Migrating humpback whales avoid loud, nearby sounds.BRAHSS, Author provided

Air guns used for marine oil and gas exploration are loud enough to affect humpback whales up to 3km away, potentially affecting their migration patterns, according to our new research.

Whales' communication depends on loud sounds, which can travel very efficiently over distances of tens of kilometres in the underwater environment. But our study, published today in the Journal of Experimental Biology, shows that they are affected by other loud ocean noises produced by humans.

As part of the BRAHSS (Behavioural Response of Humpback whales to Seismic Surveys) project, we and our colleagues measured humpback whales' behavioural responses to air guns like those used in seismic surveys carried out by the offshore mining industry.

***Read more**: It’s time to speak up about noise pollution in the oceans*

Air guns are devices towed behind seismic survey ships that rapidly release compressed air into the ocean, producing a loud bang. The sound travels through the water and into the sea bed, bouncing off various layers of rock, oil or gas. The faint echoes are picked up by sensors towed by the same vessel.

During surveys, the air guns are fired every 10-15 seconds to develop a detailed geological picture of the ocean floor in the area. Although they are not intended to harm whales, there has been concern for many years about the potential impacts of these loud, frequent sounds.

Sound research

Although it sounds like a simple experiment to expose whales to air guns and see what they do, it is logistically difficult. For one thing, the whales may respond to the presence of the ship towing the air guns, rather than the air guns themselves. Another problem is that humpback whales tend to show a lot of natural behavioural variability, making it difficult to tease out the effect of the air gun and ship.

There is also the question of whether any response by the whales is influenced more by the loudness of the air gun, or how close the air blast is to the whale (although obviously the two are linked). Previous studies have assumed that the response is driven primarily by loudness, but we also looked at the effect of proximity.

We used a small air gun and a cluster of guns, towed behind a vessel through the migratory path of more than 120 groups of humpback whales off Queensland's sunshine coast. By having two different sources, one louder than the other, we were able to fire air blasts of different perceived loudness from the same distance.

We found that whales slowed their migratory speed and deviated around the vessel and the air guns. This response was influenced by a combination of received level and proximity; both were necessary. The whales were affected up to 3km away, at sound levels over 140 decibels, and deviated from their path by about 500 metres. Within this "zone", whales were more likely to avoid the air guns.

Each tested group moved as one, but our analysis did not include the effects on different group types, such as a female with calf versus a group of adults, for instance.

Our results suggest that when regulating to reduce the impact of loud noise on whale behaviour, we need to take into account not just how loud the noise is, but how far away it is. More research is needed to find out how drastically the whales' migration routes change as a result of ocean mining noise.

Rebecca Dunlop receives funding from the Joint Industry Programme on E&P Sound and Marine Life (JIP), managed by the International Association of Oil & Gas Producers (IOGP), and from the US Bureau of Ocean Energy Management.

Michael Noad receives funding from the Joint Industry Programme on E&P Sound and Marine Life (JIP), managed by the International Association of Oil & Gas Producers (IOGP), and from the US Bureau of Ocean Energy Management.

Authors: Rebecca Dunlop, Senior Lecturer in Physiology, The University of Queensland

Read more http://theconversation.com/noise-from-offshore-oil-and-gas-surveys-can-affect-whales-up-to-3km-away-82646