

The Voice of Guillemots

Finding the Words in the Noise

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On the cliff ledges of Stora Karlsö, thousands of common guillemots raise their chicks each summer, and the colony never falls quiet. Parents call to chicks, neighbours call to neighbours, and everything is layered over wind and waves. These birds are also messengers of the Baltic Sea, and their voices may carry signs of how the sea and the colony are doing. Yet no one knows exactly what they say to each other. Only a few calls have been described, in closely related species, and no complete catalogue exists for this one.

In summer 2025, an eight-channel microphone rig at AukLab listened to the colony for 94 days. It recorded more than 14 terabytes of sound, far more than anyone could listen to. Our project asked whether a computer could find the voices in this noise, without being told in advance what to look for.

We built a three-step pipeline. First, the computer scanned the recordings for moments when sound was concentrated at one microphone, the signature of a bird calling nearby, and marked where each vocalisation starts and ends. From the 30 best days, this gave about 123,000 such events, roughly twelve hours of pure guillemot activity picked out of the archive. Second, pre-trained audio models turned each event into a numerical fingerprint, and similar-sounding events were grouped together. Third, we listened to each group and compared it with what is known from the literature.

Because there is no catalogue to learn from, we let the sounds organise themselves rather than teaching the computer fixed labels. Grouping alone is not proof of a real call type, so every group was tested repeatedly under different settings. Of 125 candidate groups, 26 held up. Each of these is best seen as a family of calls: a stable core pattern with finer variants inside it, which researchers can now explore further. Thirteen families matched documented guillemot calls, from both adults and chicks. Three belonged to Razorbills, two were noise, and eight remain open questions. An independent expert reviewed and refined the labels.

The result is a reusable starting point rather than a finished dictionary. Researchers can go straight to the moments that matter instead of searching terabytes of noise. They can link calls to behaviour, follow how the colony changes through the season, and hunt for the rare calls set aside in the catalogue. The pipeline can serve many different tasks at many different levels. It is not meant to replace researchers, its only to speed it up their process. So far we have used one of the eight microphones, and the same approach can be applied to the other seven and to future summers.

If we can learn every variant of the colony's voice, including its rarest calls, we may one day listen to the health of the Baltic Sea through the birds that depend on it, continuously and without disturbing a single one.