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The Bat Grid

A unique approach to reliable data
Pat Ormsbee

“You don’t know what you’ve got ‘til it’s gone,” singer Joni Mitchell famously insisted in 1970. Now we’re trying to ensure that we do know what we have – at least with regard to bats in the Pacific Northwest – so we can do a better job of conserving them. For six years, a myriad of partners and I have been conducting a systematic inventory of bats in Oregon and Washington with carefully standardized data on species identification, location and other factors. The result is the Bat Grid.

To know what we’ve got requires collecting basic, conclusive and repeatable species data at a landscape scale so that the information can be applied to analyses of long-term trends of species distribution. Baseline data on the identification, presence and distribution of bat species are essential for developing conservation plans.

My primary partners in this effort are Professors Joe Szewczak of Humboldt State University, Jan Zinck of Portland State University and Aimee Hart of the U.S. Forest Service. Of course, we can’t do it all ourselves, so we engage professional and citizen scientists to collect the data. An emphasis on consistency in collection methods ensures the data can be confidently combined and analyzed with all other Bat Grid results.

The comprehensive inventory and monitoring program, known officially as the “The Bat Grid,” has grown dramatically since its inception in 2002. Surveys are conducted using a grid-based sampling frame of square sample units – each 6.2 miles (10 kilometers) on a side – that covers the Northwest. Our survey efforts are guided by the random selection of sample units.


We developed the Bat Grid sampling design and protocol with substantial help from statisticians and biometricians. Initially developed only for the state of Oregon, the Grid was eventually enlarged to cover adjoining states. The Forest Service, meanwhile, has expanded the sampling grid to cover all of North America and to address other species of wildlife. This continental grid is available for downloading at <ftp2.fs.fed.us/incoming/rsac/wildlife>.

A standardized protocol includes three methods for identifying bats: morphology, acoustics and genetics. Bat Grid surveyors (“Gridders”) take direct measurements of the key physical characteristics of captured bats, but recent research has shown that morphology alone cannot reliably discriminate some very similar species from one another. Therefore, we also sample genetic and acoustic characteristics.

Szewczak, a biologist and acoustics specialist, has developed SonoBat software that Gridders use to analyze and catalog the full-spectrum acoustic characteristics of bat calls, both from captured bats and from unknown bats in flight. The software includes a library of calls for each species to aid in identification.

He notes that recognizing bats by their calls is much more difficult than identifying bird



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species by their songs. “In addition to needing bat detectors just to listen in on the chatter,” he said, “the way that bats use sound renders the calls of one species much more like those of another than is true of birds.

“Birds sing to proclaim where they are and who they are, and they have undergone selective pressure to be different from one another.” Bats, on the other hand, use echolocation calls to obtain information about their environment and, “to the bane of bat biologists, this information-acquisition function of bat calls provided no selective pressure to be different from any other species. As a result, discerning many bats by their calls entails teasing out subtle acoustic characteristics.”

Szewczak and his lab at Humboldt State and collaborator Stuart Parsons of the University of Auckland (New Zealand) continue to evolve the SonoBat hardware and software. “Right now,” he said, “we can correctly classify 70 to above 90 percent of high-quality recordings of the species in an area. We are working to improve our classification rate and automate recording and classification.”

In fact, he said, “we envision a future of noninvasive bat surveying using “digital mist nets.”

Genetics is the Bat Grid’s third method of identification, thanks to Zinck, the team’s geneticist. She has developed genetic markers to identify species using either wing biopsies or guano. Genetic analysis is particularly important when assessing roost sites where nobody’s home, since identification can be obtained from guano piles left behind. That is the beauty and promise of Zinck’s work, as it will help permit “non-invasive, range-wide surveys” the next step in furthering our understanding of [bats].

She notes that the biggest impact of the Bat Grid is that it is “collaboratively building a huge archive of data that, because it was collected in a systematic way, allows researchers to investigate questions across longer periods of time and greater geographic areas than ever before.”

Collaboration is key to implementing the Grid, and the list of partners includes state and federal agencies, universities, non-government organizations and individuals. The U.S. Bureau of Land Management, the Forest Service, Department of Defense, National Fish and Wildlife Foundation, Oregon Department of Fish and Wildlife and Bat Conservation International’s North American Bat Conservation Fund have been primary funders of the project. And in-kind contributions from Portland State University, Humboldt State University and volunteer surveyors exceed \$100,000 a year.

The Bat Grid’s abiding success is due largely to the enthusiasm and continuing participation of both professional and citizen scientists. We selectively provide equipment and free training that covers capture techniques and species identification, acoustic recording and analysis, and collection and storage of genetic samples. Experienced participants are paired with novice workers to provide guidance and support beyond the training sessions, an essential part of ensuring credible data collection. An important result of this blend of field training and mentoring is a growing cadre of competent bat biologists who are dedicated to informed bat conservation in the Northwest.

The Bat Grid provides annual training and refresher sessions in key locations around the region. And all Gridders are provided with standardized data sheets, survey protocols and

data standards. The importance of unwavering standardization is the program's basic mantra. So far, we have trained more than 100 surveyors in Oregon and Washington, and another 40 in Idaho, Montana and South Dakota.

This kind of careful, consistent data collection year after year may not be terribly exciting for some, but the results are critical. If I spend the rest of my career "year after year" collecting good baseline data on bats, I feel I will have made a valuable contribution to bat conservation. There's no other program anywhere in the world that is collecting this type of comprehensive information on bats over such a large area.

Besides, says Aimee Hart, my longtime assistant, "There is something special about people who love bats. The camaraderie and the sense of adventure captivate everyone. It is really special to spend time in the outdoors at night, especially when you are contributing to something so important."

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All articles in this issue:

- ▶ [The Bat Grid](#)
- ▶ [Bats on the Wing in the Canadian Winter](#)
- ▶ [Teaching Colombian Children](#)
- ▶ [News Notes](#)
- ▶ [Meeting the Challenge in the Philippines](#)
- ▶ [Mysterious Bat Die-off Triggers Alarm](#)