

# Double-checking the science: Ocean acidification does not impair the behavior of coral reef fishes

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Damselfishes on the Great Barrier Reef in Australia, including species used by the researchers in their study. Credit: Simon Gingins

Sometimes it helps to check the facts. You may be surprised what you find.

Over the last decade, several high-profile scientific studies have reported that [tropical fish](#) living in [coral reefs](#) are adversely affected by [ocean acidification](#) caused by climate change—that is, they behave oddly and are attracted to predators as levels of carbon dioxide dissolved from air pollution increase.

But now new research suggests that isn't the case.

In fact, in the most exhaustive study yet of the impacts of ocean acidification on the [behaviour](#) of coral reef [fish](#), headed up in Australia and co-authored by two Université de Montréal researchers, it turns out fish behaviour is not affected at all.

"The past decade has seen many high-profile studies that have found alarming effects of ocean acidification on coral reef fish behaviour," with some reporting that "fish become attracted to the smell of predators in acidified waters," said lead author Timothy Clark, an associate professor at Deakin University's School of Life and Environmental Sciences in Geelong, a seaside city near Melbourne, Australia.

But when they tried to re-do those earlier studies with many of the same species, and by crunching the data in a new analysis, Clark and his team of Canadian and Scandinavian scientists—including UdeM biologists Sandra Binning and Dominique Roche—arrived at very different results.

It turns out the original results couldn't be replicated.



Damselfishes on the Great Barrier Reef in Australia, including species used by the researchers in their study. Credit: Simon Gingins

"We expected previous results would be easy to repeat because of how clear and strong they appeared in the initial papers. Instead, we found consistently normal behaviours in fish that we acclimated to (predicted) end-of-(21st)-century levels of CO<sub>2</sub>," said Clark.

But "by using rigorous methods, measuring multiple behaviours in multiple species, and making our data and analysis code openly available, we have comprehensively and transparently shown that ... ocean acidification has negligible direct impacts on the behaviour of fish



on coral reefs," said Clark.

"Specifically, elevated CO<sub>2</sub> does not meaningfully alter activity levels or behavioural lateralisation (left-right turning preference), nor does it alter the response of fish to the chemical cues released by predators."

The new study is bound to make a big impact in the marine biology world, the scientists believe. Not only does it contradict earlier studies, it shows that science doesn't always produce results to buttress things everyone agrees on, like climate change.

Quite the opposite, in fact.

"Some people may be surprised by these findings, but that's how science operates: it's a normal and healthy process to question published results. Sometimes they hold up, and sometimes they don't. Ultimately, it's the accumulation of evidence that matters and brings us closer to the truth," said Binning, an assistant professor at UdeM.

"It's not because some researchers have found one thing that we should take it at face value. As scientists, we should always be critical of what we read and what we see. That's how science advances."



Sandra Binning and Dominique Roche on a small research vessel at the Lizard Island Research Station on the Great Barrier Reef, Australia, where the experiments were conducted. Credit: Simon Gingins

"We're not saying that climate change is not a problem—far from it," added Roche, her husband, a research associate at UdeM. "Our point is that replication studies are very important, just as are ocean acidification and global warming generally."

Clark agreed.

"The negative effects of CO<sub>2</sub> emissions are well established, with [global warming](#) already having devastating effects on coral reef ecosystems around the world. Among other things, more frequent storms and coral

bleaching during heatwaves is causing severe habitat loss for fish," he said.

"So, despite our new results, coral reefs and their fish communities remain in grave danger because of increasing atmospheric CO<sub>2</sub>."

Now, instead of concentrating on how [fish behaviour](#) is affected by ocean acidification, scientists would do better to focus their attention "on others aspects of climate change that are more in need of research," such as infectious disease risk, habitat destruction, and decreased oxygen levels in water, said Binning, holder of a Canada Research Chair on Eco-Evolution and Host-Parasite Interactions.

"With so little time left to combat [climate change](#), it's vitally important that research dollars are used in the best way possible to better help us understand and target systems and organisms at the greatest risk," added Roche.

"Ocean acidification does not impair the behaviour of coral reef fishes," by Timothy D. Clark et al, was published Jan. 8, 2020, in *Nature*.

**More information:** Ocean acidification does not impair the behaviour of coral reef fishes, *Nature* (2020). [DOI: 10.1038/s41586-019-1903-y](https://doi.org/10.1038/s41586-019-1903-y) , [nature.com/articles/s41586-019-1903-y](https://www.nature.com/articles/s41586-019-1903-y)

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