Eavesdropping on seabirds

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Ashy storm petrels spend most of their time at sea. Unless they're incubating an egg, adults typically visit their nesting sites for just a few hours in the middle of the night, making them a challenging species to study. Credit: U.S. Fish & Wildlife Service/Jeff Poklen via Flickr.

Ecologists trying to pin down the complex web of connections swirling around a particular species need to start with the basics, things like the size of the population, and whether or not its members are breeding

successfully. Simple questions, but if a scientist's quarry is elusive or cryptic, it can take more than the powers of human observation to find the answers.

New remote sensing techniques, which more closely resemble your smartphone's personal assistant than traditional field sampling, may be able to help.

How, for example, do you study an imperiled seabird population when for most of the year the adult birds' stealthy habits keep them out at sea hunting for food – and away from spying scientists – around the clock, except for a brief period in the middle of the night when it's too dark to tell a petrel from a pile of rocks?

That was the situation facing researchers who wanted to know if there were any ashy storm petrels on Anacapa Island, about 25 kilometers off the California coast, ten years after invasive rats were eradicated from the island.

Ashy storm petrels are small enough to fit in your hand, fog-gray and stern looking, with a prominent brow and slightly hooked beak. It's a look that's belied by their call, which was described in a 1903 scientific paper as a "sing-song twitter, regularly punctuated with a gasp" like a tiny train engine. Their population numbers somewhere between 5,000 and 10,000, all living on craggy coastal islands scattered along the edges of California and Baja California.

The International Union for Conservation of Nature lists the species as "endangered," and some scientists worry that ashy storm petrels' limited range and small population make them especially vulnerable to threats like invasive rats.

For decades, rats ruled Anacapa Island, a rugged dash of rock in Channel

Islands National Park. Introduced rats can decimate island ecosystems by gobbling up seabird eggs, chicks and adults, as well as other native creatures, so 15 years ago state and federal government agencies worked with scientists to get rid of the rats on Anacapa.

Seabirds are fundamental to the island ecosystems where they live, according to conservation biologist Rachel Buxton of Colorado State University. They scoop up food from the ocean, then fertilize their home islands with their guano, functioning like a conveyor belt of nutrients.

"Their recovery is really important for island restoration," Buxton said. "So it's really central to your whole restoration project to be able to monitor them."

But because of the remoteness of coastal islands and the furtive habits of some species, searching for seabirds in person is difficult. Ashy storm petrel adults are rarely at their nesting sites during the day, except when mates are taking turns incubating an egg. Even then, the crevices where they live are so well camouflaged that it's difficult to tell them apart from the rest of a rocky coastline.

Researchers scramble up slick rocks and slippery scree slopes, stick scopes down bird burrows, and sometimes even follow their noses in the dark – ashy storm petrels produce a musky odor distinct enough to serve as a signpost marking their homes.

"It's one of the most challenging wildlife monitoring situations that I can think of," Buxton said, of searching for nocturnal seabirds. "This is where acoustic recorders have been extremely valuable."

After the rat eradication on Anacapa, scientists wanted to see if seabirds were recovering on the island. When they went looking for ashy storm petrels in 2011, they didn't find any. But they left some microphones

behind, just in case. They retrieved the recordings every few weeks, and sent them to Conservation Metrics for analysis.

Conservation Metrics, a company based in Santa Cruz, California, develops software designed to differentiate between the sounds that scientists want to hear, like the cheeps and chirps of bird chatter, and everything else. It's the same type of voice recognition analysis that smartphones use when they 'listen' and talk back to you – and as with your cellphone, the challenge for the software is the sheer volume of background noise.

"It's like Siri constantly trying to figure out what someone's saying, in the middle of Grand Central Station, on speaker phone," said Matthew McKown, CEO of the company.

The recordings from Anacapa were, for the most part, devoid of ashy storm petrels' trilling squawk – with one exception. At one site, called Portuguese Rock Cove, microphones picked up the voices of ashy storm petrels on 10 of the 19 nights they were recording.

The researchers returned to the island to search for the seabirds once again, and this time, thanks to the recordings, they knew where to look – Portuguese Rock Cove.

"They went back and they found the first record ever of an ashy storm petrel breeding on the island," McKown said, proving that remote acoustic sensing has more than potential – it actually works.

Acoustic recordings can augment and even improve traditional seabird surveys, McKown said, and Buxton agreed.

Still, Buxton, who wasn't involved in the Anacapa study, said she doesn't think the need for traditional, in-person seabird monitoring will ever

completely disappear.

"There are some things that you just can't tell from acoustic monitoring," she said, like how many chicks survived the breeding season, or what exactly birds have been eating.

But, she added, "it's going to be an incredible complement to the way research is done."

Ashy storm petrels have more to say, according to McKown, and he and his colleagues will be listening. The National Fish and Wildlife Foundation recently awarded them a grant to set up a wireless network of microphones in the California Coastal National Monument, which spans the entire shoreline of the state. They're going to eavesdrop on Leach's storm petrels, fork-tailed storm petrels and black storm petrels, too, and keep an ear out for other seabirds like puffins and murrelets.

"We have a mission to improve conservation through better monitoring," McKown said. By listening in on the conversations of seabirds, he hopes to do just that.

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