

EMBARGOED until Feb 2nd, 2016: 07.00 EST / 12.00 GMT

PRESS RELEASE



Ship noise extends to frequencies used by endangered killer whales

*Noise in coastal habitats could interfere with orca's communication
and ability to locate scarce salmon*

When an endangered orca is in hot pursuit of an endangered salmon, sending out clicks and listening for their echoes in the murky ocean near Seattle, does the noise from the nearby shipping lane interfere with them catching dinner? To find out scientists measured underwater noise as ships passed their study site 3,000 times. This unprecedented characterization of ship noise will aid in the understanding of the potential effects on marine life, and help with possible mitigation strategies.

One of the threats faced by today's oceans is underwater noise pollution from ships. Amazingly, the growth in commercial shipping has raised the intensity of low-frequency noise almost 10-fold since the 1960s. Because this noise occurs at the low frequencies used by baleen whales there is growing evidence it may impact their ability to communicate, and therefore their survival. But could ship noise extend to the higher frequencies used by toothed whales and therefore pose similar threats to them?

To answer this question and understand the nature of ship noise, particularly in coastal areas where ships access ports, scientists measured approximately 1,600 unique ships as they passed through Haro Strait, in Washington State. This area is the core critical habitat for the endangered Southern Resident killer whales -- salmon-eating orcas which are iconic in the Pacific Northwest and which support a multi-million dollar ecotourism industry in the U.S. and Canada.

Because these orcas, like other toothed whales, use mid- and high-frequencies to communicate and find their prey, the study measured a wide range of frequencies (10 Hz to 40,000 Hz). The results show that ships are responsible for elevated background noise levels not only at low frequencies as expected, but also at medium and higher frequencies (including at 20,000 Hz where killer whales hear best). This

means that in coastal environments where marine mammals live within a few kilometers of shipping lanes, ship noise has the potential to interfere with both communication and echolocation.

The study is unique because it estimates the source levels of larger populations and more classes of ships than in previous studies. Overall, container ships exhibited the highest median source levels (at all frequencies below 20,000 Hz). Military vessels had some of the lowest levels, suggesting that transfer of quieting technology to the commercial sector could be a successful noise mitigation strategy.

The study shows that another potential way to reduce noise pollution is to simply slow down. The data suggest that, on average, each reduction in a ship's speed by 1 knot could reduce broadband noise levels by 1 dB.

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Media:

Zip file of the high resolution images, three audio clips, and a PDF of this press release:

<http://static.peerj.com/pressReleases/2016/1657-media.zip>

Three short audio clips are available:

http://orcasound.net/mp3s/showcase/ship-1min-clips/120520_235725-ship.mp3

Title: Typical underwater noise from a passing ship. (1 minute)

Caption: This noise from a passing ship is typically heard about twenty times per day in the Salish Sea and lasts for about 1/2 hour.

http://orcasound.net/mp3s/showcase/ship-1min-clips/071008_0347-squeaky-ship-1min.mp3

Title: Tonal underwater noise from a passing ship. (1 minute)

Caption: The noise from this passing ship includes tonal sounds in addition to the typical repetitive swishing and clacking (of the propeller).

<http://orcasound.net/mp3s/showcase/squeaky-ship.mp3>

Title: Unusually intense underwater noise from a passing ship. (5 seconds)

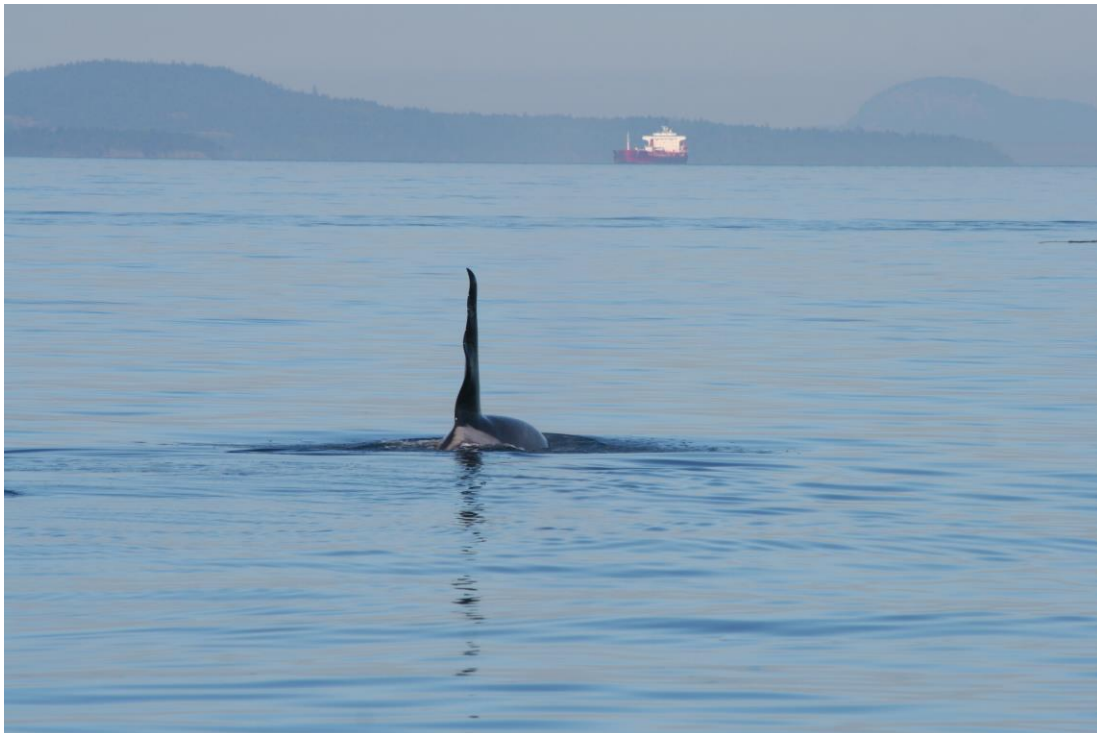
Caption: This type of ship noise (with screeching intermittent tonal sounds) probably indicates a mechanical problem with the ship, like a "singing" propeller.



Title: Endangered killer whales eye an oil tanker

Caption: Two endangered Southern Resident killer whales rise in unison from the Salish Sea as a tanker passes through their critical habitat along the Canada-U.S. border.

Credit: beamreach.org (CC BY SA)



Title: Does ship noise interfere when orcas use sound to search for salmon?

Caption: The male orca "Ruffles" uses echolocation to find his favorite food -- Chinook salmon -- as a tanker approaches him in Haro Strait, WA, USA.

Credit: beamreach.org (CC BY SA)

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EMBARGOED until February 2nd 2016: 7 am EST; 12 midday GMT (i.e. the date of publication)

PDF of this Press Release: <http://static.peerj.com/pressReleases/2016/Press-Release-Veirs.pdf>

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Link to the Published Version of the article (quote this link in your story – the link will ONLY work after the embargo lifts): <https://peerj.com/articles/1657> - your readers will be able to **freely** access this article at this URL.

Citation to the article: Veirs et al. (2016), Ship noise extends to frequencies used for echolocation by endangered killer whales. **PeerJ 4:e1657; DOI 10.7717/peerj.1657**

Peer Review History: The peer-review history of this article will be made public at the time of publication. To access the review history before publication email press@peerj.com

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