

03



## Boulder corals take the lead

Key reef-building boulder corals such as *Sidastrea siderea* (massive starlet coral) and *Orbicella annularis* (boulder star coral) are typically more thermally tolerant and have shown a smaller decrease.

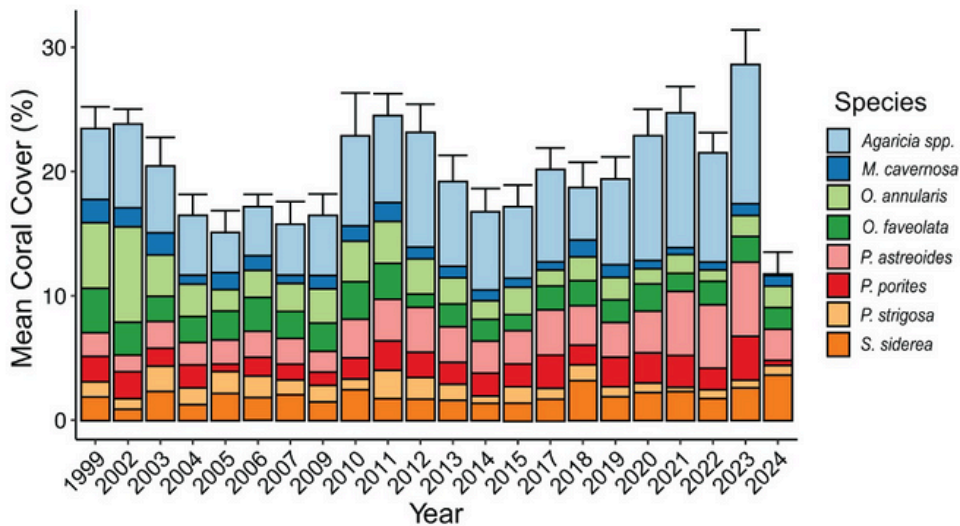


Fig. 4. Contribution of various coral families to overall percent cover

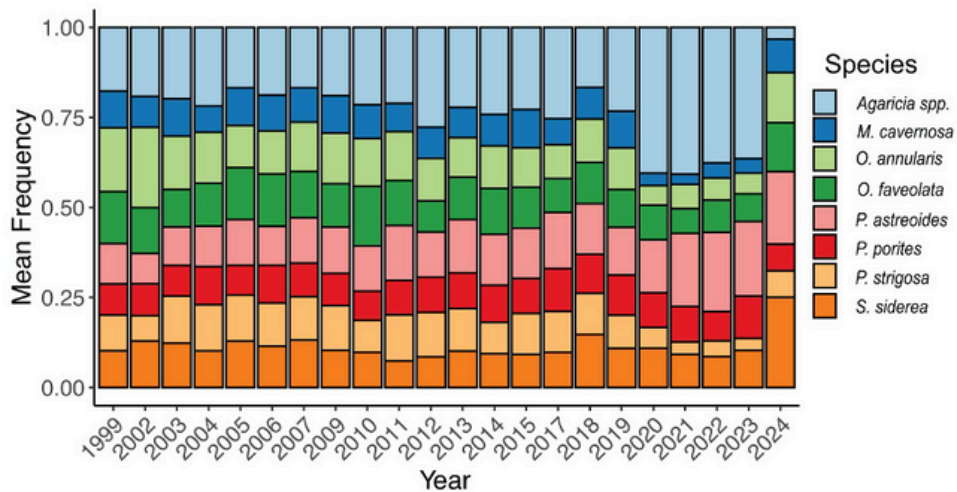
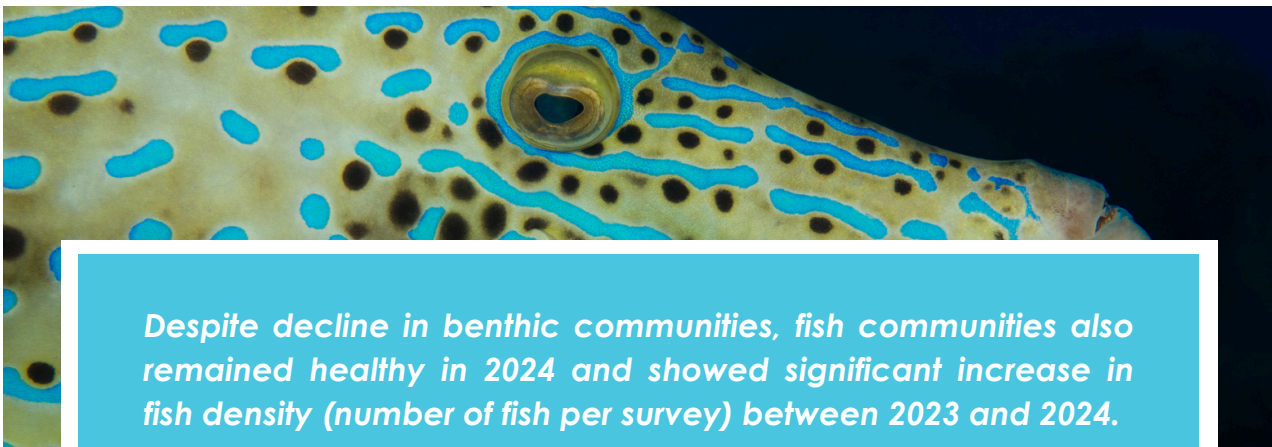


Fig. 5. Mean species frequency from 1999 – 2024



# Fish communities





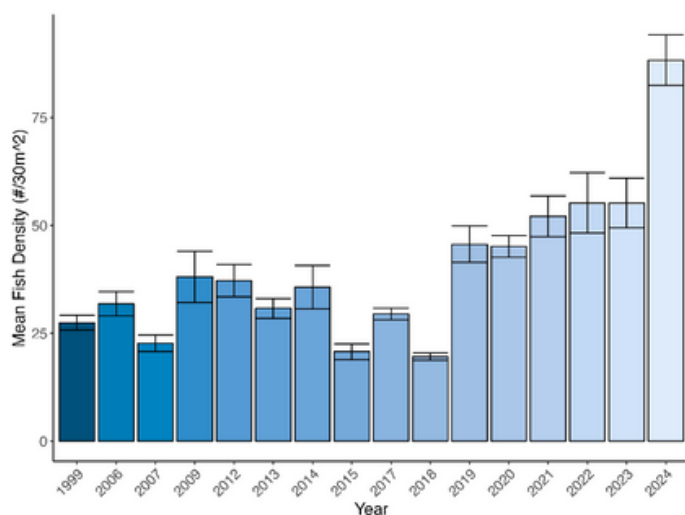


Fig. 6. Fish density (left) showing a marked increase since 2018 and fish biomass (right) showing a similar trend

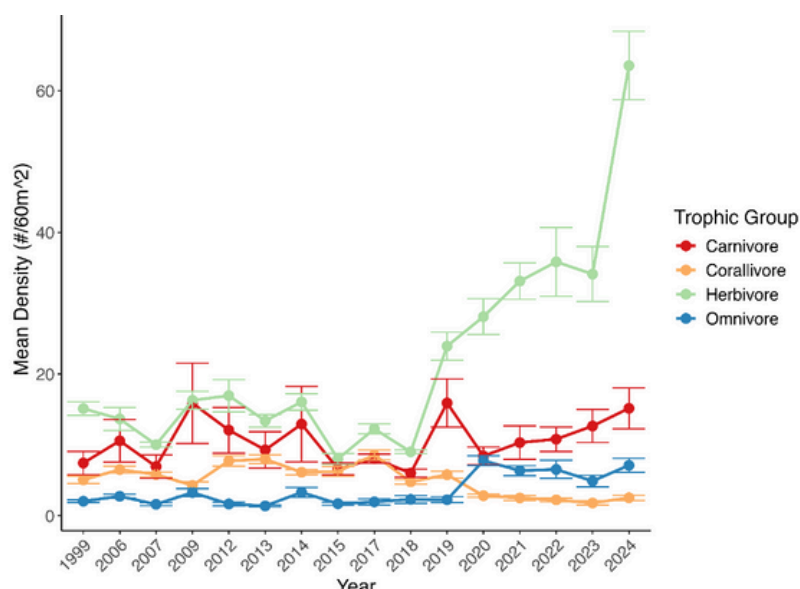


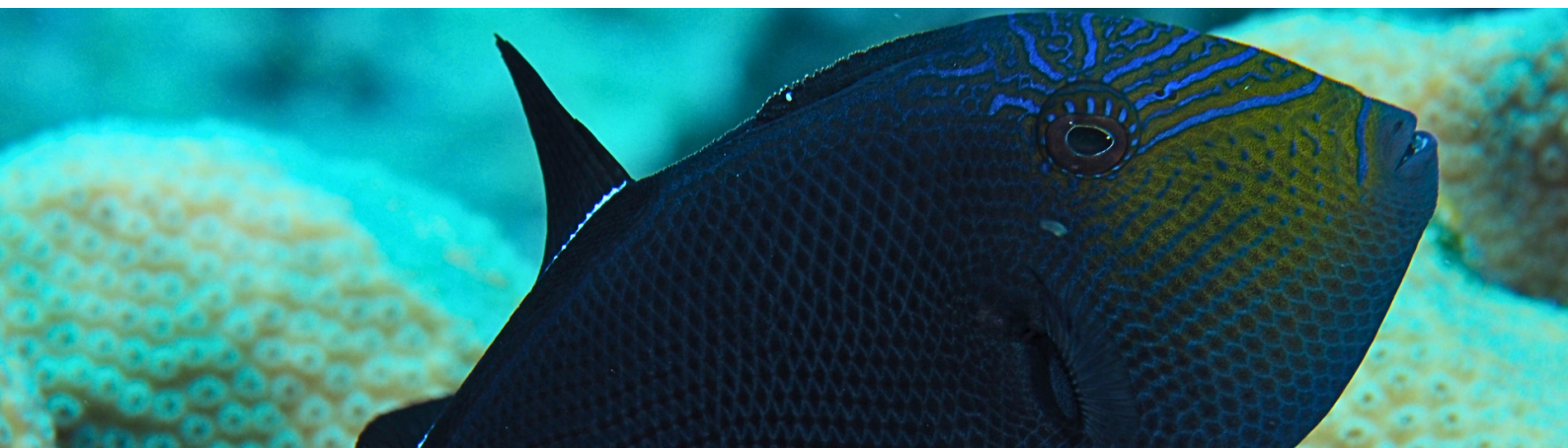
Fig. 7. Contribution of each fish trophic group to total fish density over time

## Fishy findings

Fish density has increased steadily in recent years, but in 2024, this increase was exponential compared with previous years.

## Reef clean-up crew expands

This increase in density is primarily driven by an increase in the number of herbivores, which has increased exponentially in the last eight years and even more so in the last year. Carnivore density has also been increasing in recent years but not as substantially as herbivores.



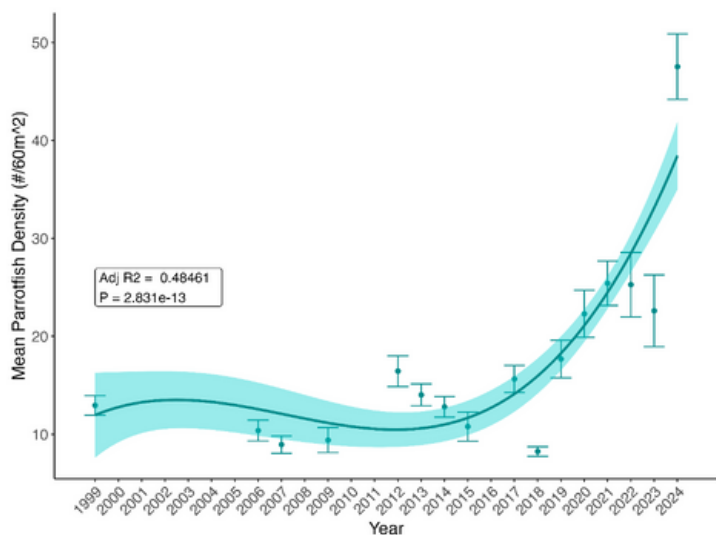


Fig. 8. Parrotfish density over time (1999 – 2024)

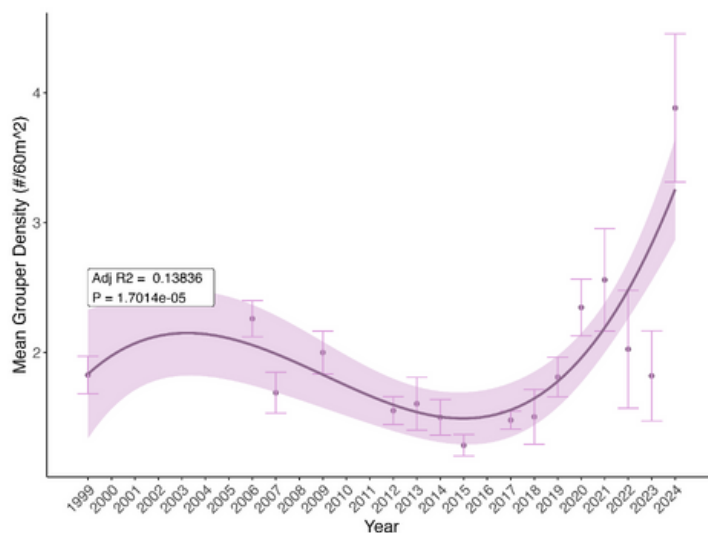


Fig. 9. Mean density of grouper on reef sites surveyed in Little Cayman from 1999 – 2024



### Parrotfish

Within the herbivores, parrotfishes show the strongest change in density over time with a significant increase from 1999 to 2023 and a significant increase from 2023 to 2024.



### Grouper

Similarly, within the carnivore trophic group, grouper show the largest degree of change with a significant increase over time, and specifically following the catch limits put in place in 2016. Similar to parrotfish, grouper showed a significant increase from 2023 to 2024.



# Macroalgae

*Finally, the percent cover of macroalgae on the benthos has increased since 2023.*

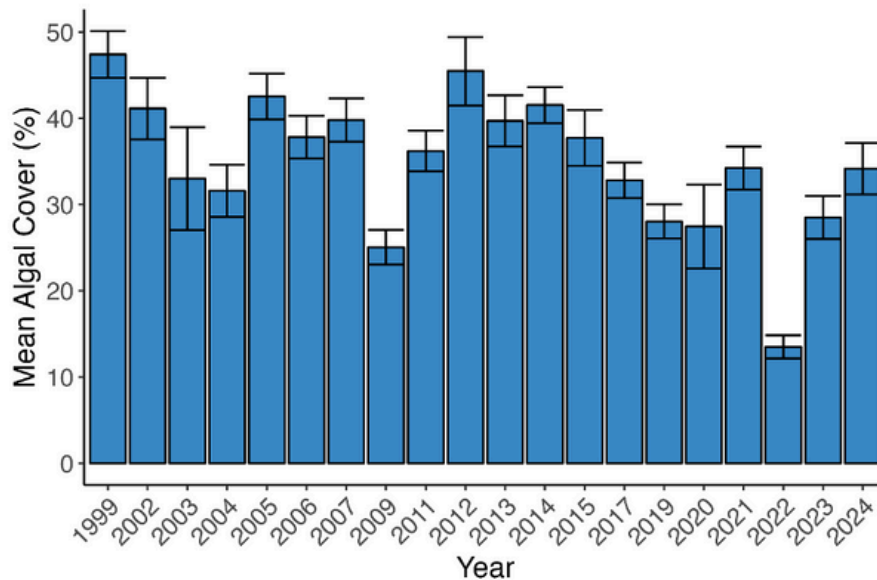


Fig. 10. Mean percent cover of macroalgae on the benthos in Little Cayman from 1999 to 2024

It is likely that this increase in macroalgae could be supporting the increase in herbivore populations that feed upon algae. An increase in macroalgae is expected with the decrease in coral cover recorded following the bleaching event. Although this is another indication of a decrease in reef health in 2024, it is possible that the healthy fish populations in Little Cayman will contribute to macroalgal control and support reef recovery in the coming years.

**Macroalgae is up post-bleaching, but thriving herbivores could help reefs bounce back.**



# Conclusion

*In 2023, the world experienced the most extensive global coral bleaching event ever recorded, affecting 77% of reefs due to prolonged ocean warming.*



## Coral Cover Decline

*Coral cover in Little Cayman plummeted from a 26-year high in 2023 (27.3%) to a record low in 2024 (~10%) following the bleaching event.*



## Coral Species Impact

*The decline was most severe among less heat-tolerant 'weedy' coral species while more resilient boulder corals fared better.*



## Herbivores & Carnivores

*Herbivores, especially parrotfish, and carnivores, such as grouper, have seen strong population growth, contributing to ecological balance.*



## Reef Health State

*Reef health deteriorated sharply, with 27% of sites now in poor condition—only the third time this has occurred since 1998.*



## Fish Community Trends

*Despite benthic declines, fish communities remain healthy, with a major spike in fish density observed in 2024.*



## Macroalgae Trends

*Macroalgae cover increased post-bleaching, but booming herbivore populations may help control algae and support reef recovery.*





## About CCMI

CCMI is dedicated to conducting and facilitating research, education, and outreach that will sustain marine diversity for future generations. Our vision is a world with vibrant oceans and healthy coral reefs. We will make this vision a reality by undertaking cutting edge, impactful research and transforming this research into conservation and education initiatives which will serve to bridge the gap between knowledge and action. CCMI is a US 501(c)(3) nonprofit organization (ID# 22-3609293), a UK charity (#1104009), and Cayman Islands nonprofit (NP-03).

**Produced with the support of CCMI's Healthy Reef sponsors**



**We thank you for your continued support in our efforts to save coral reefs.**

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