

Can sound protect eagles from wind turbine collisions?

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Every year, bald and golden eagles are killed when they inadvertently fly into wind turbine blades. One possible way to prevent these deaths is to chase the birds away with acoustic signals—sound. To determine what types of sounds are most effective in deterring the birds, researchers at the University of Minnesota and their colleagues tested the behavioral responses of bald eagles to a battery of both natural and synthetic acoustic stimuli.

Auditory neuroscientist JoAnn McGee will present the results of those tests at the 177th Meeting of the Acoustical Society of America, which takes place from May 13-17, at the Galt House in Louisville, Kentucky.

Three adult [bald eagles](#) were used for the study: two [birds](#) that are unable to survive in the wild and live permanently at the university's Raptor Center, where the testing was done, and one bird undergoing rehabilitation at the center prior to release back into the wild.

Each bird was tested within a 9- by 7-foot space lined with sound-dampening materials. The bird was perched on a bar in the center of the room, with loudspeakers mounted on the wall to its right and

left; a high-resolution video camera mounted directly in front of the bird captured its reaction to the sounds.

Ten different stimuli, varying in spectral complexity, were tested. The sounds included natural stimuli, such as calls produced and transmitted by eagles themselves, and synthetic sounds including pure tonal stimuli, frequency- and amplitude-modulated [stimuli](#), and white noise. The researchers also tested a novel "crow mobbing" signal—"literally the calls produced and transmitted by crows when mobbing, or ganging up on other birds entering their territories," McGee explained.

Observers viewing the videos of the birds judged their responses, noting whether the birds moved or tilted their heads when a stimulus was played, for example, or appeared startled.

Perhaps not surprisingly, the eagles were more interested in, and paid closer attention to, natural calls rather than synthetic signals. "That is not to say, however, that they weren't responsive to other relatively wide-ranging [acoustic signals](#)," McGee said—including the crow mobbing sound. "Paying attention to their immediate environment has grave survival implications, so we weren't surprised," she said.

The study also showed that bald and [golden eagles](#)' "working auditory space" falls within a fairly well-defined frequency band, with an upper cutoff frequency of approximately 6 kilohertz and a lower cut-off frequency below 0.35 kHz. The researchers recommend that signal designers use the data as a developmental guideline in efforts to design effective and efficient acoustic deterrent systems.

The results from the project take one critical step forward in the effort to develop acoustic alerting or deterrence technologies that might discourage eagles from flying into wind farm airspaces and reduce instances of injury and death associated

with turbine collision, McGee explained.

More information: Presentation #3pAB1, "Bald eagles (*Haliaeetus leucocephalus*) monitor their immediate acoustic environment vigilantly," will be at 1:30 p.m., Wednesday, May 15, in the Clements room of the Galt House in Louisville, Kentucky.

acousticalsociety.org/asa-meetings/

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