Scientists use storm-chasing weather radar to track bat populations

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Storm chasers have become bat watchers. A scientist at the University of California, Santa Cruz, working with meteorologists at the University of Oklahoma, is using mobile storm-chasing radars to follow swarms of bats as they emerge from their caves each night to forage on insects.

The radar images of bats appear as distinct "blooms" of radar reflectivity and give scientists clues to their behavior, said Winifred F. Frick, a post doctoral researcher in environmental studies at UC Santa Cruz. Frick, a bat expert, is working with professor Thomas H. Kunz, of Boston University, Phillip B. Chilson, associate professor of meteorology, at the University of Oklahoma and Kenneth Howard at the National Oceanic and Atmospheric Administration's National Severe Storms Laboratory.

Friday, February 18, 2011, the team will give a press briefing in Washington, D.C. in advance of a presentation the next day at the annual meeting of the American Association for the Advancement of Science. The presentation is titled "Aeroecology: Transcending Boundaries Among Ecology, Meteorology, and Physics."

Kunz coined the term "aeroecology" two years ago to describe the interactions of organisms – birds, bats, and insects– in the lower atmosphere. Aeroecology can be recognized as a stand-alone discipline just as marine biology is recognized as a stand-alone discipline concerning life in the oceans, Frick said.

"It's very interdisciplinary or transdisciplinary in the sense that it

involves bird biologists and bat ecologists, entomologists, radar scientists and meteorologists," she said.

Frick received a National Science Foundation fellowship in bioinformatics to use current radar technologies to estimate densities of bat populations in the atmosphere. A year ago, she and Kunz, with whom she has worked for years, met with atmospheric and radar scientists at the University of Oklahoma in Norman, Okla. to collaborate using weather data collected by radars to study bat populations.

In addition to truck-mounted mobile radars, Frick and her colleagues use data from 160 fixed NEXRAD weather radars around the country. Familiar as "doppler radar" from TV weather reports, these radars have recorded and archived atmospheric data every five minutes for the past 20 years.

Scientists at the National Severe Storms Laboratory in Norman collect NEXRAD radar data to predict weather patterns but first they must filter out "bioscatter" -- birds, bats, and insects -- to focus on weather patterns, Frick said. "They want to get rid of this bioscatter clutter to make accurate storm predictions," she said.

Now, the storm scientists are reversing the filter to instead focus on bioscatter. That offers the potential of looking back two decades to see population changes among bats, insects, and migrating birds.

They've developed a website called Surveillance of Aeroecology using weather Radars, or SOAR, that will be a "bioscatter portal," Frick said. There researchers can look at patterns of bat emergences from colonies, bird migrations, and even Monarch butterfly migrations.

Last July, the team positioned a mobile, storm-chasing radar from NOAA outside a cave in Texas to focus on swarms of Mexican free-tail

bats. Using calculations of the amount of radar backscatter from a single bat in the laboratory, the group is developing the first means to calculate aerial densities of bats as they travel on the wing.

In August, Frick and Kunz published findings suggesting the possible extinction of the little brown bat in the northeast United States because of a fungus that disrupts the bats' hibernation cycles.

Provided by University of California - Santa Cruz

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