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Earth

Software simulator tracks undersea noise pollution

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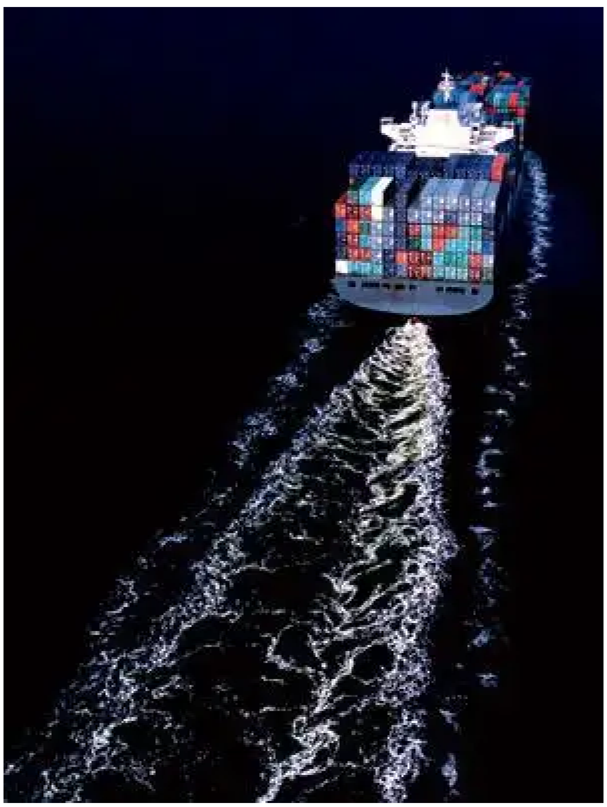

Making sound waves
(Image: Robert Llewellyn/Plain Picture)

IT'S getting noisy beneath the waves. Studies off the California coast have shown that low-frequency noise has doubled every decade since 1960. This human-made noise could be having a devastating effect on underwater life, by interfering with whales' calls or damaging creatures' bodies.

Now new noise forecasting techniques are being used to help track the effect that noisy human activity is having on sea life. This information could eventually be used to reroute ships to safeguard vulnerable marine species.

Whales are particularly at risk because they use low-frequency calls to communicate across thousands of kilometres. Unfortunately, these frequencies, in the 20 to 2000 hertz range, overlap with major noise pollutants, chiefly ships' propellers and the air guns used to prospect for oil beneath the seabed (see "The din beneath the waves") #bx281652B1.

One result may be that whales are losing contact with one another and with their prey. Baleen whales, including the endangered humpback and right whales, are particularly vulnerable, says Leila Hatch, a marine ecologist at Stellwagen Bank National Marine Sanctuary in Scituate, Massachusetts.

A study in the bay of Fundy, Canada, showed that right whales appear to be issuing louder calls to make themselves heard over the noise. This saps energy that could otherwise be used for finding food or mating, Hatch says. It was also reported this year that shipping noise can "pulp" the ears of squid and octopuses, making it hard for them to balance in the water and move (*New Scientist*, 16 April, p 15).

Thomas Folegot, founder of Quiet-Oceans in Brest, France, has developed a computer model called Quonops that analyses maps of the sea floor and predicts how sound will behave as it propagates through water of different salinities, temperatures and depths. Folegot presented his system at the 2nd International Marine Conservation Congress in Victoria, British Columbia, Canada, last month. He has used Quonops to make noise pollution maps of roughly 18 cubic kilometres of ocean in the middle of the Strait of Gibraltar.

The identity, location and speed of all ships over 300 tonnes can now be tracked using a system called Automated Identification System (AIS). Quonops can use this information to identify ships with the noisiest propellers and predict how this noise will propagate through the water.

To determine how those noises overlap with the sounds produced by marine animals, Hatch placed recorders on the sea floor in the 2200-square-kilometre Stellwagen sanctuary. From these recordings it was possible to map nearby marine mammals by their calls and calculate the distance over which the whales' voices can be heard against any background noise. The team's preliminary results show that right whales have lost, on average, 80 per cent of the area they would normally be able to communicate over. The recordings also helped to validate computer-derived noise forecasts from systems similar to Quonops.

The data can be used to campaign to get shipping lanes moved to avoid overlap with the right whales. "If you're going to confront an environmental threat like noise, you have to know what's out there," says Lindy Weilgart, a whale acoustician at Dalhousie University in Halifax, Nova Scotia, Canada. "Mapping soundscapes is a necessary first step."

The din beneath the waves

Ships' propellers generate continuous low-frequency noise, as their churning action forms cavities in the water that pop loudly as they collapse. “A really cavitating propeller is a bad propeller,” says marine ecologist Leila Hatch. To reduce noise, propeller blades can be redesigned to minimise cavitation. Military and cruise ships already use less noisy propellers.

Another source of underwater noise is the guns that fire shots of compressed air at the ocean floor to probe the seismic properties of the underlying rock. One way of mitigating the noise pollution from these devices is to use more sensitive receivers to pick up sound waves reflected by the rock, so that less powerful blasts are needed.