

Have you ever wondered why you've seen bats in somewhere as bright as New York City and not somewhere with a more similar atmosphere to their home caves? So have we. Which is why we're asking the question: **How does bat species distribution in the Northeast and Southwest compare between urban and rural areas?**

Methods

- Collect iNaturalist data from NYC, Long Island, Austin, & Georgetown
- Compare with Presence / Absence charts
- Note which species are found more typically in certain regions and if in urban / rural area
- Compare species to light / radiance and see difference in species

Background

We are aware that light is not only factor affecting species distribution. Other influential factors to take into consideration could be anthropogenic noise, volume of infrastructure activity, temperatures, and distribution/availability of prey and vegetation.

Due to using iNaturalist for our data, we rely on citizen science and observations, which means that we can infer there will be many more urban sightings due to a higher population value.

Additionally, Bracken Cave, on the northern outskirts of San Antonio, is home to the world's largest bat colony, making it likely that Austin would have an outflow of the bats living in this cave.

Results

Figure I. Presence / Absence of Varying Bat Species in Urban vs Rural New York and Texas

	New York City	Long Island	Austin	Georgetown
Big Brown Bat	✓	✓	✓	✓
Cave Myotis			✓	✓
Eastern Red Bat	✓	✓	✓	✓
Evening Bat	✓	✓	✓	✓
Fringed Myotis			✓	
Hairy-tailed Bat	✓	✓	✓	✓
Hoary Bat	✓		✓	✓
Mexican Free-tailed Bat			✓	✓
Mouse-eared Bat	✓		✓	✓
Northern Myotis		✓		
Northern Yellow Bat			✓	✓
Pallid Bat			✓	
Red Bat				✓
Silver-Haired Bat	✓	✓	✓	✓
Tricolored Bat		✓	✓	✓
Vesper Bat			✓	✓
Vespertilionoid Bat			✓	✓



Big Brown Bat
Riverside Community Park, NY
Found at all locations



Northern Myotis
Suffolk County, NY
Found only in New York State



Mexican Free-tailed Bat
South River City, TX
Found only in Texas

	2018	2019	2020	2021	2022
New York	105.2	100.2	92.1	95.8	99.5
Long Island	20.8	21.7	19.7	20.5	21.8
Austin	146.5	134.1	136.4	145.8	148.3
Georgetown	11.9	12.8	11	13.4	13.4

Figure II. Measure of Radiance in (W/m²-sr) for each location

Findings

- Bats found in all four locations:
 - Big Brown Bat
 - Eastern Red Bat
 - Evening Bat
 - Hairy-tailed Bat
 - Silver-Haired Bat
- Bats found only in New York State:
 - Northern Myotis
- Bats found only in Texas:
 - Cave Myotis
 - Fringed Myotis
 - Mexican Free-tailed Bat
 - Northern Yellow Bat
 - Pallid Bat
 - Red Bat
 - Vesper Bat
 - Vespertilionoid Bat
- Bats found only in Urban Areas:
 - Fringed Myotis
 - Pallid Bat
- Bats found only in Rural Areas:
 - Northern Myotis
 - Red Bat

Conclusion

Reviewing the data and looking at our presence / absence chart led us to many conclusions, which are summarized in our findings section within the results.

While looking this over, we have seen that within Texas, as a whole, there is much more diversity within species distribution in comparison. Both urban and rural New York sites have the same species distribution value, with seven different species being found.

Despite assumption that New York would have highest radiance (light) levels, NYS Senate Bill S7663 regulated outdoor night lighting and NYS Assembly Bill A8644 enacted the "dark skies protection act" to protect against light pollution, in an effort to lessen impact of light pollution on natural patterns of wildlife, such as bats.

Other Contributing Factors:

- More people within urban areas (especially Texas due to the notorious bridge in downtown Austin that is home to bats) than in rural
- Depending on season of observers, migration patterns may influence which species are in specific locations
 - Hoary bats (roost in trees) migrate south for the winter (found along coasts and in northern Mexico)
 - Mexican Free-tailed bats (from Carlsbad Caverns, NM) migrate to Mexico for winter
- Both species only found in rural areas (Northern Myotis and Red Bat) prefer forested areas as a habitat

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