BBC NEWS

Boat turbulence kills zooplankton

By Matt Walker
Editor, Earth News

Turbulence generated by speeding motor boats kills significant numbers of zooplankton, a study has revealed for the first time.

Experiments on copepods, tiny crustaceans that live and float in water, show that a third die in waters frequented by propeller-driven boats.

That is significantly more than in bodies of water not used by boats.

Zooplankton play a crucial role in water ecology and their death may have hitherto unknown impacts.

Details of the discovery are published in the Journal of Experimental Marine Biology and Ecology.

> **Regions with high boat traffic exhibited a higher occurrence of copepod carcasses**
> Biologist Samantha Bickel Virginia Institute of Marine Science

"A number of studies have been performed that looked at the impacts of much smaller scale turbulence on zooplankton," said Samantha Bickel, a PhD student at the Virginia Institute of Marine Science in Gloucester Point, US.

"But to my knowledge, no one had explored the idea that the intense turbulence generated by boats could have an adverse impact on zooplankton."

These prior studies had showed that even a small amount of turbulence can affect a copepod's ability to feed and grow.

So "it seemed intuitive that the sudden and intense turbulence created by a boat could harm or even kill copepods".

With colleagues Kam Tang, and Joseph Hammond of Hampton University, Virginia, US, Ms Bickel conducted experiments to test whether that was the case.

The researchers stained the copepods using a dye, which colours live animals red, while dead ones remain unstained.

That allowed them to quickly identify how many were alive and how many were dead in each sample.

"Regions with high boat traffic exhibited a higher occurrence of copepod carcasses," Ms Bickel told BBC News.

For example, 34% of copepods were dead in a channel while only 5-6% were dead in a marina and along a shoreline.

More copepod carcasses were found inside boat wakes (14%) than outside boat wakes (7%) and the fraction of dead copepods increased with increasing turbulence intensity.

> EXPERIMENTAL DESIGN
> • The biologists sampled copepods from three locations in the lower Hampton River and York River, estuarine tributaries of Chesapeake Bay:

- 1) From a marina with lots of boats, but very little boat-generated turbulence
- 2) A channel in the middle of the river where multiple boats pass, generating sizable wakes
- 3) A rocky shoreline that encountered very little boat activity
- They also collected zooplankton from areas before a boat passed and again from within its wake, comparing the fraction of dead copepods between the two samples
- Finally, they performed lab experiments: exposing copepods to increasing levels of turbulence and measuring how many died after exposure to each
- Each approach was designed to rule out other causes of copepod mortality

"This suggests that turbulence generated by boats can be an important source of mortality among copepods," Ms Bickel said.

"This could have a number of important impacts within aquatic systems."

Zooplankton are a critical link between phytoplankton and fish in aquatic food webs.

High mortality in copepods could reduce the ability of a zooplankton population to graze down phytoplankton blooms and reduce the amount of food available to smaller fish that eat zooplankton, says Ms Bickel.

Also, if copepod carcasses are not consumed, they could transport high quality organic materials to the sediments or be decomposed by bacteria within the water column, she adds.

"So the zooplankton biomass that would normally go towards feeding fish would be diverted to feed bacteria instead."

The scientists have not yet been able to establish how many boats might cause a problem, and much would depend on their size and speed, which have a large effect on the turbulence they create.

"When viewed at a global scale, the portion of zooplankton killed by boat-generated turbulence is probably minimal," she says.

However, turbulence could have a significant impact on zooplankton, and therefore water ecology, at a local scale.

This may be particularly so in areas of high boat traffic and in closed freshwater systems such as lakes.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/earth/hi/earth_news/newsid_9449000/9449070.stm

Published: 2011/04/19 08:32:56 GMT