

Ocean Noise Has Increased Considerably Since 1960s, According to New Scripps Analysis

Declassified Navy documents allow comparison that points to global shipping as the likely reason behind increase in undersea noise pollution

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Mario Aguilera

With populations increasing around the globe in recent decades, no one would be surprised by an increase in the amount of noise produced in terrestrial environments. Now, a unique study involving researchers at Scripps Institution of Oceanography at the University of California, San Diego, has shown that the underwater world also is becoming a noisier place, with unknown effects on marine life.

New research published in the August issue of the *Journal of the Acoustical Society of America (JASA)* has shown a tenfold increase in underwater ocean noise off Southern California's coast as compared with the 1960s. Mark McDonald of WhaleAcoustics in Bellvue, Colo., and John Hildebrand and Sean Wiggins of Scripps Oceanography accessed acoustic data recorded in 1964-1966 through declassified U.S. Navy documents and compared them against acoustic recordings made in 2003-2004 in the same area off San Nicolas Island, one of the Channel Islands more than 160 miles west of San Diego.

Sean Wiggins examines data disk drives inside an acoustic recording instrument.

The results showed that noise levels in 2003-2004 were 10 to 12 decibels higher than in 1964-1966, an average noise increase rate of three decibels per decade. The culprit behind the increase, according to Hildebrand, appears to be a byproduct of the vast increase in the global shipping trade, the number of ships plying the world's oceans and the higher speeds and propulsion power for individual ships. The noise detected off Southern California originates from ships traveling across the entire North Pacific Ocean.

According to Lloyd's Register figures quoted in the JASA paper, the world's commercial fleet more than doubled in the past 38 years, from 41,865 in 1965 to 89,899 in 2003.

"We've demonstrated that the ocean is a lot noisier now than it was 40 years ago. The noise is more powerful by a factor of 10," said Hildebrand, a professor of oceanography in the Marine Physical Laboratory at Scripps. "If we've doubled the number of ships and we've documented 10 times more noise, then the noise increase is due to both more ships and noisier individual ships than in the '60s. And that may be because the ships are now bigger, faster and have more propulsion power. The next step is to understand what aspect of modern shipping has resulted in more noise per ship," said Hildebrand.

Several years ago, while searching for information about noise levels off Southern California, Hildebrand obtained declassified documents that described a U.S. Navy sound surveillance system that used cabled hydrophones to measure ambient ocean noise in the 1960s. A detailed analysis of the recordings was reported in 1968.

Hildebrand's group sought to obtain similar readings in the same location using advanced listening devices called acoustic recording packages, or ARPs, developed in Hildebrand's laboratory. Hildebrand and members of his group regularly deploy ARPs at various locations around the world to obtain and analyze acoustic signals emitted by whales, dolphins and other marine animals.

The authors of the study argue that the increase in noise documented off San Nicolas Island may be representative of the entire Northeast Pacific Ocean. To understand what impacts such noise might have on sound-dependent marine mammals and other sea life, the authors argue that repeated acoustic measurements at multiple sites are needed.

"The impact of the increased noise on marine animals is unknown," said Hildebrand. "If impacts are shown to exist, what can be done to protect marine animals? For instance, it may be appropriate to move shipping lanes away from areas where there are concentrations of marine animals. The impact of ocean noise pollution may be minimized by diminishing the noise source or by separating the noise from things that are sensitive to it."

Media Contacts: Mario Aguilera or Cindy Clark (858) 534-3624

