

Passive acoustic monitoring reveals clues to minke whale calling behavior and movements

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Mouth of a minke whale with distinct grooves in its throat. Credit: Denise Risch, NEFSC/NOAA.

Scientists using passive acoustic monitoring to track minke whales in the Northwest Atlantic have found clues in the individual calling behaviors and movements of this species. These findings, recently published online in the journal *Behaviour*, provide insight into one of the least studied baleen whales.

"Although we regularly observe minke whales in our Gulf of Maine surveys, we know very little about minke whale vocalizations and how they use sound in their behavioral and social interactions," said Denise Risch, lead author of the study and a marine mammal researcher at NOAA's Northeast Fisheries Science Center (NEFSC).

Information on individual calling behaviors and source levels are important in understanding marine mammal social interactions. Risch and colleagues used passive acoustic recordings to track and assess the sound production behavior of 18 minke whales in the Stellwagen Bank National Marine Sanctuary (SBNMS) in the Gulf of Maine. The study periods were October - November 2009 and August - October 2011.

The recordings came from arrays of bottom-mounted marine autonomous recording units, MARUs, deployed in the sanctuary since December 2007 to continuously record low-frequency sounds. The recordings are analyzed for the presence of vocally active [baleen whales](#) and fish species. The sound data are also being used to calculate a noise budget for the sanctuary and to examine potential effects of human-induced noise on the acoustic communication of marine animals.

Sounds produced by minke whales in the Gulf of Maine region have only recently been described in more detail, thanks in part to the recordings from the Stellwagen Bank MARUs. A 2013 study by Risch and others on minke whale acoustic behavior and vocalization patterns in Massachusetts Bay described seven distinct pulse train types, which fall into three main categories and occur with varying frequency. The behavioral significance of these vocalizations and whether they are specific to sex, age, recording site, or season is unknown.

Given that the minke whale vocal repertoire has several typical call types, the main objective of this study was to investigate whether individual minke whales use the full vocal repertoire, or combine pulses

in predictable sequences. How individuals use the different call types when they interact with other individuals was also a study priority.

Risch and colleagues found that none of the 18 minke whales studied produced all of the call types. Instead, they produced two call sequences that combined three to four different call types in a specific order. The sequences were stable across years and were shared between individuals. Seven of the whales used one calling pattern, ten used another pattern, and one animal combined the call types differently. Animals producing different call sequences were in acoustic range of one another on several occasions. Although the specific behavioral function of the call patterns is unknown, the sound sequences may be important in social interactions between individuals, or may reflect age or sex differences.

"Because the same calling patterns were shared by several individuals, the patterns may contain information related to sex, age or a specific behavior," said Risch, a member of the passive acoustics group at the NEFSC's Woods Hole Laboratory. "The whales seem to regularly use different patterns of calling when in hearing proximity of one other. We don't know yet what purposes these patterns serve or which sex is producing the calls."

"In several other baleen whale species only the males produce songs, which serve in a reproductive context," Risch said. "This could also be true for minke whale vocalizations, which appear to be more common during migration and the winter breeding season than during the summer feeding period."

Minke whales are the smallest of the "great whales" or rorquals, a group that includes the blue whale, Bryde's whale, and humpback, fin and sei whales. Rorqual whales are relatively smooth in appearance and have pointed heads and small pointed fins. Rorquals can be distinguished from other whales by the many deep grooves along their throats that

expand when they feed.

The 18 acoustically tracked animals in this study exhibited swim speeds that matched those of migrating minke whales in other areas. The summer feeding grounds of minke whales in the North Atlantic generally extend from Labrador to the Barents Sea. Since there are few documented minke whale calls or sightings in the SBNMS during summer, the sanctuary appears to be part of the migration route rather than a feeding ground destination.

"Minke whales have a streamlined body shape and move quickly, so few acoustic recording tags have been successfully attached," Risch said. "Passive acoustic recordings can be a less costly and more feasible option to track minke whales, given limited visual observations to correlate with vocalizations. The successful tracking of 18 individual [minke whales](#) demonstrates the feasibility of using long-term passive acoustic arrays for this purpose."

Provided by NOAA Headquarters

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