

A stylized, high-contrast map of Chicago in white lines on a black background. The map shows the city's grid of streets and major highways, with the Lake Michigan coastline visible on the right side. A dark grey rectangular box is superimposed over the upper-middle part of the map, containing the title text.

Predicting West Nile Virus in Chicago

Three small white dots are arranged horizontally above the authors' names.

Joseph Brown
Jenny Doyle
Mark Mummert

Outline

Data Exploration/Feature
Selection

Modeling Approach

Interpreting Results

Goal:

**Predict West Nile Virus
presence in mosquito traps
to inform pesticide use.**

Data

Trap Information

Weather Data

Spray Data

$$\frac{\text{Observations with Positive Results}}{\text{Total Observations}} = \text{Ratio of Traps with West Nile}$$

Trap Data



Geographic Frequency

Observations with Positive Results

Total Observations

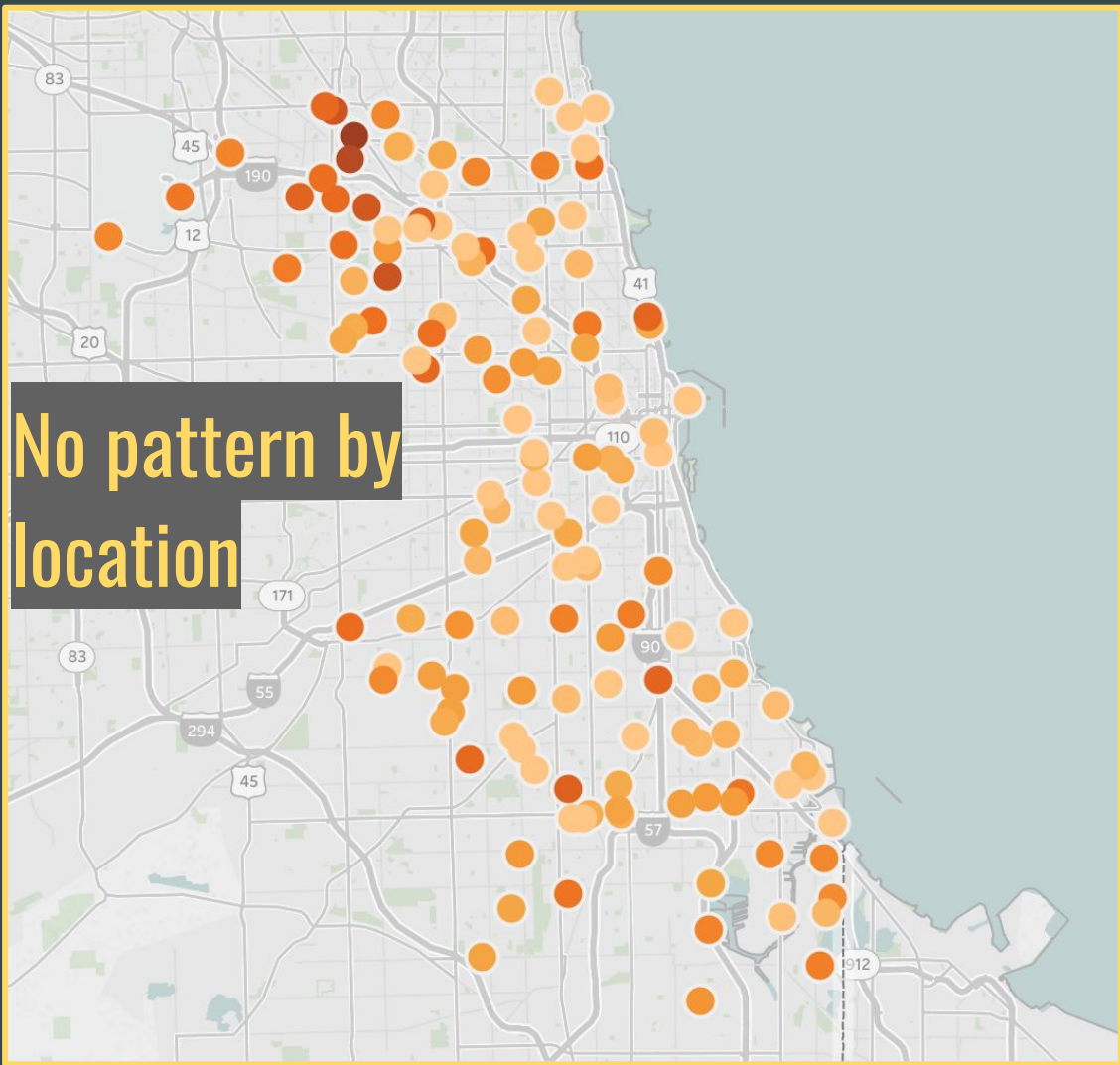
No pattern by
location

West Nile Positive Rate



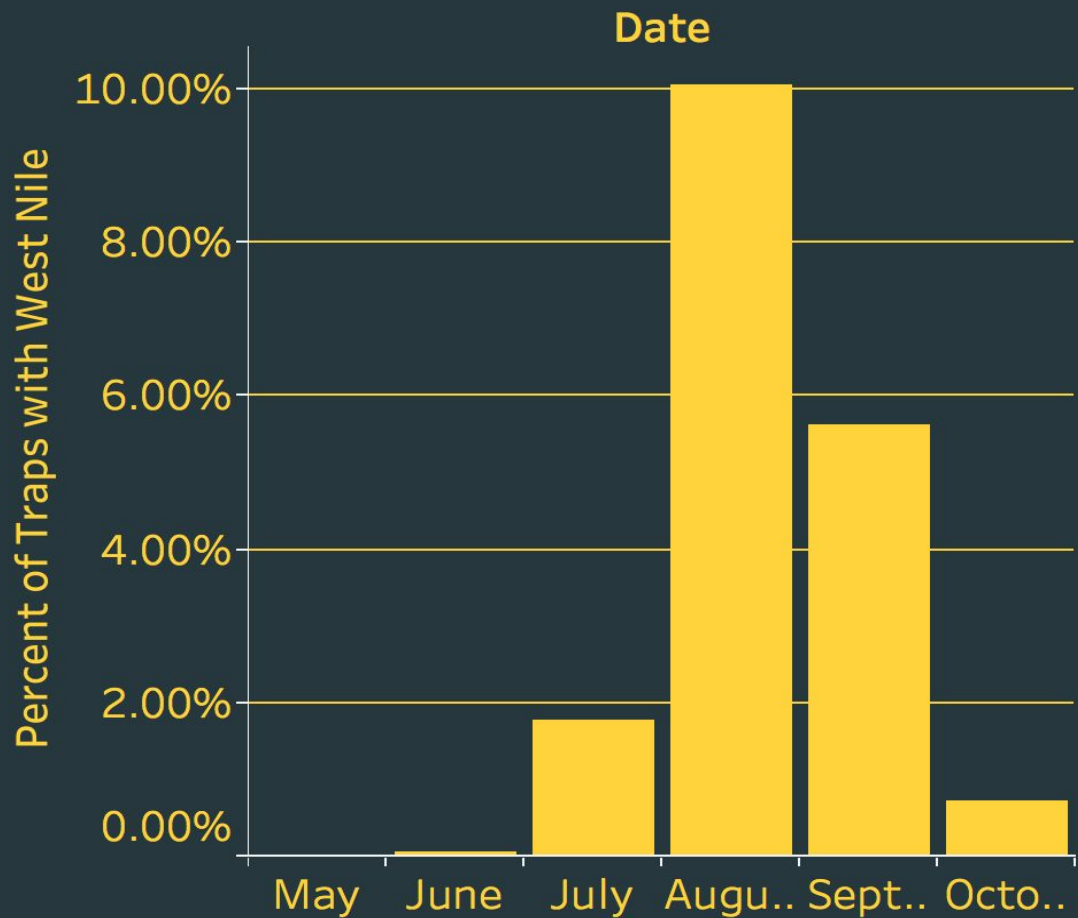
0%

19%



August and
September are
bad!

West Nile Rate by Month



Weather Data

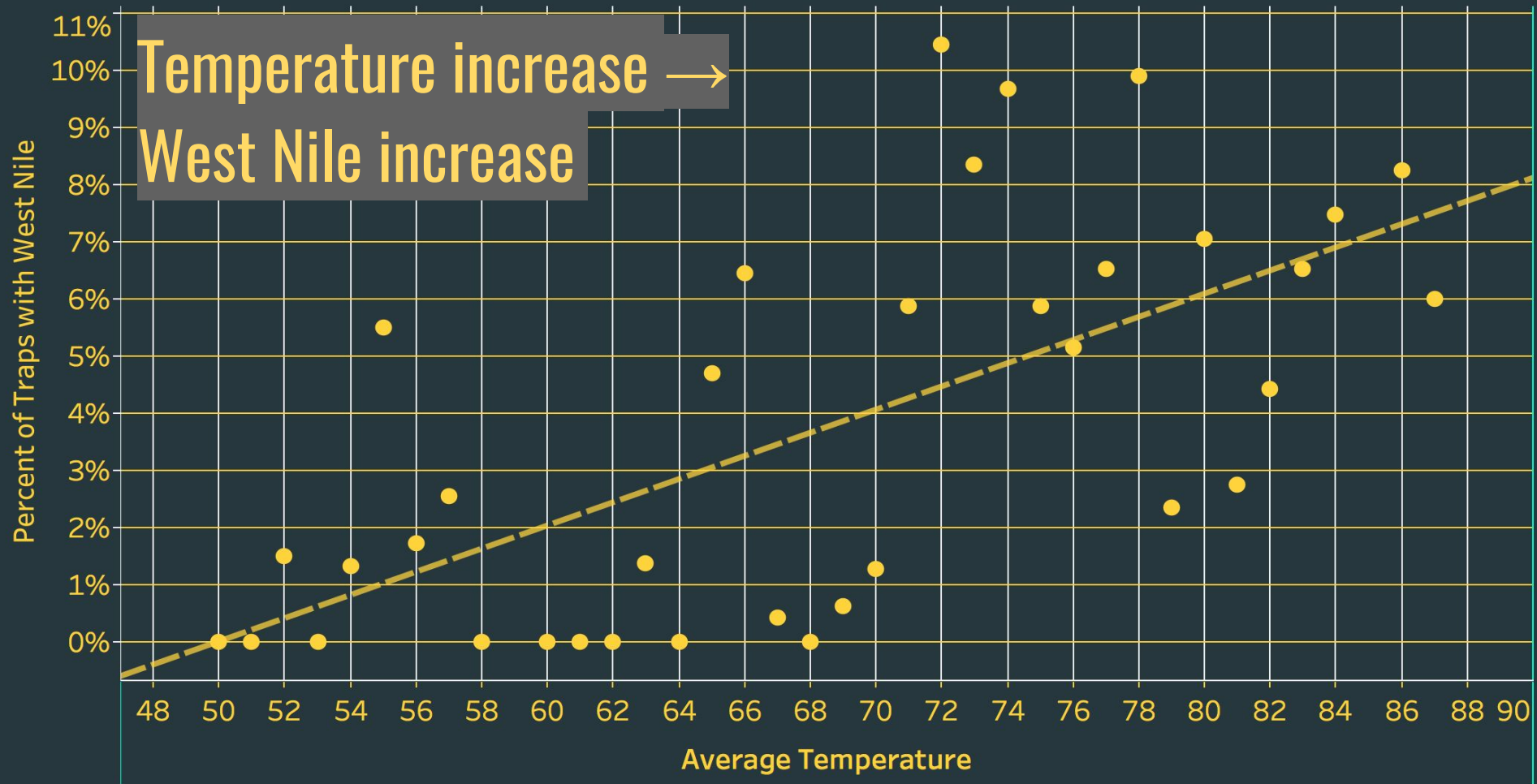


“The Northern House mosquito, **Culex pipiens**, is the primary carrier of West Nile virus. This mosquito species thrives in water with high organic content, such as that found in catch basins (storm sewers).

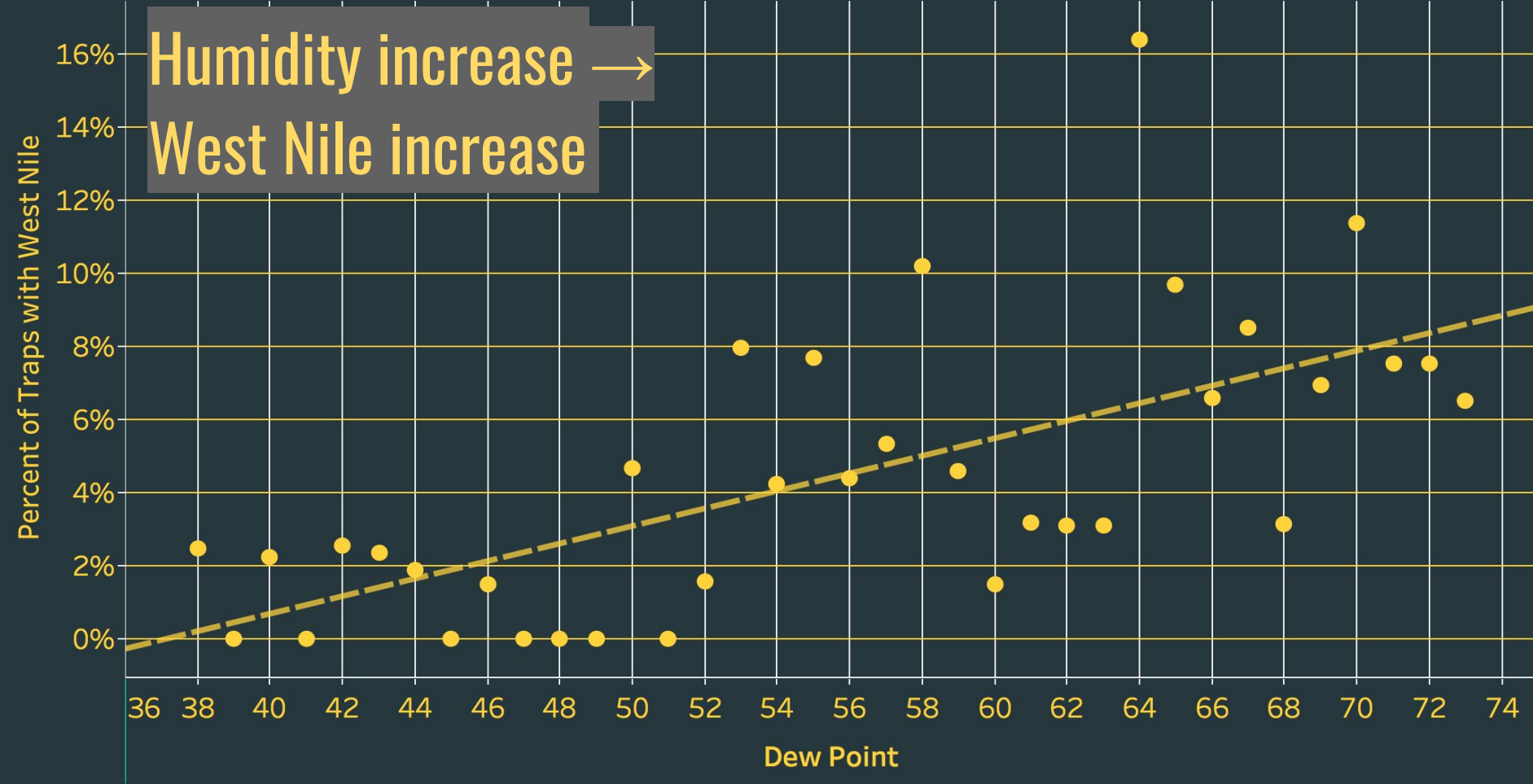
Consequently, a hot, dry summer increases the risk of West Nile virus infection, exactly the opposite of what many people believe”

- Chicago Department of Public Health

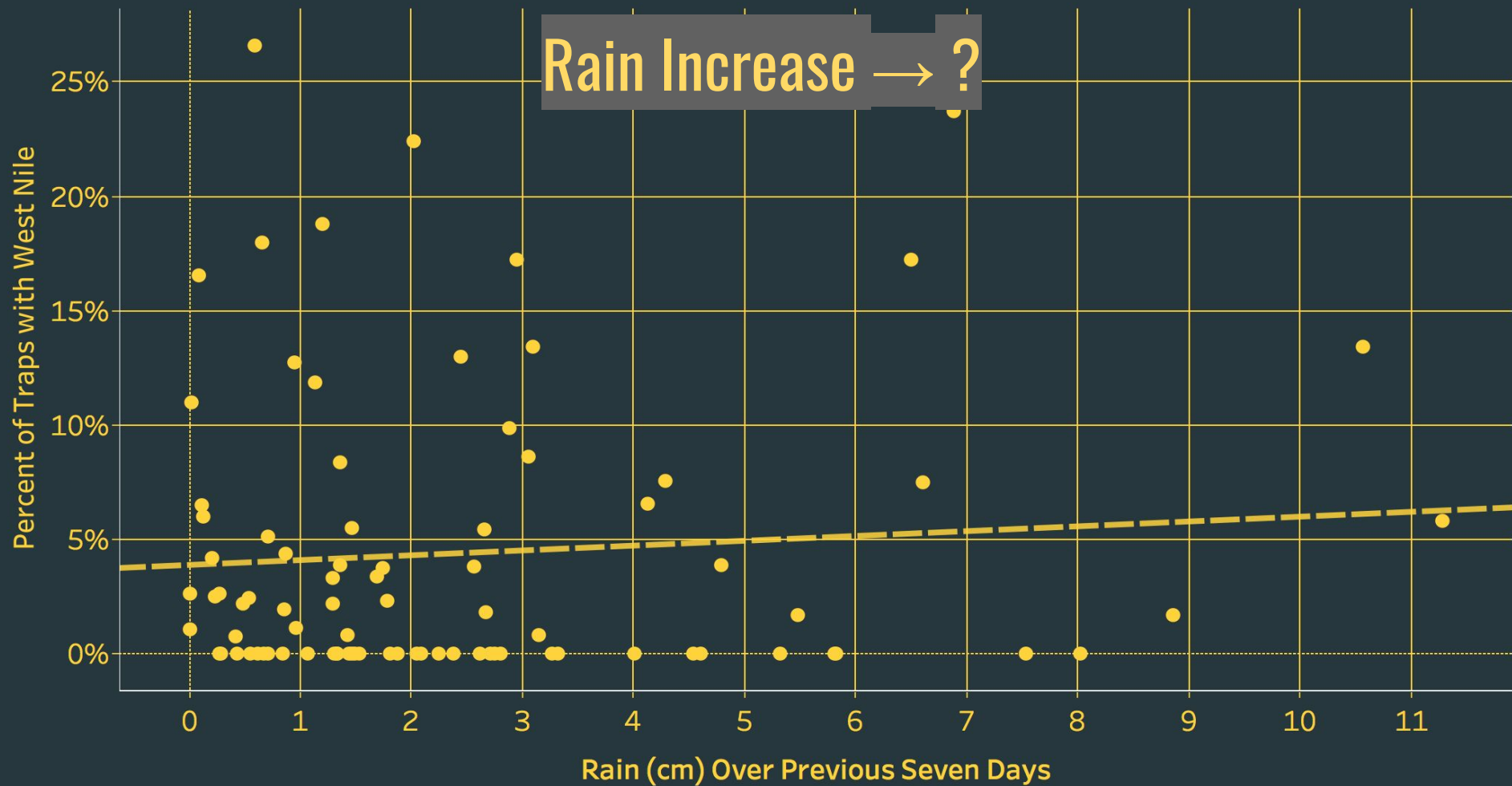
West Nile Rate by Temperature



West Nile Rate by Dew Point



West Nile Rate by Rain - Previous Seven Days



Model Building



Model Features

Weather Data

20 Day Average Min Temp

20 Day Average Max Temp

3 Day Average Min Temp

Dew Point

Trap Data

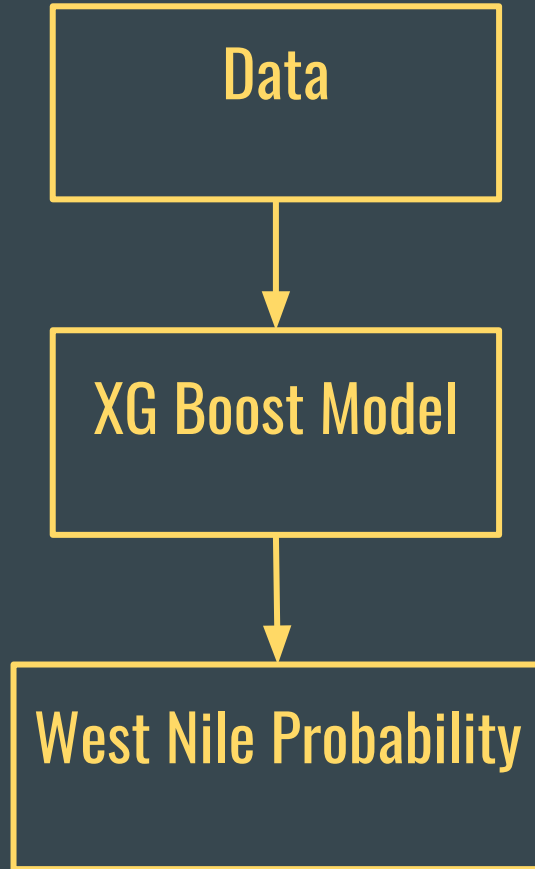
Longitude

Latitude

Culex Pipiens

Month

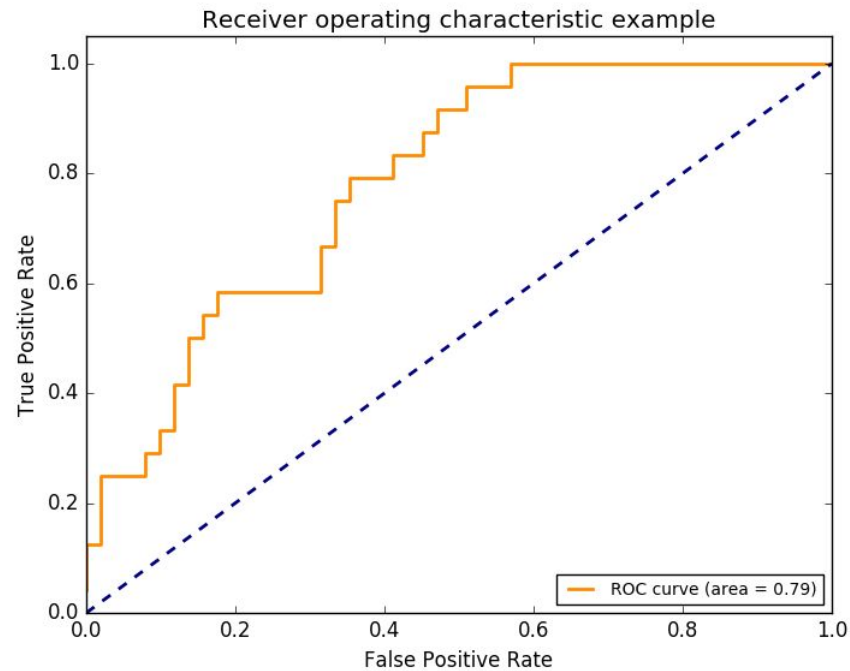
Model Features



Score:

0.75110

ROC Curve



Interpreting Results



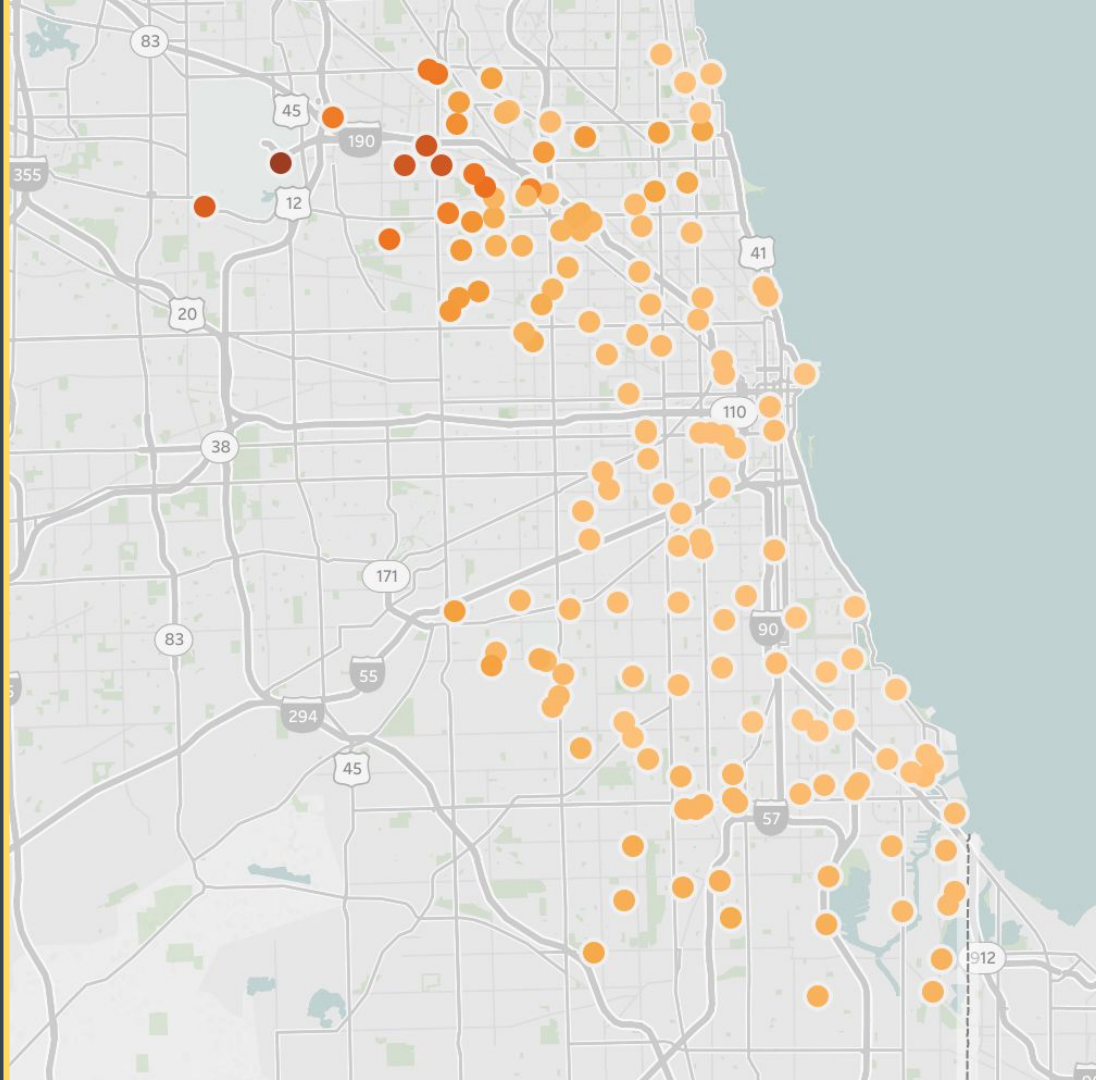
Final Predictions

Average Probability of West Nile Presence



1.74%

14.44%



Zip Code Map with Population Density

Density



195

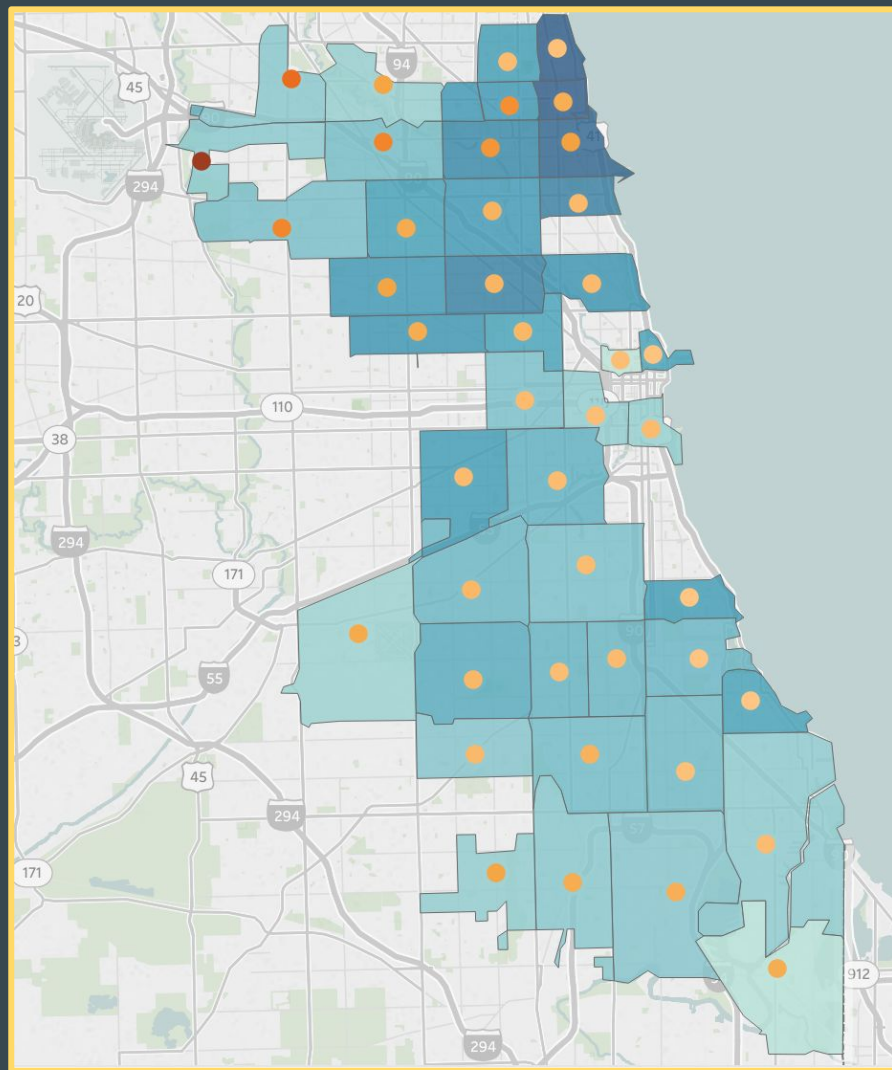
34520

Average Probability of West Nile Presence



1.87%

10.72%



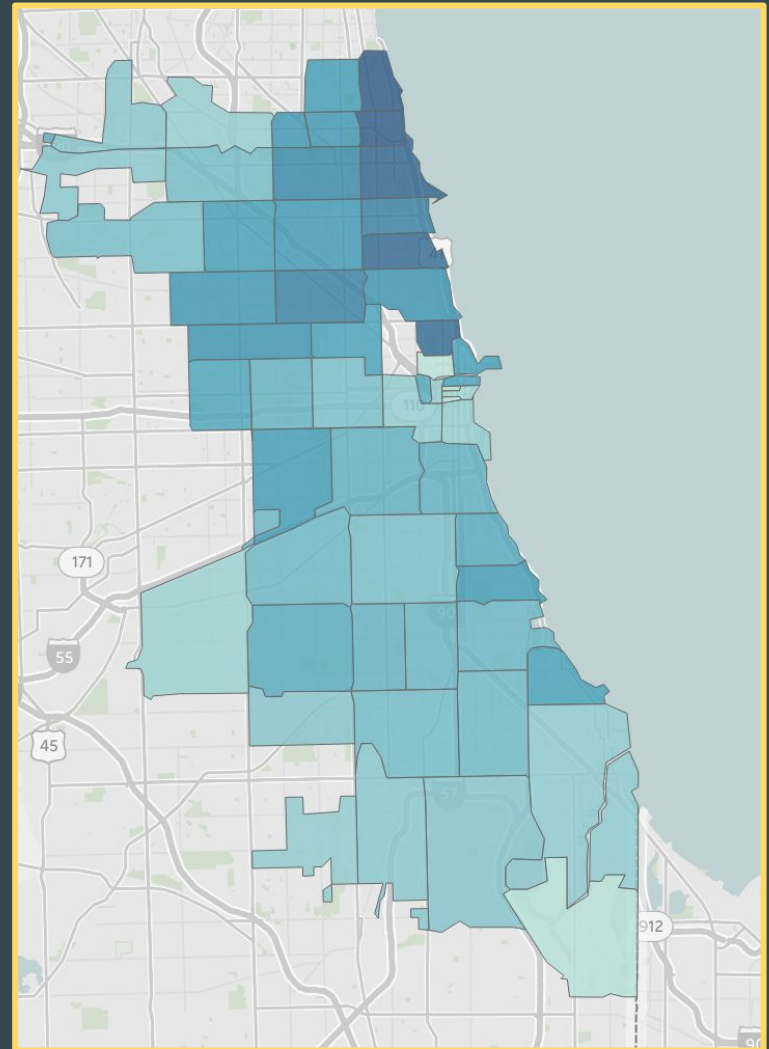
Density x West Nile Probability

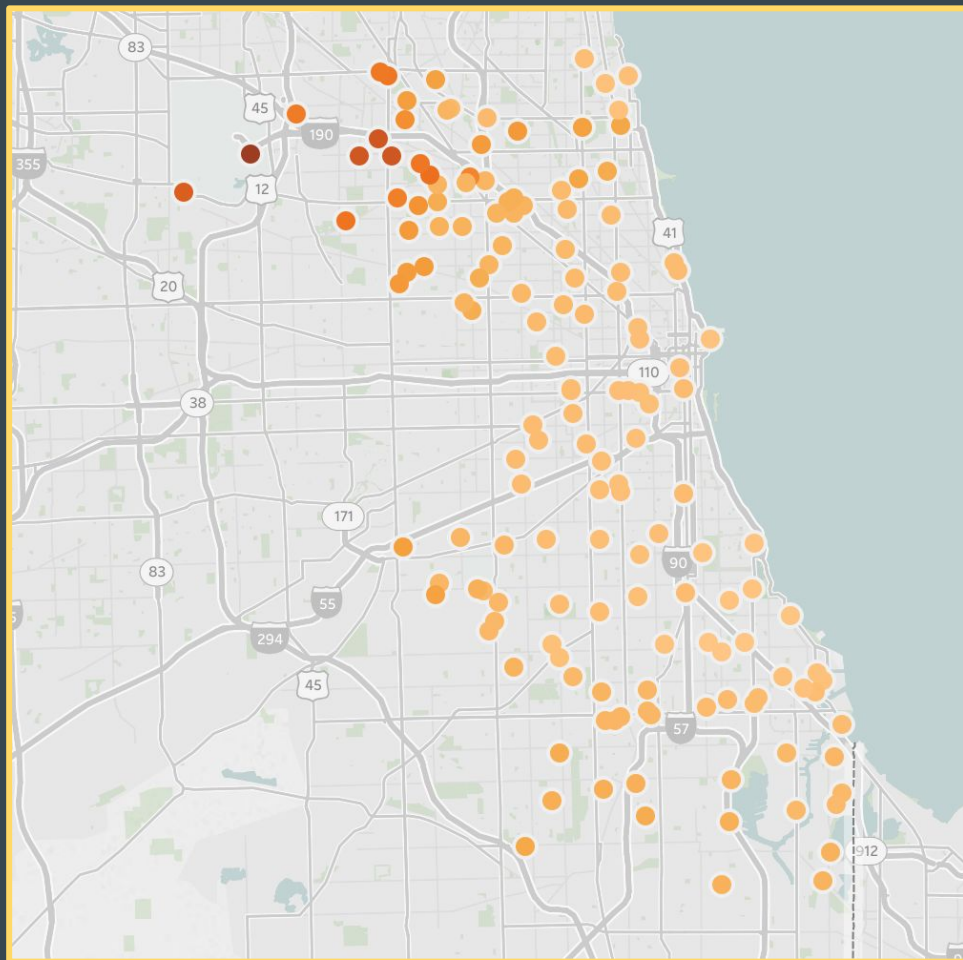
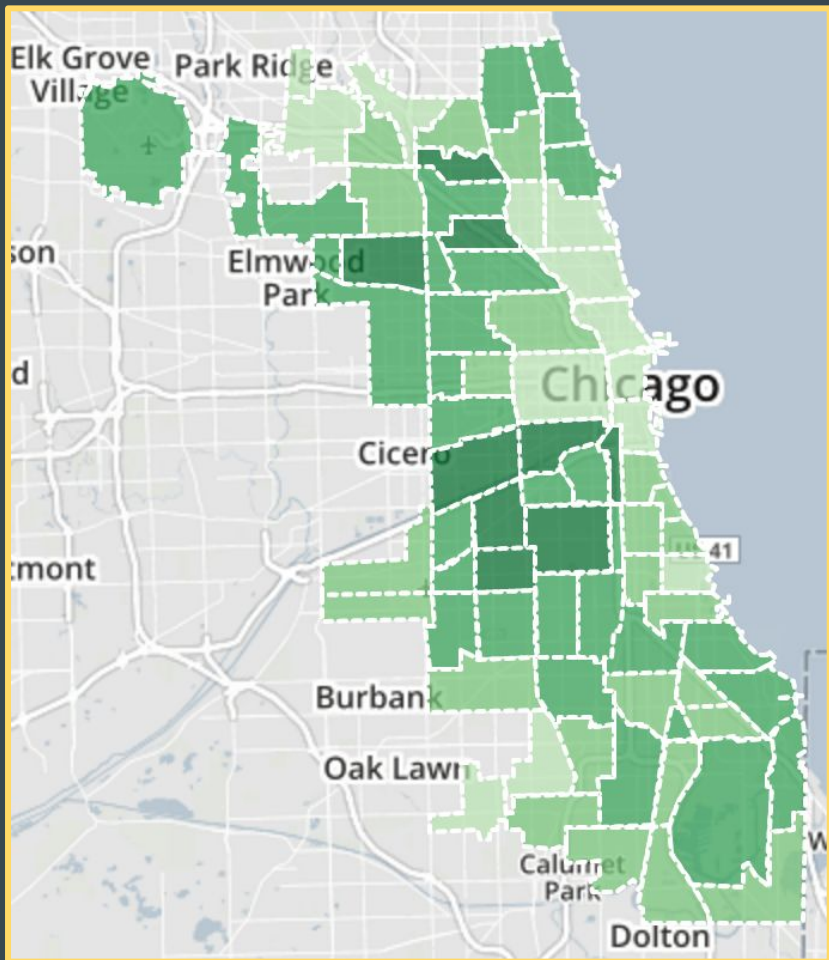
Density * West Nile Probability



0.0%

100.0%





A stylized, high-contrast map of a city grid, likely New York City, rendered in white lines on a black background. The map shows a dense network of streets and avenues, with a prominent diagonal line running from the top left towards the bottom right. A dark gray rectangular box is centered over the map, containing the word "Questions" in a bold, yellow, sans-serif font. Below the text box, there are three small white dots arranged horizontally, suggesting a sequence or a list.

Questions

