

GC13D-0222 Death of a Coral Refugium After the 2023 Marine Heatwave and What Remains of Coral Gardens Belize



Monday, 9 December 2024



13:40 - 17:30



Hall B-C (Poster Hall) (Convention Center)

Abstract

Coral Gardens, Belize was documented as an *Acropora cervicornis* (Staghorn) coral refugium in 2020. Prior to December 2023, it contained the largest documented extant population of endangered *A. cervicornis* in the Caribbean. Corals at the site were long-lived with some coral genets over 400 years old, and the site exhibited uninterrupted growth through a time of precipitous decline seen elsewhere in the Atlantic over recent decades. Percent live *A. cervicornis* coral was assessed annually from 2012 to 2024 using photographs of 1 m² quadrats across 5 transect sites, and quantified using Adobe Illustrator, Adobe Lightroom, and MATLAB. *A. cervicornis* decreased significantly (17.4% per m²) across sites between 2012 and 2017, then stabilized and even increased modestly from 2017 to June 2023, before plummeting to zero between June 2023 and December 2023 during the marine heatwave of 2023. Sea-surface temperatures (SST) at Coral Gardens, measured once daily by satellite (5 km resolution) and hourly by in situ sensors since 2012, increased earlier (May), peaked higher (>31.3 °C), and remained elevated longer (mid-Nov) than any year since 1985. Despite proximity of Coral Gardens to the wave-dominated crest of the Mesoamerican Reef, acroporid corals in this shallow reef environment appear to have succumbed to unprecedented thermal stresses (DHW = 19-25 °C-weeks; NOAA Coral Reef Watch Alert Levels 4 and 5) of the 2023 marine heatwave. Field surveys in June 2024 indicate that some live *A. cervicornis* is still present at depth along the fore reef, and at one location along the reef crest. The question of what happens next at Coral Gardens remains. Algal cover (*Dicotyia* sp. (Y-branch) and *Corallinales* sp. most abundant) increased by 13% between June 2023 and June 2024 at what was once the most prolific *A. cervicornis* portion of Coral Gardens. Non-acroporid live coral abundance declined from 6.9% to 3.6% between June 2023 and June 2024, with *Porites astreoides*, *Porites*

porites/divaricata, *Orbicella* sp, and *Millepora* sp. remaining, in decreasing relative abundance. Although coral decreased dramatically and algae increased, algae-eating urchins decreased from 24.1 per m² to 13.6 per m² from 2019 to 2024. In light of increasing algae, decreasing herbivores, and a continued rise in SST, the prospect of coral survivorship on this former refugium remains dim.

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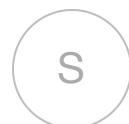
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