Cameras light up bats in the dark

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Hibernating little brown bat (Myotis lucifugus). Credit: Paul Cryan

An Associate Professor in veterinary public health at Massey University has been involved in developing tools to watch bats as they hibernate that may be key to saving them from a disease decimating their populations.

The new article was published in *Methods in Ecology and Evolution* and

is part of a long-term effort led by the United States Geological Survey (USGS), a scientific agency of the United States Government. It represents the first use of thermal imaging surveillance cameras to monitor long-term hibernation behaviours of bats over winter, providing a way to study bats in hibernation without disturbing them. It found that a bats movement during hibernation may be key to their survival.

White-nose syndrome is a fungal disease of hibernating bats causing unprecedented population declines in North America since 2007. More than half of the 42 species of insect-eating bats in the United States rely on hibernation as a primary strategy for winter survival and could be adversely affected by syndrome, but researchers have so far been unable to determine why some are at more risk than others.

Two temperature-sensing surveillance cameras in two bat hibernation caves hit by white-nose syndrome were deployed and provided video imagery of hibernating bats over several winters. The video produced by the cameras allowed the researchers to analyse the patterns of arousal from hibernation in the groups of bats.

Associate Professor, David Hayman, of Massey University's Institute of Veterinary, Animal and Biomedical Sciences says the research looked to answer one of the biggest unanswered questions about the disease.

"We observed bats from a species that appears to be less affected by the disease are performing group arousals throughout winter hibernation. This result suggests that group arousal during hibernation might be associated with the ability to survive disease, rather than as a precursor to death. Group arousal may enable body temperatures less conducive to fungal growth and increase the bats' ability to survive disease."

Bats are overlooked, but vital animals across much of the world because they are the main predators of night-flying insects. This means that bats

limit insect damage to many farm crops and unknown numbers of wild plants."

Light 'em up

Associate Professor Hayman worked with other collaborating scientists from Colorado State University, and Mathworks, to develop computer methods and sharable software for efficiently processing the thousands of hours of resulting video imagery produced by his USGS colleagues.

USGS researcher and study co-author Paul Cryan said, "Discovering how bats survive infection by the WNS fungus may lead to response actions that enhance bat survival and predict disease risk to different bat species and colonies in different regions".

From here researchers may be able to enhance bat survival and predict disease risk to individuals, colonies, populations, continental regions, and species. Practical applications of the new methods include identifying species-specific behaviours that help bats survive the disease, monitoring for changes in hibernacula of endangered species, and efficiently studying how not only bats, but all cryptic animals cope with environmental change.

Ongoing research by USGS aims to test the possibilities that certain behaviours and winter habitats used by bats infected with the syndrome fungus help them live through winter. Identifying such survival behaviours and habitats could help focus response actions and builds on other research Dr Hayman has performed with the same researchers and other researchers.

More information: David T. S. Hayman et al. Long-term video surveillance and automated analyses reveal arousal patterns in groups of hibernating bats, *Methods in Ecology and Evolution* (2017). DOI:

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