European Commission

Science for Environment Policy

Ship noise increases metabolism of crabs

Ship noise increases shore crabs' metabolism, a new study suggests. The researchers found that larger crabs were particularly affected by recordings of ship noise in controlled experiments. Increased metabolism is a sign of stress and could potentially reduce the growth of crabs and have implications for their survival, as well as for fisheries.

6 June 2013
Issue 331
Subscribe to free weekly News Alert

Source: Wale, M.A., Simpson, S.D. & Radford, A.N. (2013). Size-dependent physiological responses of shore crabs to single and repeated playback of ship noise. *Biology Letters.* 9: 20121194. http://dx.doi.org/10.1098/rsbl.2012.1194.

Contact:
andy.radford@bristol.ac.uk

Read more about:
Marine ecosystems, Noise

There is growing evidence that noise from human sources can affect the behaviour and health of a variety of creatures, but studies tend to focus on how groups of animals are affected by a single noise in isolation. However, in the natural environment, creatures are more likely to experience repeated exposure to noise, which may change how they respond to the sound over time. In addition, not all members of a population may be affected in the same way by noise; for example, group status, age and size could all influence responses to noise.

Studies of noise's ecological effects have tended to focus on vertebrates. However, 60% of marine species are invertebrates and are both ecologically and economically important. To shed new light on the impacts of noise on invertebrates, researchers studied shore crabs *(Carcinus maenas*) in the UK. The crabs were gathered from a harbour and placed in an aquarium where controlled experiments could be conducted. The crabs were of different sizes, and exposed, in tanks, to single and repeated recordings of ambient harbour and ship noise.

A total of 36 crabs received the single exposure experiment to both ambient and ship noise, and 22 crabs were exposed to the same sounds eight times at 48-hour intervals. Stress is likely to increase the crabs' metabolism, which in turn increases their oxygen consumption. Oxygen levels in the tanks were therefore measured at the start and end of each trial to indicate the crabs' metabolic rate.

Results from the single-exposure experiment revealed that crabs exposed to ship noise consumed, on average, 67% more oxygen than those exposed to ambient harbour noise, and that heavier crabs were more affected than lighter individuals.

Interestingly, repeated exposure to recorded ambient noise also led to increased oxygen consumption across time, whereas there was no significant change in the metabolic rate of crabs exposed to repeated recordings of ship noise. It is possible that crabs showed their maximum response to the first recording of ship noise and then became tolerant to further noise exposure. Stress from repeated handling of the crabs by the researchers, however, may also have affected the results by increasing metabolic rates.

If commercially-important crabs and other crustaceans, such as prawns and lobsters, are affected by noise, these findings have implications for fisheries in busy shipping areas, where larger individuals may be at a disadvantage. Quieter aquaculture facilities may therefore lead to higher yields and profits. In their natural environment, there may be implications for growth and, if metabolic rates increase, crabs may spend more time foraging to compensate, which increases their risk of being preyed upon.

Caution is needed when interpreting these results in relation to a real-world context: tank playbacks cannot replicate natural sounds perfectly, and crustaceans are likely to detect sounds through the movement of particles. More detailed investigations are needed on the effects of longer, more frequent exposures to aquatic noise created by humans, an increasingly widespread global pollutant.