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An Earsplitting Threat Is Endangering the World's Rarest Killer Whales

Noise pollution from ships imperils Southern Resident orcas that depend on sound to communicate and find food and mates.

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Southern Resident killer whale and calf. (Photo: Candice Emmons/NOAA Fisheries/via Reuters)



DEC 15, 2015



Erica Gies' work has appeared in *The New York Times*, *The Guardian*, *Scientific American*, *The Economist*, and other outlets.



Humans navigate the world primarily by sight, but whales use sound to find food, avoid predators, and choose mates.

For [Southern Resident killer whales](#), which live in the Haro Strait between Victoria, British Columbia, and Seattle, sound is the foundation of their culture. They are unique in the animal kingdom in that they spend their entire lives with their families, even after they grow to adulthood. “Family is everything to them,” said Rob Williams, a whale and dolphin researcher who cofounded the Oceans Initiative, a nonprofit based on Vancouver Island. Each family makes a singular call, an acoustic dialect that no other family utters, and its use helps the orcas avoid inbreeding.

But this fundamental reliance on sound is why noise pollution can be devastating for whales, especially for a critically endangered species that is suffering from other threats. The population of Southern Resident killer whales has shrunk to [just 85 individuals](#). The threats they face are myriad. The salmon that make up most of their diet have declined dramatically because of logging, which warms and silts spawning streams. Fish farms allow diseases to fester, and cities and farms divert and pollute streams. High levels of persistent organic pollutants introduced by humans also contaminate the whales.

Noise could be the final straw, said Williams. It’s not just intense, episodic noise from naval operations or industrial activity that can drive whales to beach themselves. Daily ship traffic, especially the gargantuan cargo vessels that bring us the vast majority of everything we wear, use, and eat are also harming whales and other marine life.

It's like trying to chat when you're walking along a busy road with lots of traffic. You have to raise your voice, and even so, when a particularly loud truck goes by, you might miss something critical.

Chris Clark, director of the Bioacoustics Research Program at Cornell University, can also hear these ships when he uses instruments to listen underwater. He likens the background noise from thousands of engines to smog. "There are places now, especially in the Northern Hemisphere, where the background noise level is 100 to 1,000 times above what it would be normally," said Clark. "And it's chronic."

That means that whales' signals don't go as far. In effect, their world has shrunk because of ship noise.

"Median noise levels are high enough to [cause killer whales to lose 62 percent of their ability to communicate](#) with each other," said Williams. "When it gets extremely noisy, when there's lots of ship traffic, [that rises to 97 percent.](#)"

"Ship noise is reducing acoustic habitat for killer whales in exactly the same way that clear-cut logging is reducing habitat available to grizzly bears," said Williams, a Pew Fellow.

Other endangered marine mammals, including fin whales and humpback whales in the North Pacific, also at risk, Williams' research discovered. And [Clark and other scientists found](#) that endangered North Atlantic right whales have lost about 65 percent of their communication space, on average, because of [noise pollution](#).

The United States and Canadian governments have acknowledged that human-caused noise is a contributing factor to Southern Resident killer whales' decline, but neither country has taken action to reduce this threat, said Williams. But unlike ocean plastic pollution, for instance, ship noise

doesn't take time to clean up. "We can stop tomorrow," said Williams.

One thing he and other researchers are recommending: Keep quiet areas quiet. Some biologically rich areas, such as northern British Columbia between the mainland and the Haida Gwaii islands, are home to fin, humpback, and minke whales as well as other marine mammals. The area is quiet owing to low human activity. Protecting these "opportunity sites" now as critical habitat designation or marine protected areas would maximize conservation gains at minimal cost to society, wrote Williams and Clark in a [recent paper in *Marine Pollution Bulletin*](#).

"It's a new idea to map out the distribution of whales and our best estimate of noise throughout a big patch of ocean and see if there are places where we don't have to request draconian measures from the shipping industry; we can just leave things as they are," said Williams.

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Acting now is important because those quiet areas are at risk of industrial development. There are proposals for liquefied natural gas terminals, oil pipelines to ship Alberta tar sands oil, and expansion of the Port of Prince Rupert, all of which could add thousands of ship trips a year to these waters.

Williams is also suggesting that marine authorities ask ships to slow down through important marine mammal habitats, "just like we ask drivers to slow down through school zones," he said. As ships slow down, they become quieter.

However, Christine Erbe, director of the Center for Marine Science and Technology at Curtin University in Perth, Australia, and a coauthor of the marine quiet zone paper,

cautioned that it might not be so simple. “If ships go more slowly, they are quieter, but then they take longer to cross a habitat, meaning that sound exposure is longer,” she said. Biologists have not yet determined which would be better, and “the answer might differ from animal to animal,” she said.

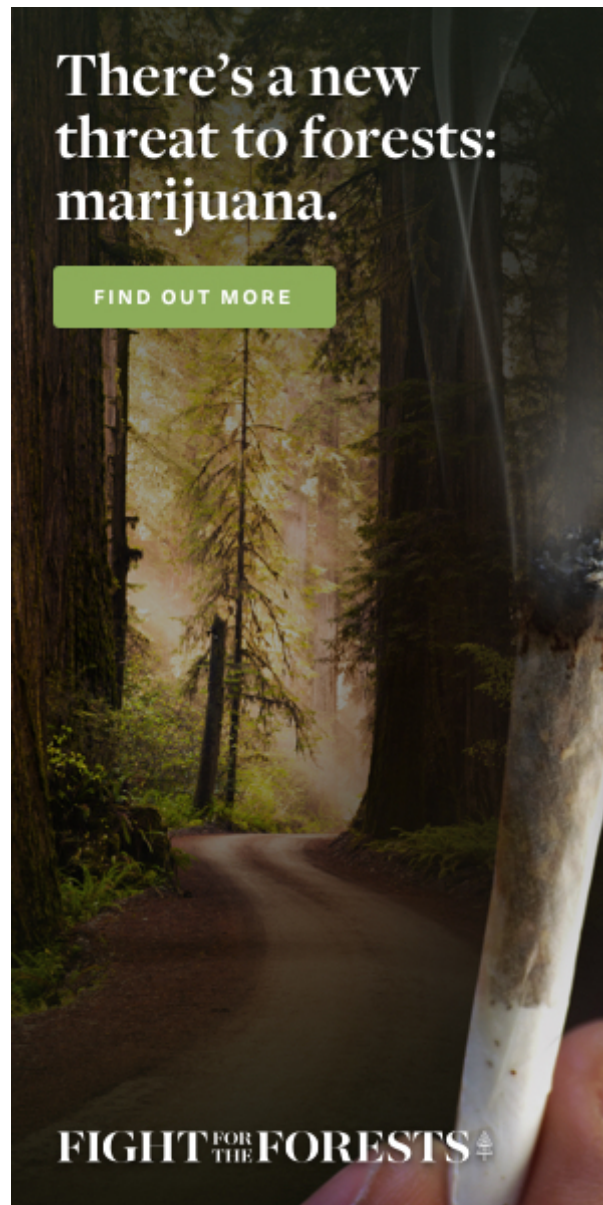
Nevertheless, ocean noise is beginning to be recognized worldwide as an environmental problem.

The European Union is furthest ahead on legislative action to reduce undersea noise, said Michael Jasny, a lawyer and senior policy analyst for the Natural Resources Defense Council. A policy called the Marine Strategy Framework Directive calls for member countries to meet set environmental standards by 2020, including the reduction of undersea noise. “Europe is the first region that is acting collectively across sectors to restore acoustic habitat in their water,” said Jasny.

“Other jurisdictions have focused primarily on marine protected areas.”

The International Marine Organization [adopted guidelines](#)

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last year for the quieter operation of commercial vessels. These include taking measures like slowing down or cleaning barnacles off hulls and propellers to reduce drag noise. However, the primary focus is on new technologies that reduce noise, such as propeller and bow designs, and refurbishing older ships. The guidelines are voluntary, but Jasny said it's encouraging that industry is beginning to consider the technical aspects of how to make ships quieter.

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Ship classification societies—nongovernmental organizations that establish technical standards for ship construction and operation—have also set noise output standards for commercial ships. “Ships can apply to these societies to get a special notation to mark that ship as quiet,” said Jasny.

Because some ships are much noisier than others, quieting the loudest 10 percent would generate outsize returns—and also likely improve their fuel efficiency, according to studies by Russell Leaper, a marine scientist with the International Fund

for Animal Welfare.

In British Columbia, where Southern Resident killer whales are struggling for their survival, the Port of Metro Vancouver has initiated a research program to better understand and manage shipping's impacts on whales. It's called Enhancing Cetacean Habitat and Observation, and officials just installed a hydrophone in the inbound shipping lane at the port.

"We've been working with pilots to maneuver vessels over the hydrophone," said Carrie Brown, the port's director of environmental programs. "That way we can better identify the type of sound signature from that particular vessel," she said. A report is expected in fall 2016.

Brown said that depending on study results, measures to reduce noise could be added to the port's [EcoAction](#) program, which offers incentives to vessels that use environmental best practices, such as burning low-sulfur fuels or plugging into electrical outlets while docked rather than burning diesel fuel.

Twenty years ago, ocean noise was an under-the-radar issue, said Jasny. "But now there's widespread recognition that ocean noise represents serious problems for the entire marine ecology," he said. "It's been taken up by the Convention on Biological Diversity, the Convention on Migratory Species, the European Union, the International Marine Organization, and the International Whaling Commission."

Williams and other researchers who dedicated their careers to studying whales emphasize that many of these tweaks don't need to curtail human economic activity, and that win-win should make such changes a moral imperative.

People don't have a lock on complex culture, said Williams. "Every time we come up with a definition of what makes humans unique, someone finds a species—whales or primates

or elephants or wolves—that share that same attribute, making them just as deserving of respect and dignity and protection as we are.”

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