Thomas Clay Kynor and Dalit Hendel
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DATA 220: Communicating with Data
Final Project Paper

ANIMAL RESCUES IN LONDON
2009-2021

Introduction and Background:

The London Fire Brigade (LFB) attends to numerous non-fire-related emergencies each year. These emergencies are referred to as "special service" calls and often include assisting animals in distress. The data for animal-related special services is published on the London.gov website under the title *Animal rescue incidents attended by LFB* and can be freely accessed. The data used in this analysis spans the years 2009-2021 with the latter being an incomplete year ending on 5/31/2021. The dataset comprises 7544 rows and 31 columns and includes variables such as incident type, locations, and cost. The visualizations for this analysis were completed in Jupyter Notebook using Python and ArcGIS Pro.

The goal of this analysis is to provide insights into the incident patterns and spending needs of animal rescues in London. Shedding light on these patterns can hopefully lead to a reduction in both incidents and spending costs related to animal rescue. The primary audience of this analysis are the state and local elected leaders of the London Borough Council and concerned citizens.

The main focus of this analysis is three-fold: (1) examine how animal rescues have increased over time (2) examine which types of animals comprise the majority of animal rescues and (3) examine which type of animal rescue represents the biggest financial burden to the London taxpayers. Our hypotheses for these three goals were as follows: **(1)** animal rescues have increased over periods of societal instability/turmoil -such as a global pandemic or Brexit **(2)** small pets (such as household pets) will be more common and thus make up the bulk of animal rescues across all recorded time periods **(3)** rescuing animals from heights is the most expensive animal rescue category.

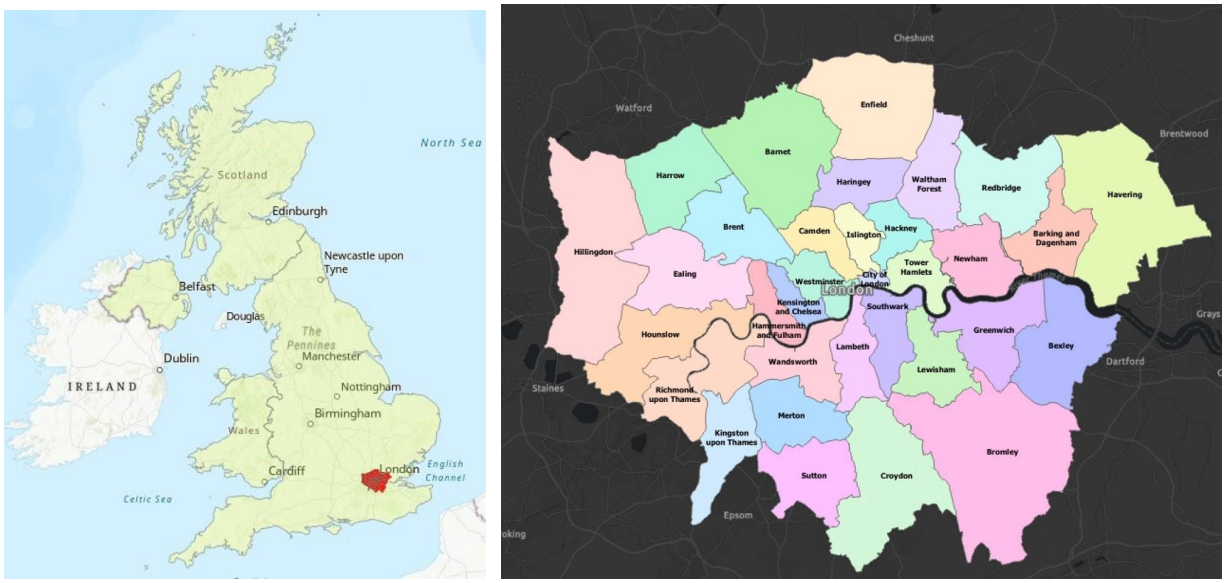
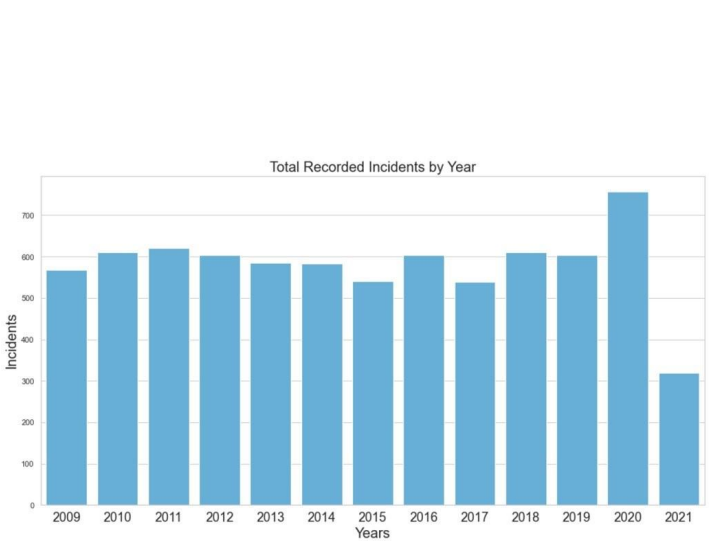


Image 1 and 2*: Map of London with the United Kingdom as reference (left). Map of the 32 boroughs of London color coded and labeled.*

Incidents Visualized:

Image 3 below displays a visualization of the total incidents of animal rescues by year. The incidents of animal rescues had a sharp increase in the year 2020, which coincides with a pandemic year. However, during 2016 which is the year that coincides with Brexit there is no significant increase in animal rescue incidents. Our prediction of societal instability was only partially supported by the data indicating that some periods of societal instability did have greater than average animal rescue incidents while other periods of societal instability had normal levels of animal rescues.



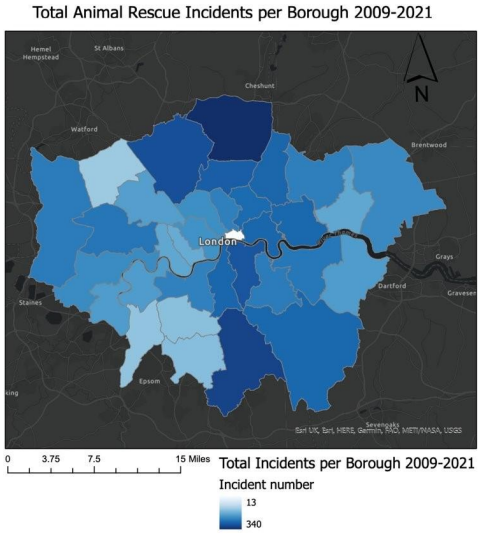


Image 3 and 4: *Bar graph displaying the total recorded animal rescues for each year (left). Map showing total incidents by London boroughs for all time periods (right).*

Incident Type Category Visualized:

As shown in Image 5, the years 2009 to 2011 had *animal rescue from height* as the animal rescue service type with the most incidents recorded. There is a shift after 2011 for which the highest animal rescue service type for the years 2012 to 2021 becomes *other animal assistance*. This is a broad category that includes every animal rescue that cannot be categorized as from a height, from water, or from below ground. Also of note, *animal rescue from water* had the lowest incident for all time periods recorded. For more details on animal rescue categories see Images 6-9 displaying the subcategories for each animal rescue type.

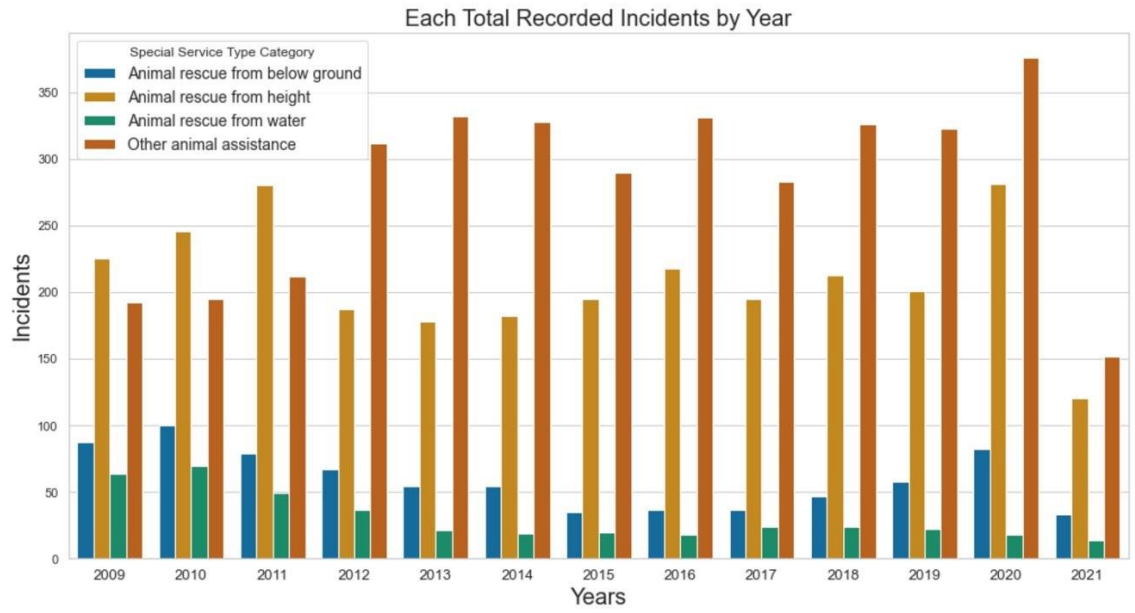


Image 5: *Bar graph displaying animal rescue service type totals by year. The color pallet used is the standard colorblind friendly pallet included with python titled 'colorblind'.*

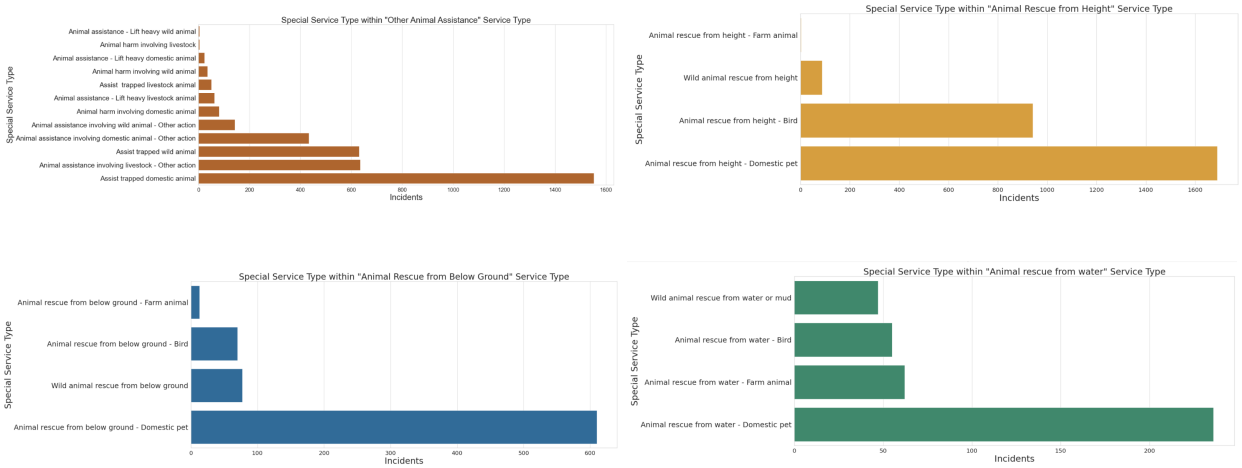


Image 6, 7, 8, and 9: *Display the total incidents for the sub-categories within the four animal rescue category types.*

Animals in Need of the Most Rescue:

The top five animals in need of the most rescue were, as shown in Image 10, cats, birds, dogs, foxes, and horses. Cats needed the most rescue from *heights* (with 1484 height rescues recorded). Birds needed the most rescue from *heights* (with 936 height rescues recorded). Dogs needed the most rescue from being *trapped* (with 409 trapped rescues recorded under other animal assistance). Foxes needed the most rescue from *heights* (with 159 height rescues recorded). Horses needed the most rescue from being *trapped* (with 159 trapped rescues recorded under other animal assistance). As predicted in our second hypothesis, domestic animals such as pets (cats in particular) make up the majority of animal rescues (Image 10-11).

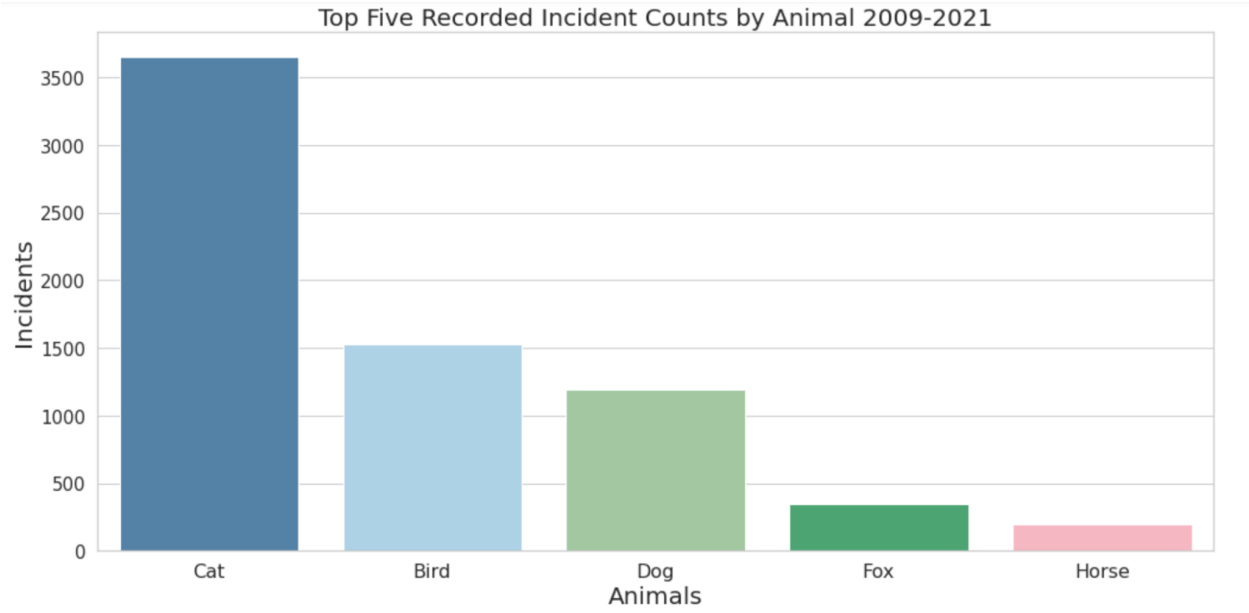


Image 10: *Displays the top five animals needing the most rescue from the years 2009-2021. The color pallet used is a variant of the colorblind friendly pallet included with python titled 'Paired'.*

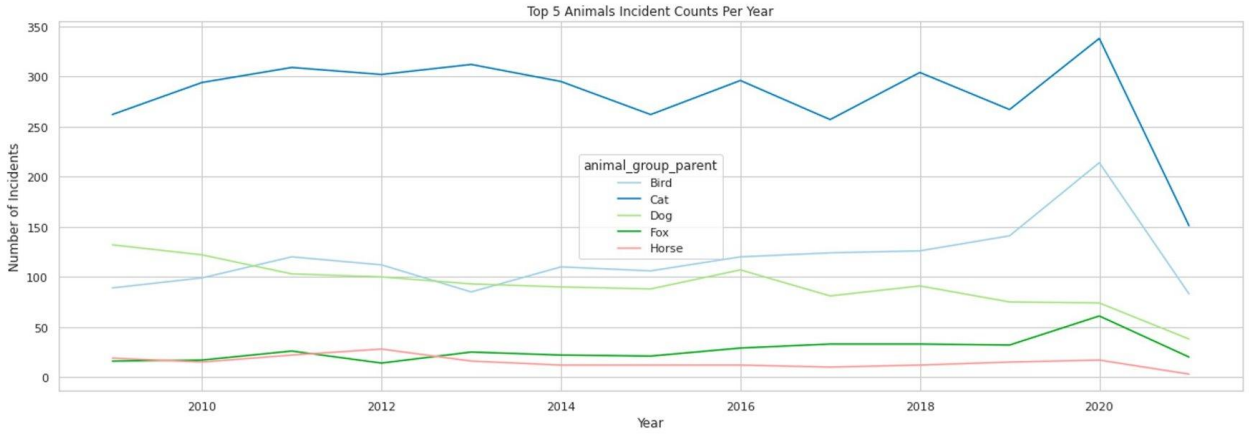


Image 11: *Displays the top five most rescued animals for each year.*

In Image 11, there is a spike in all animal rescues (except for dogs) during 2020 indicating support for our first hypothesis that animal rescues have increased during social instability. In this case, a time where people are isolating in homes due to a global pandemic and possibly paying more attention to animals.

We can see in Image 12, that this drastic increase of total reports was almost completely due to the steep rise in non-domestic animal cases in 2020 (while looking at all of the animal types instead of just the top 5 reported groups). Additionally, since 2009 the number of domestic calls to animal services in London seems to remain somewhat constant, fluctuating at around 400 calls each year whereas the number of calls for non-domestic animals increased by 92 incidents in 2020 compared to the previous year. This

intuitively makes sense as throughout London many spent much more time isolating themselves at home in 2020, perhaps paying more attention to animals outside as more non-domestic animals explored more into the city while the streets were empty. The London pandemic lockdown data supports these aforementioned claims as a United Kingdom national lockdown was introduced on March 23, 2020 and lifted in May as well as lockdowns in winter of 2020 due to surging cases (*Timeline-lockdown-social*).

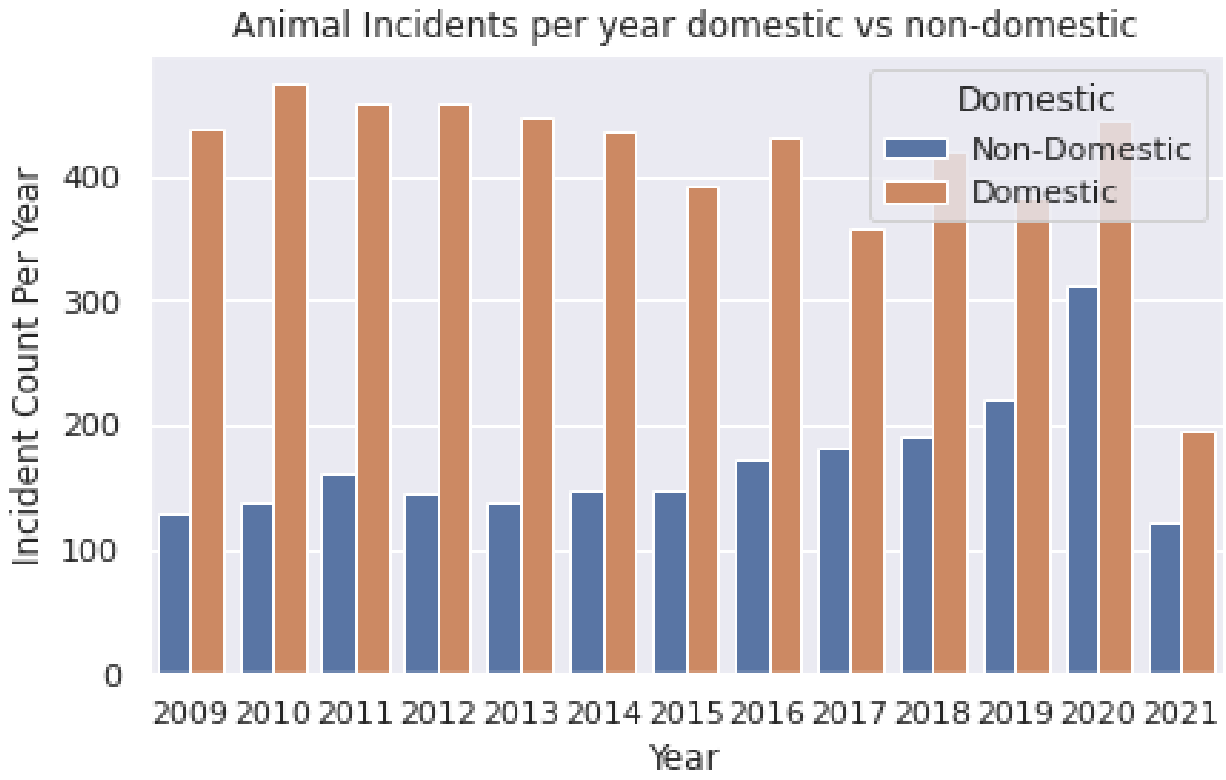


Image 12: *Displays the incidents per year for domenstic and non-domestic animal rescues.*

The data set did not include a boolean indicating Domestic vs. Non-Domestic animals in our dataset. We created our own categorical variable by classifying all domestic animals involved in each incident, including livestock (i.e. Dog, Cat, Hamster, Horse or Cow) and other animals (i.e. squirrels, foxes, deer, pigeons) as non-domestic. The recent climb in numbers of non-domestic animal rescues supports the need for increased resources targeted toward non-domestic animal rescues. In addition, even though the 2021 data is incomplete the ratio between total non-domestic and domestic animal incidents is more similar to 2020's ratio than the past decade, thus emphasizing the potential for a high non-domestic incident count despite the incomplete 2021 data.

Cost Analysis:

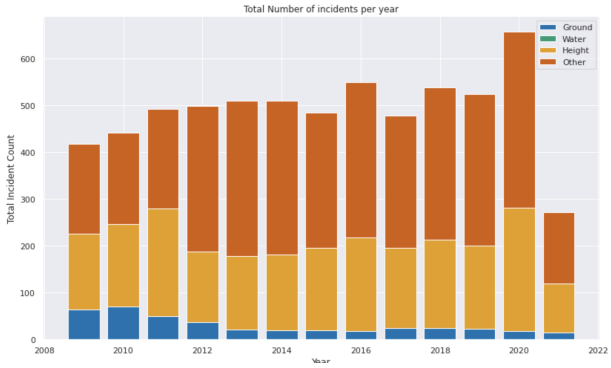


Image 13: *Count of Incident Type by year*

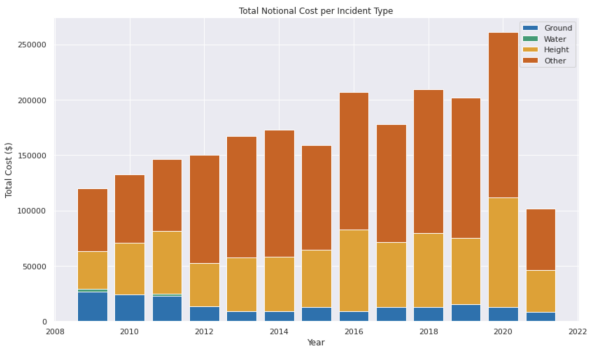


Image 14: *Cost per Incident Type by Year*

Images 13 and 14 show a clear correlation between the costs of each type of incident as they all seem to echo the incident numbers per year (meaning that each incident type costs relatively the same amount). Another interesting trend can be found from these visualizations, as Image 13 shows, is an increase in total incidents. There is a 33.27% increase in total incidents from 2009 compared to 2020. Similarly, Image 14 shows the total costs of all incidents per year as they have risen 73.2% from 2009 compared to 2020.

After seeing the lack of water rescues in our incident stacked bar graph (Image 13 - green bars) and the financial stack bar (Image 14 - green bars) showing only as slight slivers in the years 2009 and 2011, our interest was sparked in financial cost per service type. We found that despite water incidents being so few, on average the cost of water incidents are more than 40% higher than the cost of an average non-water rescue making it the least common but also the most expensive type of rescue. Out of the five most expensive animal rescue incidents in London from 2009-2020, three of them involved horses falling into bodies of water. Upon further examination, this appears to be a common occurrence in cities throughout the world with thousands of news articles reporting on horses falling in pools. One piece of actionability that can come from this insight would be finding a more cost effective way of rescuing horses from these bodies of water since these rescues last at least ten hours. Additionally, preventative measures like putting fences up throughout London could help limit these expensive outlier incidents.

These findings disprove our third hypothesis as per incident *water rescues* were the most expensive category and collectively the *other animal rescue* category comprised the majority of spending each year (see Images 13-14). This makes *rescues from height* neither the most expensive incident per rescue type category nor the greatest cumulative cost per year.

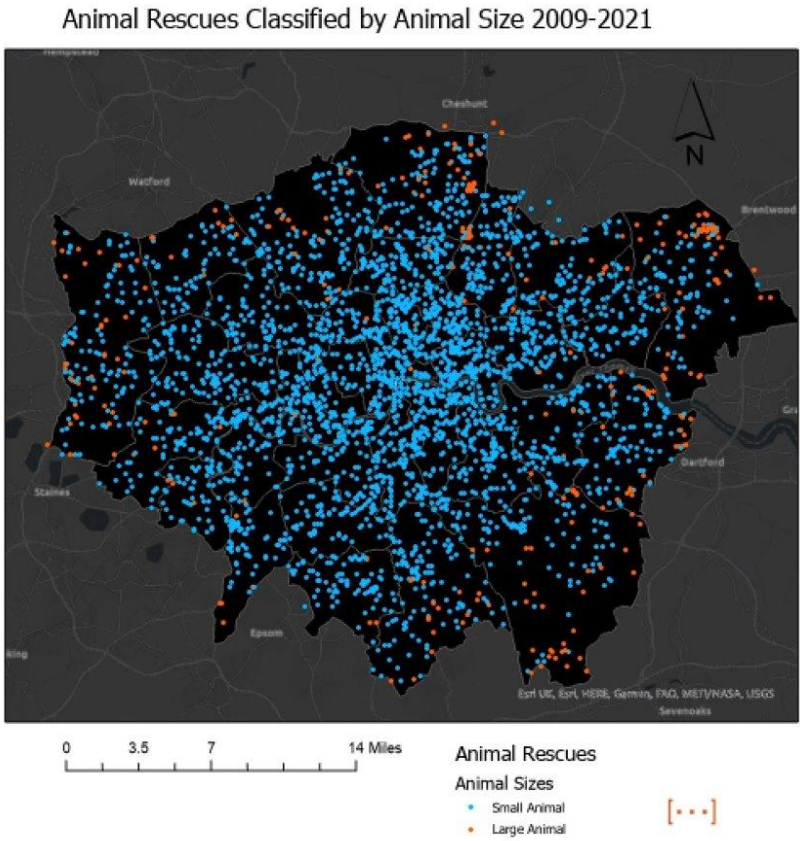


Image 15: *Displays the location for all animal rescues in London from 2009 to 2021. Animal rescues of small animals are shown in blue while animal rescues for large animals are shown in orange.*

The figure above, Image 15, shows the location of large and small animal rescues throughout the recorded decade. We found through this point data visualization that the majority of rescues were for small animals like cats, dogs, or hamsters whereas the large animal incidents are fewer and occured mostly around the outskirts of London. This intuitively makes sense as these large wild animals would be likely to draw attention and have the incident called in immediately as they entered the city, thus not allowing large animals such as a deer or a moose to reach the heart of the city.

Conclusion:

Animal rescue incidents in London divide the focus of the London Fire Brigade on non-fire related causes and cost the London Borough Council and concerned citizens enormous amounts of taxpayer money. In our analysis of London animal rescue incidents from the years 2009-2021, we aimed to shed light on trends in the data and provide actionable insights to lower the financial burden and incident frequency. We focused our analysis on three main hypotheses. Our first hypothesis questioned whether times of increased societal turmoil would result in higher than average animal rescue incidents. We found that the pandemic

exacerbated the drain on resources as not only did incident numbers dramatically rise in 2020, but the cost per incident increased by 18.22% in 2020 compared to the average from the previous decade. Our second hypothesis examined whether small household pets made up the bulk of animal-related incidents. As predicted by our second hypothesis, the majority of animal rescue incidents in London were cats, dogs, and other small domestic animals as they comprised 66.7% of all incidents from 2009-2020. Due to the evidence supporting our second hypothesis one actionable insight we recommend is to target certain high incident boroughs about proper pet safety. Any reduction in the number of yearly incidents would be financially beneficial to citizens of London, especially since in 2020 the number of incidents were 28.8% higher than the average of each year in the previous decade from 2009-2019. Our third hypothesis examined whether *animal rescues from heights* would be the most expensive animal rescue category. Our third hypothesis was proven wrong. We found that *other animal rescues* was the most common animal rescue category thus making up the highest cost and that *animal rescues from water* was the most expensive animal rescue per individual incident. Due to the evidence negating our third hypothesis one actionable insight we recommend is to implement preventative measures, such as putting up fences around bodies of water, to minimize these infrequent yet costly animal rescues from water. Overall, we found several actionable insights from analyzing this data set and hope to help ease the London Borough Council, London taxpayers, and LFB from the opportunity cost and financial burden of animal rescues, which have been on the rise in recent years.

Works Cited:

(2021). Animal Rescue Incidents Attended by LFB (London Fire Brigade) [Data set]. London Data Store.

Seaborn.pydata.org - API Reference sheets for distribution and categorical plots.

Timeline-lockdown-social - the institute for government. (n.d.). Retrieved May 13, 2022, from https://www.instituteforgovernment.org.uk/sites/default/files/timeline-lockdown-web.pdf