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(Don't) Pump up the Volume: Sound Waves Silence Whales' Song

The U.S. Supreme Court says the Navy can use active sonar in despite evidence that it and other noise pollution can deafen, and even kill denizens of the sea and skies

By Brendan Borrell

The noise in the Pacific off the southern California coast has become 10 times louder over the past five decades because of the rumbling of commercial shipping vessels, the clicking of oceanographic research equipment, and the din of Navy operations and sonar systems—all of which are threatening whales that use the same frequency range to communicate.

"These animals should have earplugs on," says whale expert and acoustic ecologist Christopher Clark, director of the Bioacoustics Research Program at Cornell University, noting that mid-frequency active sonar has resulted in hundreds of whales and other marine mammals getting flustered, losing their way, and, in some cases, becoming beached and dying.

In an effort to save the whales, the Natural Resources Defense Council (NRDC) sued to stop the Navy from conducting operations in the area that employ that particularly damaging form of sonar. But the U.S. Supreme Court last week in a 5–4 ruling dismissed the suit, giving the Navy the all-clear to continue blasting sound waves despite the environmental impact.

This sonar, which can be operated with the sound intensity of a jet engine, is used during training exercises to detect stealthy diesel-electric enemy submarines, some 300 of which are in the hands of 40 nations including China, North Korea and Iran.

But active sonar also rouses normally reclusive, squid-eating beaked whales from the deep. Sometimes, it causes them to ascend to the ocean surface so rapidly that they succumb to "the bends"—the development of deadly nitrogen bubbles in their blood; later their corposes wash up on beaches. Since 1989 the NRDC has documented 13 mass-stranding events of whales and porpoises that they said were linked to military sonar use. Among them: an event in January 2005 that led to the stranding deaths of 34 whales of three species along North Carolina’s Outer Banks.

Mass strandings are perhaps the most gruesome example of how human-produced noise impacts wildlife. But all humans contribute to chronic noise pollution through road clatter and loud industrial operations, which threaten many species already at peril due to deforestation and urban development.

"This rising tide of noise is depriving animals of their habitat," Clark says.

Clark's research has shown that endangered blue whales, for instance, are only able to hear up to 100 miles (160 kilometers) away today, compared with the 1,000-mile (1,600-kilometer) acoustic range they enjoyed back in 1940. Other whales are even changing their tunes—literally.

The endangered North Atlantic right whale communicates at frequencies two thirds of an octave higher than it did a century ago, according to a 2007 study that Clark and bioacoustics researcher Susan Parks of Pennsylvania State University in State College published in the Journal of the Acoustical Society of America. Higher frequencies do not carry as far in the water, reducing the distance over which they can communicate. In busy shipping channels, the ambient noise can be so great that whales simply shut up and hunker down as they would during a major storm—behavior that Clark believes could hinder the species' ability to find mates and reproduce. "These marine animals are all about acoustics: that's how they communicate, that's how they find food," he says.

Noise pollution is not only a problem underwater. Several studies have linked reverberations of cars and trucks to a decrease in bird diversity and population numbers. Meanwhile, military overflights in the Arctic disturb female caribou, forcing them to migrate an additional mile (1.6 kilometers) daily which could increase the likelihood that calves will be separated from the mothers, making them more vulnerable to predators and more likely to die because of a lack of food. (In Canada, the indigenous Innu people protested the Canadian Air Force’s overflights near Goose Bay because they claimed the sound disturbed moose, waterfowl and other wildlife—thus degrading the once-abundant resources in their hunting territories.)
Ecologist Erin Bayne of the University of Alberta in Edmonton published a study in the journal Conservation Biology last month indicating that energy pipeline compression stations—which continuously produce about 90 to 95 decibels of noise radiating out up to half a mile (0.8 kilometer) away—impact bird behavior and biodiversity. Some 6,000 of these stations are strewn across northern Canada, and two thirds of them are located in wilderness areas. "Male birds sing to tell other birds where they are, where their territory is," he says, "and we think there may be some communication breakdown which results in birds choosing not to be there."

In Bayne's study, male birds living in noisy territories near these stations had trouble attracting mates, suggesting that their song was either not being heard or heard incorrectly. Overall, areas around noisy compression stations had one third fewer birds than quiet sites. Although technology is available to mitigate noise levels, Bayne says companies are only forced to invest in such measures in more urbanized areas when humans complain. In wilderness areas, they are left unchecked.

Some conservation organizations, such as the NRDC and Conservation International based in Arlington, Va., are just beginning to get a grip on the challenges of preserving the acoustic environment. The NRDC prevailed in lawsuits against the Navy in a California federal court, which restricted the use of mid-frequency active sonar within 2,400 yards (2,200 meters) of any marine mammal. But the Navy appealed the case to the nation's top court, successfully arguing that antisubmarine warfare is one of its highest priorities, that sonar operators depend on realistic training exercises, and that the restrictions placed on sonar use were overly burdensome.

"It's a sad day for the Navy to take such a high-handed, arrogant approach to its responsibility as a steward to the ocean," Clark says, "and it's a sad day for the marine environment."