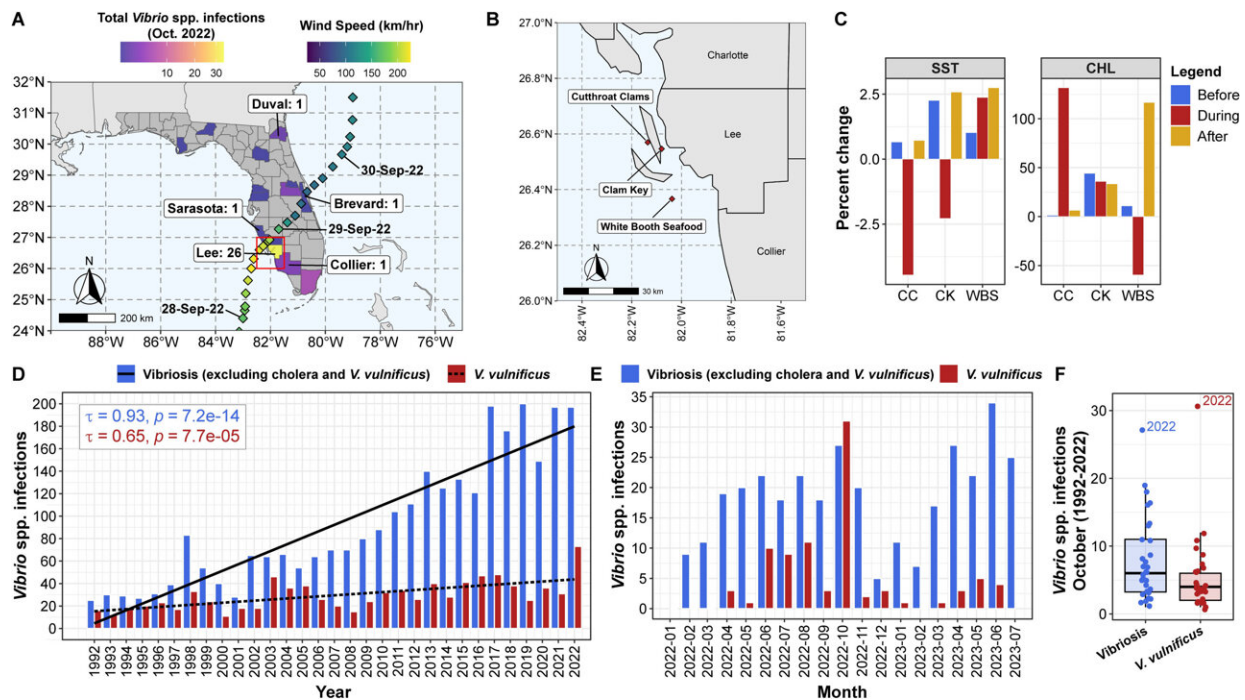


Flesh-eating and illness-causing bacteria found in Florida's coastal waters following Hurricane Ian

October 16 2023



Area of study. (A) Path of Hurricane Ian and total number of confirmed *Vibrio* spp. infections in FL at the county level for October 2022 (43, 45). Counties reporting *V. vulnificus* cases and number are indicated. Track, timeline, and windspeed of Hurricane Ian, indicated by diamonds, were retrieved from the International Best Track Archive for Stewardship (IBTrACS) project (47). The outlined red box indicates an area of sampling locations. (B) Map of sampling locations, indicated by red diamonds. Scale bar corresponds to distance according to World Map Data from Natural Earth (48). (C) Percent change in a time series analysis to determine potential impact of anomalous weather events

before (24 July 2022 to 23 September 2022), during (24 September 2022 to 30 September 2022), and after (1 October 2022 to 30 November 2022) Hurricane Ian, for sea surface temperature (SST) and chlorophyll (CHL). (D) Confirmed vibriosis (excluding cholera and *V. vulnificus*) and *V. vulnificus* cases between 1992 and 2022. Correlations among axis variables were respectively generated using Kendall's tau method. (E) Confirmed vibriosis (excluding cholera and *V. vulnificus*) and *V. vulnificus* cases at a monthly scale between January 2022 and July 2023. (F) Confirmed vibriosis (excluding cholera and *V. vulnificus*) and *V. vulnificus* cases during the month of October between 1992 and 2022. Boxes summarize distribution by indication of interquartile range (IQR), with median shown as the center bar of each group. Whiskers represent 1.5 times the IQR. Credit: *mBio* (2023). DOI: 10.1128/mbio.01476-23

When Hurricane Ian struck southwest Florida in September 2022, it unleashed a variety of *Vibrio* bacteria that can cause illness and death in humans, according to a [new study](#) published in the journal *mBio*.

Using a combination of genome sequencing and satellite and environmental data, a team of researchers from the University of Maryland, the University of Florida and microbiome company EzBiome detected several pathogenic *Vibrio* species in water and oyster samples from Florida's Lee County, a [coastal region](#) that was devastated by Hurricane Ian. The samples, which were collected in October 2022, revealed the presence of two particularly concerning species: *Vibrio parahaemolyticus* and *Vibrio vulnificus*.

"We were very surprised to be able to detect—without any difficulty—the presence of these pathogens," said the study's senior author Rita Colwell, a Distinguished University Professor in the University of Maryland Institute for Advanced Computer Studies (UMIACS) who has studied *Vibrio* for the last 50 years.

The study's findings correspond with a reported increase in *V. vulnificus* cases in the state of Florida in October 2022. According to the Florida Department of Health, Lee County, which had the highest caseload in the state, reported 38 infections and 11 deaths linked to vibriosis.

Vibrio bacteria naturally occur in the ocean, where they live symbiotically with crustaceans, zooplankton and bivalves. When the bacteria come in contact with humans, some species can cause an [infection](#) known as vibriosis, but the side effects depend on the type of *Vibrio* and severity of the infection. *V. parahaemolyticus* can cause gastroenteritis and wound infections, while the *V. vulnificus* species can cause necrotizing fasciitis—a flesh-eating infection—and kills 1 in 5 infected people.

People can contract vibriosis by eating raw or undercooked seafood or by getting seawater in an open wound. Because *Vibrio* thrive in warm saltwater, hurricanes and floods can increase the chances of a person becoming exposed.

Several conditions during and after Hurricane Ian favored the growth of *Vibrio* bacteria, including the amount of rainfall, changes in [sea surface temperature](#) and concentrations of chlorophyll in the ocean, which can indicate densities of phytoplankton—and subsequently zooplankton—in an area. In places with plankton blooms, the researchers found an abundance of *Vibrio* bacteria.

With warming oceans expected to fuel wetter and more powerful storms like Ian, coastal communities could see more *Vibrioinfections* in the future.

"These *Vibrios* generally grow well between 15 and 40 degrees Celsius [59–104 degrees Fahrenheit], so as the temperature warms, their generation time shortens and they divide faster and faster," Colwell said.

"The warming of seawater—which mixes with freshwater, creating optimal salinities—really enhances the growth of Vibrios, so it's a very serious concern."

While the [environmental conditions](#) in Florida following Hurricane Ian were ripe for vibriosis, these cases are not limited to southern climes. In August 2023, three people in New York and Connecticut [died from V. vulnificus infections](#).

Colwell and her co-authors—which included Kyle Brumfield (Ph.D. '23, marine estuarine environmental sciences) and UMD Cell Biology and Molecular Genetics Research Professor Anwar Huq—predicted this recent spike in vibriosis cases based on trending environmental conditions in the Northeast United States. As ocean temperatures continue to rise, Colwell said the rapidly warming Chesapeake Bay could also be affected.

"The waters are much warmer in Florida right now than they are in the Chesapeake Bay, but on a lot of the East Coast, the waters are warming," Colwell said. "This is a threatening indication that we may be seeing more *Vibrio vulnificus* infections.

Colwell and her co-authors noted that while they analyzed only a limited number of samples, their findings illustrate the potential of genetic analysis, [environmental data](#) and remote sensing to improve [public health](#) by proactively detecting and characterizing *Vibrio* pathogens.

They also called for further investigation to quantify the prevalence of *Vibrio* bacteria in different locations, seasons and environmental conditions. Colwell said this research is not only vital to public health but also an important step in understanding our changing climate.

"On the positive side, knowing that these infections are associated with

the increased variability of a changing climate, perhaps now is the time to develop mechanisms to understand and mitigate it," Colwell said. "Climate change and flooding are clearly linked to infectious disease, and we need to take it seriously."

More information: Kyle D. Brumfield et al, Genomic diversity of *Vibrio* spp. and metagenomic analysis of pathogens in Florida Gulf coastal waters following Hurricane Ian, *mBio* (2023). [DOI: 10.1128/mbio.01476-23](https://doi.org/10.1128/mbio.01476-23)

Provided by University of Maryland

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