



# Hurricane Harvey: Spatial Analysis Using Twitter

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## Introduction:

Hurricane Harvey is considered by many to be the first major storm of the social media age (Time 2017). For many in the path of the storm, emergency services, such as 911, were down; responders were overwhelmed due to the numerous amount of calls made during that time. Many victims of the storm resorted to Twitter in order to request emergency services, which created real time information about locations of victims, locations of shelters, and number of victims. For the first time, people resorted to social media as a means of rescue, a phenomena which is spatially interesting to map out and analyze.

## Research Questions:



- Does social media have a role in future large scale disaster response?
- Were volunteer rescue centers advertised on Twitter accessible to those who needed rescuing?
- Can Twitter data help to map out the temporal extent of the flood?
- Do rescue requests made on Twitter correlate with the actual/ground truth rescues?

## Methods:



Use Crimson Hexagon to extract twitter data from August 23, 2017-September 2, 2017 using the Boolean Query.



Extract data information from Crimson Hexagon:

- User contents
- Home addresses
- Time, dates



Categorized the data in the following:

- Rescue request: 503
- Volunteer Aid: 86
- Other: 247\*

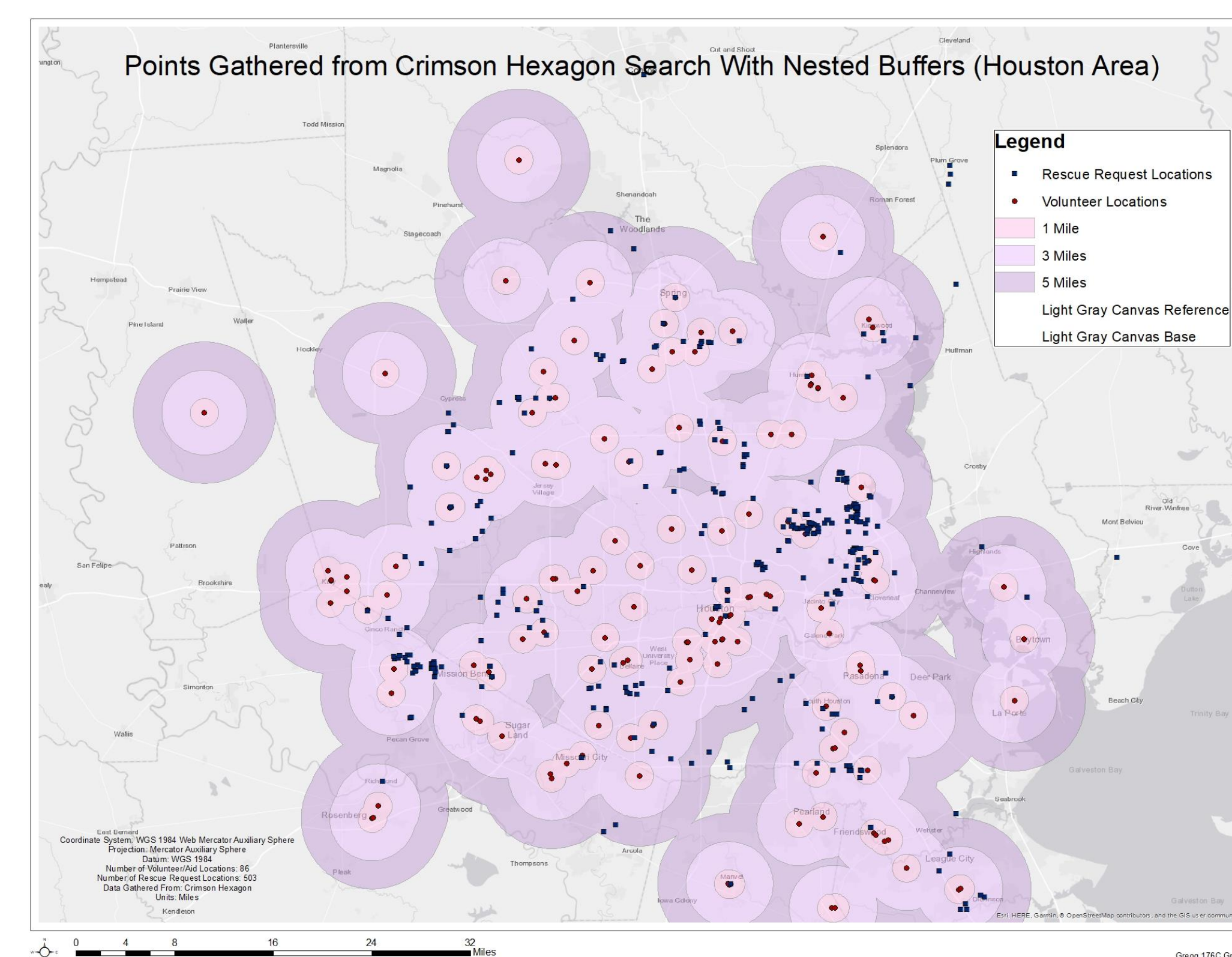


Created 3 spatial maps using the following analysis and obtain results:

- Nested buffers: 1, 3, 5 miles
- Multiple date layers in a 3-day interval
- Comparison data between the multiple volunteer master data and gathered Twitter data

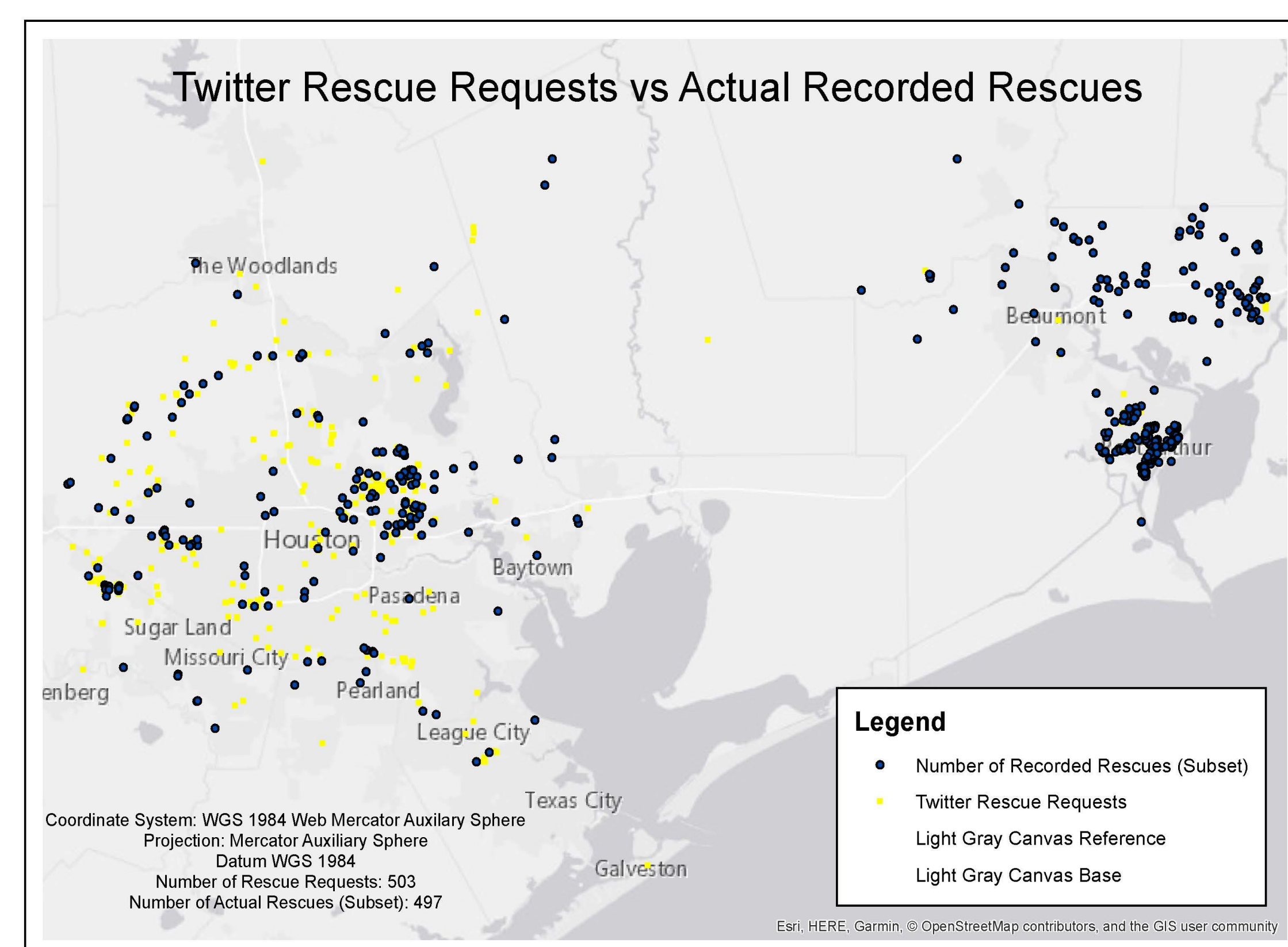
\* Not applicable to our analysis

## Results:



(1)

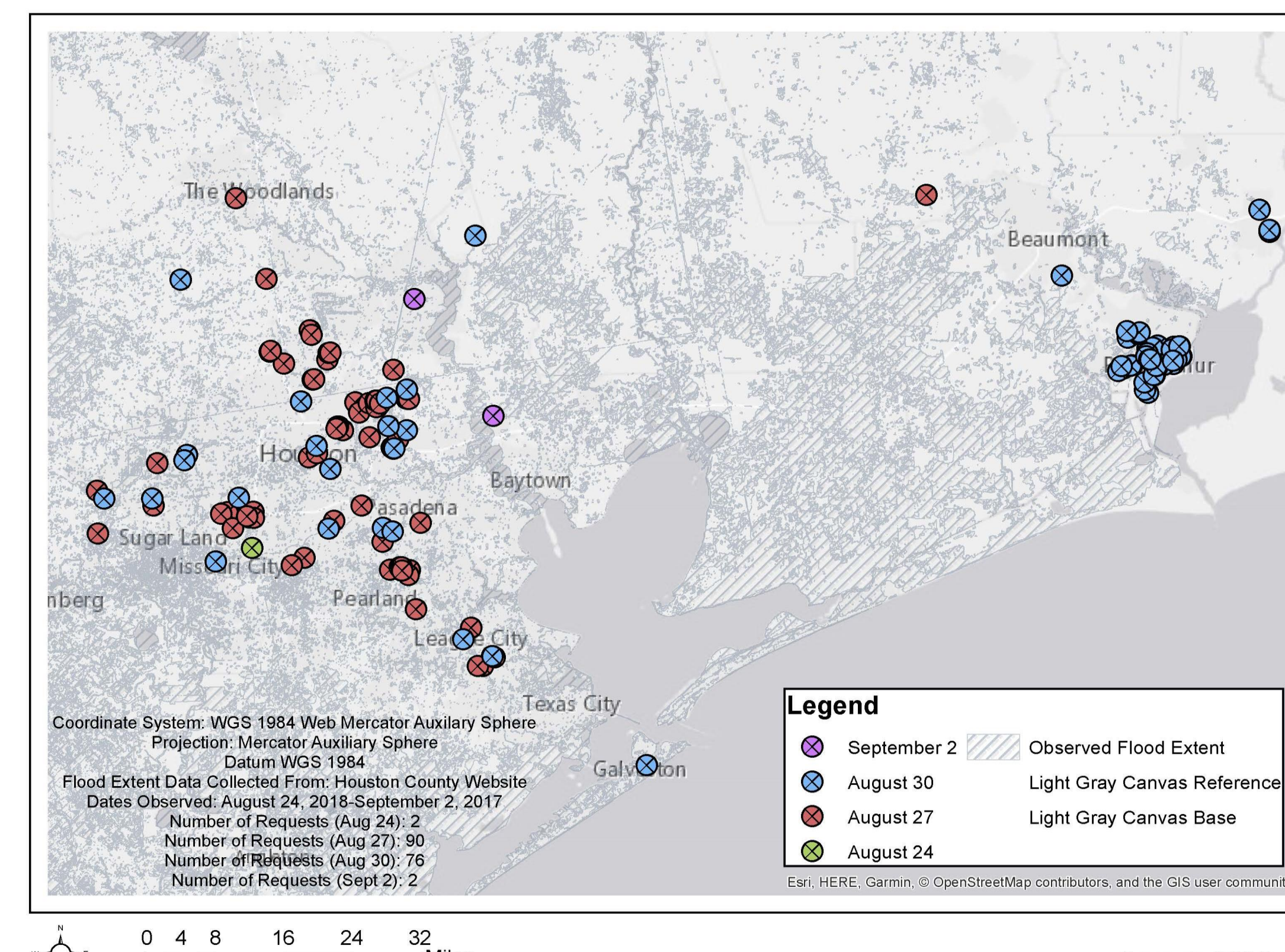
Figure 1. shows the distance volunteer sites were away from victims. The majority of twitter rescue requests were within 1, 3, or 5 miles to a volunteer site (as seen in the nested buffers). However there were some requests that were out of a reasonable range of the volunteer centers.



(3)

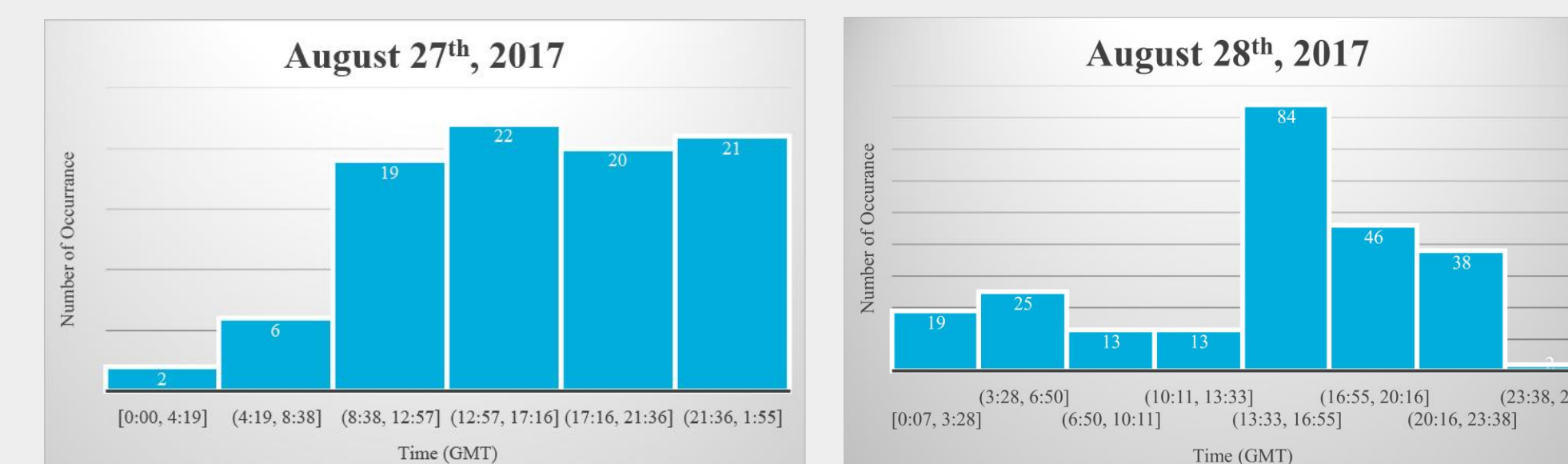
Figure 3. shows both the volunteer gathered master data found on ArcGIS online and our gathered twitter data from Crimson Hexagon. Results have shown from our comparison that 45.15% of our actual data were actually confirmed rescues from the volunteer master data.

## Rescue Request Time Extent (Full Extent)



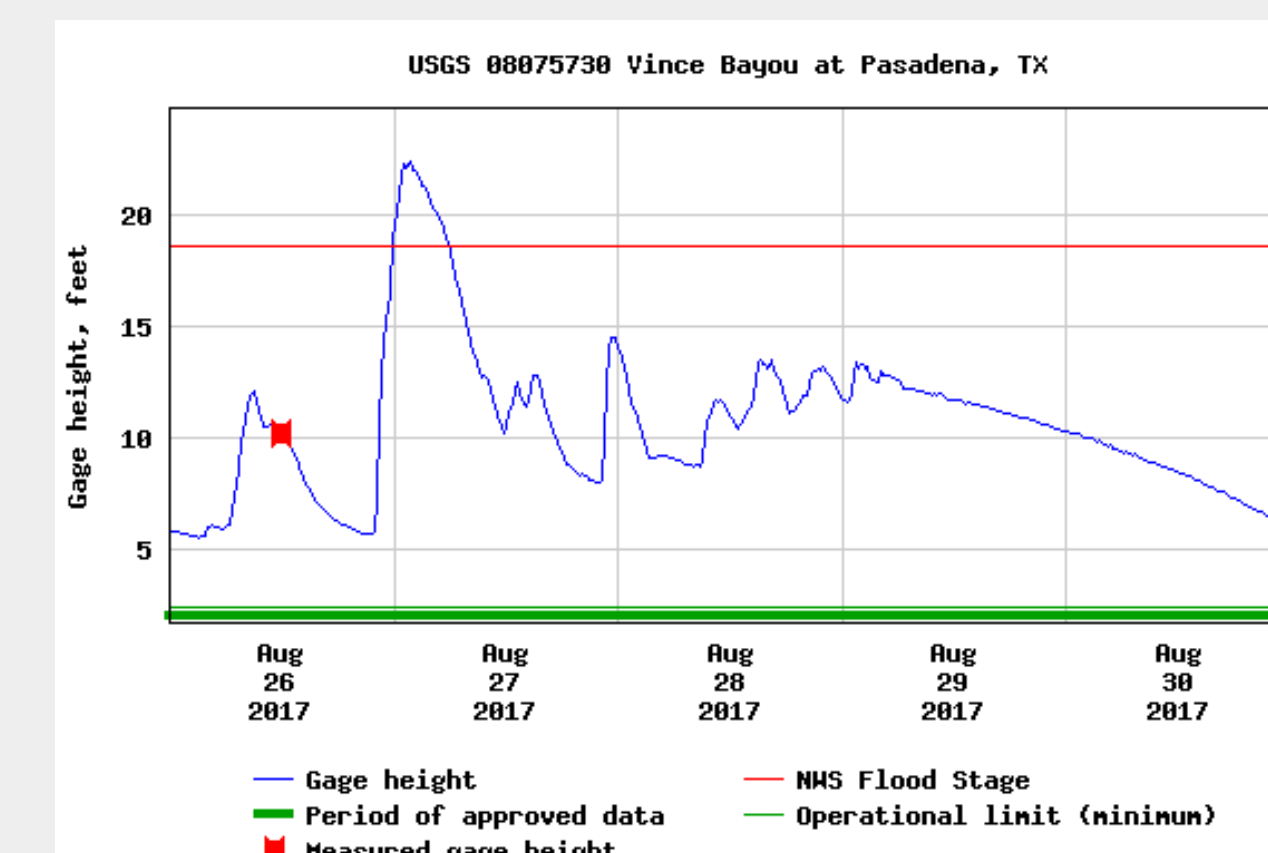
(2)

Figure 2. demonstrates a 3-day interval (August 24, 27, and 30, September 2) locating parts of Houston associated with the flood extent to avoid bias. We can see where the hurricane travel from east of Houston to the last days reaching Port Arthur. Most rescue were needed East of Houston and Port Arthur, Texas.



(2a)

(2b)



(2c)

Figure 2a and 2b. demonstrates the number of tweets on August 27th and 28th 2017 during the Hurricane Harvey event. On August 27th, a steady rate of people were asking for help until August 28th, where between 1-5pm (GMT) the most requests for help were made.

Figure 2c. is a rain gauge (USGS) displaying the amount of rain Pasadena (south of Houston) received. This corresponds to the amount of twitter requests that were made on the 27th on Figure 2.

## Conclusion:

Twitter proved to be somewhat helpful in locating victims of Hurricane Harvey. While 911 was down, people turned to Twitter in order to get help from volunteers and other locals. There was a lot of community support and comradery from this event, with users giving each other useful information and identifying potential shelters. Since social media continues to have a presence in our modern lives, we suggest that emergency responders and government officials embrace this new form of communication in order to make rescues easier. By encouraging storm victims to use designated hashtags and geolocation features, rescuing people who are trapped could become easier. Geolocated tweets are essential for finding where victims are, both in the field and when doing analyses like this. That is why it is important to promote not only using Twitter or social media in cases of emergency where 911 is down, but also to have people take advantage of geolocation on their phones.

## Future Analysis/ Suggestions:

- Looking at social media data that has geolocations already implemented
- Applying this information to the upcoming (2020) Census data in order to see the ethnic/socioeconomic conditions of the various areas
- Encouraging rescue workers and government officials to use Twitter as a resource in future natural disasters

## Acknowledgments:

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## References:

Hansen, Michele. "Six Things I Learned Building the [Harvey.Geocod.io](https://www.harveygeocod.io) Twitter Rescue Requests Map." Medium, Augmenting Humanity, 11 Sept. 2017, [medium.com/@mjwhansen/six-things-i-learned-building-the-harvey-geocod-io-twitter-rescue-requests-map-2c78127664a3](https://medium.com/@mjwhansen/six-things-i-learned-building-the-harvey-geocod-io-twitter-rescue-requests-map-2c78127664a3).

Rain Gauge Data (USGS)