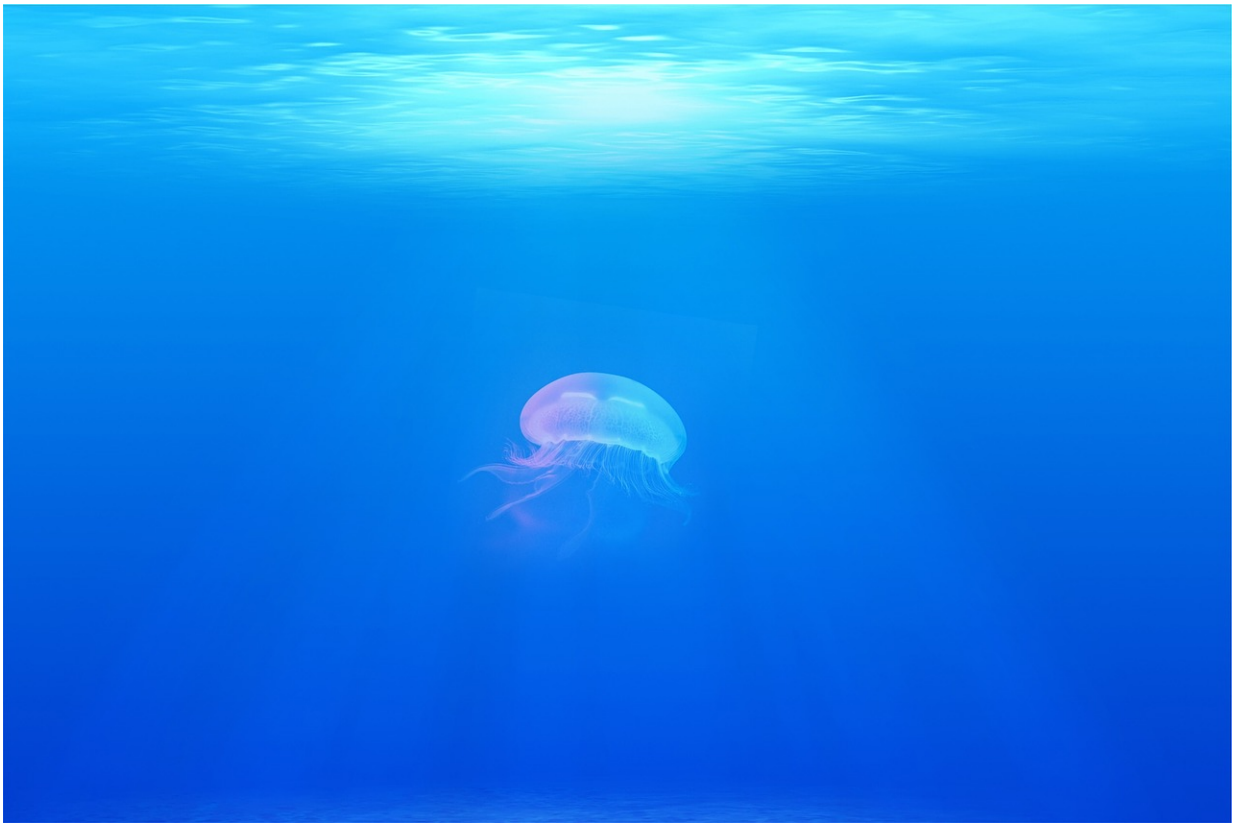
'Weedy' fish species to take over our future oceans

July 6 2017



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University of Adelaide researchers have for the first time demonstrated that the ocean acidification expected in the future will reduce fish diversity significantly, with small 'weedy' species dominating marine

environments.

Published today in *Current Biology*, the researchers studied species interactions in natural marine environments at underwater volcanic vents, where concentrations of CO_2 match those predicted for oceans at the end of the century. They were compared with adjacent marine environments with current CO_2 levels.

"Most research on the impacts of climate change has so far involved the study of individual or small numbers of species over short periods of time," says project leader Professor Ivan Nagelkerken, marine ecologist in the University's Environment Institute.

"From these studies, there have been predictions that fish biodiversity would be reduced - but we've never been able to provide firm evidence before.

"This study was done in a shallow-water temperate kelp ecosystem using volcanic CO_2 vents as natural laboratories to get a peek into what future ecosystems might look like. It further shows that forecasting effects of climate change on future ecosystems is impossible if we do not incorporate complex species interactions."

The researchers showed in surveys and underwater experiments over three years, that in high CO_2 marine environments one or two species of the smaller, behaviourally dominant fish proliferate while the less aggressive, and less common species disappear.

"If we look at the total number of fish we actually see that these increase under ocean acidification but local biodiversity is lost," says Professor Nagelkerken. "There are increases in the abundance of food such as small crustaceans and snails and, because the dominant species tend to win almost all combats with other species and are attracted to food much

faster, their numbers rise.

"Small weedy species would normally be kept under control by their predators—and by predators we mean the medium-sized predators that are associated with kelp. But ocean acidification is also transforming ecosystems from kelp to low grassy turf, so we are losing the habitat that protects these intermediate predators, and therefore losing these species.

"The result is a lot of what are known as weedy species—somewhat the marine equivalent to rats and cockroaches, plenty of them around but no-one really wants to eat them."

One way this biodiversity loss could be delayed is by reducing overfishing of intermediate predators.

"We showed how diminishing predator numbers has a cascading effect on local species diversity," Professor Nagelkerken says. "Strong controls on overfishing could be a key action to stall diversity loss and ecosystem change in a high CO_2 world."

More information: *Current Biology* (2017). DOI: 10.1016/j.cub.2017.06.023

Provided by University of Adelaide