

Biology Letters

rsbl.royalsocietypublishing.org

Published 3 July 2013 doi: 10.1098/rsbl.2013.0223
Biol. Lett. 23 August 2013 vol. 9 no. 4 20130223

First direct measurements of behavioural responses by Cuvier's beaked whales to mid-frequency active sonar

Stacy L. DeRuiter¹, Brandon L. Southall^{3,4,5†}, John Calambokidis⁶,
Walter M. X. Zimmer⁷, Dinara Sadykova¹, Erin A. Falcone⁶,
Ari S. Friedlaender^{3,4,5}, John E. Joseph⁸, David Moretti^{9,2},
Gregory S. Schorr⁶, Len Thomas¹ and Peter L. Tyack²

+ Author Affiliations

e-mail: brandon.southall@sea-inc.net**Abstract**

Most marine mammal strandings coincident with naval sonar exercises have involved Cuvier's beaked whales (*Ziphius cavirostris*). We recorded animal movement and acoustic data on two tagged *Ziphius* and obtained the first direct measurements of behavioural responses of this species to mid-frequency active (MFA) sonar signals. Each recording included a 30-min playback (one 1.6-s simulated MFA sonar signal repeated every 25 s); one whale was also incidentally exposed to MFA sonar from distant naval exercises. Whales responded strongly to playbacks at low received levels (RLs; 89–127 dB re 1 μ Pa): after ceasing normal fluking and echolocation, they swam rapidly, silently away, extending both dive duration and subsequent non-foraging interval. Distant sonar exercises (78–106 dB re 1 μ Pa) did not elicit such responses, suggesting that context may moderate reactions. The observed responses to playback occurred at RLs well below current regulatory thresholds; equivalent responses to operational sonars could elevate stranding risk and reduce foraging efficiency.

acoustic disturbance avoidance response anthropogenic noise
mid-frequency active sonar military *Ziphius cavirostris*

Received March 7, 2013.

Accepted June 14, 2013.

© 2013 The Authors. Published by the Royal Society under the terms of the Creative Commons Attribution License <http://creativecommons.org/licenses/by/3.0/>, which permits unrestricted use, provided the original author and source are credited.

Help | Privacy Policy | Cookies | Contact us | Sitemap

Online ISSN: 1744-957X | Copyright © The Royal Society 2013

Partner of Research4Life, PERI-INASP, CrossRef & LOCKSS