

A stylized, high-contrast map of Chicago, Illinois, rendered in white lines on a black background. The map shows the city's grid system, major highways, and the surrounding Lake Michigan. A dark gray rectangular box is superimposed over the upper portion of the map, containing the title text in yellow.

Predicting West Nile Virus in Chicago

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

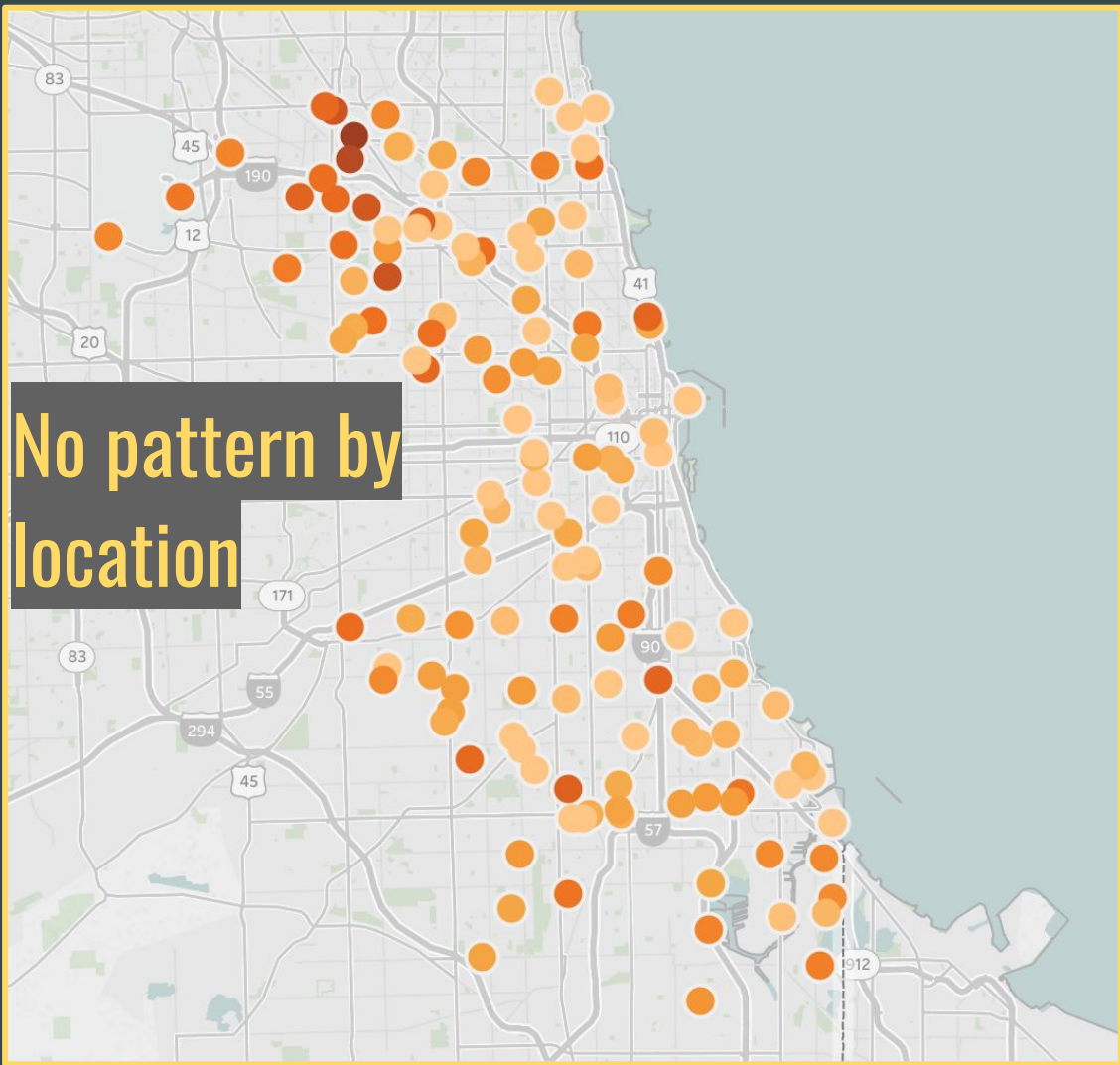
No pattern by
location

West Nile Positive Rate



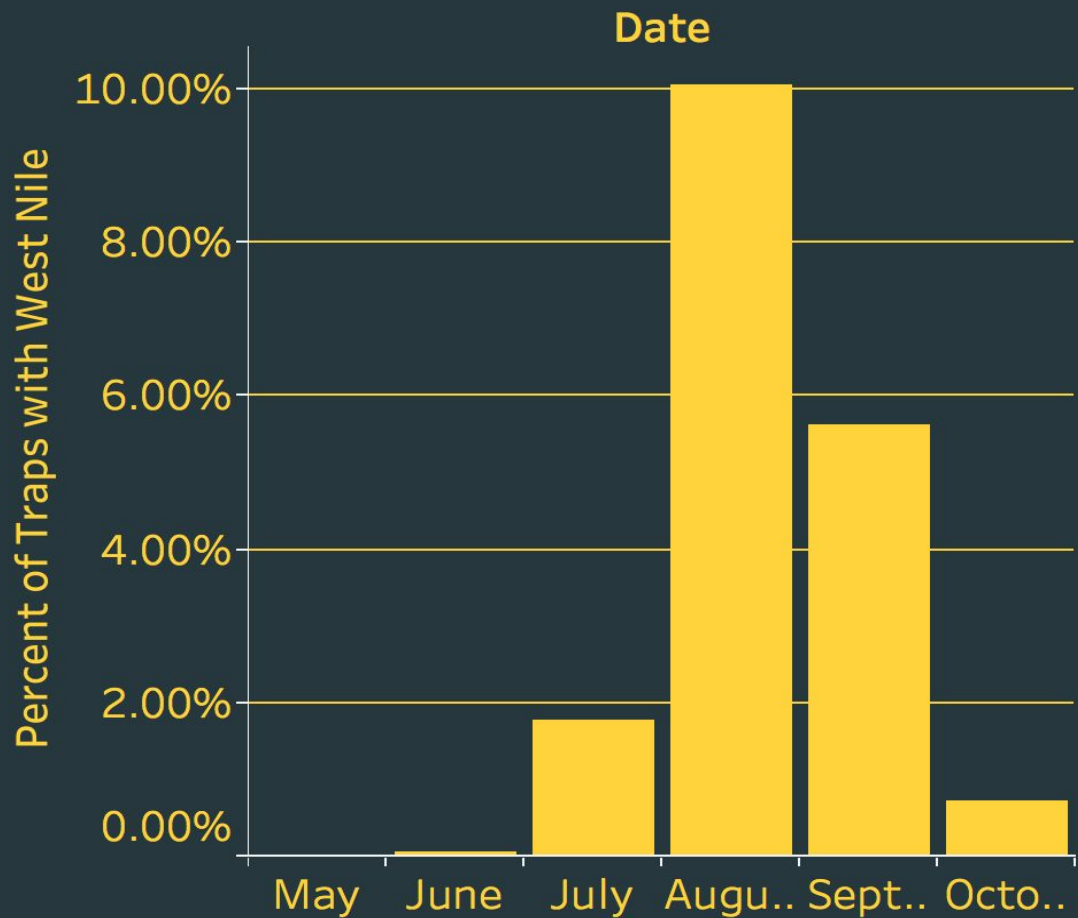
0%

19%



August and
September are
bad!

West Nile Rate by Month



Weather Data

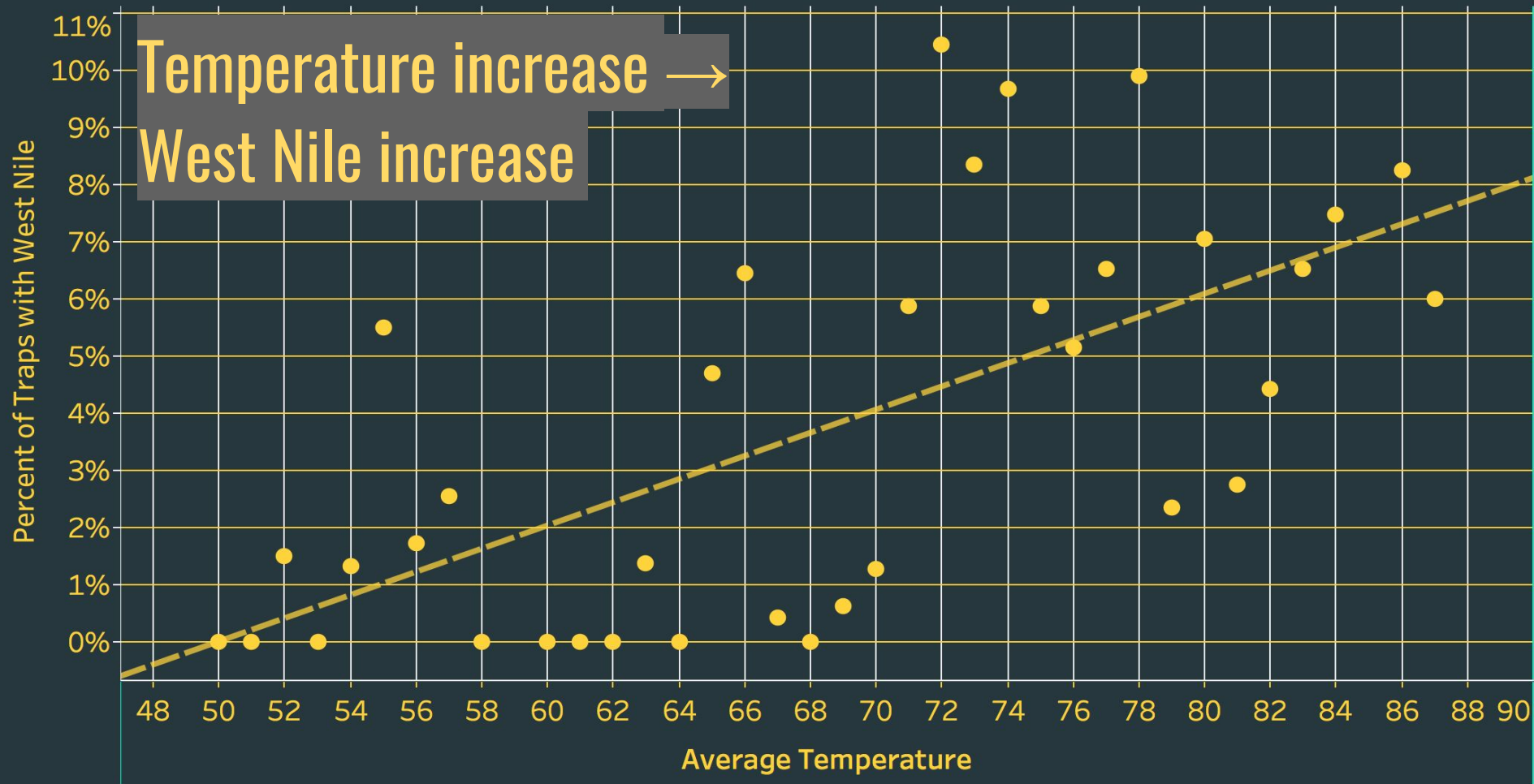


“The Northern House mosquito, **Culex pipiens**, is the primary carrier of West Nile virus. This mosquito species thrives in water with high organic content, such as that found in catch basins (storm sewers).

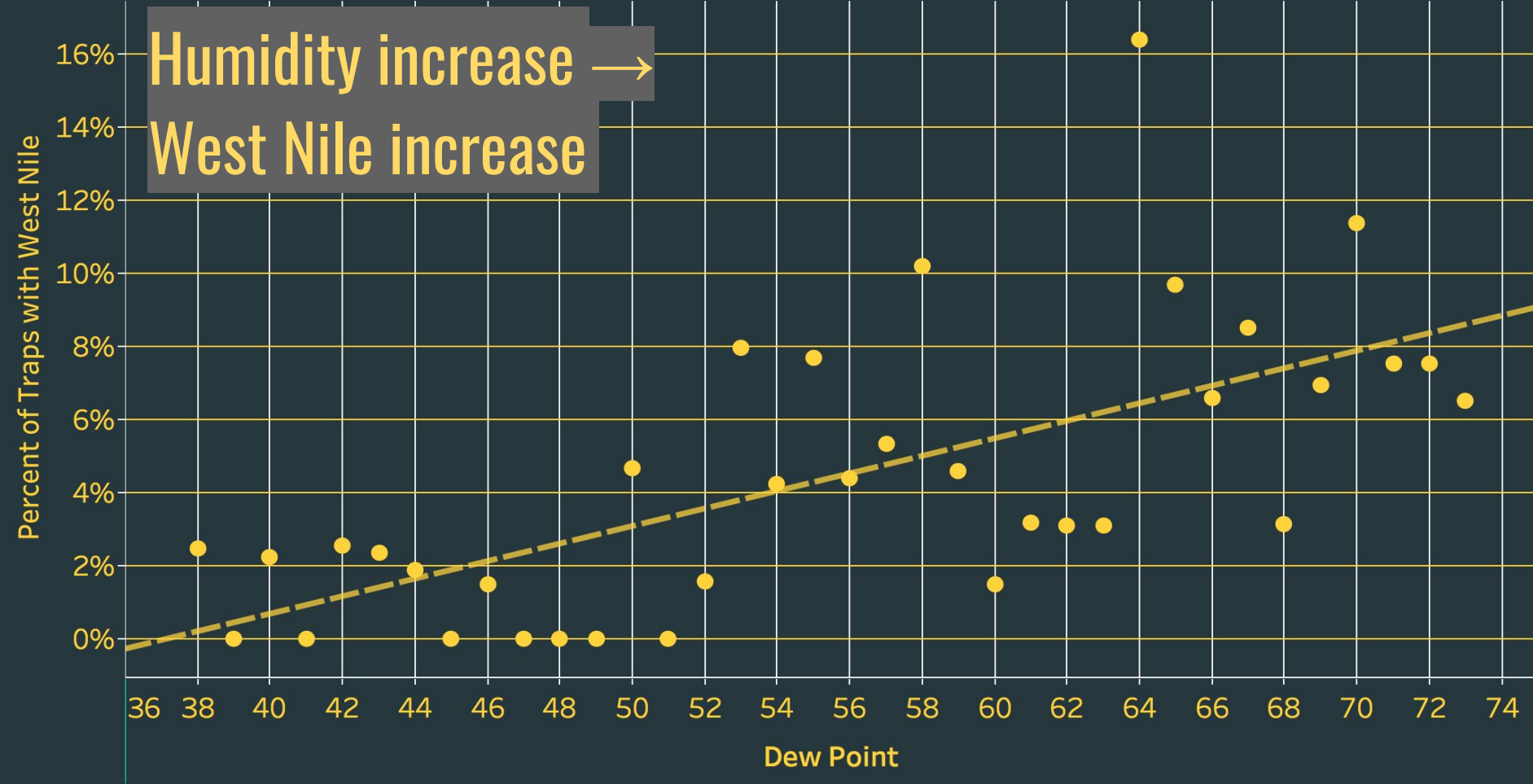
Consequently, a hot, dry summer increases the risk of West Nile virus infection, exactly the opposite of what many people believe”

- Chicago Department of Public Health

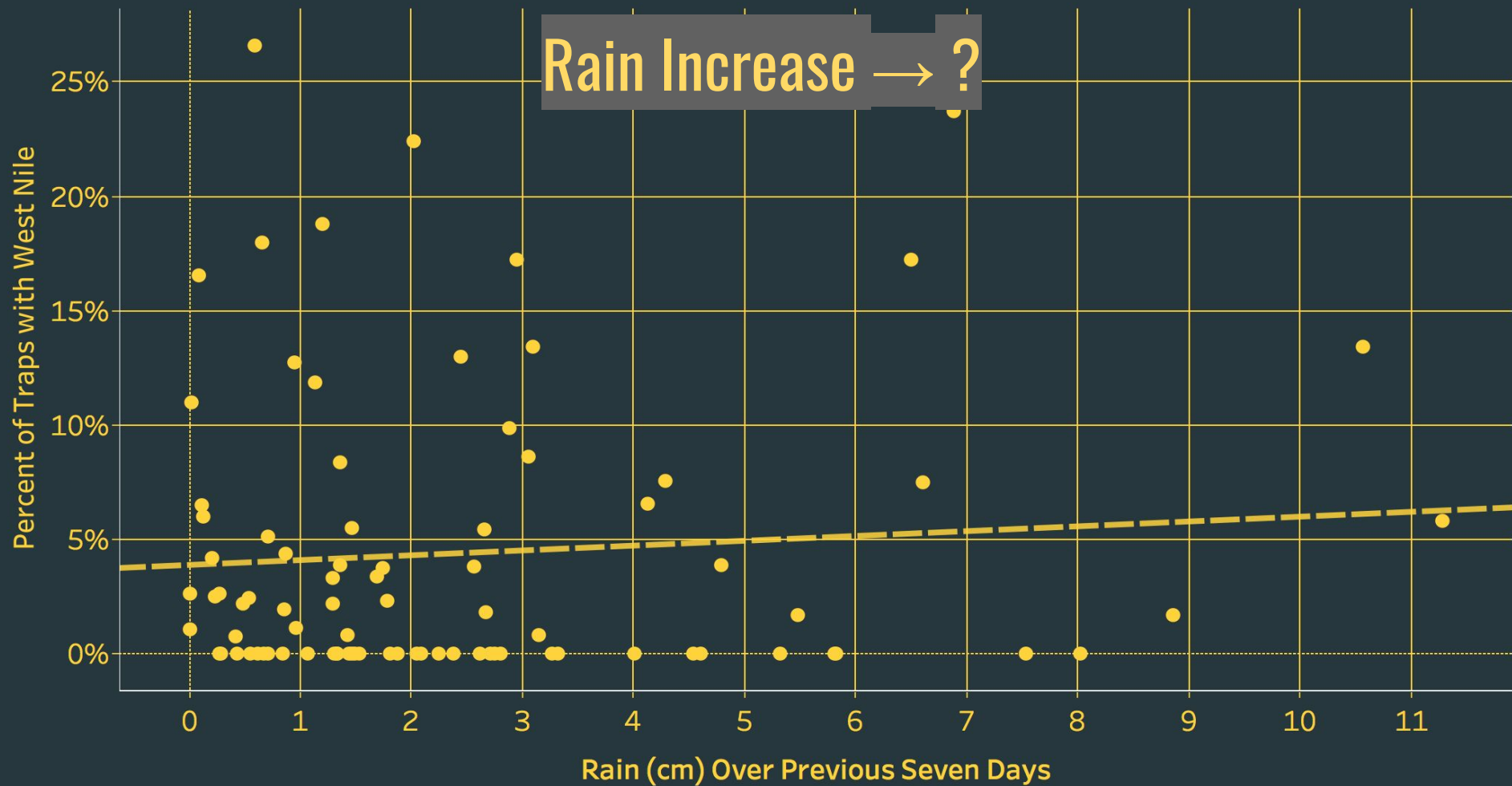
West Nile Rate by Temperature



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

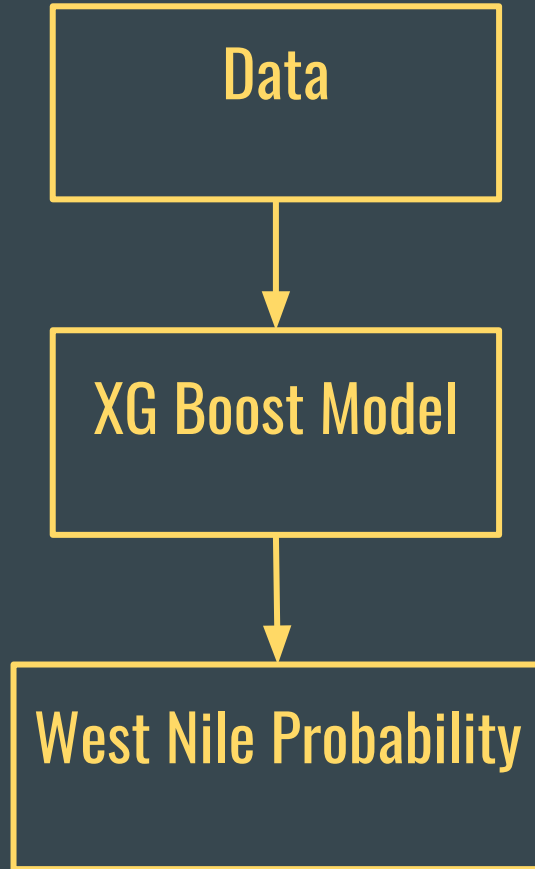
Longitude

Latitude

Culex Pipiens

Month

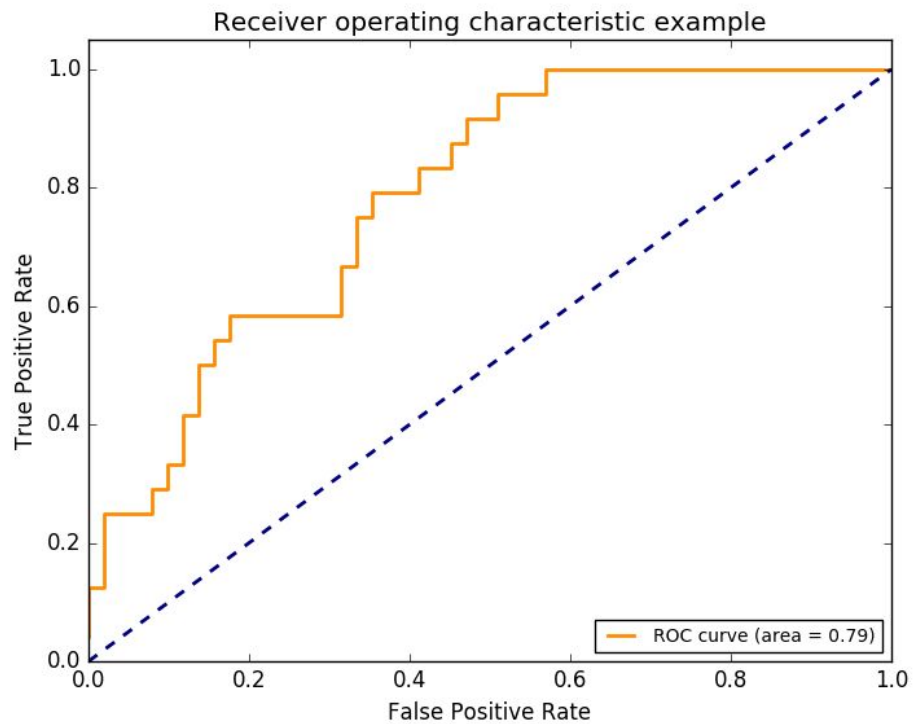
Model Features



Score:

75.110%

ROC Curve



Interpreting Results



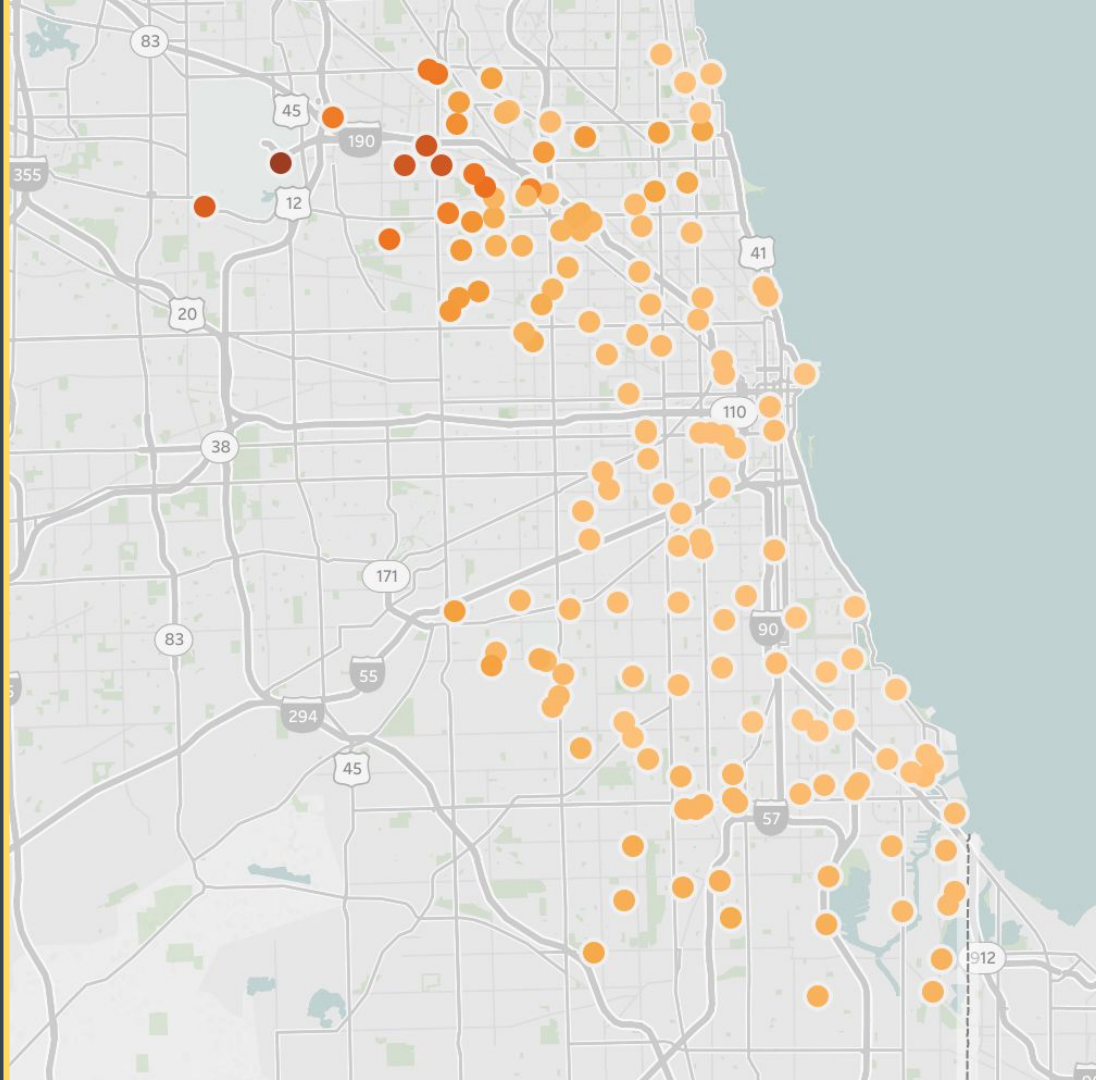
Final Predictions

Average Probability of West Nile Presence



1.74%

14.44%



Zip Code Map with Population Density

Density



195

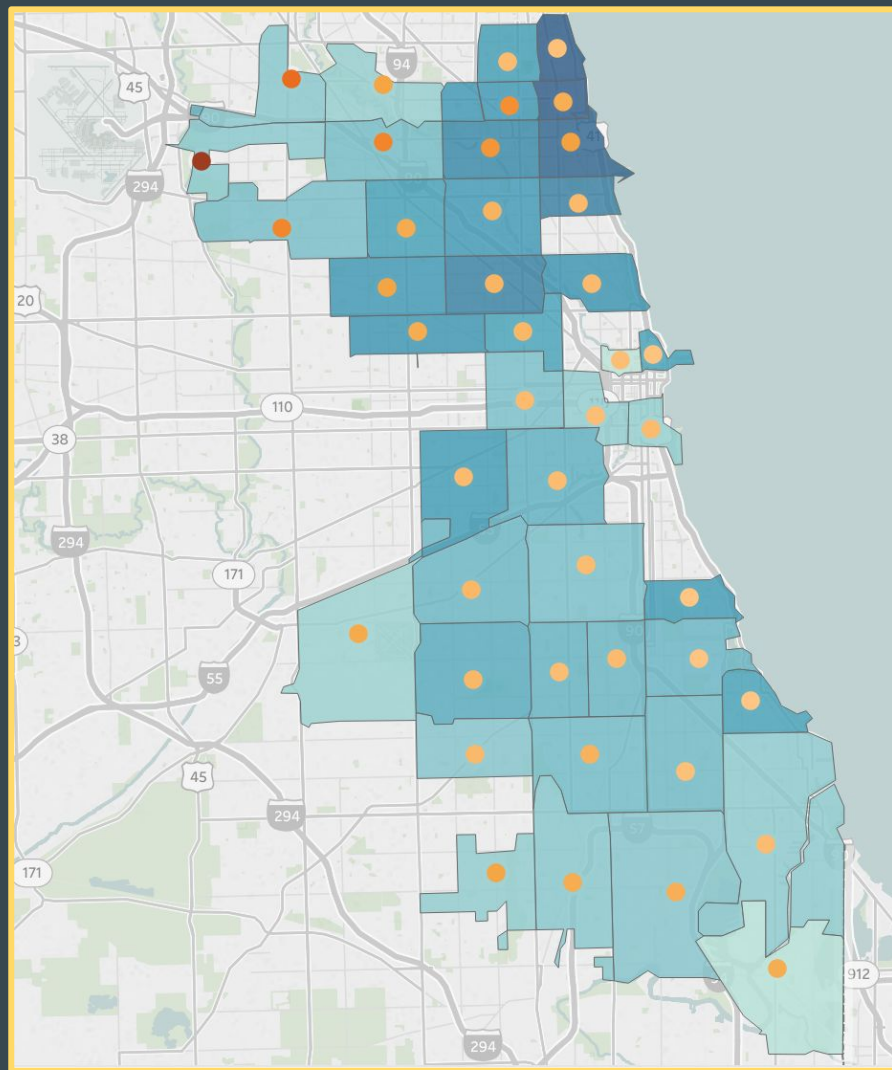
34520

Average Probability of West Nile Presence



1.87%

10.72%



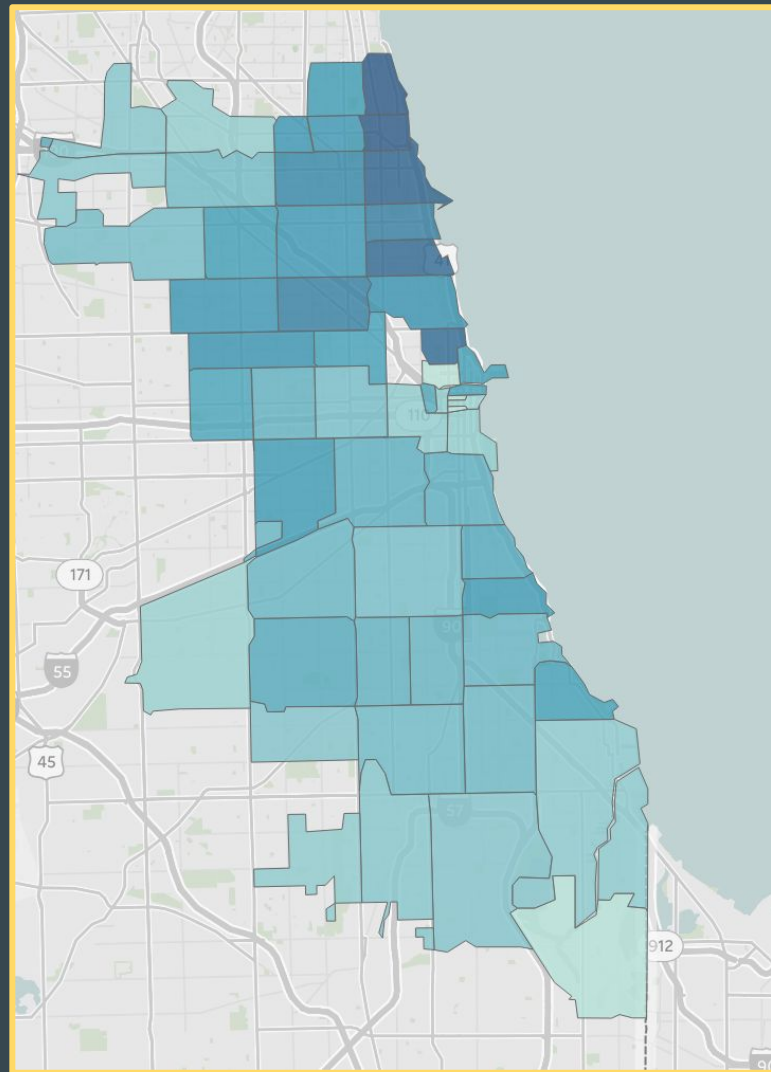
Density x West Nile Probability

Density * West Nile Probability

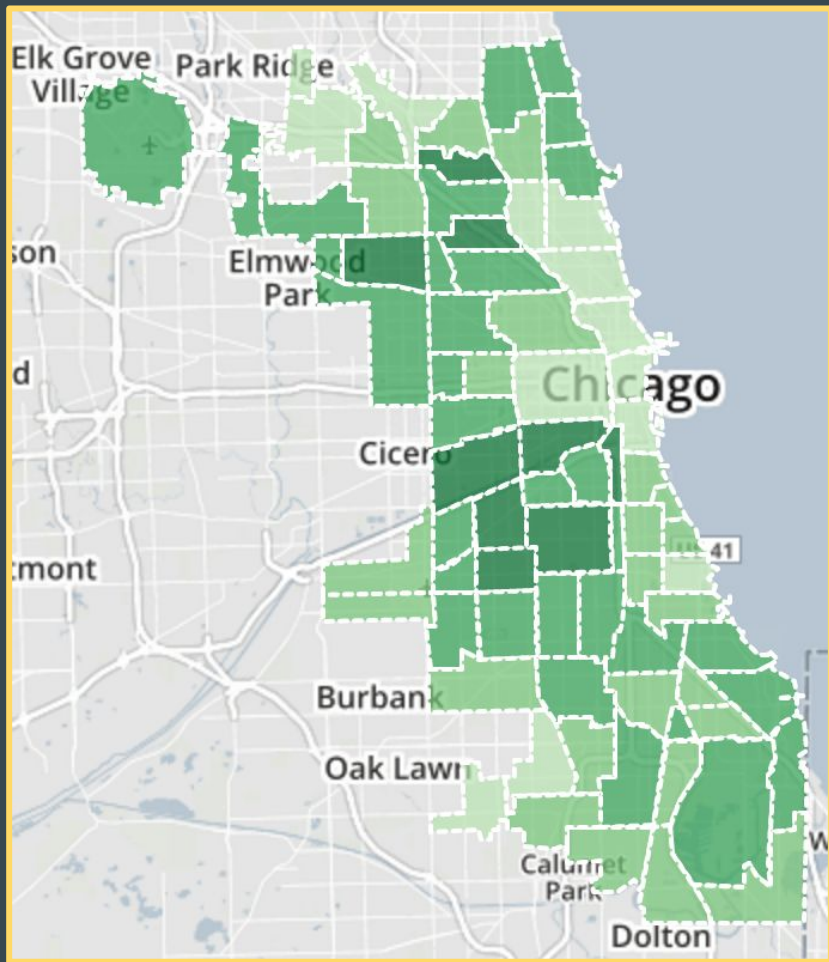


0.0%

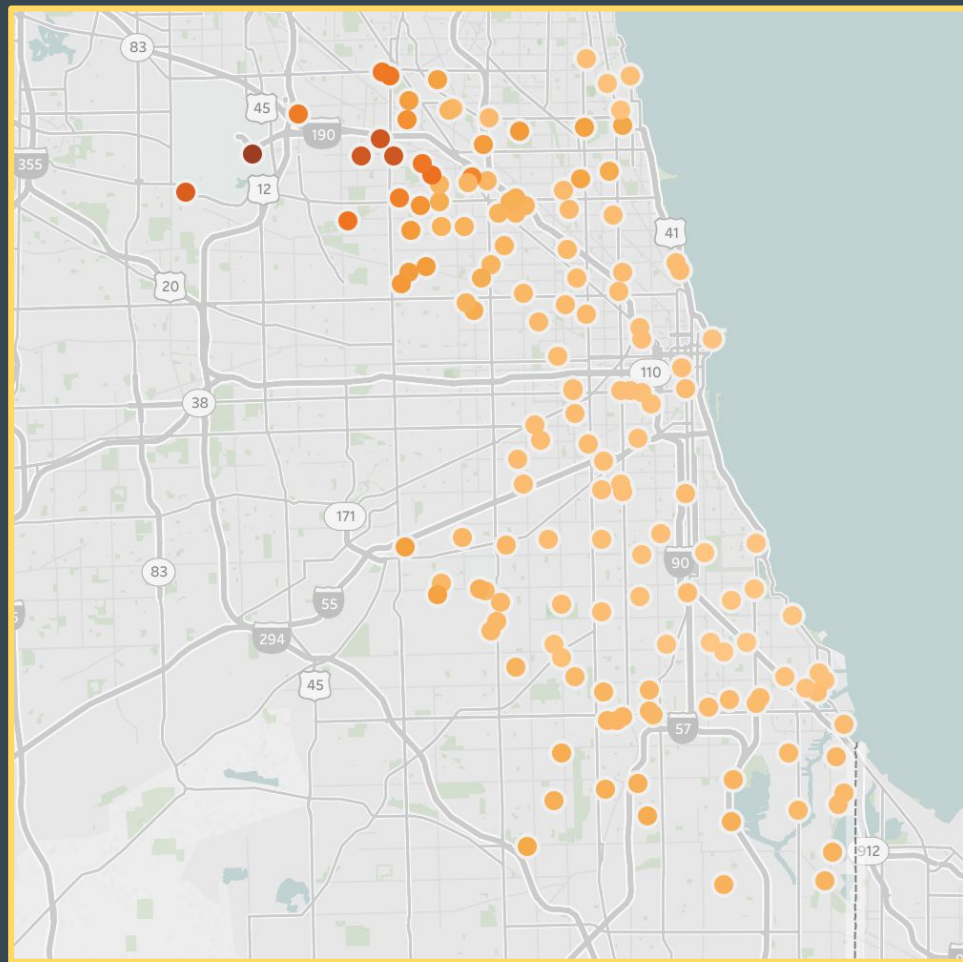
100.0%



Uninsured Rate



West Nile Probability



Conclusions

- Overall, West Nile probability is low
- Key Predictors
 - Temperature
 - Month
 - Humidity
 - Location
- Spraying areas should consider population and healthcare access



Questions

