

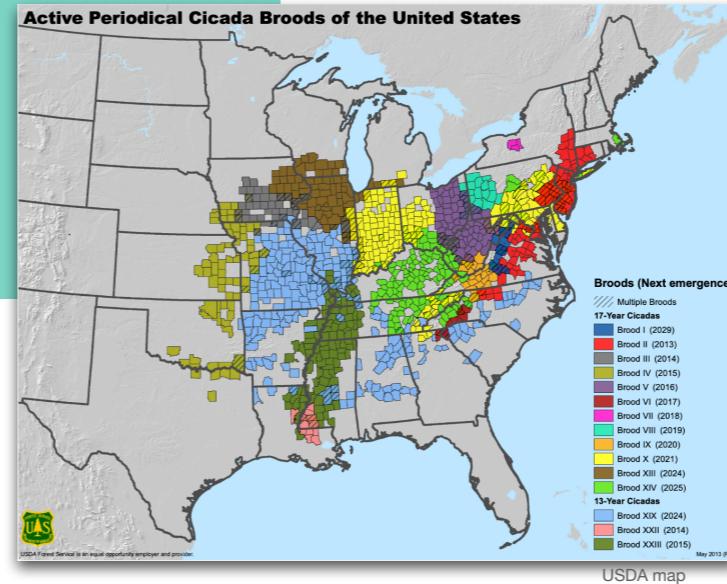
I got caught up in the hype about Brood 10 cicadas emerging this year.

The media has been reporting the emergence of Brood 10 cicadas as a special event, where in some places humans are outnumbered by these insects on a scale of 600 to 1. We're talking billions. I've never experienced a periodical cicada emergence, and I'm very curious about what it's like.

Based on what I was hearing about the scale, the noise, and "unpleasantness" of cicadas I wondered if they cause any subconscious changes in human behavior.

Biological Context

- Periodical cicada cycles are location-specific



A quick biology lesson:

Periodical cicadas are classified into broods, which you can think of like high school graduating classes (or NSS cohorts, perhaps). Each Brood follows its own specific cycle, in its specific geographic regions. This turned out to be a really significant factor in how I approached the project.

This map from the USDA demonstrates how you could *theoretically* be a cicada groupie, and experience a Brood emergence almost every year...somewhere.

Biological Context



Periodical Cicada



Annual Cicada

I think it might also be important to highlight that periodical cicadas are not the same as annual cicadas you might see every summer. They are comprised of totally different species, look very different, and periodicals and annuals tend to emerge from the ground during different months.

Also, the scale will be different (I included a picture of discarded nymph exoskeletons and some dead adults). It's the scale that is most interesting to me in terms of potentially impacting human activity.

Questions for the Data

During a periodical brood emergence...

- Do people have more complaints, expressed via contacts to city services?
- Are people driven to bad behavior, conveyed via citations and crime?
- Is there an increase in traffic accidents?

So what are we looking for? I narrowed things down to these questions:

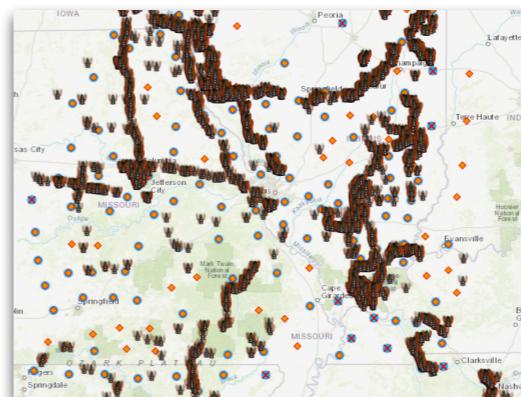
Do people have more complaints for 311 and city services? **Maybe the noise of these cicadas is the last straw needed for someone to finally report the pothole they've been driving around.**

Or are people **subconsciously pushed to bad behavior** — driven by irritation? For that, I looked at non-traffic police citations and crime reports.

And finally, is there an increase in traffic accidents? One headline that really stood out for me from Brood 10 read: "**Man crashes after cicada flies into car, smacks into his face.**"

Methodology

- Varying brood years + locations **supported data collection** for years during and around emergences
 - Cicada locations gathered from UCONN maps on the county level
 - Data cleansed to '**cicada months**' of May and June



<https://cicadas.uconn.edu/>

We have the questions, let's talk about the Methods.... The University of Connecticut has a really detailed collection of maps, based on aggregated scientific observations of different broods. (This is an example)

From these maps, I **created lists of counties** with verified cicada sightings, alongside the years in which their broods emerge.

Then, I tracked down reliable data relevant to the questions, and within the time and location constraints.

For every one of those data sets I obtained, I only kept data points from within the months of May and June. Why (more biology). Cicada emergence is responsive to soil temperatures and weather, and the right conditions are typically reached in May. Given that the **above-ground lifespan of these cicadas is limited to 6-8 weeks**, looking at the months of May and June should cover the time that humans can be impacted by them, while allowing for flexibility in season and individuality.

Let's jump in with 311 data!

311

city service requests

- Non-emergency requests for city services
- Request types curated for indicating potential bad behavior or annoyance
- Limited to months of May and June

311 is a city service concept for citizens to report non-emergency requests or complaints.

I made some decisions about the types of requests to include in the analysis so that it stayed specific to human reactions and behavior.

So for example, I

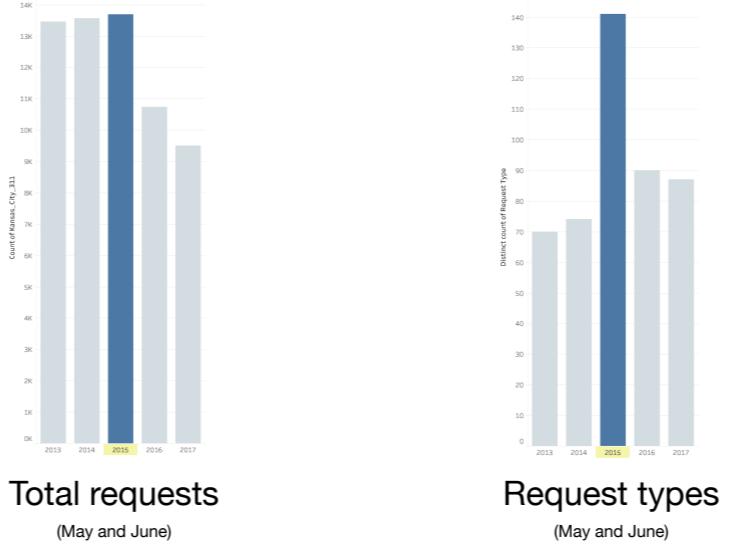
- Included: people reporting Barking Dogs, Sidewalk Obstructions, Potholes, Noise, Missed trash pickups

And I

- Excluded things like: Sewer Cave-in (Syracuse)

Kansas City, Missouri

Brood IV 2015

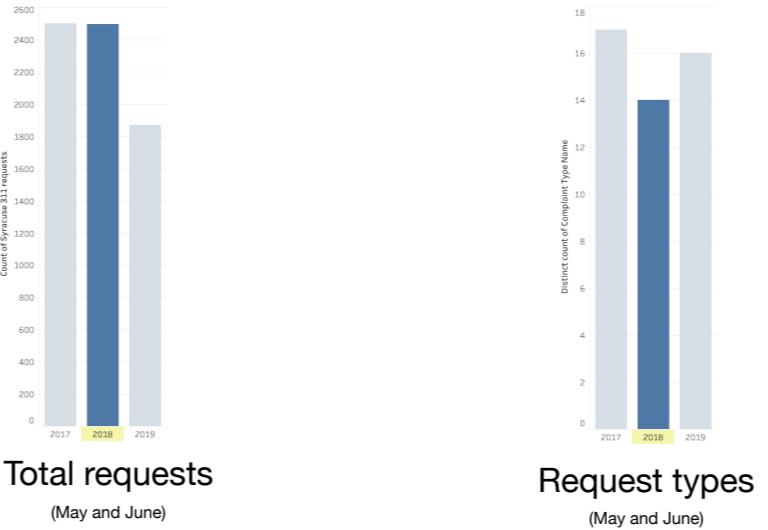


Kansas City experienced Brood 4 in 2015.

Looking at the **total number** of requests on the left, and the number of **different types of requests** on the right,
we can see an increase in both during the cicada year.

Syracuse, New York

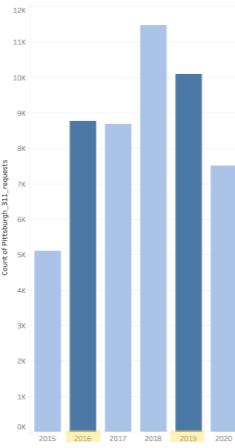
Brood VII 2018



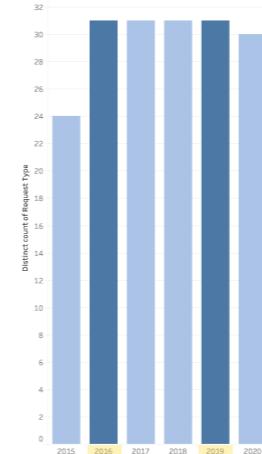
We do not see this pattern in Syracuse NY though, for Brood 7 in 2018.

Pittsburgh, Pennsylvania

Brood V 2016 & Brood VIII 2019



Total requests (May and June)



Request types (May and June)

We also don't see it during the emergence of two **separate** broods in Pittsburgh in 2016 and 2019.

311 cicada relationship scorecard

Kansas City
Brood IV 2015



Syracuse
Brood VII 2018



Pittsburgh
Brood V 2016



Sum up for 311 we'll

Use the cicada relationship scorecard, modeled after traffic lights. (I'll use this for the other analyses too).

Green indicates a strong change in the data during the cicada year,

and red indicates no change or correlation for that year.

For 311, we only get one out of three hints of correlation between cicadas and complaints to the city.

Crime And non-traffic citations

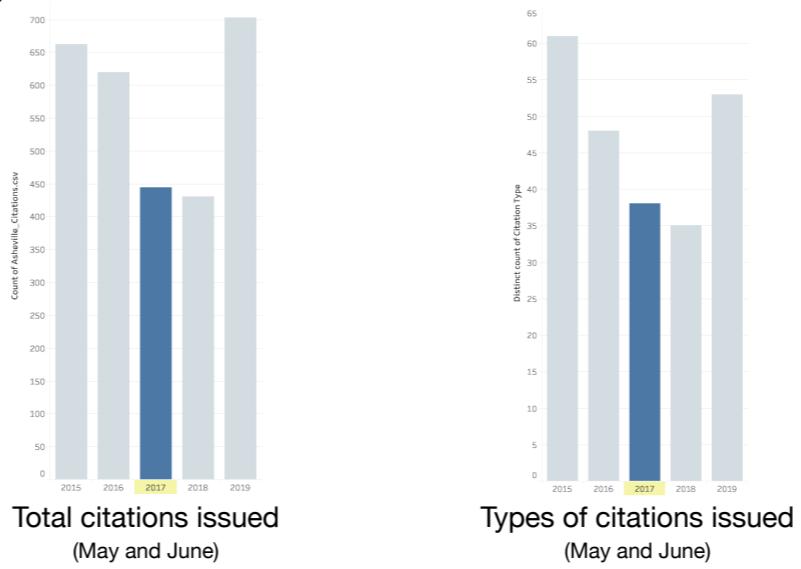
- City or County level data
- Limited to months of May and June

Let's move on to crime and non-traffic police citations.

Depending on availability I found data for this on either the city or county level.

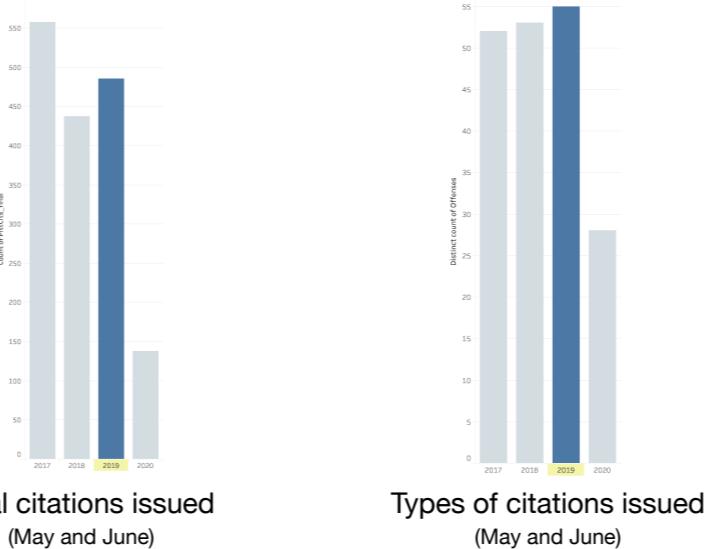
Asheville, North Carolina

Brood VI 2017



In Asheville, we actually see a **decrease** in the **total number** of citations issued in 2017, compared to the preceding year. We also don't see a correlation in the **total types** of citations issued. I looked at total types as an indicator of the breadth of things people were getting in trouble for. But in Asheville we don't see an increase.

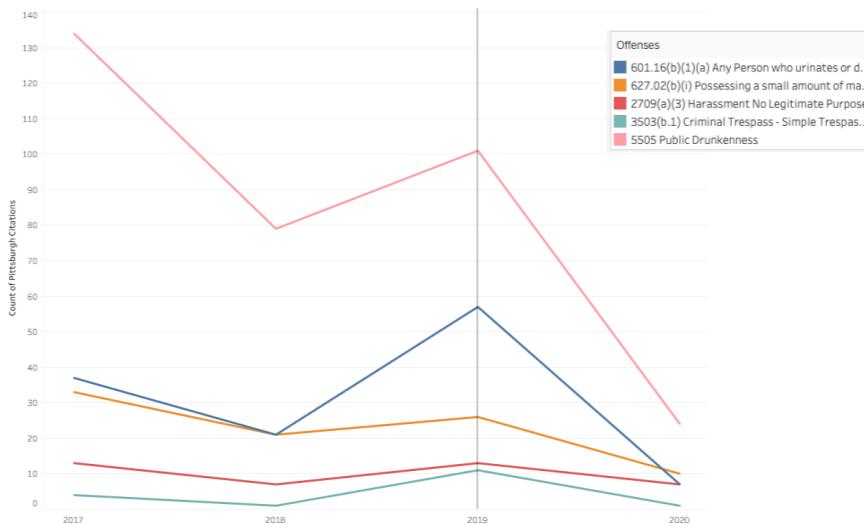
Pittsburgh Brood VIII 2019



In Pittsburgh, we do see a suggested correlation for these same parameters during their 2019 brood emergence. But I need to point out that 2019 falls against 2020, the year of staying home - this could imply a decrease in **overall** activity and present an anomaly of a year, Which makes it difficult to understand how unique 2019 may have been.

Pittsburgh

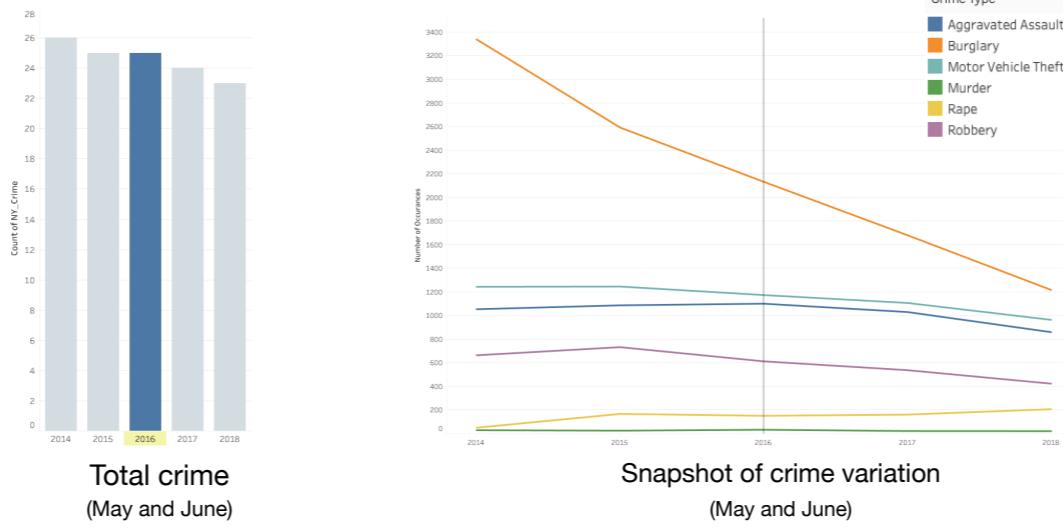
Brood VIII 2019



For fun and also to show what I was looking at for types of crime and citations, here are some noteworthy changes for Pittsburgh. Compared to the year before and after, public drunkenness had a surge, alongside public urination or defecation, possession of small amount of marijuana, harassment, and trespassing

Suffolk County, New York

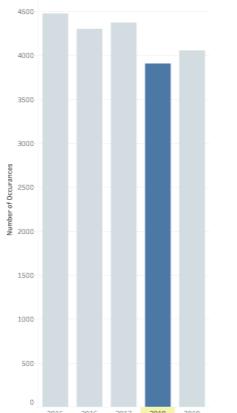
Brood V 2016



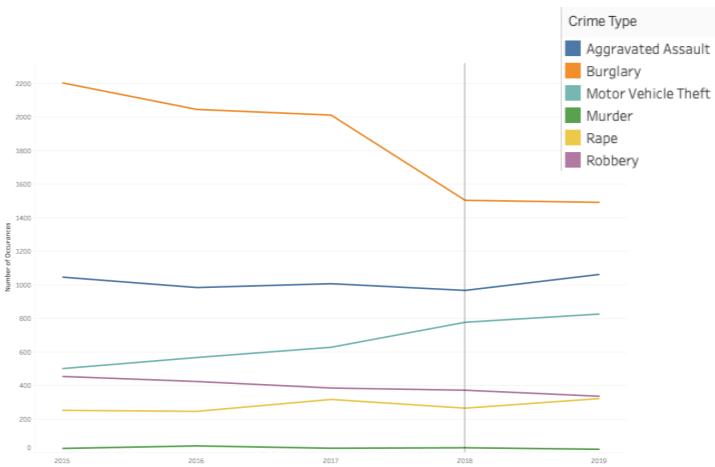
Suffolk County, NY is part of Long Island. **We really** don't see much variation during Brood 5's emergence for **either** total crimes or types of crime.

Western New York Counties

Brood VII 2018



Total crime
(May and June)



Snapshot of crime variation
(May and June)

In 2018, some counties in western NY state experienced Brood 7.

Like Asheville, there was overall ***less*** crime that year in these counties, and no specific type of crime had a peak increase or decrease.

Crime and non-traffic citations cicada relationship scorecard

Asheville, NC
Brood VI 2017



Pittsburgh
Brood VII 2019



Suffolk County, NY
Brood V 2016



Western New York Counties
Brood VII 2018



Pittsburgh is the only location where we saw an increase
in the total and type of citations issued,
but remember it was followed by 2020 so it may be unreliable. It gets an asterisk.

Traffic Accidents and 511 unplanned events

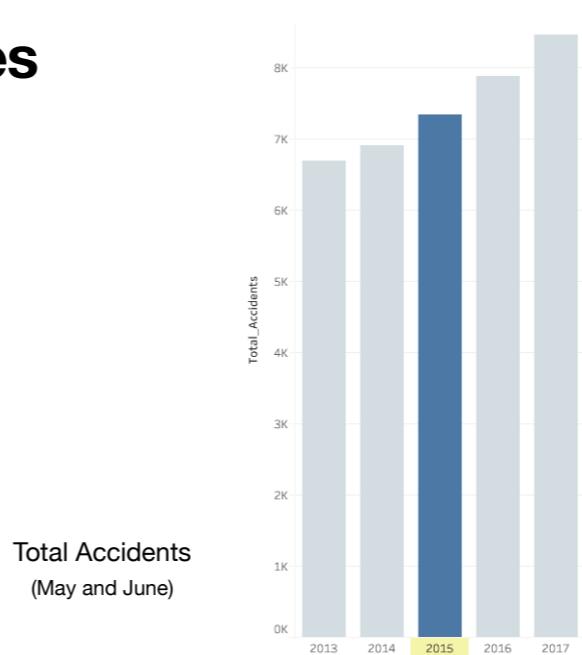
- City or County level
- 511 data curated for unplanned incidents
- Limited to months of May and June

Finally, let's take a look at traffic during brood emergencies.

Again the data that was available determined if I could look at this on a city or county level.

Tennessee Counties

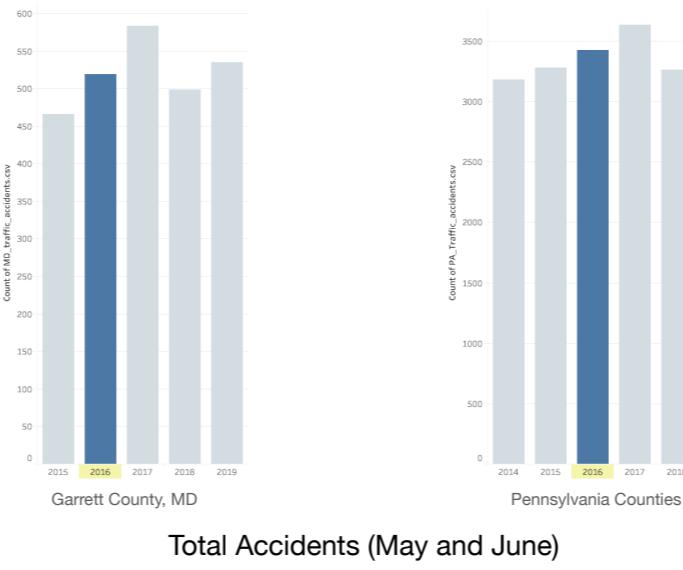
Brood XXIII 2015



In 2015, several counties in TN saw brood 23. We don't see an increase in accidents unique to that year - the trend of a general increase in accidents is pretty evident, though.

Counties in Maryland and PA

Brood V 2016

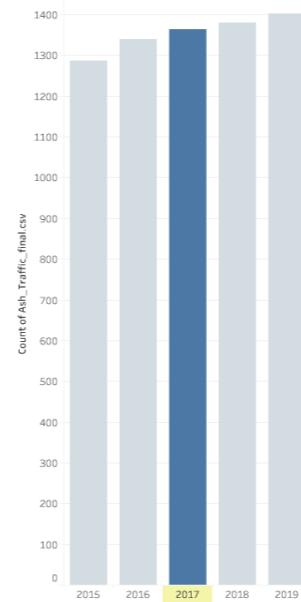


Brood 5 emerged in
Garrett County, MD and in a handful of counties in Pennsylvania.
Where we **again** don't see any suggestion that the presence of cicadas impacted traffic.

Asheville, North Carolina

Brood VII 2017

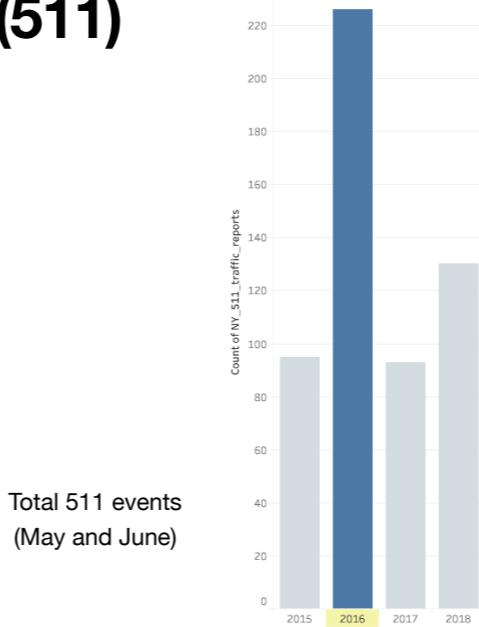
Total Accidents
(May and June)



In the city of Asheville, we also don't see anything abnormal during brood 7 in 2017.

Suffolk County, NY (511)

Brood V 2016



Now, I want to call out Suffolk County separately here.

For Suffolk county, I obtained 511 data, which is a transportation hotline which includes data beyond accidents. ‘debris spill,’ ‘delays’, and stop and go traffic’ I excluded data related to rail roads, special events, and construction **because they are not personal vehicles, and they are planned events. My investigation is focused on unplanned incidents.**

Here, we really do see a difference in the level of traffic-related activity during the cicada year.

Traffic Accidents + 511 cicada relationship scorecard

Tennessee Counties
Brood XXIII 2015



Pennsylvania Counties
Brood V 2016



Garrett County, MD
Brood V 2016



Suffolk County, NY (511)
Brood V 2016



Asheville, NC
Brood VI 2017



Here is the sum up of relationships for traffic accidents and cicadas.
We only see a correlation when looking at the 511 data for Suffolk County

Findings and further research

- No obvious suggestion of changes in human behavior, based on the data I collected



All said and done, while cicadas present an opportunity for temporary changes in human behavior, the data that I found does not suggest that this actually happens overall.

Findings and further research

- No obvious suggestion of changes in human behavior, based on the data I collected



- Look at more 511 data
- Normalize crime, citations, and 311 request types across locales in order to view on a larger scale
- Consider variations in brood density in different counties, and urban vs. rural locations

If this project were to be revisited in the future, my suggestions are to

- Get more data (especially 511 data since that looked the most promising)
- Normalize the labelling of request and crime types across locales in order to get a broader view of potential impact, and maybe more interesting visualizations
- Consider variations in how dense an emergence is in a given county. When I was collecting data, if there was a confirmed cicada sighting in a given county from the UCONN maps, it got added to the list regardless if there was one sighting or many.
- It's also tempting to think that emergences are different in **urban versus rural settings** and finding a way to consider that could be useful too.

More location data supported by citizen scientists will definitely help our knowledge about that progress.

References + Data Sources

Maps

1. Liebhold, A. M., Bohne, M. J., and R. L. Lilja. 2013. Active Periodical Cicada Broods of the United States. USDA Forest Service Northern Research Station, Northeastern Area State and Private Forestry.
2. cicadas.uconn.edu

311 and City Service requests

1. Kansas City: <https://data.kcmo.org/311/311-Call-Center-Service-Requests-2007-March-2021/7at3-sxhp>
2. Pittsburgh: <https://data.wprdc.org/dataset/311-data>
3. https://data.syrgov.net/datasets/0aa5fcf76dbd4f2cabf2aeb1ddd0179e_0/about

Citations and Crime

1. Asheville: https://data-avl.opendata.arcgis.com/datasets/05af48ba4caf43499a37f348abb98a66_0/explore
2. New York Counties: <https://data.ny.gov/Public-Safety/Index-Crimes-by-County-and-Agency-Beginning-1990/ca8h-8gjz>
3. Pittsburgh: <https://data.wprdc.org/dataset/non-traffic-citations>

Traffic Accidents and 511

1. Asheville: https://data-avl.opendata.arcgis.com/datasets/05af48ba4caf43499a37f348abb98a66_0/explore
2. Maryland Counties: <https://opendata.maryland.gov/Public-Safety/Maryland-Statewide-Vehicle-Crashes/65du-s3qu>
3. New York Counties: <https://catalog.data.gov/nl/dataset/511-ny-events-beginning-2010>
4. Tennessee Counties: https://www.tn.gov/content/dam/tn/safety/documents/crash_stats/month_04132021.pdf