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Introduction

- Examining climate change and the increased frequency and strength of storms throughout the world, while learning how to mitigate and adapt to the negative effects that result is important
- This study investigated the frequency, location, and socioeconomic effects of street flooding in New York City (NYC).
- The study focused on occurrences of street flooding and catch basin clogs in order to determine the most vulnerable areas within the boroughs of NYC. Flooding during Hurricanes Irene in 2011 and Sandy in 2012 were the focal points of our research.
- A better understanding of how storms affect transportation such as the subway, and the welfare of the people in New York City will be developed.
- The results will show how different parts of NYC deal with street flooding. The results will also give us insight as to what the causes of street flooding are in the boroughs. Performing such research provides the opportunity to properly adapt to a crises like Irene or Sandy, as we will be able to strengthen certain areas of NYC that require better infrastructure.
- Looking at how hurricanes affect NYC socioeconomically is very important to know in order to adapt to storms such as Hurricane Sandy.



Chayes, M. (2015, June 28). NYC challenges new federal flood maps. Retrieved August 5, 2019, from <https://www.amny.com/news/nyc-challenges-new-federal-flood-maps-1.10587040>

Research Objectives

- Identify which boroughs, neighborhoods, and communities are more prone to street flooding and catch basin clogs.
- Understand how hurricanes of difference characteristics affect different parts of the city.
- Build a better understanding of the causes of street flooding in NYC boroughs.

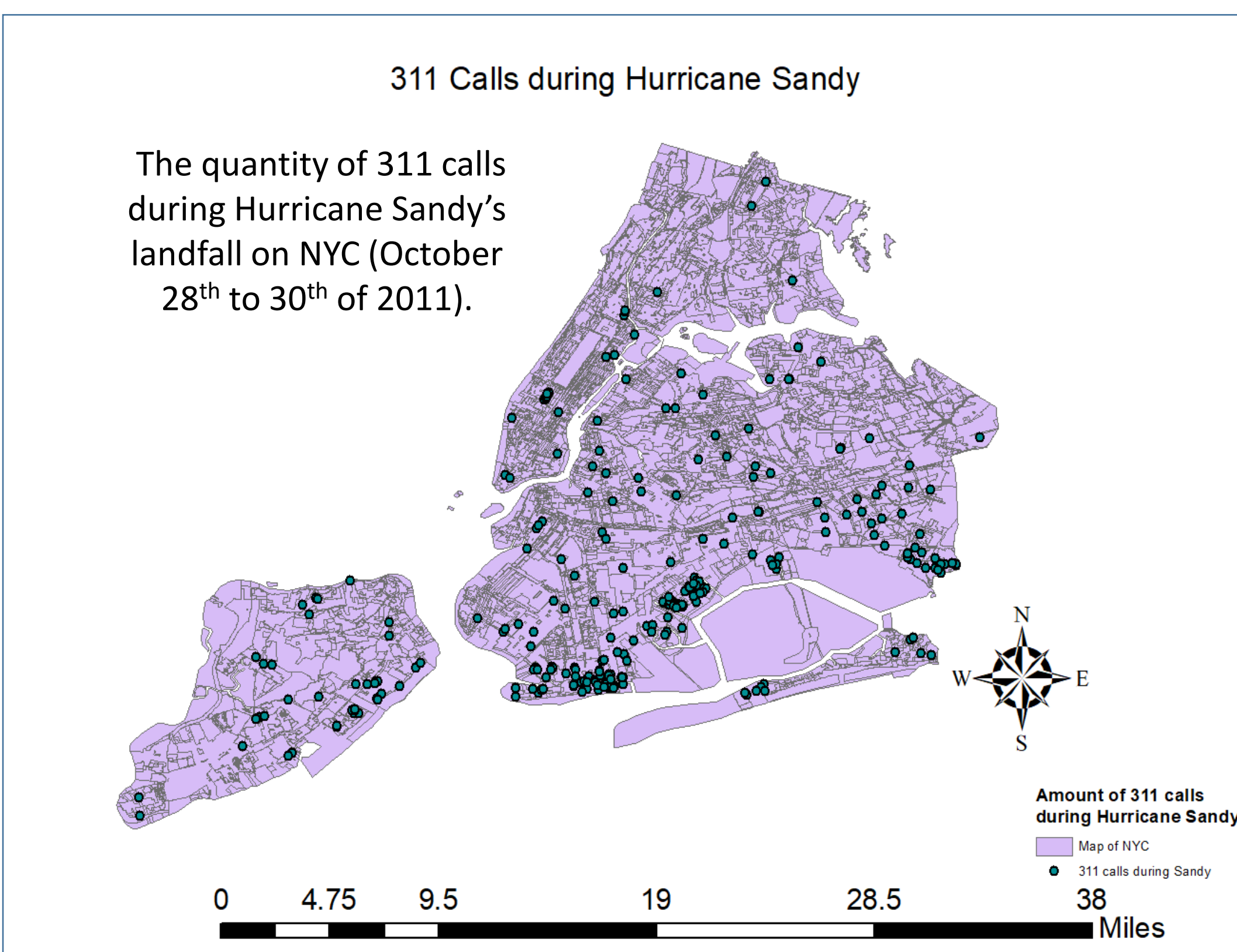
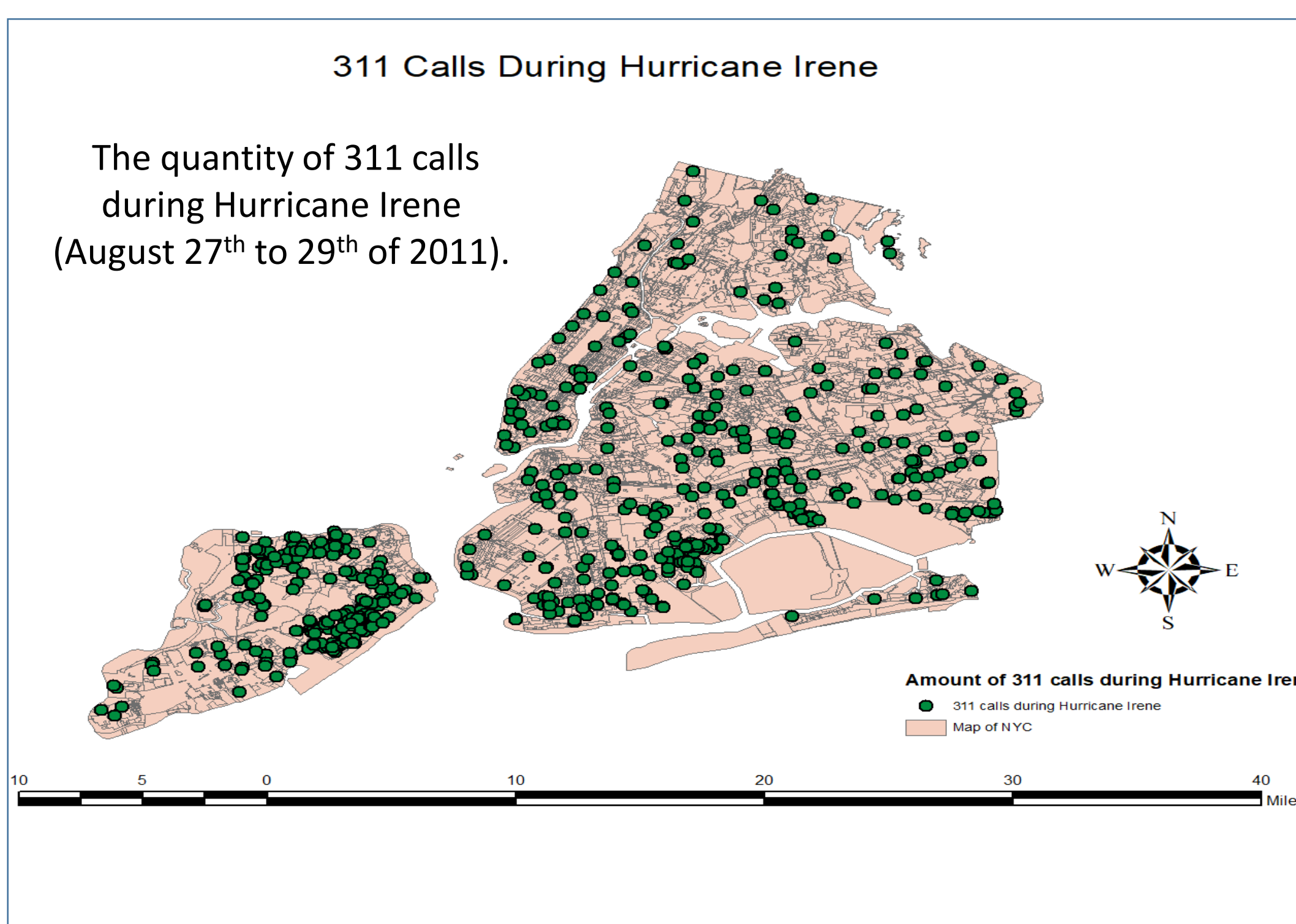
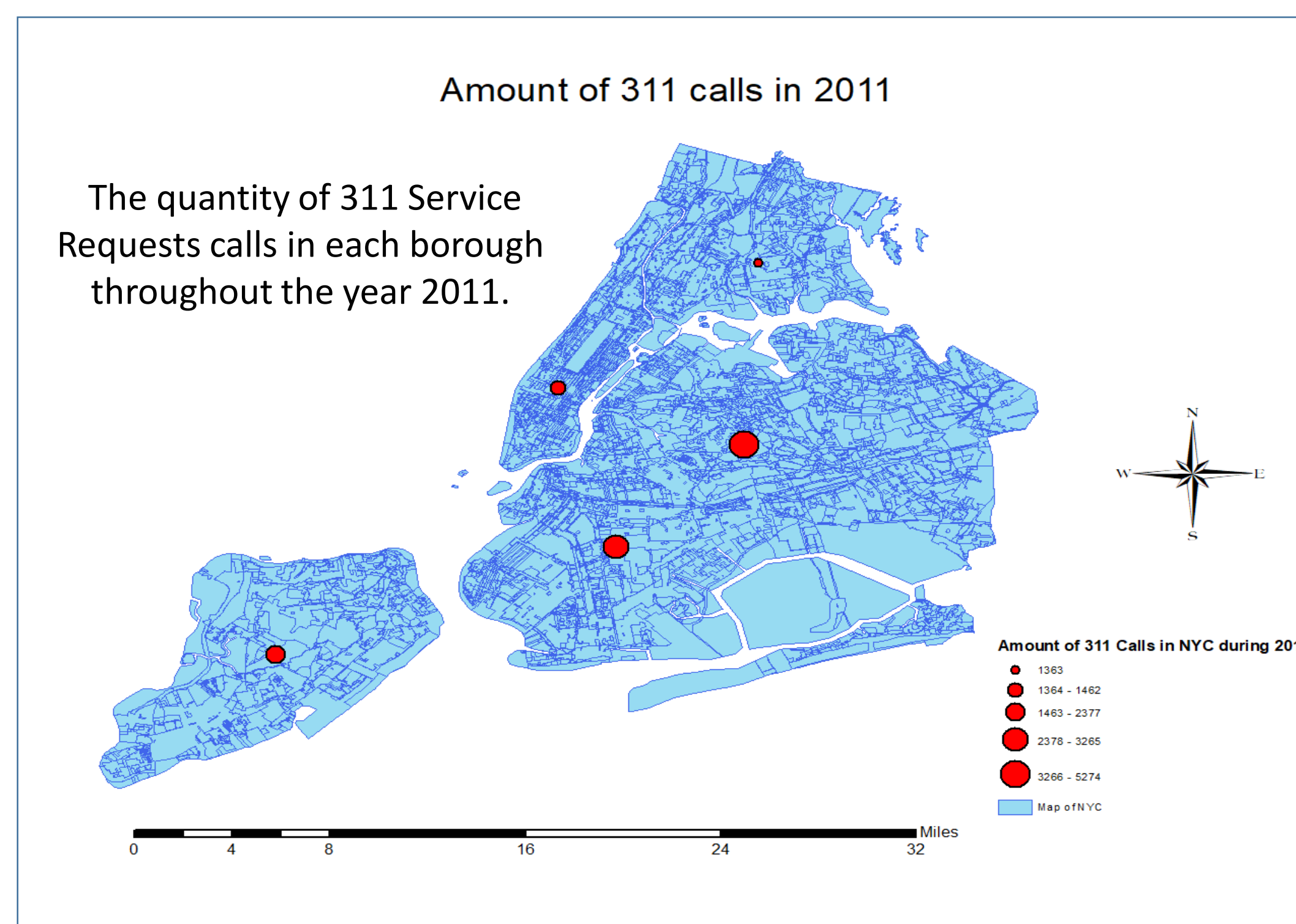
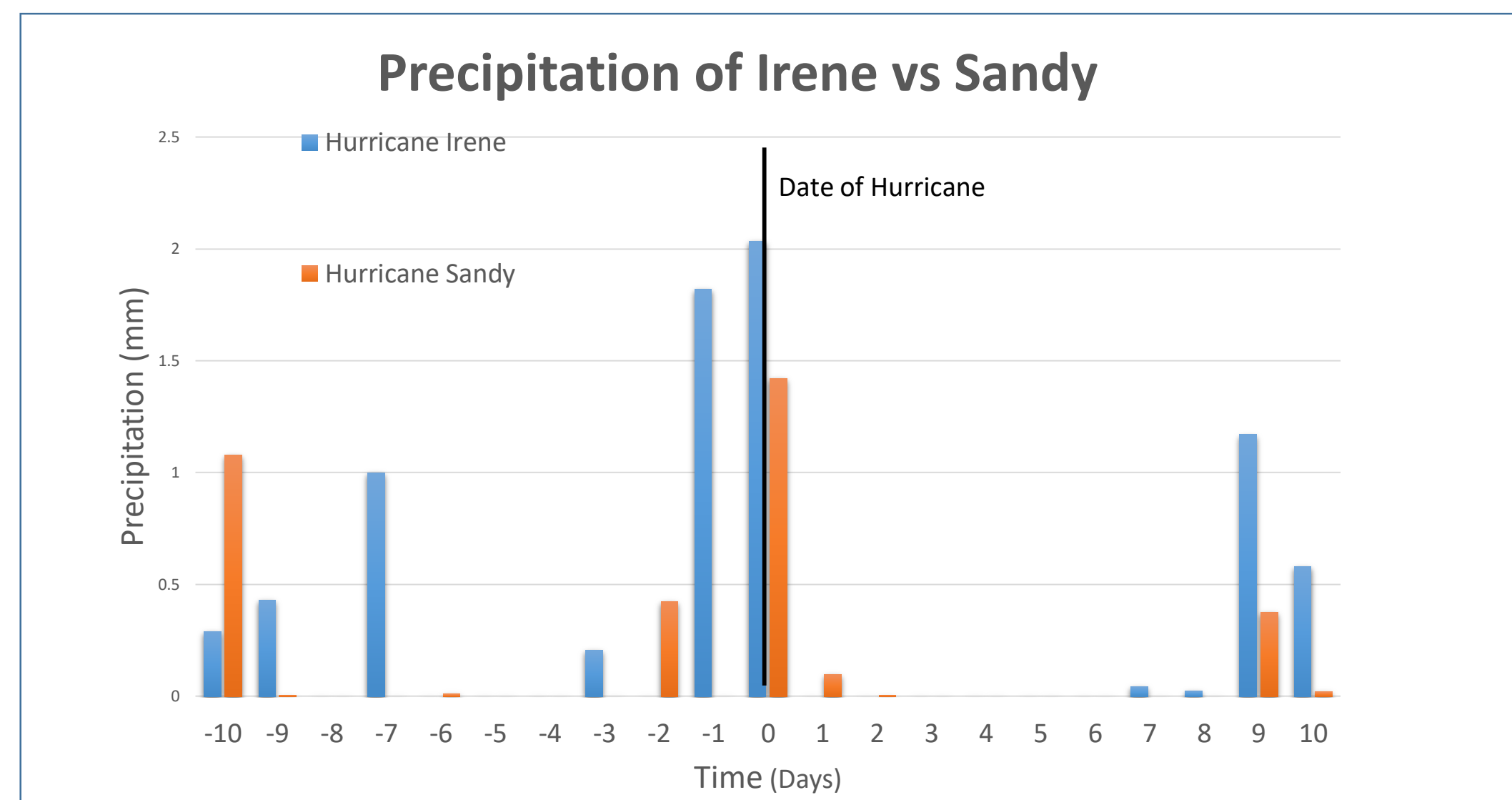
Motivations for the Study

- The results of this project will help New York City to prepare for the next major hurricane event, as NYC is a coastal city and may have to cope with bigger storm surges in the future
- This project will be able to locate places that are hit the hardest and tell people where they need to strengthen infrastructure in NYC.
- We need to find out which and why areas are flooding, as New York City is going to have to deal with bigger Hurricanes and flooding in the future due to climate change. By 2030 it is predicted that we will have storm surges like Sandy every five years.

Methods

- Performed a literature review on street floods within the NYC boroughs and Hurricane Irene and Sandy
- Collected data from the National Climatic Data Center's (NCDC) three NYC weather stations and the NYC Open Data Center on daily precipitation and 311 Service Request calls
- Organized the data using data filtering techniques in Excel and RStudio
- Performed statistical analyses within RStudio in order to compare the impacts of both Hurricane Irene and Sandy
- Spatially analyzed this filtered data with ArcGIS
- Identified trends and areas in which flooding occurs the most in their respective conditions

Precipitation and Flooding in NYC



Results

- As a result of processing our data we found that 3.9% of the data in 2011 was not available and 3.1% of the data in 2012 was also not available.
- New York City is heavily affected by major hurricane events both during and after them.
- This is because of the flooding that the hurricane events cause within the city.
- The areas of the city most affected by this flooding are the low-income areas. The infrastructure is very old and outdated there which makes it so the infrastructure does almost nothing to help the people and building of those areas.
- Hurricanes with large storm surges also have much greater effects on the buildings.

Conclusions

- There was more precipitation and flooding in Irene but Sandy caused more damage. This may be because the areas Sandy hit were different from Irene. Another factor could be that the larger storm surges of Sandy made it so Sandy caused major flooding in more concentrated areas and caused more damage to buildings compared to Irene.
- Queens was the most vulnerable borough with up to 5274 calls made to 311 during 2011. The Bronx was the least vulnerable borough with only 1363 calls made to 311. These differences may be because the Bronx is inland and Queens is not. Queens also has aging infrastructure that may lead to more flooding.
- Sandy was also more condensed than Irene which meant it caused more damage to the places it hit.

Future Work

- Evaluate which neighborhoods and/or communities present infrastructure issues or neglect.
- Investigate areas needs attentions using the data to adapt to prevent damage in the future.
- Determine the social and economical implications of such neglect.
- Continue to research to better understand why street flooding occurs.
- Find out how people with socio-economically differences deal with flooding differently.

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