

The Art of Surveillance – Data Visualizations

2:15PM EST | November 18th, 2020 | 2020 SyS Symposium

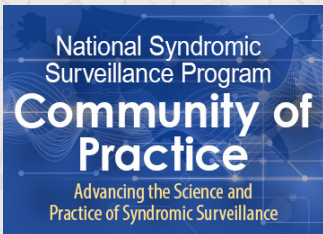
Moderated by Yushiuan Chen, MPH – Tri-County Health Department (Colorado)

Speakers:

Amanda Dylina Morse, MPH – Washington State Department of Health

MisChele Vickers, MPA – Alabama Department of Public Health

Michelle Carr, MPH & Yifang Dang, MS – Houston Health Department (Texas)



Council of State and Territorial Epidemiologists

Amanda Dylina Morse, MPH
Washington State Department of Health



MisChele Vickers, MPA
Alabama Department of Public Health



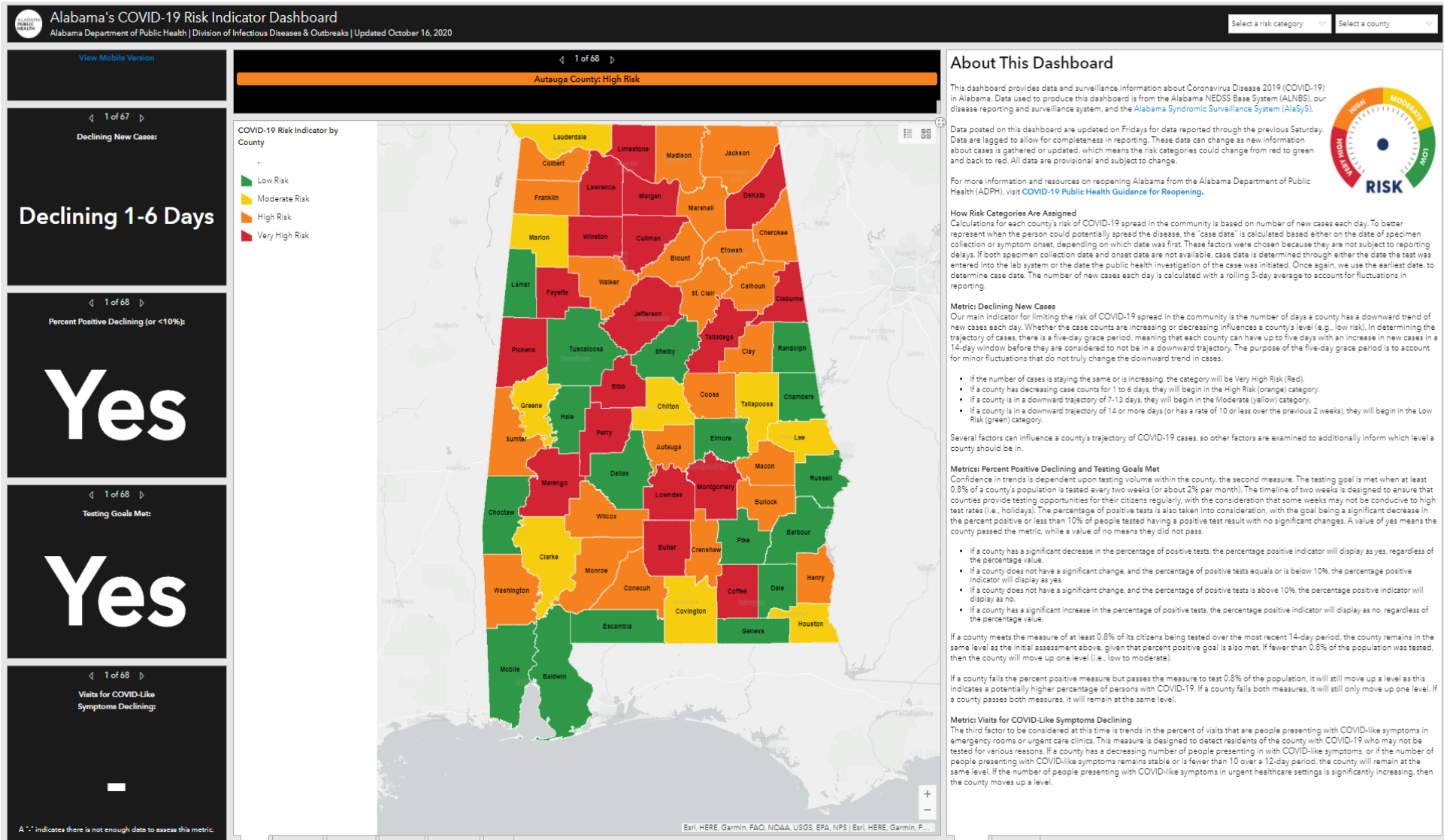
**The Art of Surveillance:
AlaSyS Data Visualizations**
2020 Syndromic Surveillance Symposium

*Analytics, Statistics, and Visualization
Alabama Syndromic Surveillance (AlaSyS)*

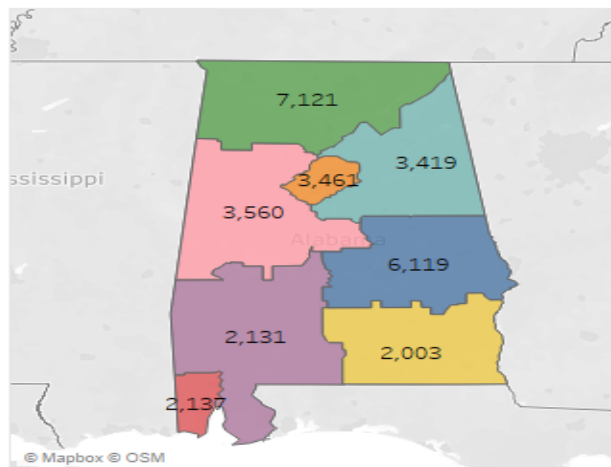
*Epidemiology, Surveillance, & Informatics
Infectious Diseases and Outbreaks Division
Bureau of Communicable Disease*



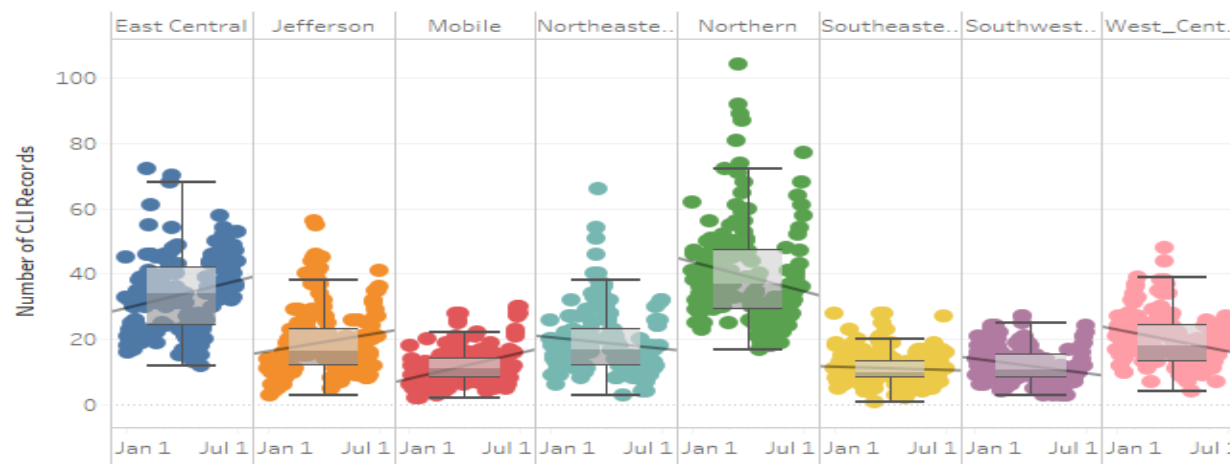
MisChele A. Vickers, MPA
Public Health Research Analyst III



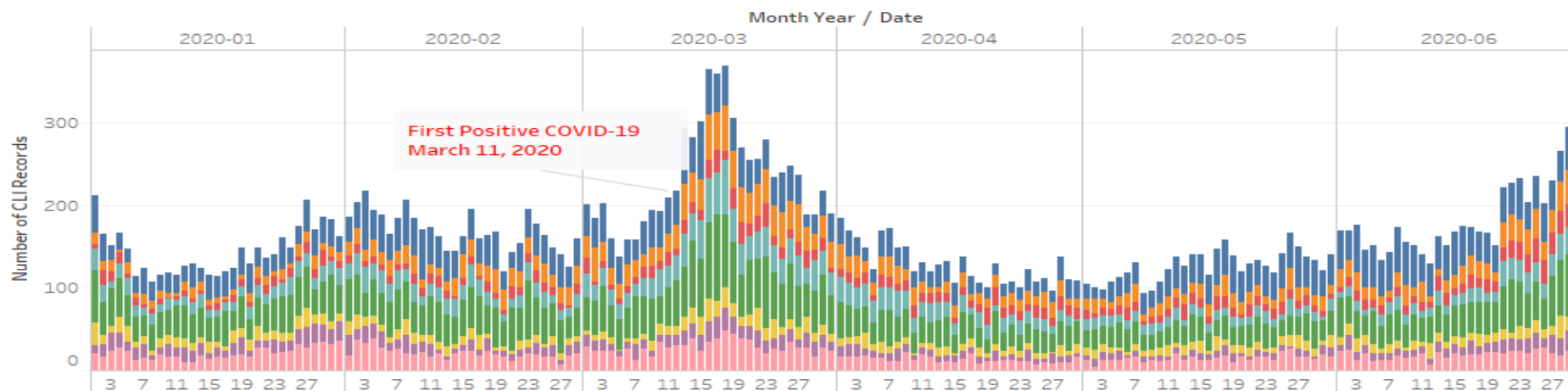
Public Health District Count (Jan to Jun)



Regional Trends ~Jan to June



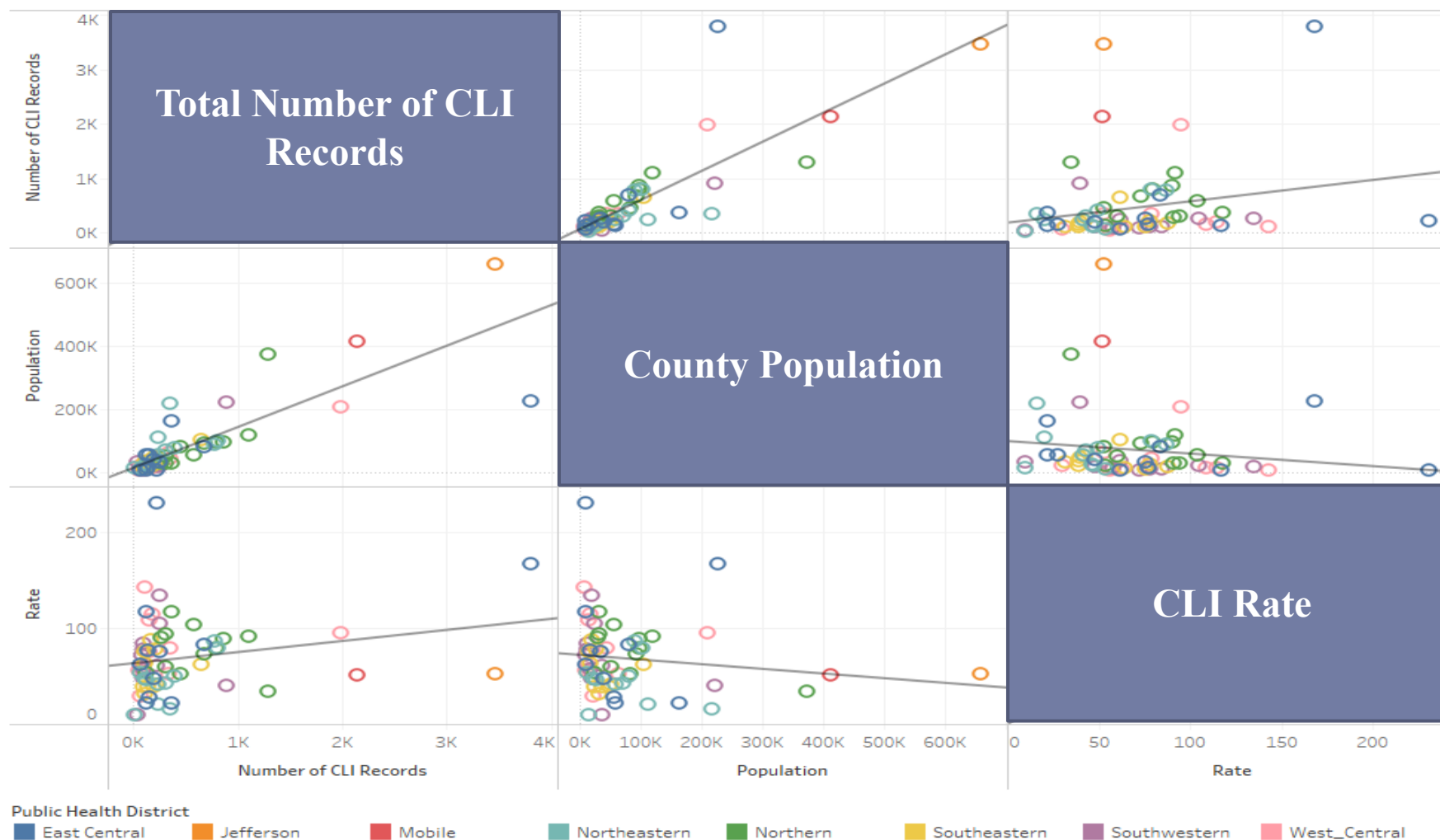
Daily Count Jan to June



Alabama CLI Summary Jan- Jun 2020

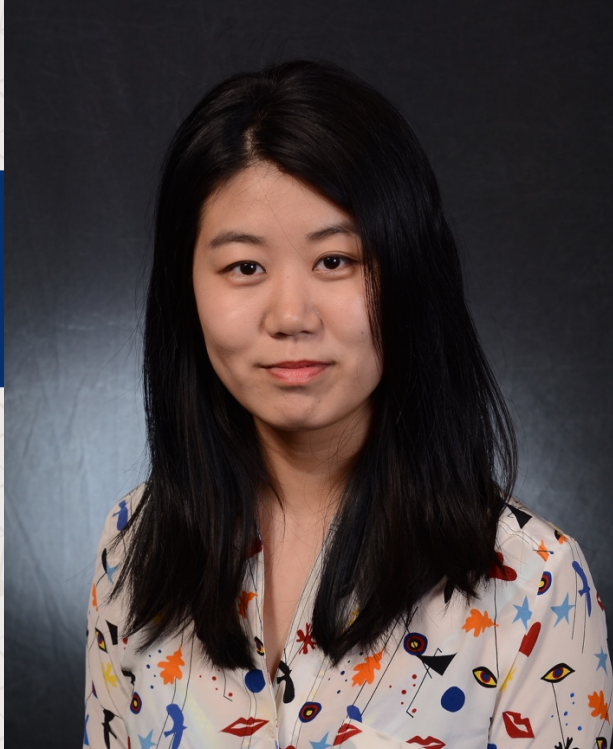


Scatterplot matrix with respect to all three continuous measurements.



Thank You!

- Alabama Department of Public Health
 - Infectious Diseases and Outbreaks Division
- National Syndromic Surveillance Program
 - Community of Practice
- Council of State and Territorial Epidemiologists
- Centers for Disease Control and Prevention



Michelle Carr, MPH & Yifang Dang, MS
Houston Health Department (Texas)





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Use of Informatics Visualization Tool Overlaying with Syndromic Surveillance Data in Monitoring Respiratory Health after Deer Park Fire in March 2019

Session Name: Data visualization

Presentation by: Yifang Dang, Michelle Carr, Biru Yang

Authors: Yifang Dang, MS, Imran Shaikh, Michelle Carr, Biru Yang, PhD, MPH, Olubukunola Okulate, MS, MPH, Isaac Desouza, Naomi Macias, REHS/RS, Camden Hallmark, Joann Schulte, DO, MPH and Melanie McNeese

Presentation Date: 11/18/2020 2:15PM-3:15PM (Wednesday)

Presented at: 2020 CSTE Conference, Virtual

Disclaimer: These do not represent the views of the City of Houston



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To present a novel visualization tool that can be used to effectively share syndromic surveillance analysis

- On March 17 , 2019, a massive petrochemical plant erupted in Deer Park, Texas
- The fire burned for 4 days



Surveillance Data

- Review of syndromic data collected from surveillance systems within the Houston Health Department (HHD):
 - Southeast Texas Syndromic Surveillance System (STSS)
 - Houston Electronic Disease Surveillance System (HEDSS)

Environmental Data

- Air quality data collected from seven Texas Commission for Environmental Quality (TCEQ) environmental sensors

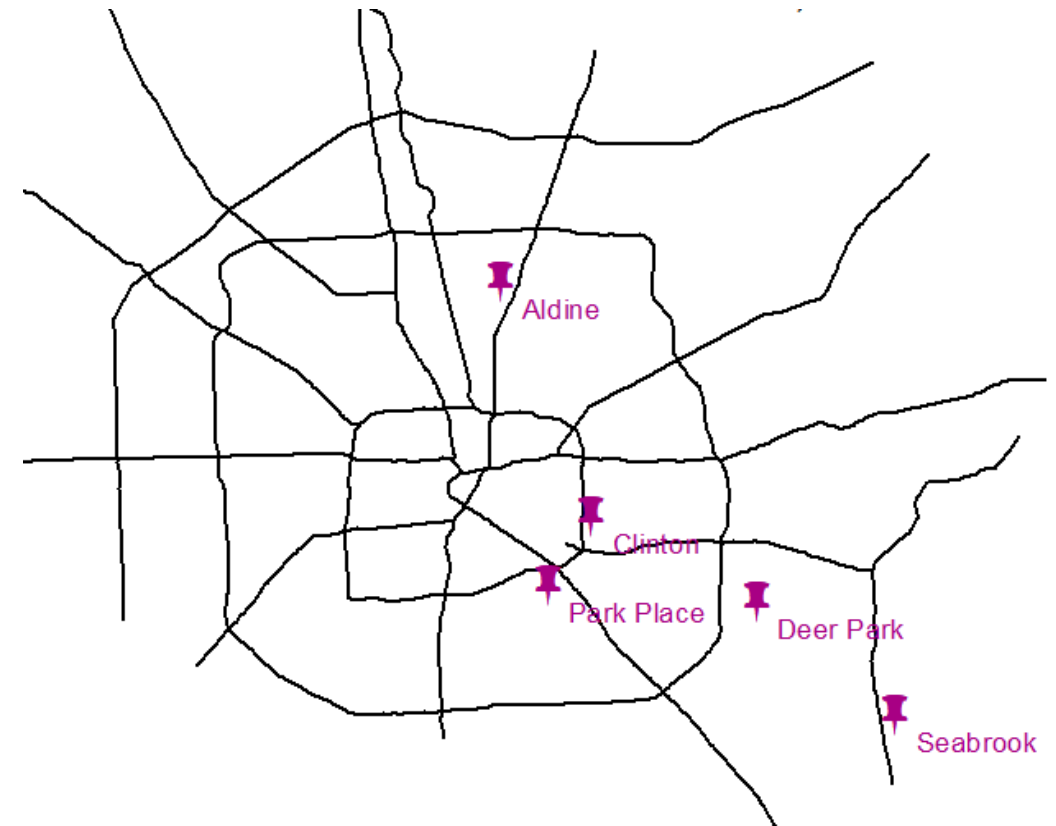
ArcGIS

- Overlay air quality data with STSS data
- Inverse Distance Weighting (IDW) tool

- Inverse distance weighted (IDW) interpolation assumes that measured points with proximity are more alike than those that are further apart.
- Based on power and neighborhood

☐ Method	Inverse Distance Weighted Interpolation
Power	2
☐ Searching neighborhood	Standard
Neighbors to include	15
Include at least	10
Sector type	Full
Major semiaxis	0.245070366577
Minor semiaxis	0.245070366577
Angle	0

- Five sensors were visually displayed
- Air quality on the east side of the incident had the greatest average reading
- Trends in air quality data readings





- Respiratory-related illness complaints were:
 - highest in the first two days
 - day lag
 - long lasting pattern

Trends in respiratory related visits by zip code

Conclusions



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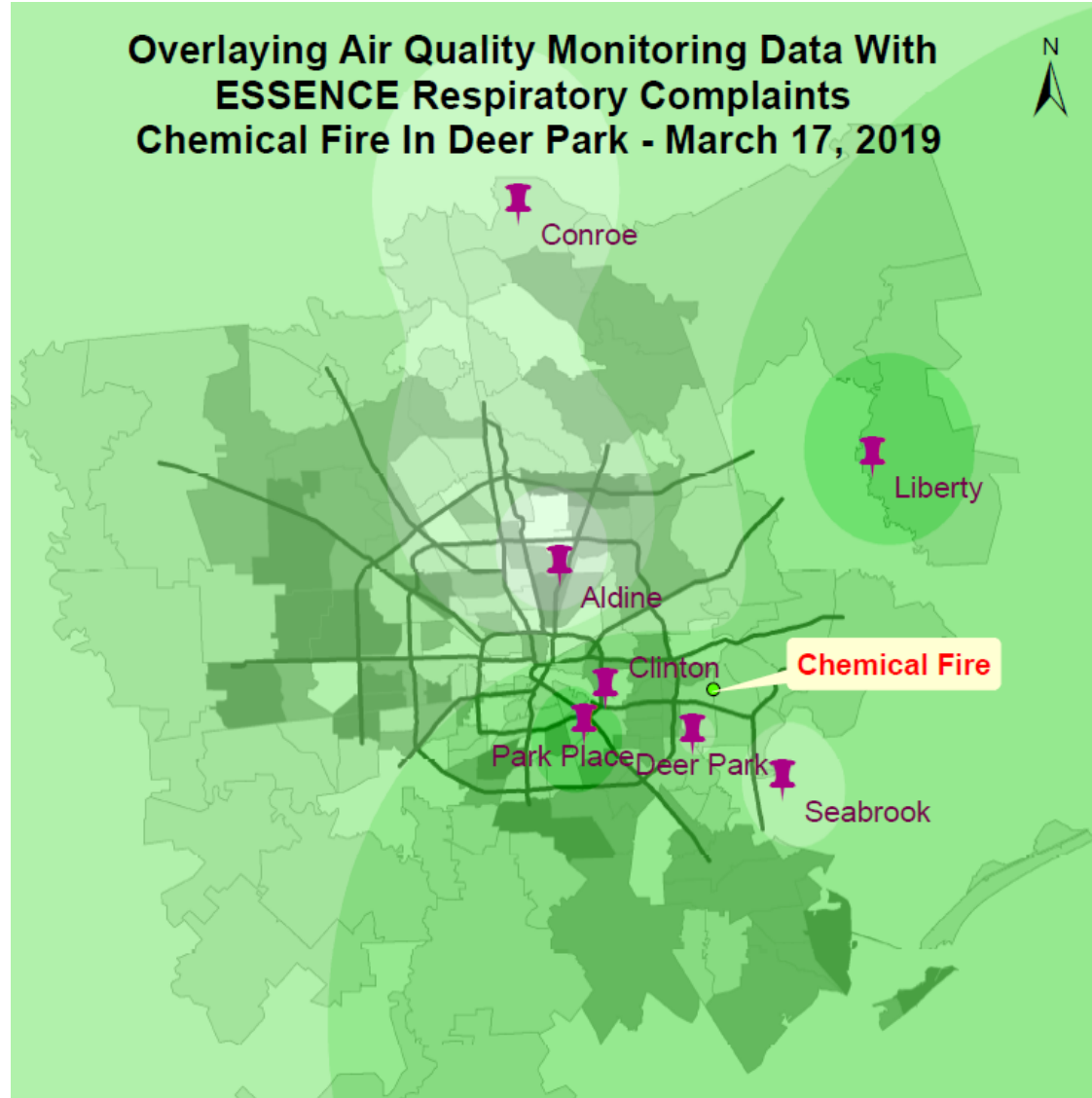
After the Deer Park Fire, air quality had a sharp and narrow tide compared to the dull and long-lasting respiratory complaints tendency.

Overlaying Air Quality Monitoring Data with ESSENCE Respiratory Complaints



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Deer Park Chemical Fire, March 17, 2019



Legend

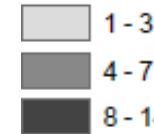


Air Quality Monitoring Sensors

Highway

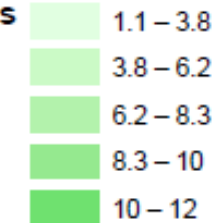
ESSENCE Respiratory Complaints

Count



Air Quality Monitoring Data

Filled Contours

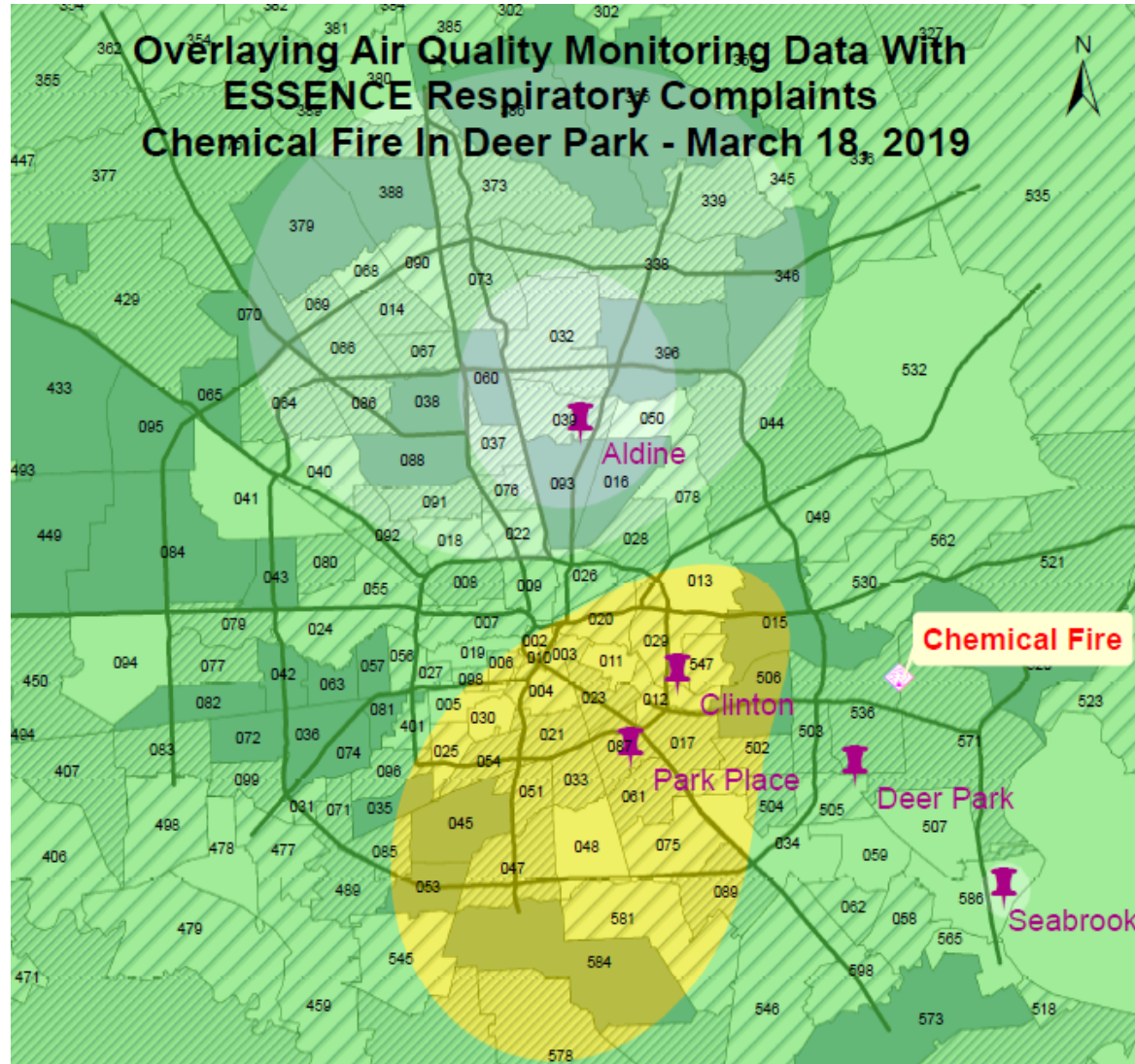


Overlaying Air Quality Monitoring Data with ESSENCE Respiratory Complaints



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Deer Park Chemical Fire, March 18, 2019



Legend

Air Quality Monitoring Sensors

Deer Park Chemical Fire Incident

Highway

ESSENCE Respiratory Complaints

count

1 - 3

4 - 7

8 - 23

none

Air Quality Monitoring Data:

Filled Contours

0 - 4

4 - 8

8 - 12

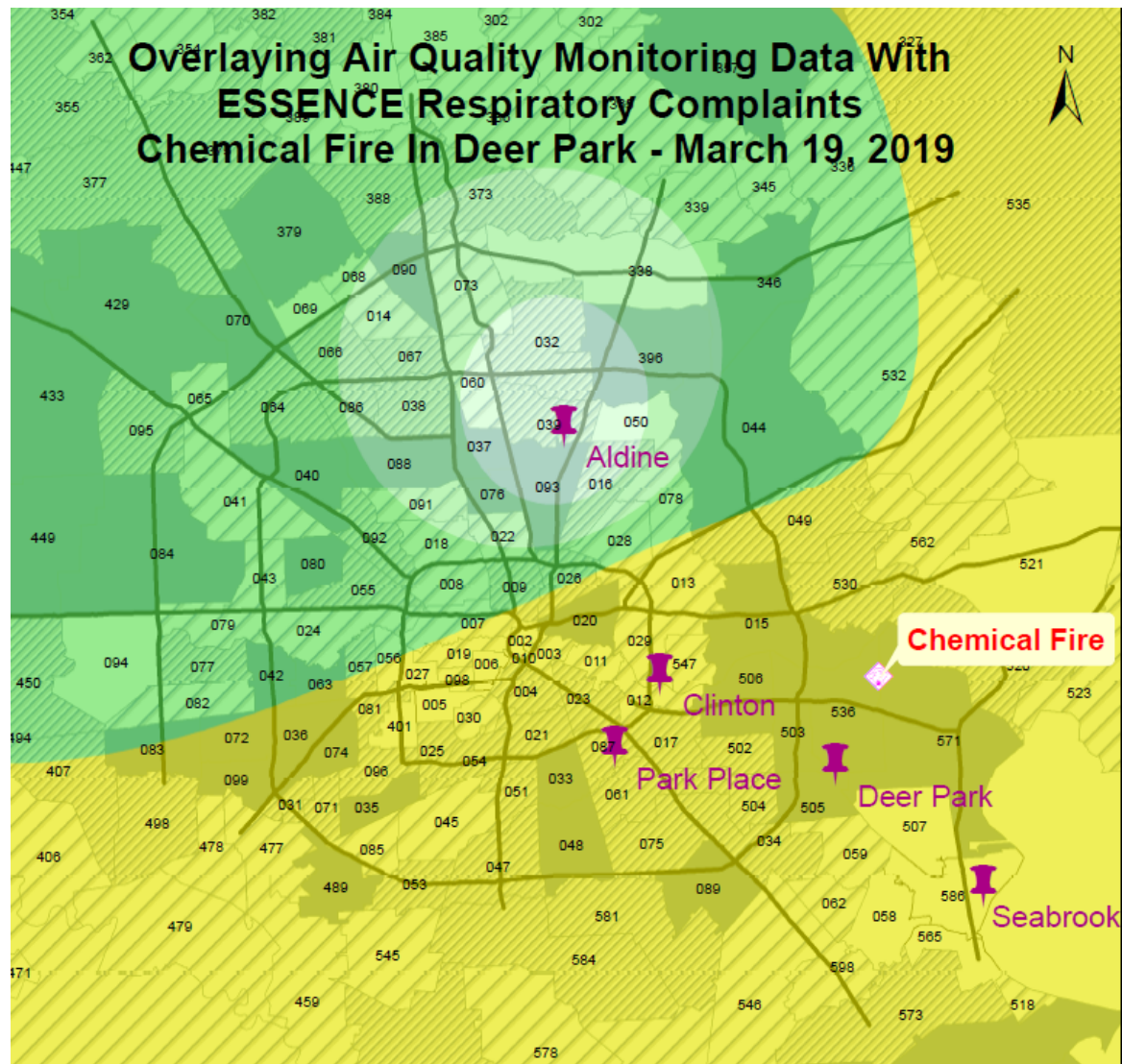
12 - 16.0208333

Overlaying Air Quality Monitoring Data with ESSENCE Respiratory Complaints

Deer Park Chemical Fire, March 19, 2019



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Legend

Air Quality Monitoring Sensors

Deer Park Chemical Fire Incident

Highway

ESSENCE Respiratory Complaints

Count

1 - 3

4 - 7

8 - 25

none

Air Quality Monitoring Data

Filled Contours

0 - 4

4 - 8

8 - 12

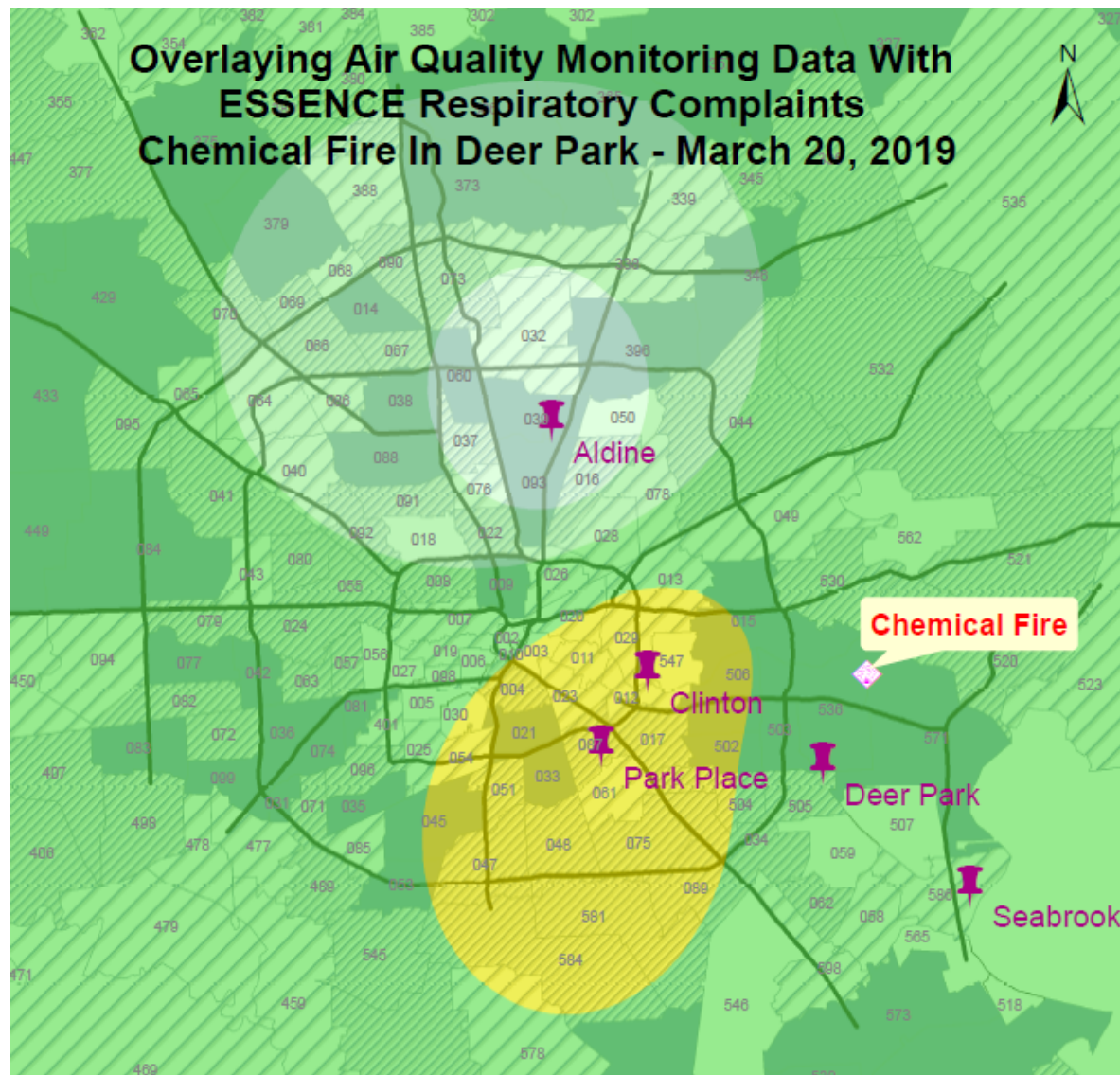
12 - 18.3

Overlaying Air Quality Monitoring Data with ESSENCE Respiratory Complaints

Deer Park Chemical Fire, March 20, 2019



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Legend

Air Quality Monitoring Sensors*

Deer Park Chemical Fire Incident

Highway

ESSENCE Respiratory Complaints***

Count by Zip Code****

1 - 3

4 - 7

8 - 19

none

Air Quality Monitoring Data

PM 2.5**

0 - 5

5 - 10

10 - 15

15 - 18.5

* From 12:00 am to 11:59 pm on 3/20/2019, sensors monitored by the state, data collected every hour.

** PM 2.5 is Particulate Matter that measures 2.5 microns or smaller and are likely to enter lungs during respiration.

*** From 12:00 am to 11:59 pm on 3/20/2019, received from 25 EDs in Southeast Texas.

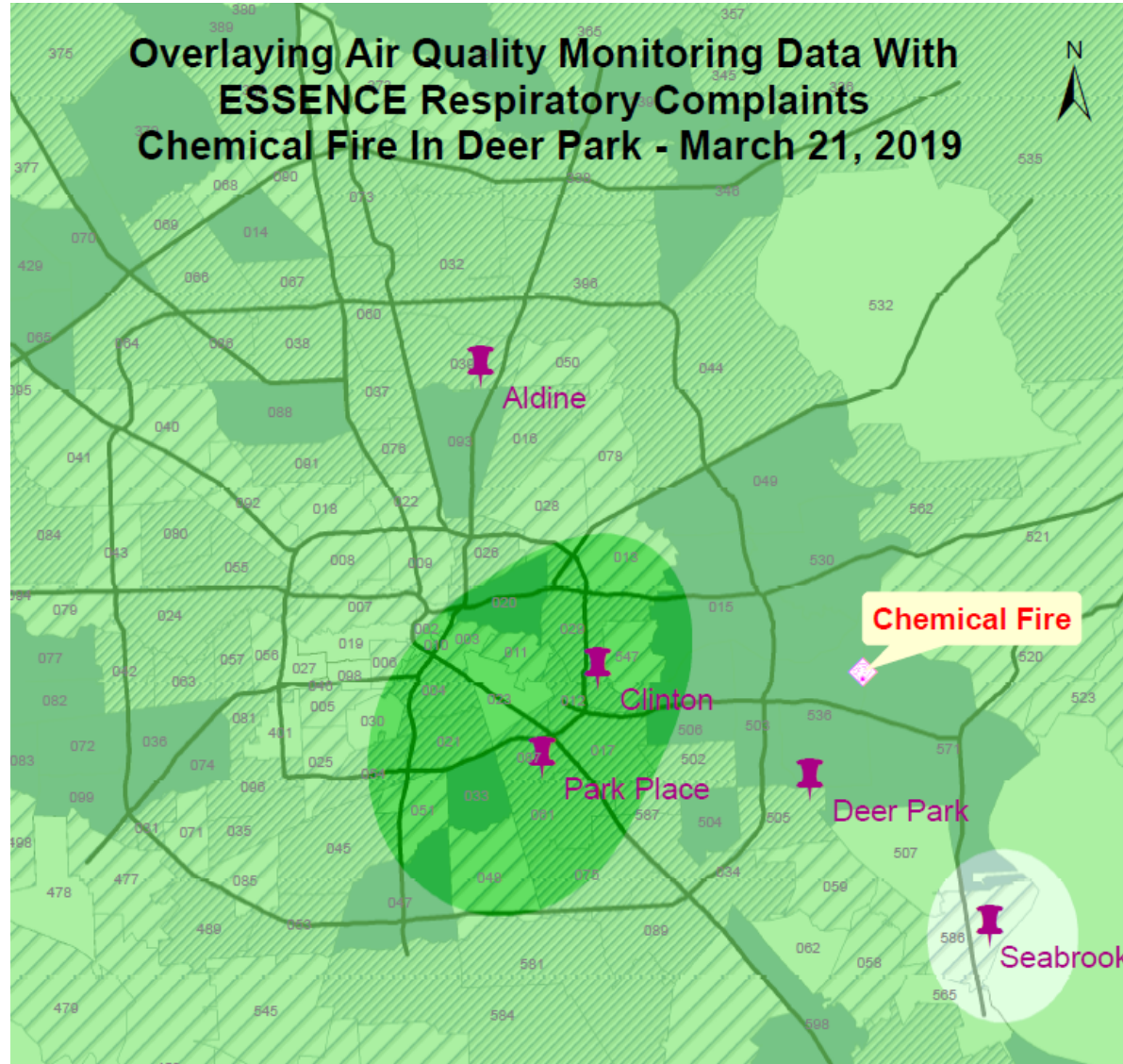
**** Labelled using last 3 digits.

Overlaying Air Quality Monitoring Data with ESSENCE Respiratory Complaints

Deer Park Chemical Fire, March 21, 2019



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Legend



Air Quality Monitoring Sensors*



Deer Park Chemical Fire Incident



Highway

ESSENCE Respiratory Complaints***

Count by Zip Code****



1 - 3



4 - 7



8 - 22



none

Air Quality Monitoring Data

PM 2.5**

8.6 - 9

9 - 12

12 - 12.9

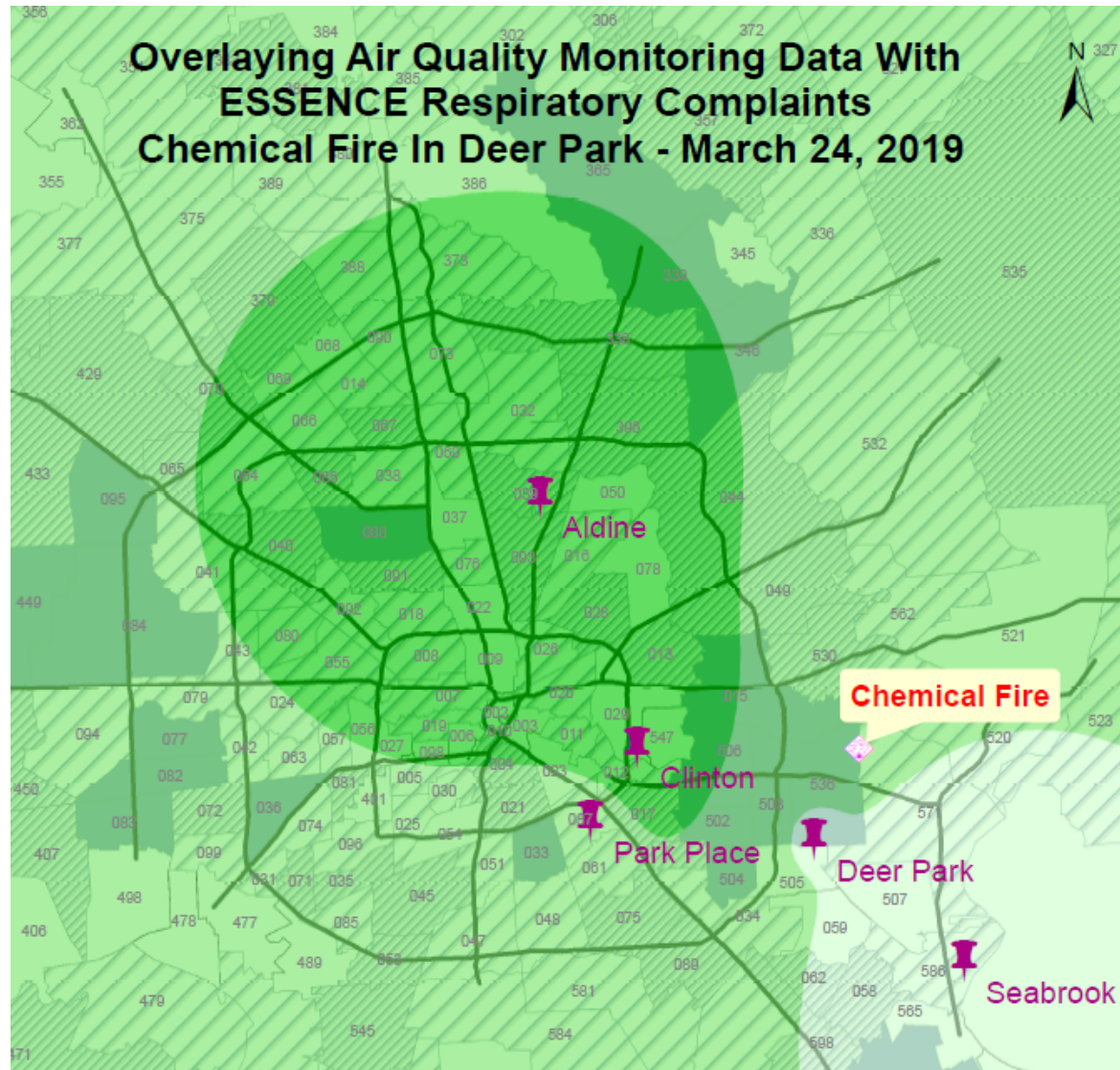
* From 12:00 am to 11:59 pm on 3/21/2019, sensors monitored by the state, data collected every hour.
** PM 2.5 is Particulate Matter that measures 2.5 microns or smaller and is likely to enter lungs during respiration.
*** From 12:00 am to 11:59 pm on 3/21/2019, received from 25 EDs in Southeast Texas.
**** Labelled using last 3 digits.

Overlaying Air Quality Monitoring Data with ESSENCE Respiratory Complaints



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Deer Park Chemical Fire, March 24, 2019



Legend



Air Quality Monitoring Sensors*



Deer Park Chemical Fire Incident

Highway

ESSENCE Respiratory Complaints***

Count by Zip Code****



1 - 3



4 - 7



8 - 20



none

**Air Quality Monitoring Data
PM2.5****

6 - 7.2

7.2 - 8.3

8.3 - 9.3

* From 12:00 am to 11:59 pm on 3/24/2019, sensors monitored by the state, data collected every hour.

** PM 2.5 is Particulate Matter that measures 2.5 microns or smaller and is likely to enter lungs during respiration.

*** From 12:00 am to 11:59 pm on 3/24/2019, received from 15 EDs in Southeast Texas.

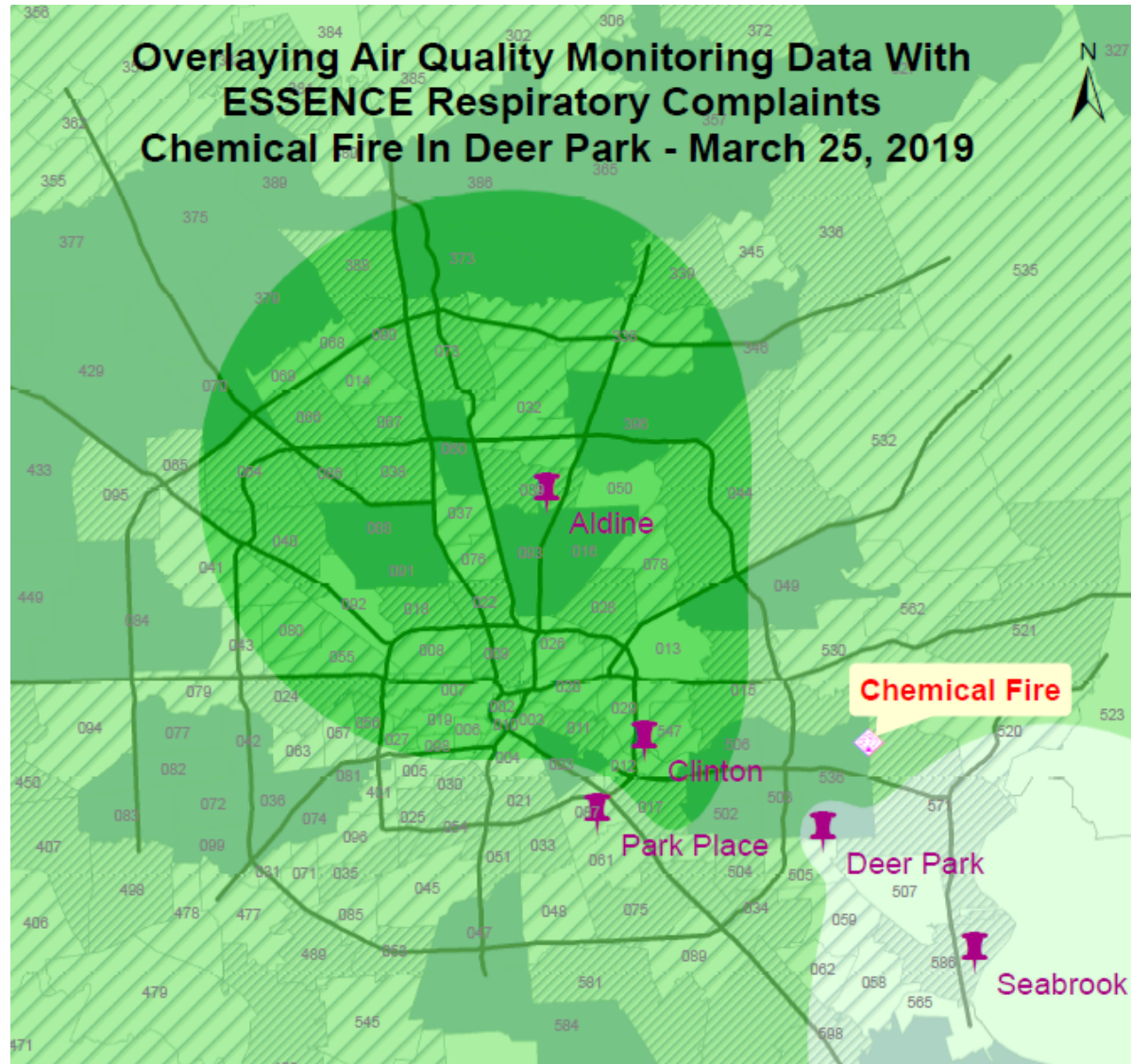
**** Labelled using last 3 digits.

Overlaying Air Quality Monitoring Data with ESSENCE Respiratory Complaints



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Deer Park Chemical Fire, March 25, 2019



- Surrounding ERs have not been fully onboarded to STSS
- Data points were dependent on reporting timeliness and may have been underrepresented
- Observations of 22nd and 23rd were missing
- The Aldine monitoring site was under maintenance and data was unavailable for 3/18-3/25
 - IDW tool interpreted reading as 0
- IDW readings did not consider environmental conditions

- Environmental surveillance data and health surveillance data can be combined for resource allocation purposes
- Standard categorization needs to be established for easy interpretation
- This air quality plus respiratory complaints combination can be applied to other environmental and health issues, such as
 - Wildfire smoke and respiratory symptoms
 - temperature and heat-related illnesses in the summer
 - parasite and parasite-infectious diseases after hurricane



1. <https://www.houstonchronicle.com/business/energy/article/Deer-Park-fire-a-blemish-for-the-image-of-13717661.php>
2. <https://desktop.arcgis.com/en/arcmap/10.3/tools/3d-analyst-toolbox/how-idw-works.htm>

Thank you!



Acknowledgements:

Imran Shaikh, Epidemiologist Supervisor, Informatics Program

Olubukunola Okulate, Biostatistician, Informatics Program

Isaac Desouza, Engineer

Naomi Macias, Bureau Chief of Public Health

Camden Hallmark, Senior Analyst, Division of Disease Prevention and Control

Melanie McNeese, Epidemiologist Specialist, Bureau of Epidemiology

National Syndromic Surveillance Program

Community of Practice

Advancing the Science and Practice of Syndromic Surveillance



Block Schedule

Training

Methods

Innovation

1-1:15PM EST	Daily Opening, Logistics, Overview		
1:15-2PM EST	Training: Call Up Your Data Using APIs	Breakout: Querying from Scratch - Cooking Up New Syndromes	Training: Data Sharing Step-by-Step Using the AMC
	...BREAK...		
2:15-3PM EST	Training: Telling Your Story - Insights and Tips to Promote Syndromic Surveillance	Breakout: The Art of Surveillance - Data Visualizations	Lightning: New Tactics for Old Problems
	...BREAK...		
3:15-4PM EST	Training: Dashboard Creation in NSSP ESSENCE	Breakout: Making the Best of a Sys Situation - Data Quality for Sys	Roundtable: COVID, Current Events, and More - Discussing Syndromic Surveillance Practices in 2020
	...BREAK...		
4:15-5PM EST	Virtual Happy Hour		