

Press release**Stiftung Tierärztliche Hochschule Hannover****Sonja von Brethorst**

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<http://idw-online.de/en/news579184>Research projects, Scientific Publications
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transregional, national**How well do gray seals hear?****TiHo researchers investigate the hearing of the marine mammals.**

Researchers from the Institute for Terrestrial and Aquatic Wildlife Research of the University of Veterinary Medicine Hannover Foundation (TiHo) are investigating the hearing of gray seals (*Halichoerus grypus*) under the leadership of Professor Dr. Ursula Siebert and Dr. Andreas Ruser. They published the first results in the online specialist magazine Plos one (www.plosone.org). The investigations were financed by the German Federal Agency for Nature Conservation (BfN) in order to increase knowledge about the effects of underwater noise on marine mammals. They are part of a multi-year, extensive BfN research program. The measuring system was supported by Technical Center Army Office 71 of the German Armed Forces.

“We urgently need to learn more about how well and in which frequency range gray seals hear,” says Professor Dr. Ursula Siebert, Head of the institute. “The last scientific publication on this topic dates back to 1975.” Noise pollution in the sea is continuously increasing: shipping traffic, construction works in the sea, blasting, sound cannons to search for crude oil or the use of sonar devices stress the animals. The scientists need precise data about the hearing of gray seals in order to assess the effects of underwater noise on the animals. This seal species, along with porpoises and seals, is among the most common marine mammals in the North and Baltic Seas.

For their current study, the researchers investigated six gray seals from rearing stations. Dr. Andreas Ruser explains: “Basically, we proceeded according to the principle which we know from ear specialists.” In contrast to humans, however, animals cannot say when they hear a tone, so the challenge for the researchers was to find out whether the seals perceive a tone or not. The researchers sedated the gray seals shortly before they were to be released into the wild. Then they played tones to them and measured the nerve impulses transmitted from the cochlea to the auditory nerve. As soon as the animals woke up again, the researchers were able to release them into the wild.

Since seals close their external ear channel when sedated, it is impossible to treat them with ultrasound using speakers. “We therefore used specially adapted in-ear headphones,” explains Ruser. The researchers found out that gray seals, similar to humans, can hear in a frequency range between 1,000 and 20,000 hertz and are much more sensitive than previously known in a range higher than 3,000 hertz. Furthermore, there are indications not yet confirmed that gray seals can also hear above 20,000 hertz. “Using this method, however, we can only prepare a so-called air audio diagram for wild animals, which means that measurements can only be carried out in the air. Sound waves are transmitted in a different manner under water. We therefore assume that gray seals hear even higher frequencies under water.”

Next, Ruser and his colleagues want to examine this difference with gray seals trained and held in human hands at the University of Southern Denmark, Odense: The gray seals must therefore “learn” to signalize whether they hear something, first above and then under water. The seals are thus to be trained to show a defined reaction as soon as they hear a tone. This training is carried out in the pool of the respective seal facility. The tones are then played for the gray seals under controlled conditions using headphones or loudspeaker in the air and loudspeaker or hydrophones under water. “We are looking forward to the further results, particularly with regard to the hearing of the seals under water,”

says Professor Siebert. “We are hoping for reliable evidence that shows to what extent seals are affected by the increasing noise pollution in the North and Baltic Seas.”

Background Information

Gray seals are the biggest wild predators in Germany. They can live up to 35 years. With a length of 230 centimeters and an average weight of 220 kilograms, males are considerably larger than females, which can be up to 180 centimeters in length and may weigh 150 kilograms.

The employees of the Institute for Terrestrial and Aquatic Wildlife Research work in Hannover and at a branch of the TiHo in Büsum in Schleswig-Holstein. The focal points of aquatic wildlife research are basic research, applied research and monitoring. The aim is to investigate the biology and ecology of marine mammals and to assess the influence of humans on animals, their health and their population.

Original Publication

In-air evoked potential audiometry of grey seals (*Halichoerus grypus*) from the North and Baltic Seas
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With specially adapted in-ear headphones TiHo researchers investigated the hearing of gray seals.
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