

How Do You Use Radar to Study Bats?

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SUPER 2023 Communication Piece Script

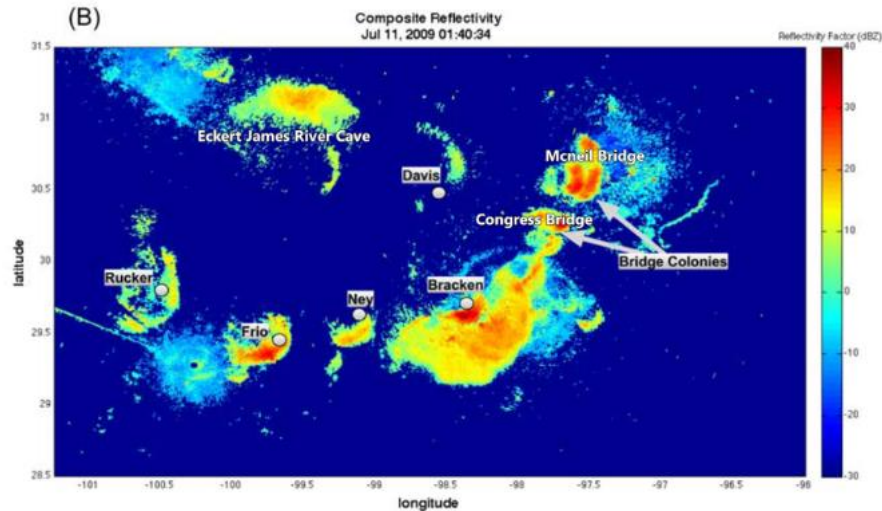
Millions of Mexican Free-tailed Bats summer in Texas!

Mexican Free-tailed Bats are a species of bat found in the Western and Midwestern US and throughout Mexico. Every summer, millions of Mexican free-tailed bats roost in South-central Texas. These bats raise their pups here and then most leave to winter in Central and Northern Mexico. The largest roost in this area is Bracken Cave outside of San Antonio, TX, which is one of the largest congregations of mammals on Earth and hosts millions of bats every summer (Stepanian & Wainwright, 2018). Mexican free-tailed bats play an important role in their ecosystem as a predator for beetles and seed bugs but are also essential for agriculture in this region.

Mexican free-tailed bats save farmers around \$3 million as pest control every year (Wiederholt et al., 2013). Single large roosts can provide ecosystem services (in form on pest control) that are valued at \$1 million on average (Wiederholt et al., 2013). Mexican free-tailed bats are also of cultural value, as large roosts like Bracken Cave near San Antonio and Congress Bridge in Austin attract visitors from around the country to view their emergences. Mexican free-tailed bat ecotourism in this region is valued at \$6.51 million, which fuels an emotional and economic connection to these bats.

These bats are important for their ecosystem, for the farmers that depend upon them, and for the people who find them fascinating and the ecotourism sector dependent on them. However, we know very little about the Mexican Free-tailed Bats who summer in Texas. Given this gap in knowledge and the importance of this species, it is vitally important to study them. One way that we can learn more about Mexican free-tailed bats and aid in their conservation is by using radar data to study migration and emergence patterns.

Radar data used to predict weather usually filters out biological noise. This data can be processed to instead turn the focus to this 'noise': large congregations of flying animals like birds, bats, and insects. By using reflectivity derived from the radar data, roosts of bats can be identified as they emerge at night to go forage.



The image above shows what this data looks like post-processing. Eight large Mexican free-tailed bat roosts have been identified, seen emerging at night to feed on insects.

Information collected using radar data can include emergence time and GPS location. Further analysis of reflectivity can even allow scientists to estimate density of bats in a given roost. This can allow scientists to learn about migratory patterns (phenology), emergence patterns, impacts on these patterns due to urbanization, and could be used to learn about how Mexican free-tailed bat behavior is changing due to climate change.

Radar data is a powerful tool that can be used to study flying animals like birds, bats, and insects. Given the understudied nature of species like the Mexican free-tailed bat, especially on larger scales, there is incredible potential for the ways that this data can be used to better understand these animals.

Sources:

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