

Pacific Islands Climate Change Cooperative



Projections of coral reef bleaching: at current rates, most reefs impacted by mid-century

The world's climate is highly complex, with decades to centuries of lag time in response to changing levels of greenhouse gases and warming. Nevertheless, global climate models show that reducing the emission of pollutants from fossil fuels and other sources can make a significant difference in the 21st century climate. Much climate change research revolves around projecting future scenarios, offering policymakers and the public a choice -- sometimes a stark one. For example, what are the odds of coral reef loss based on current conditions versus a world that is serious about reducing greenhouse gas emissions?

With support from the [Pacific Islands Climate Change Cooperative](#), researchers at the Institute for Pacific Coral Reefs have recently combined information from global climate models, greenhouse gas emission scenarios, and ocean acidification studies to develop a tool that answers that question. Their study shows that at the current rate of growth of emissions, the world can expect to see fully [90% of all coral reefs](#) experiencing severe thermal bleaching annually by 2055. Scientists believe that annual bleaching marks the point at which coral-dominated systems cannot persist as we know them, since significant bleaching events are often followed by coral death.

A first: climate change projections for coral reefs publicly accessible

The [coral reef bleaching and ocean acidification model](#), now freely available at

NOAA's Coral Reef Watch website, presents information in a Google Earth file allowing anyone to focus on what is likely in store for their region of the world. This marks the first time that climate change projections for coral reefs have been made publicly accessible. In general, researchers calculate that tropical and subtropical (low latitude) reefs will experience annual bleaching about 10-15 years earlier than reefs in higher latitudes under the current emissions growth scenario. However, even cooler higher latitude reefs cannot escape the effects of acidification, which will continue to increase. The tool's projections are dire but provide the most up-to-date assessment of what the changing climate and ocean acidification mean for the persistence of coral reefs.



Cauliflower coral hosts more than 100 Hawaiian domino damselfish

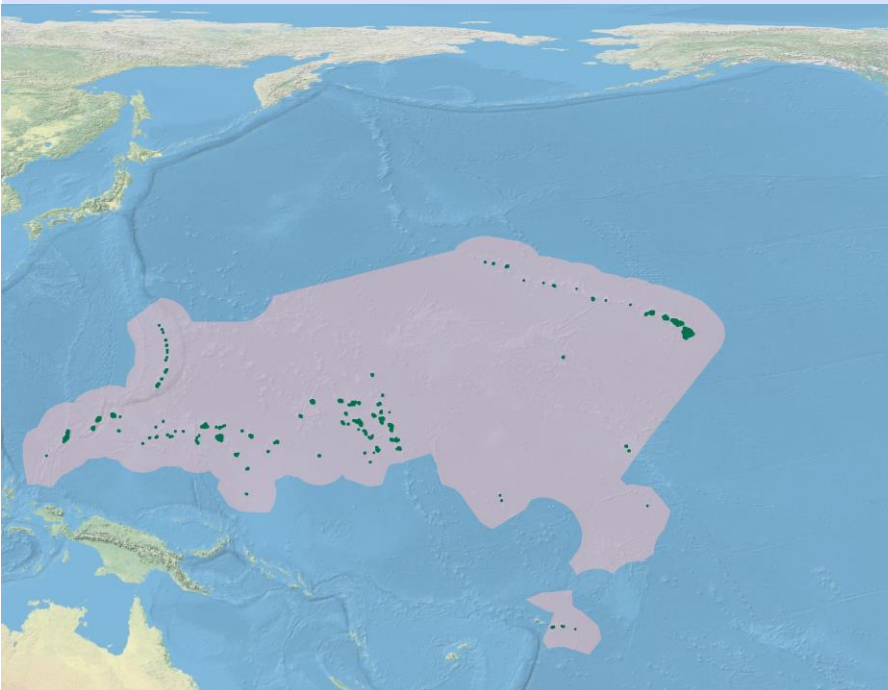
Island communities ask about local harvests and what they can do

What does this mean for Hawai‘i? The tool’s output suggests that conditions more severe than those that have caused bleaching in the Northwestern Hawaiian Islands in the past will occur annually in the main Hawaiian islands in the 2040s and in the Northwestern Hawaiian Islands in the 2050s. As part of this project, researchers organized engagement sessions with native Hawaiian communities in Lāhaina, Maui and Honolulu.

Communities were focused on the impacts that they could expect locally – particularly with respect to seafood security – which are essentially unknown. (NOAA states that [coral reef fish are a significant food source](#) for over a billion people worldwide, 85 percent of whom rely on fish as their major source of protein.) These sessions yielded insights about the best avenues for educating local communities, best practices for scientists who wish to engage the Hawaiian public, and possible local strategies for resilience.

For more details about this project, visit the PICCC projects page: piccc.net/our-projects.

The map below depicts the PICCC geography, which includes Hawai‘i, American Sāmoa, Guam, the Northern Mariana Islands, the Marshall Islands, the Federated States of Micronesia, Palau and 4 Marine National Monuments.



Principal Investigator

Jeffrey Maynard
[Institute for Pacific Coral Reefs](#)

[The Pacific Islands Climate Change Cooperative \(PICCC\)](#) was established in 2009 to assist those who manage native species, island ecosystems, and key cultural resources in adapting their management to climate change for the continuing benefit of the people of the Pacific Islands. The PICCC provides a range of services and tools to help managers in Hawai‘i, the Mariana Islands, American Sāmoa, and other Pacific Island groups make informed decisions for conservation of natural and cultural resources including climate models at the scale of islands and archipelagos, ecological response models, and implementation and monitoring strategies for island species, resources, and communities. Our goal is to help managers reach explicit biological and cultural conservation objectives in the face of climate change and ongoing threats such as fire, land conversion, and invasive species.

Contact:

Jeff Burgett
PICCC Science Coordinator
jeff.burgett@piccc.net
677 Ala Moana Blvd., Suite 320
Honolulu, HI 96813
Phone: 808-687-6175
Fax: 808-664-8510

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