The whale that is heard, but not seen

By Fanni Szakal (Hungary)

Beaked whales are so rare that instead of observing them directly, researchers have to rely on listening to the sound of the ocean to study them.

I stared out over the stern of the boat at the disappointingly smooth water surface and sighed – we had been fruitlessly scanning the horizon for 15 hours straight. The team, parched from spending all day in the relentless sun, started talking about giving up. Then, the water began to swirl and the enormous cigar-shaped body of a whale emerged right beside the boat. With its bumpy head and its body covered with round white patches and scars, I felt like I was looking at a creature from outer space.

As if a string suddenly snapped, everyone jumped into action. Someone grabbed the tagging stick – a long plastic pole with a suction-capped tag on the end – and manoeuvred the device onto the whale's back. I reached for the camera and started snapping pictures while fighting back tears, knowing I was experiencing something that only a few are fortunate enough to see. About two minutes later, the whale dived down and the water surface returned to smooth, as if nothing had been there.

The whale that I was so lucky to catch a glimpse of was Cuvier's beaked whale, one of 24 species of beaked whales, and touted as one of the rarest mammals on earth. While Cuvier's is the most commonly sighted species in this group, that is a low bar – some species such as the spade-toothed whale have never been seen alive, and were described from two dead animals and a couple of bones washed up on the beach.

Unsurprisingly, we know almost nothing about the life history of these whales, yet learning more about them is imperative for their own sake – beaked whales have been involved in multiple mass strandings linked to naval sonars. This has prompted an increase in research efforts, but how can we study and protect an animal that we hardly ever see?

Beaked whales belong to the realm of the deep sea, coming up to the surface to breathe for mere minutes before diving back down again. Cuvier's beaked whale holds the world record for the deepest diving mammal, with a staggering depth of 2,992 metres and a maximum dive length of three hours and 42 minutes. Scientists have put in a lot of effort to learn more about them, but getting close to them is a challenge. By the time a research boat has sighted the whales, and then come close enough to deposit a tag, the animals have usually dived back down. The next place they pop up – between 20 minutes and several hours later – could be a kilometre or more away, making it almost impossible for the boat to reach them for their next few minutes on the surface.

Eiren Jacobson, a researcher at the University of St Andrews uses a clever way to circumvent the issue of studying an animal that you can't find. Instead of spending days chasing whales out on the ocean, she just listens. Jacobson works with a technique called Passive Acoustic Monitoring (PAM), where she uses hydrophones – microphones designed to record sounds in the water – mounted at the bottom of the sea and analyses the presence and activity of whales underwater.

Just as humans have interfered with the climate, the forests, and the air, we have also managed to disrupt the natural sound waves of the ocean. In the eternal darkness of the deep sea, beaked whales rely on echolocation to hunt and find their group members. Apart from having to go hungry due to the interruptions in foraging, sonar frequencies can also

spook the whales, making them ascend too quickly and cause decompression sickness, or the ‘bends’, a potentially deadly condition familiar to scuba divers.

In a recent study funded by the US Navy, Jacobson analysed the responses of Blainville’s beaked whales to navy training activities and sonars in Hawaii. While it has long been known that beaked whales are sensitive to sonar, Jacobson’s research showed that even the boating activity during the training exercises had a massive effect on the animals. The probability of finding beaked whales in the study area when the sonar was on decreased by 77% compared to periods of general training activities and by 87% compared to no activity prior to the training.

‘We think that previous studies have been measuring the decrease due to sonar relative to the training period,’ explains Jacobson. ‘But our data showed that actually there's a pretty big decrease that happens before the sonar even starts. This implies that the true impact of the sonar is actually greater than what has previously been reported.’

In future studies, Jacobson plans to dissect navy training activities further to find out exactly which noises are the most offensive to the whales. They would also like to use modelling approaches to understand how noise impacts the animals in the long term and to see whether the lost hunting opportunities, and the energy expended during the quick escapes, impact the whales’ health and reproduction.

While there is hope that increased research efforts will eventually lead to more protection for the whales, whether the studies will inspire real change is unclear. It is an alarming possibility that as the ocean’s symphony turns into a cacophony, beaked whales might end up neither seen nor heard.