

Shhh... to make ocean conservation work we should keep the noise down

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Quiet areas should be sectioned off in the oceans to give us a better picture of the impact human generated noise is having on marine animals, according to a new study published in *Marine Pollution Bulletin*. By assigning zones through which ships cannot travel, researchers will be able to compare the behavior of animals in these quiet zones to those living in noisier areas, helping decide the best way to protect marine life from harmful noise.

The authors of the study, from the University of St Andrews, UK, the Oceans Initiative, Cornell University, USA, and Curtin University, Australia, say focusing on protecting areas that are still quiet will give researchers a better insight into the true impact we are having on the oceans.

Almost all marine organisms, including mammals like whales and dolphins, fish and even invertebrates, use sound to find food, avoid predators, choose mates and navigate. Chronic [noise](#) from human activities such as shipping can have a big impact on these animals, since it interferes with their acoustic signaling - increased [background noise](#) can mean animals are unable to hear important signals, and they tend to swim away from sources of noise, disrupting their normal behavior.

The number of ships in the oceans [has increased fourfold since 1992](#), increasing marine noise dramatically. Ships are also getting bigger, and therefore noisier: in 2000 the biggest cargo ships could carry 8,000 containers; today's biggest carry 18,000.

"Marine animals, especially whales, depend on a naturally quiet ocean for survival, but humans are polluting major portions of the ocean with noise," said Dr. Christopher Clark from the Bioacoustics Research Program, Cornell University. "We must make every effort to protect quiet ocean regions now, before they grow too noisy from the din of our activities."

For the new study, lead author Dr. Rob Williams and the team mapped out areas of high and low noise pollution in the oceans around Canada. Using shipping route and speed data from Environment Canada, the researchers put together a model of noise based on ships' location, size and speed, calculating the cumulative sound they produce over the course of a year. They used the maps to predict how noisy they thought a particular area ought to be.

To test their predictions, in partnership with Cornell University, they deployed 12 autonomous hydrophones - devices that can measure noise in water - and found a correlation in terms of how the areas ranked from quietest to noisiest. The quiet areas are potential noise conservation zones.

"We tend to focus on problems in conservation biology. This was a fun study to work on, because we looked for opportunities to protect species by working with existing patterns in noise and animal distribution, and found that British Columbia offers many important habitat for whales that are still quiet," said Dr. Rob Williams, lead author of the study. "If we think of quiet, wild oceans as a natural resource, we are lucky that Canada is blessed with globally rare pockets of acoustic wilderness. It makes sense to talk about protecting acoustic sanctuaries before we lose them."

Although it is clear that noise has an impact on marine organisms, the exact effect is still not well understood. By changing their acoustic

environment, we could be inadvertently choosing winners and losers in terms of survival; researchers are still at an early stage of predicting who will win or lose under different circumstances. The quiet areas the team identified could serve as experimental control sites for research like the International Quiet Ocean Experiment to see what effects ocean noise is having on marine life.

"Sound is perceived differently by different species, and some are more affected by noise than others," said Christine Erbe, co-author of the study and Director of the Marine Science Center, Curtin University, Australia.

So far, the researchers have focused on marine mammals - whales, dolphins, porpoises, seals and sea lions. With a Pew Fellowship in Marine Conservation, Dr. Williams now plans to look at the effects of noise on fish, which are less well understood. By starting to quantify that and let people know what the likely economic effect on fisheries or on fish that are culturally important, Dr. Williams hopes to get the attention of the people who make decisions that affect ocean noise.

"When protecting highly mobile and migratory species that are poorly studied, it may make sense to focus on threats rather than the animals themselves. Shipping patterns decided by humans are often more predictable than the movements of whales and dolphins," said Erin Ashe, co-author of the study and co-founder of the Oceans Initiative from the University of St Andrews.

Keeping areas of the ocean quiet is easier than reducing noise in already busy zones, say the authors of the study. However, if future research that stems from noise protected zones indicates that overall marine noise should be reduced, there are several possible approaches to reducing noise. The first is speed reduction: the faster a ship goes, the noisier it gets, so slowing down would reduce overall noise. The noisiest ships

could also be targeted for replacement: by reducing the noise produced by the noisiest 10% of ships in use today, overall marine noise could be reduced by more than half. The third, more long-term, option would be to build quieter ships from the outset.

More information: "Quiet(er) marine protected areas" by Rob Williams, Christine Erbe, Erin Ashe and Christopher W. Clark ([DOI: 10.1016/j.marpolbul.2015.09.012](https://doi.org/10.1016/j.marpolbul.2015.09.012)). The article is open access and appears in *Marine Pollution Bulletin*.

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