# Was Florida red tide made worse by Hurricane Ian? Here's what we know

March 2 2023, by Max Chesnes

Credit: NOAA

Twenty-two days after Hurricane Ian made landfall, the first signs of a red tide bloom emerged on Florida's Gulf Coast.

It was Oct. 20, just offshore of the Sarasota coast, when researchers documented medium levels of the organism that causes toxic blooms.

If you had scooped up one liter of ocean water there that day, you'd find more than 100,000 tiny karenia brevis cells. That's enough to kill wildlife and impair human breathing. Enough to be considered a

"bloom."

Until that discovery, nearly a year had passed since researchers at the Florida Fish and Wildlife Research Institute had seen a bloom in Southwest Florida. But now, more than four months later, red tide is still raging as far north as Pinellas County and south to Collier. Thousands of pounds of dead fish have washed ashore as this latest bloom ebbs and flows—and beachgoers are still reporting breathing problems along the coast.

Hurricane Ian slammed the state less than three weeks before red tide appeared, leading many to link the storm with the toxic algae's return. But what role, if any, did Ian play in the arrival of this latest red tide? We asked experts at three Florida universities, plus two leading state and federal scientists, and their answers boiled down to these main points:

Red tide would still be flaring up, with or without the hurricane; it's still possible the storm brought red tide closer to shore; the present red tide today is likely no longer feeding on pollution dumped by Ian months ago, and Ian proved scientists still have much to learn about the relationship between storms and toxic algal blooms.

"It's easy to make correlations: There's a hurricane, and then there's a longer bloom. Maybe it's correlated, but that doesn't mean it's causal," said Dail Laughinghouse, an assistant professor of applied phycology at the University of Florida's Institute of Food and Agricultural Sciences.

In science, a cause-and-effect relationship happens when you change one thing, and it changes another.

Knowing this, it's hard for scientists like Laughinghouse, who has studied algae for roughly two decades, to piece together the precise relationship between hurricanes and red tides.

The toxic algae was particularly bad after Hurricane Charley in 2004 and Hurricane Irma in 2017, for instance, but the connection between them isn't clear-cut, according to Michael Parsons, director of the Water School at Florida Gulf Coast University.

"We cannot draw a simple line connecting one to the other," Parsons said.

But here's what they do know:

Red tide usually begins in late September or early October, just like it did this past fall. That happens to coincide with the height of the Atlantic hurricane season (federal meteorologists consider Sept. 10 to be the peak). There were already trace levels of the red tide-causing organism brewing two weeks before Ian's landfall, more than 10 miles offshore of Collier County. It was out there, in small amounts though not yet a bloom, as early as Sept. 13, according to data provided by the wildlife institute.

That makes sense scientifically. There's a broad consensus that red tide blooms begin offshore, then move closer to beaches as time passes.

The question now is whether Hurricane Ian helped push the karenia brevis organism closer to shore.

Bob Weisberg, a physical oceanographer at the University of South Florida, believes this is likely what happened.

"Ian got (red tide) closer to the shore. It didn't trigger it—just got it a little bit closer. So then, when the subsequent passage of cold fronts occurred, there was additional transport towards the shore," Weisberg said. Cold fronts are a big factor in how red tide moves in the Gulf.

"Another way of saying it: Regardless of Ian, we were going to have a red tide this year."

## Making 'scrambled eggs'—The pollution question

Millions of gallons of polluted water flowed off the land in the days following Hurricane Ian's landfall. From space, chocolate milk-looking water clashed with the turquoise waters of the Gulf of Mexico.

Red tide likes to feed on the nutrients mixed into polluted water. Unlike harmless algae species that float around passively, karenia brevis is an efficient hunter: It can swim up and down in the water to access those nutrients, and can swim back up to the light near the surface. But there's also a catch: The organism doesn't like freshwater, so it can't hunt the nutrients immediately after a storm. It has to wait for the water to get saltier.

Parsons likens it to a scrambled raw egg in a bowl: The yellowy yolk are the nutrients in polluted freshwater runoff, and the egg white is normal conditions. After a storm, there are patches of elevated nutrients, but still plenty of large swaths of normal water. Red tide has to "wait" until the freshwater (yolk) mixes with Gulf water (egg white).

There are some algae species that can tolerate freshwater easier than karenia brevis can. And that algae gets the first bite of the nutrients, gobbling it up before red tide can. Scientists have to parse through water samples for months before they can get a true "big picture" view of how water quality was affected by Ian, according to Parsons.

## Weather is favorable for a harsher red tide

Recent weather hasn't helped clear Southwest Florida from red tide's

grip.

The ongoing red tide is persisting because of the conditions over the last two months, not because of the conditions caused in the weeks after Ian, according to Richard Stumpf, an oceanographer at the National Oceanic and Atmospheric Administration.

Typically, high pressure will lead to northerly winds in the winter, pushing red tide blooms out. But this year there there have been weaker winds from changing directions, with southwest winds in recent weeks bringing the bloom closer to shore, Stumpf said.

But the nutrients dumped into the Gulf from Ian have been diluted or used up by now, Stumpf said in an emailed statement.

Unanswered questions still remain. Two include: What causes a red tide to end, and do hurricanes impact how a red tide comes to an end? Researchers are out collecting samples constantly to try and solve this question, according to Parsons.

"These storm events really highlight the complexity behind the environmental linkages to bloom dynamics," said Kate Hubbard, the director of the state's Center for Red Tide Research.

"It's hard to point to any one or even multiple factors," Hubbard said. Red tide is a complex beast where biology, physics and chemistry all play an important role. Throw a high-end Category 4 storm into the mix, and answers get harder to answer.

Still, Hubbard offered her conclusion: "If we hadn't had the storm, I think that we still would have had a bloom that would have started later."