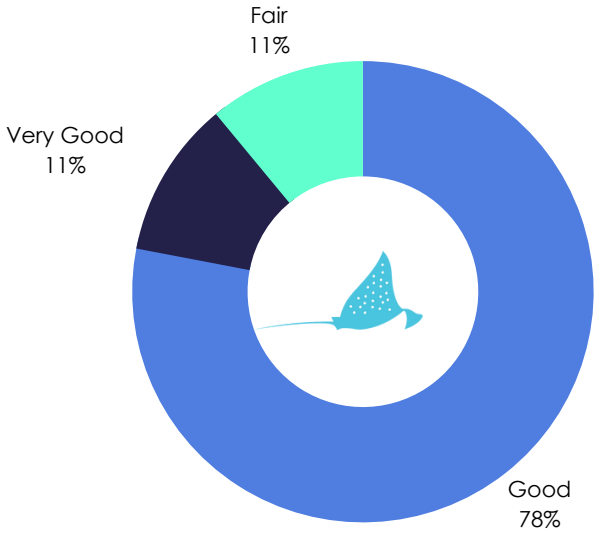
LITTLE CAYMAN REEF REPORT CARD 2022

CELEBRATING CCMI'S 25 YEAR ANNIVERSARY

89%

REEFS SURVEYED IN "GOOD" OR "VERY GOOD" HEALTH



- CORAL COVER HAS REMAINED STABLE
- MACRO ALGAE HAS DECLINED SIGNIFICANTLY
- CORAL SURFACE AREA HAS DECLINED SIGNIFICANTLY
- SHIFT IN REEF-DOMINATING CORALS ⇩ **BOULDER** ⇧ **SMALLER, WEEDY**
- CORAL RECRUITS ARE IN DECLINE
- FISH DENSITY, BIOMASS AND SPECIES RICHNESS HAVE INCREASED SINCE 2015
- FISH DENSITY HAS BEEN CONSISTENTLY HIGHER INSIDE OF MARINE PROTECTED AREAS VS OUTSIDE OF MPAS

HEALTHY REEFS FOR THE FUTURE

CCMI CENTRAL CARIBBEAN MARINE INSTITUTE

Coral Survey Results

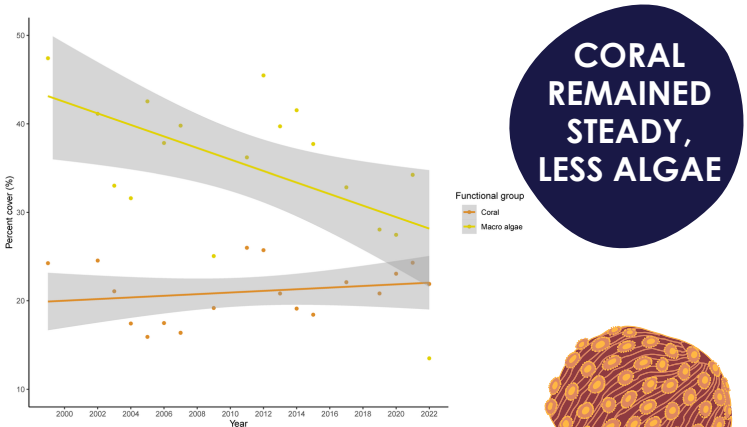


Figure 1: Percent Cover of Coral vs. Macro Algae 1999 - 2022

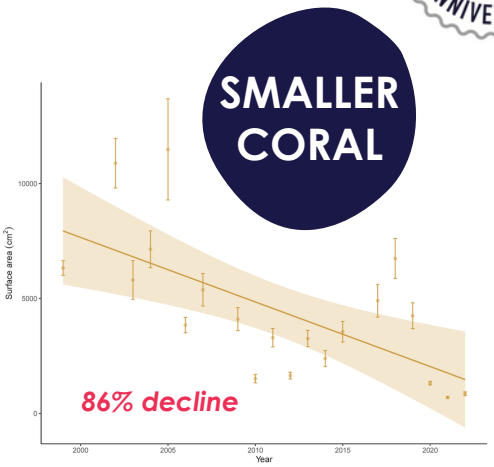
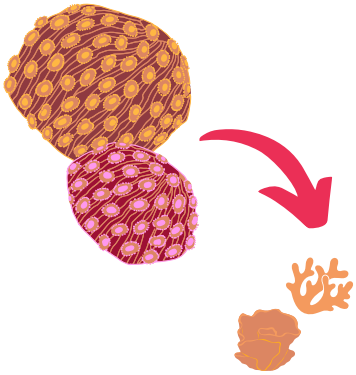


Figure 2: Surface Area of Corals Surveyed 1999 - 2022



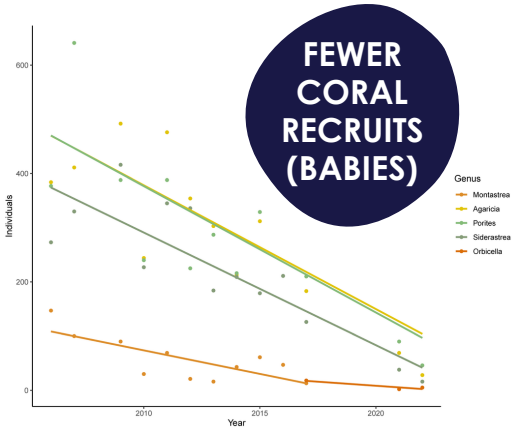


Figure 3: Decline in Coral Recruits Surveyed 2006 - 2022

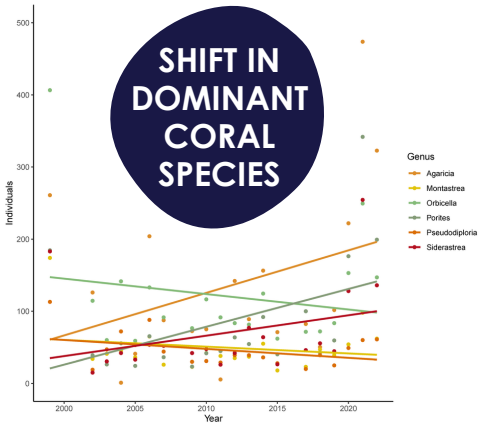


Figure 4: Shift in Coral Species Surveyed 1999 - 2022

Survey Results

- Coral percent cover remains stable (24% in 1999, 22% in 2022)
- Macroalgae has declined significantly
- Coral surface area has declined significantly (86%)
- There is a shift in species that dominate the reef
- Coral recruits are in decline

Details

- Disease, partial mortality and species shifts can contribute to decreased surface area
- There is a shift from large, reef-building boulder corals (Orbicella, Montastrea) to 'weedy' corals (Porites, Agaricia)
- Shift in recruits mirror species composition, absence of Orbicella recruits reflects regional trend

Significance

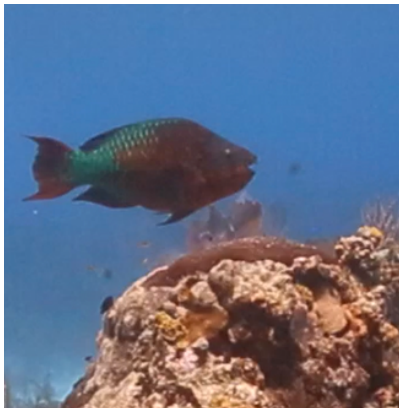
- Weedy corals reproduce via brooding throughout the year (versus species that reproduce via annual broadcast spawning), so are quick to establish on reefs after disturbance
- These corals are also faster growing
- This pattern in species shifts is consistent across the Caribbean
- The reduction in coral recruitment may suggest a vulnerable population
- If current patterns persist and adult coral populations are impacted by a mortality event (i.e., bleaching or disease), they are unlikely to recover quickly due to low rates of recruitment
- Increased protection and mitigation strategies are required to protect the present population

Fish Survey Results

CCMI's surveys show that the population density of all grouper species continues to reflect an increase following greater protections enacted by the Cayman Islands Government in 2016. These protections (inclusive of a seasonal blanket closure on Nassau grouper fishing, bag limits, gear restrictions, and size limits) were aimed at Nassau grouper but have benefited all grouper species and the fish populations in Little Cayman overall.

Overall fish density, biomass, and species richness have shown steady increases since 2016, an apparent ripple effect of the enhanced local protections aimed at Nassau grouper population recovery. There are nearly double the number of fish surveyed in 2022 than there were in 1999, and roughly three times the total biomass, indicating that there are more fish and larger fish on the reefs surveyed. This means that we are seeing more fish, larger fish, and a greater diversity of species than in previous years. Major increases in 2020 and 2021 may have been further influenced by COVID-19 and reduced overall activity on the reef. The Cayman Islands Government also expanded Marine Protected Areas (MPAs) in 2021. Nearly 75% of Little Cayman's surrounding reefs are now marine protected areas. CCMI's long-term survey data reflects that year after year, there is higher biomass inside MPAs than outside of the MPAs. While biomass numbers fluctuate from year to year, the impact of wider events is buffered inside the MPAs, allowing more fish and larger fish to thrive. Therefore, the expansion of MPAs should continue to benefit Little Cayman's reef ecosystem health.

As coral reefs face increasing global threats, overall ecosystem health must be preserved. Continued increases in fish populations, especially in key herbivorous fish like parrotfish, are helpful, positive indicators for reef health overall. Parrotfish eat algae which competes with coral for space on the reef.



By establishing and enforcing protection for key areas and populations, the Cayman Islands Department of Environment's regulations benefit the overall ecosystem.

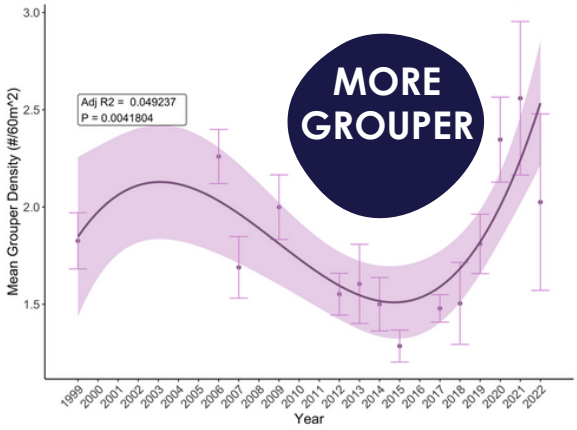


Figure 5: Grouper Population Density 1999 - 2022

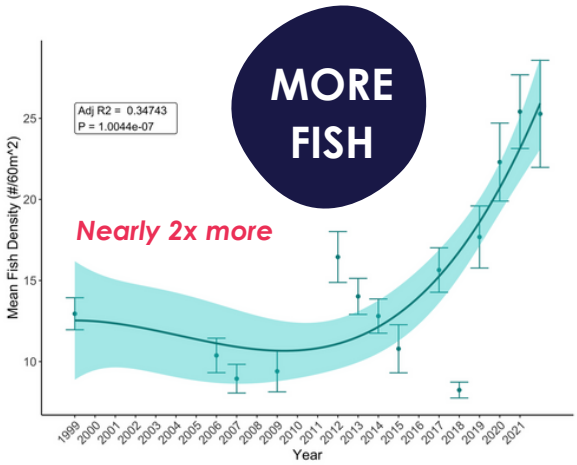


Figure 6: Mean Fish Density 1999 - 2022

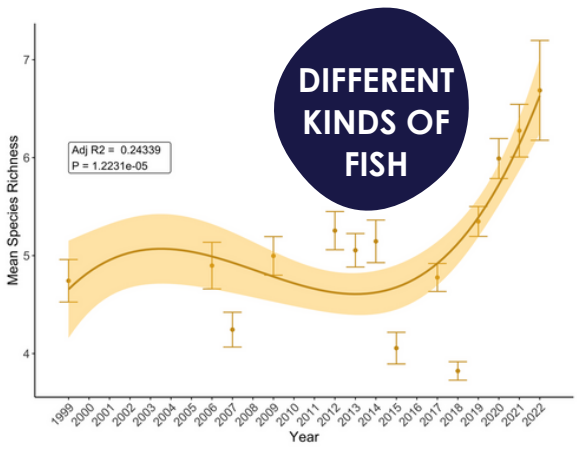


Figure 7: Mean Species Richness 1999 - 2022

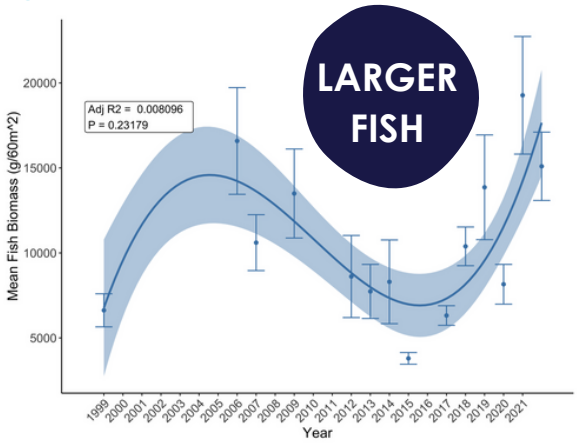


Figure 8: Mean Fish Biomass 1999 - 2022

Summary

Globally, coral reefs are threatened by human activities. Little Cayman's reefs are subject to the same urgent threats of climate change, pollution, and global overfishing. However, strong protections put in place by the Cayman Islands Government and the small human population on Little Cayman have shielded the reefs here from some of the pressures of development and local overuse. By conducting annual surveys on Little Cayman's reefs for 24 years, CCMI has compiled a long-term data set that gives light to trends and changes on the reefs here, reflecting changes in protection and use over time. Fish populations are currently rebounding, as a result of the strong protection of key species and of vast portions of the reef. However, we can also see, particularly in our coral surveys, the vulnerability of these reef ecosystems. Shifts in dominant species and declining recruitment are taking place in Little Cayman as they are throughout the region. There is an urgent need for further research into coral resiliency, so that we may understand how corals may survive in the changing climate and future threats. Coral reefs are critically important ecosystems facing increasing threats, and our work to create a sustainable, hopeful future for coral reefs is even more urgent than ever. After 25 years, the CCMI team remains committed to sustaining marine biodiversity through research, education, outreach, and conservation.

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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).

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