The Energy Examiner

CIRCULATION
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Syracuse University

TESSLYN KNAPP
IST 719 Information Visualization

Cyber Squirrels: Masters of Mischief

Summary

Animals have been causing power outages and affecting millions of people around the globe for decades. Power outages often result when animals chew through cords or find their way to a transformer or substation, which is often deadly for the animal. Birds can also produce waste from building their nests which can accumulate on power lines or insulators. This issue aims to understand which animals are the most common mischief culprits to target animal-specific technology to prevent future power outages.

Audience

This issue may be of interest to energy development companies and engineers in their endeavors to develop animal-preventative technology to avoid future animal-caused power outages. Additionally, our casual readers may also enjoy our tongue-in-cheek approach to painting the bleak picture of fragility of our electrical transmission infrastructure.

About the Data

The dataset contains the raw data of all animal-caused power outages around the globe recorded by Space Rogue, a security research think tank that cataloged each occurrence. The raw dataset contained data from 1937-2020 with 2,578 rows and 15 columns. The bulk of the dataset was focused within the United States, so only US data was kept and analyzed. After cleaning out some unnecessary columns and data inconsistencies, the final dataset contained 2,006 rows and 16 columns.

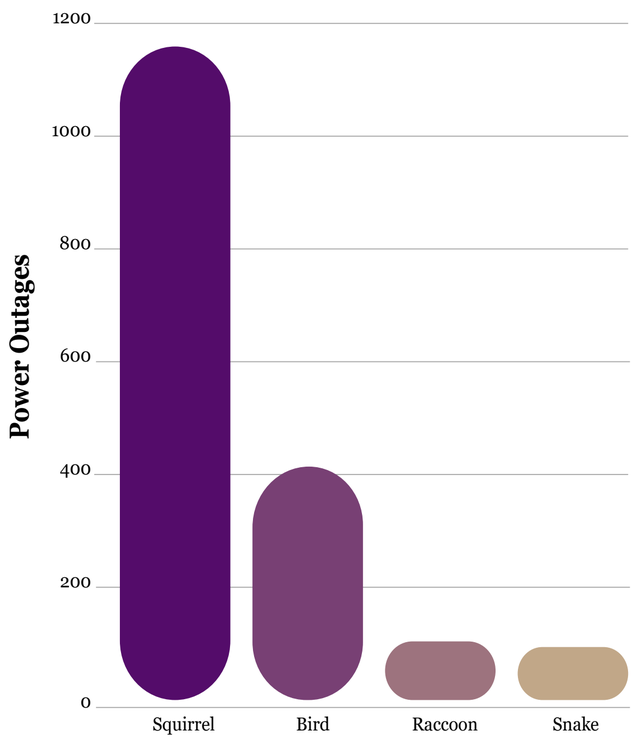
Questions

This issue will answer the following questions:
1) Which animals wreak the most havoc among power outage occurrences in the US?
2) How do animal-caused power outages differ by US state?
3) How have animal-caused power outages changed over time?

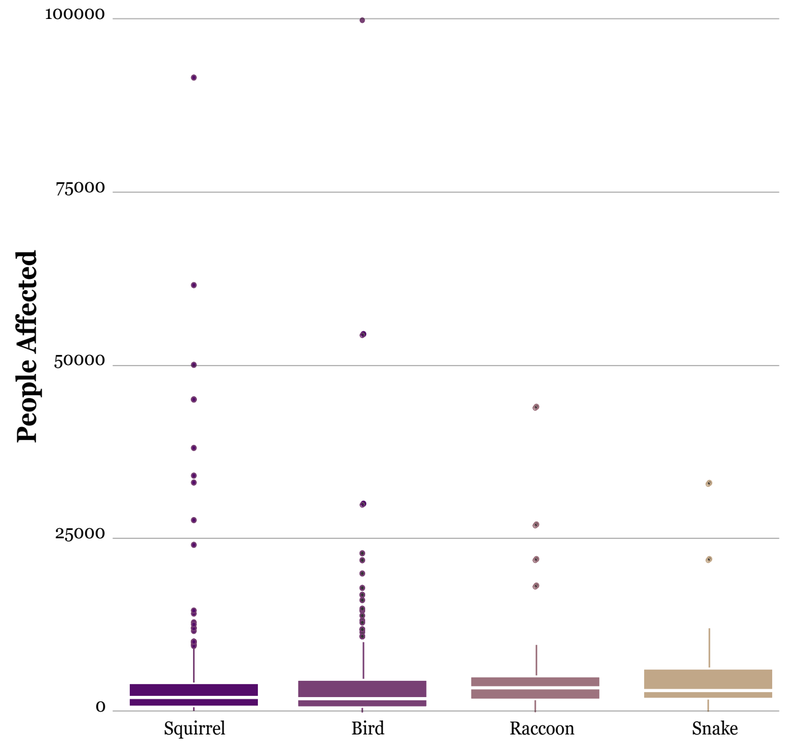
Data Source: CyberSquirrel1.xlsx (https://archive.org/details/cybersquirrel1)
R Packages: dplyr, stringr, ggplot2, maps, mapproj, plotrix, ggthemes, lubridate, wordcloud, RColorBrewer, tm

ANIMAL ANGST? RISE OF THE RODENT REVOLUTION

Power Outage Occurrences by Animal



Number of People Affected by Animal



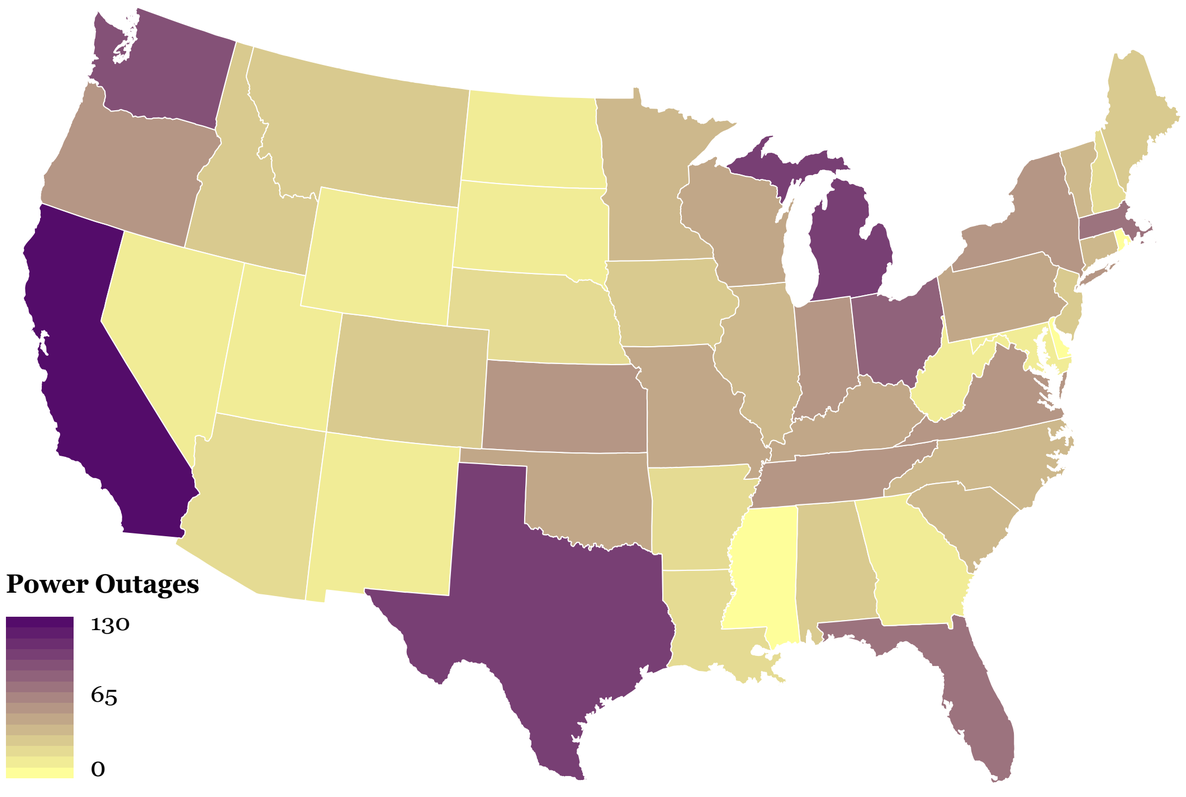
Above:
These plots indicate that squirrels cause the greatest number of power outages within the United States by a great margin (almost 3x as often as birds, the next biggest power outage culprit). However, it does not appear that the number of people affected by power outages differs from animal to animal. This suggests that development should focus on squirrel-proof technology to reduce overall animal-caused power outages.

Left:
This plot displays the number of animal-caused power outage occurrences broken down by state. There are quite a few differences among power outage occurrences by each state. California, Texas, Michigan, Washington, Ohio, and Connecticut appear to experience the greatest numbers of animal-caused power outages within the continental United States.

Right:
Wanted for the destruction of public and private property. Last seen burying and forgetting the locations of nuts - can also be coaxed with human food. Please report any sightings or capture to (555) 555-5555.

FOREST CRITTERS AID CALIFORNIA WILDFIRE PREVENTION EFFORTS

Animal-Caused Power Outage Occurrences by US State

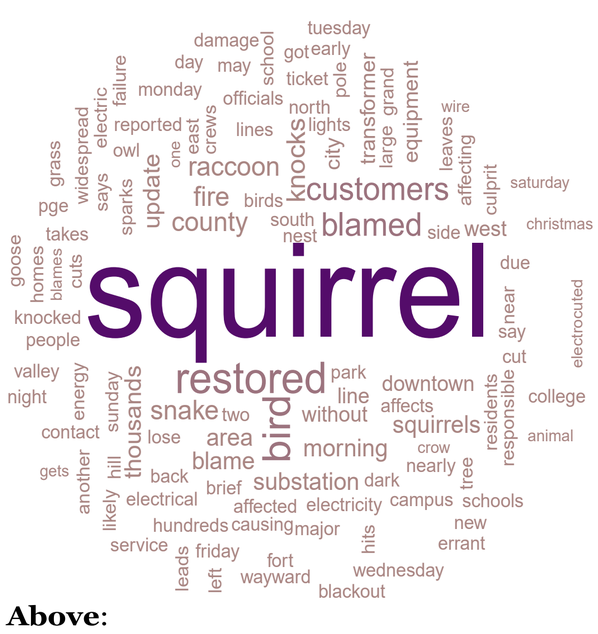


MOST WANTED

ALIVE

REWARD: Good Karma

News Article Word Cloud



Above:
The word cloud above sourced from power outage news article titles further indicates the skew in squirrel-caused power outages as opposed to other animals. The word “restored” is also a fairly common word found in the news articles, which is possibly a good indicator that many of these occurrences have been resolved.

Right:
This plot shows the changes in animal-caused power outage occurrences over time broken down by animal. The data was subsetted to start at 2004 to improve visability. There appears to be a trend of increasing animal-caused power outages over time starting in 2012, with squirrels and birds causing the largest increase in power outage occurrences in recent years.

CONCLUSIONS:
This issue aimed to focus on breaking down animal-caused power outage occurrences throughout the US. Overall, squirrels are by far the biggest contributors to animal-caused power outages in the United States. California, Texas, and Michigan experience the largest numbers of occurrences and animal-caused power outages seem to be increasing over time. Ideally, resources could be allocated to improve squirrel-resistant energy technology in the United States.

Animal-Caused Power Outage Occurrences Over Time