European Commission

Science for Environment Policy

Shark feeding may be affected by ocean acidification

Ocean acidification may affect sharks' sense of smell, causing them to avoid food, reports new research. In lab tests, the study found that sharks exhibited less feeding behaviour when they were kept in tanks of acidified seawater. These changes could pose a risk to the health of sharks, with knock-on effects for whole marine ecosystems.

23 October 2014
Issue 390

Subscribe to free weekly News Alert

Source: Dixson, D. L., Jennings, A. R., Atema, J., *et al*. (2014). Odor tracking in sharks is reduced under future ocean acidification conditions. *Global Change Biology*, 1–9. DOI:10.1111/gcb.12678.

Contact:
danielle.dixson@biology.gatech.edu

Read more about:
Climate change and energy, Marine ecosystems

Rising ocean acidity, driven by seawater's absorption of atmospheric CO_2, has been shown to negatively affect smelling-related behaviours of some marine species. For example, changes in the ability of reef fish to swim home, select habitat and avoid predators have been observed. It has been shown that acidified water may damage cognition in some marine creatures.

Atmospheric CO_2 is now at its highest level in 800 000 years and looks set to rise further, increasing the acidity of the world's oceans at the same time. This has led to growing concern regarding the effects of increasingly acid oceans on marine animals, especially those that rely heavily on their sense of smell, such as sharks.

The researchers placed smooth dogfish sharks (*Mustelus canis)* in pools. These contained waters at three different levels of acidity, recreating present-day (pH 8.11), mid-century (pH 7.80) and end-of-century (pH 7.69) concentrations of CO_2 in the sea. Mid-century and end-of-century levels assumed that CO_2 will continue to be emitted in a 'business as usual' scenario.

A hose that released the odour of squid was placed in the water, and some bricks were placed in front of the hose, which acted as targets for the sharks. Having previously tested the flows of the odour, the researchers then monitored the sharks' behaviour in relation to the odour over five days. For example, they recorded how long the sharks spent in the odour-laden water stream, how long they spent near the bricks, and how often they bumped or bit the bricks.

Sharks in the normal and mid-range CO_2 pools spent more than 60% of their time in the water stream containing the food odour. Sharks in high CO_2 conditions avoided the food odour stream, spending less than 15% of their time there. Sharks from the mid and high CO_2 treatments also showed a reduction in their attack behaviours, with statistically significantly fewer bumps and bites on the bricks.

The overall activity levels of the sharks were not affected in any conditions. This suggests that the differences in behaviour were not due to the sharks' stress levels, but to their detection or perception of the food odour.

It is not yet possible to say whether the results of these short-term laboratory tests represent exactly what may happen 'in the wild', however, they do raise concerns about the ability of sharks to feed under a changing climate.

Sharks are often the top predators in their ecosystems. Loss of these 'keystone' species can result in complex changes in interactions between species and the numbers of species in an ecosystem. These 'trophic cascades' often lead to drastic ecosystem changes and reduced biodiversity. Changes in sharks' feeding behaviours could therefore have consequences, not only for already endangered shark populations, but also entire marine ecosystems.