

Researchers report mass bleaching of coral reefs in warming Florida oceans: 'Like a forest without trees'

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Peering over the edge of research vessel Coral Reef II as it sailed through the Florida Keys, Shedd Aquarium postdoctoral fellow Shayle Matsuda saw white.

Matsuda and a group of researchers from the aquarium and other institutions witnessed firsthand how [coral reefs](#) that were healthy and vibrant just two months earlier had quickly bleached by the time they returned to the Sunshine State for their most recent trip.

An unprecedented rise in [ocean temperatures](#) off the coast of Florida early in the summer made headlines as it caused countless dead fish to wash ashore. But the impact had an even wider reach than was initially evident, according to the Shedd's research in partnership with the University of Miami, Palm Beach Zoo and the University of Southern California.

Between 90% and 95% of corals they surveyed at 76 sites across the Keys and Dry Tortugas over the span of a week showed signs of extreme bleaching, said Shedd research biologist Ross Cunning. Some [coral species](#), such as endangered branching corals like staghorn and elkhorn, were nearly all dead.

"We're pulling up to these reefs on the boat and you could see, before even getting in the water, the stark, bright white coloration of these bleached corals," Cunning said. "It was unmistakable. So, we knew before even getting in the water how severe these impacts were."

The further south researchers went, the worse the bleaching was. Throughout the Dry Tortugas, they dove as deep as 60 feet, hoping for a greater chance of encountering survivors. But they did not find a single viable staghorn [coral](#).

Researchers are calling it the "worst coral bleaching event that Florida

has ever experienced."

Corals bleach when waters are too warm, as the tiny algae living in their tissues—which provide them with essential nutrition through photosynthesis—cannot survive in high temperatures. Losing their primary food source causes corals to lose their color and turn white, leaving them vulnerable to starvation and disease.

"Bleaching is not inherently bad as a [stress response](#)," Matsuda said. The researchers explained corals expel algae in response to seasonal rises in temperatures, so even if a coral is bleached it doesn't necessarily mean it's dead.

If temperatures go back down in time, that can alleviate the [heat stress](#) on corals and allow them to regain the symbiotic algae they lost, as well as their nutritional source and their color.

It becomes a problem, however, when the bleaching lasts a few weeks too long and the corals continue to starve. "They will then die," Cunning said.

Corals serve as habitat for many other animals and fish. A quarter of all marine life spends a significant portion of their life on coral reefs, according to the U.S. Environmental Protection Agency. Being one of the most biodiverse ecosystems on the planet, coral reefs are often called the rainforests of the sea—and corals are their building blocks.

"It would be like a forest with no trees. You have no trees, you have no forests; there's no habitat for all the animals that live in the forest. It's the exact same thing with coral reefs," Cunning said.

"If you have no corals, then you have no coral reefs. So as the corals die off, then their skeletons will, over long periods of time, start to break

down like dead trees eventually fall over. And you lose that structure, you lose that habitat, and that's when we'll start to see the losses of all these other species that no longer have habitat."

The Shedd has been studying heat tolerance in corals for several years, and has been helping in international conservation efforts for endangered Caribbean corals for over a decade.

In 2019, the Tribune accompanied Cunning and other Shedd researchers on a trip to the Bahamas where they placed live coral fragments on open-ocean underwater nurseries to identify the hardiest, most heat-resistant strains of coral that will be likelier to perform better and survive in warming oceans.

It's a mission that has become somehow even more important now than it was four years ago, "because what happened in Florida this summer (is) going to be happening more and more frequently and more intensely," Cunning said.

At the Shedd, aquarists grow and propagate corals—most of their collection hails from the Pacific since Caribbean corals are banned from the aquarium trade—which Cunning and Matsuda use to complement their [field research](#) with experimental on-site work.

On a recent weekday behind the scenes of a busy aquarium, Cunning held up a dead staghorn coral, its rough surface a stark white and covered in tiny nodes that would have been occupied by polyps, or coral tissue that looks like little tentacles, if the specimen was still alive.

"When we were in the field in September, we had to look very closely at a lot of these," he said, his eyes scanning the dead coral in his hands.

"A lot of them looked like they were a bright, clean white; some of

them, we would look up close and we would be able to detect a little bit of that tissue remaining in those columns. But others, we looked very closely and saw nothing, indicating that either there was so little living tissue left that we couldn't even see it with our eyes, or they had died recently."

Elkhorn and staghorn coral are two of the most important [reef](#)-building species in Florida and the Caribbean, and consequently have long been the focus of many conservation efforts. So it was particularly devastating to him, Cunning said, to see most of those corals off the coast of Florida had died over the summer.

"On the one hand, we all knew that this was coming. This was not really a surprise, because we've known for a very long time what hot water temperatures do to corals," Cunning said. "And we've known for a very long time that we are causing (the) warming of our planet and our oceans. So in that sense, it's not a surprise, but it was still a shock to witness and just heartbreaking to see."

For researchers, the mass bleaching and death of corals in Florida represent a bellwether or indicator of what is to come for coral reefs in warming oceans worldwide.

"There are no reefs anywhere in the world that are immune to, or protected from, the impacts of global climate change," Cunning said.

"We cannot engineer our way out of this problem—for coral reefs or for the rest of our planet, for that matter. We must stop emissions and (the) further warming of our planet. And that needs to happen now, and at a global scale. So far we have not seen the level of action to address climate change that we need to ensure the survival of reefs and the rest of our planet."

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