

INNOVATOR Q&A

Trail cameras uncover surprising flexibility in mammal routines, URI study finds

The striped skunk, gray fox, and porcupine — all found in Rhode Island — became more nocturnal from 2009 to 2020 amid environmental change caused by people, the study found

By **Carlos R. Muñoz** Globe Staff, Updated April 7, 2025, 6:00 a.m.



A URI-led team has gathered photographs of daily mammalian activity, studying 445 species around the world with surprising results. UNIVERSITY OF RHODE ISLAND

University of Rhode Island researchers have made some unique discoveries using trail cameras that could redefine how hundreds of species of mammals are classified worldwide.

The team of [Brian Gerber](#), [Kadambari Devarajan](#), [Mason Fidino](#), and [Zach Farris](#) joined forces with with more than 200 partners in 38 countries on six continents to create a library of daily activity for 445 mammals, known as diel activity. There are four periods of activity and rest for animals: diurnal (day), nocturnal (night), crepuscular (twilight), or cathemeral (throughout the day).

The [Global Animal Diel Activity Project](#), which began in 2021, studied more than 8.9 million photos to create a library of standardized diel activity estimates for the 445 different species. The team's findings were published February in [Science Advances](#).

Researchers found something surprising: nearly 40 percent of the species they studied often showed more than one classification. And their behaviors are changing based on climate change and their interactions with humans, the study found.

For example, striped skunk, gray fox, and porcupine — all found in Rhode Island — became more nocturnal from 2009 to 2020 with environmental change caused by people, the diel study reported.

The researchers have called for redefining diel activity based on the data from the study.



A University of Rhode Island-based team has rewritten the book on animal schedule beliefs, based on collected data. The team from the top row left, John Crockett (a former PhD student), Amy Mayer (research associate at URI), Brian Gerber, team leader, Kadambari Devarajan, an independent researcher, former URI postdoctoral, and National Geographic Explorer. Bottom row, left, Laken Ganoe (a former PhD student) and Kimberly Rivera (a former graduate student). UNIVERSITY OF RHODE ISLAND

Devarajan, an engineer-turned-ecologist and [National Geographic Explorer](#) now based in Mumbai, India, discussed what the study means with the Globe.

Q: Why did you choose camera trap data?

Devarajan: It's the best way to understand when animals were (observed). A camera trap or trail camera, when you set it up, you get a really good idea of what species are found in which areas and at what time. Until very recently, it was used for distributional studies, which species are found and how species were distributed in space. The temporal angle, or when they were found or active, was not given too many resources as far as research.

What do you think this study could mean for animal classifications?

It's not that the traditional classifications are wrong, it's more that there could be differences in how they were being studied. They were often very local studies. We are looking at some species that were wide ranging. This was a more comprehensive huge data set.

Were there any animals that drastically changed their activity patterns?

With increasing human presence, there was some shifting. Animals that were primarily diurnal in some places, would shift to more nocturnal, or vice versa. We also noticed body size played a huge role in when they were active. A smaller mammal was significantly more likely to be nocturnal than a larger animal.

What are some examples of how human activity influences when animals are active?

For the study, we looked at a common factor called the Global Human Footprint. Some ways it could be affected were if traffic is a major issue. For example, some species migrate across roads at a fixed time during migratory period. If there is increased traffic, that changes when they are active or closer to human areas. In India, leopards in human use areas are more nocturnal, but in Africa, especially in protected areas, they tend to be more diurnal. That is to avoid humans. They do a lot of hunting at night.



University of Rhode Island researcher Kadambari Devarajan sets a camera trap in Zambia, one of the data sites for the project. The team gathered data from 20,080 total camera sites across 38 countries and six continents. UNIVERSITY OF RHODE ISLAND



This photo taken by a trail camera shows a golden jackal found in Africa, the Middle East, and South Asia. UNIVERSITY OF RHODE ISLAND

What is next for this research, follow up studies?

All our data from this is public. Anybody can download them and build on it, and work. Whatever we targeted and pitched with our collaborators, we are satisfied with this. It was such a massive thing, I think everyone wants to take a breather. ... This is really groundbreaking. This is one of the largest camera trap data sets and we put it out there free for anyone to download. A lot of research in the future is going to use these methods, both the software and the data.

Here in the US, and around the world, there have been efforts to roll back some of the environmental protections and animal protections. Do you think

some of this work that you did in the study will help reinforce the need for animal protection and conservation?

I certainly hope so. I have been quite concerned, following it from here. A lot of good was done because of the protections. We've saved a few species from going extinct in the past few years. As an ecologist, I want my research to contribute towards the conservation of species. I hope that our paper will help, not just in the US, but other countries as well, to reinforce the importance of having protections in place. The best way to pitch it is that development can happen while still having the protections. There are a lot of smart people.

See the searchable library of the team's results [here](#).

The Boston Globe's weekly Ocean State Innovators column features a Q&A with Rhode Island innovators who are starting new businesses and nonprofits, conducting groundbreaking research, and reshaping the state's economy. Send tips and suggestions to reporter Alexa Gagosz at alexa.gagosz@globe.com.

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