# PREDICTING GUN VIOLENCE IN CENTRAL PHILADELPHIA

The following analysis determines predictive variables of known gun violence incidents in northern Philadelphia. The data given for both north and central Philadelphia is as follows:

Populations

| | |
|---|---|
| **HISPANIC** | Hispanic Population |
| **NHWHITE** | Non-Hispanic White Population |
| **NHBLACK** | Non-Hispanic Black Population |
| **NHASIAN** | Non-Hispanic Asian Population |

Conditions

| | |
|---|---|
| **Pct_Col2** | Percentage of population in college for at least two years |
| **Pct_le_5yr** | Percentage of population below the age of 5 years old |
| **Med_Rent** | Median monthly rent in dollars |
| **Pct_Pov** | Percentage of population living below the poverty level |

Using Inverse Distance-Weight(IDW), Kernel Density, and Iso Cluster Unsupervised Classification, the combination of variables that have the greatest predictive power over gun violence incidents are determined for northern Philadelphia. The process is repeated on the same variables for Central Philadelphia to predict where gun violence is likely to occur.

Figure 1 depicts the outcome of the analysis on Central Philadelphia. The darker red values indicate greater likliness.

Analysis on following pages.

*Olivia Scalora*
*Assignment 7*

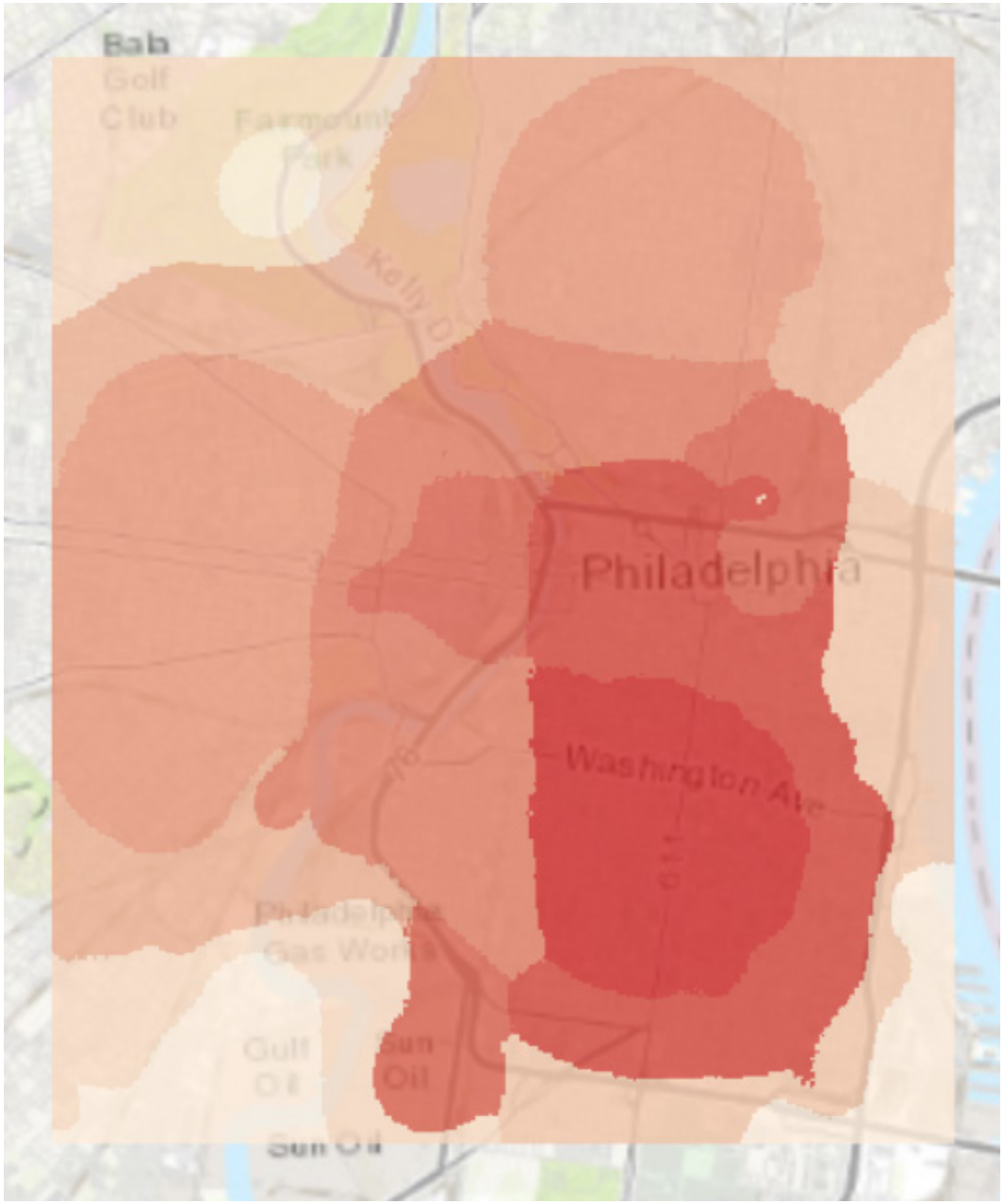


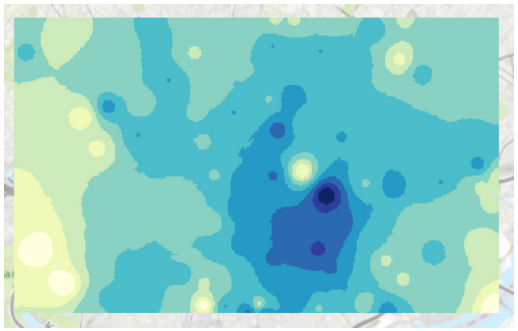

*Figure 1.*

# IDW

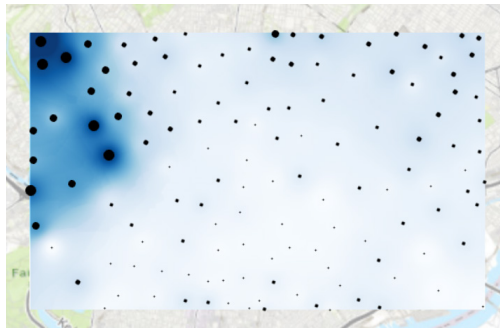
IDW calculates the weighted average of point values between points. It is used in this analysis on the variables previously listed under conditions. Each raster output is then sliced into 10 classifications in preparation for the Iso Cluster tool.

IDW_Pct_le_5yr

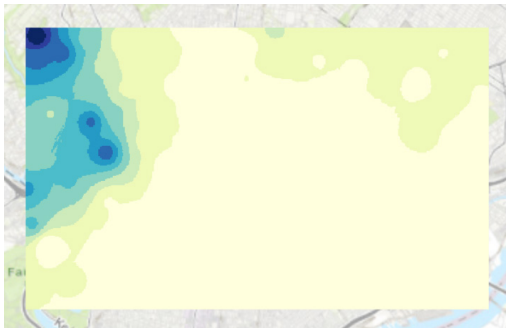
*slice*



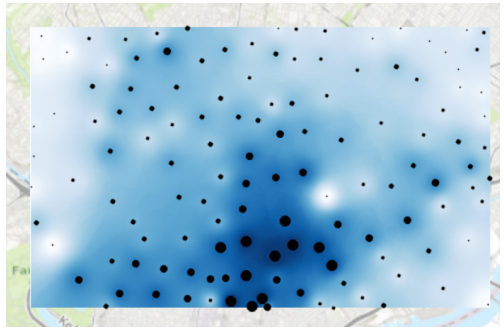
IDW_Pct_Col2



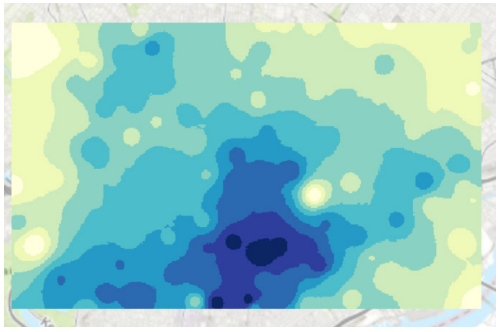
*slice*



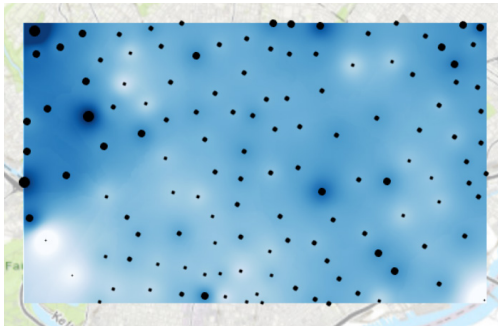
IDW_Pct_Pov



*slice*



IDW_Med_Rent

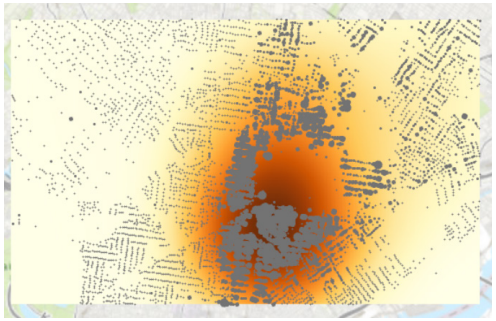


*slice*

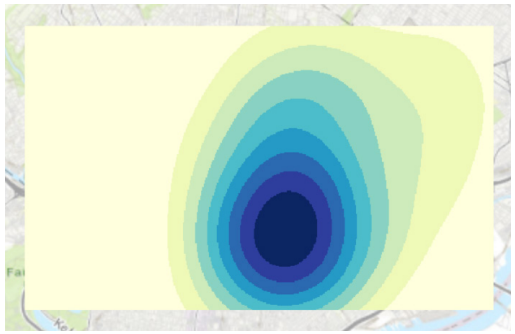
# Kernel Density

Kernel Density is operated on poplation variables. Each raster output is then sliced into 10 classifications in preparation for the Iso Cluster tool.

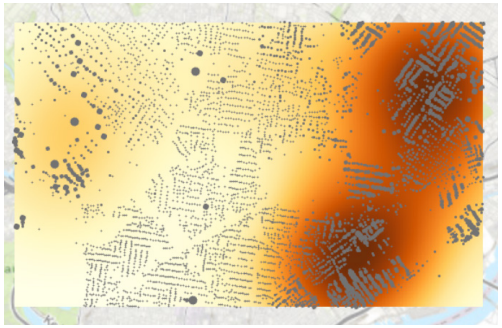
HISPANIC



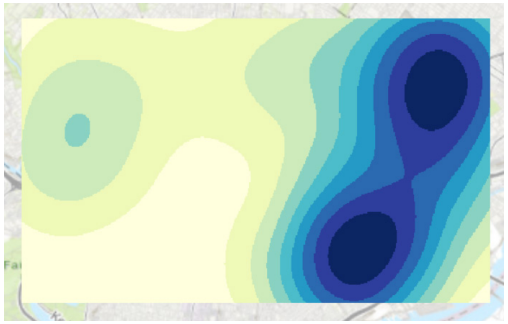
*slice*



NHWHITE

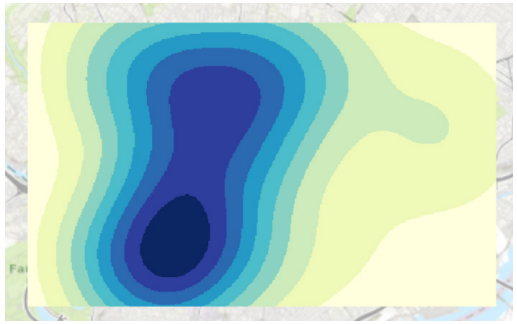


*slice*

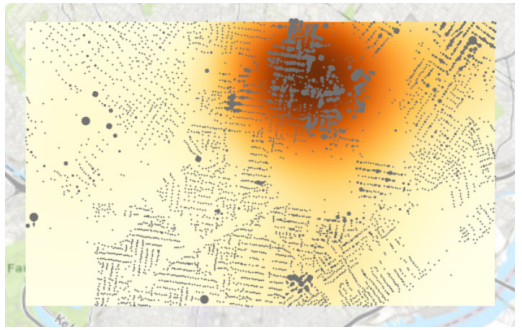


NHBLACK

*slice*

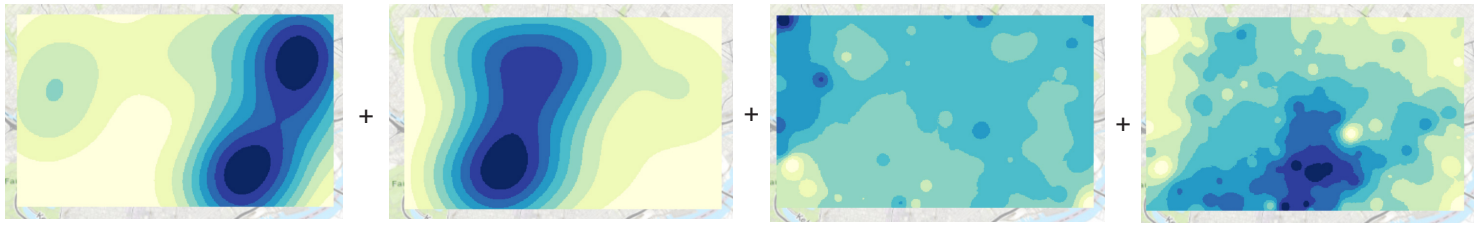


NHASIAN



*slice*

# Iso Cluster Unsupervised Classification



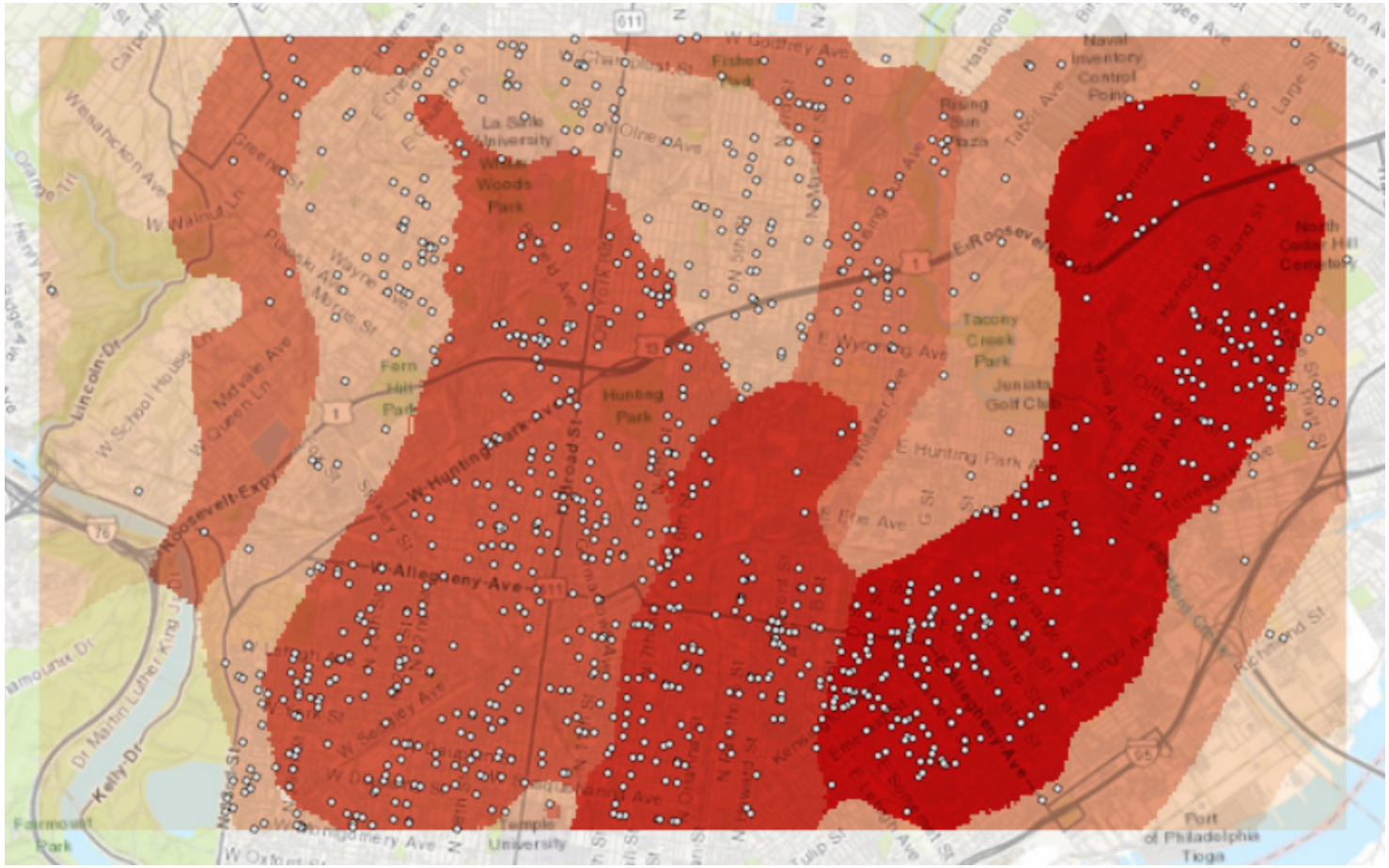




*Figure 2.*

Iso Cluster Unsupervised Classification aggregates a variable rasters to create a =range of values. Inputting the slice output for each predictive variable into the tool will result in a raster that aligns with the gun violence point data in North Philadelphia. This step takes a bit of trial, error and iteration to determine which variables have predictive power and which appear to be irrelevant.

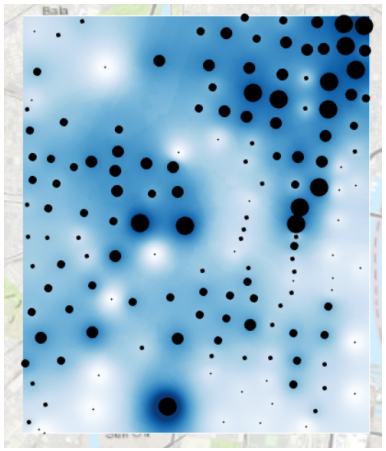
It is determined that the combination of **KD_NHWHITE + KD_NHBLACK + IDW_Med_Rent + IDW_Pct_Pov** = the raster layer with geometries and values that closely match the gun violence point data, and can therefore be applied to central Philadelphia for predictive purposes.

Figure 2 depicts the output “training” raster of the Iso Cluster tool and the gun violence points, illustrating their overlap and indicating the significance of the chosen variables.

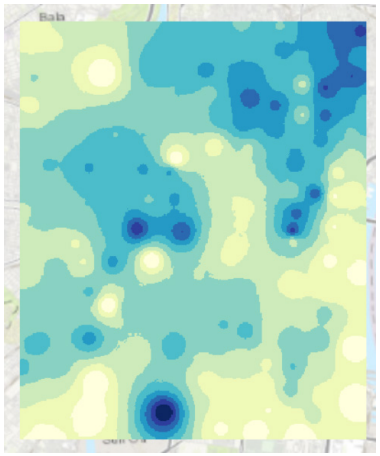
# Predicting Central Philadelphia

Having the same Population and Condition data sets for central Philadelphia allows us to repeat the process of creating IDW and Kernel Density rasters for the predictive variables, and inputting them the Iso Cluster tool to create a raster of the same classification as out “training” raster on the previous page to predict areas of high gun violence where we do not yet have data.

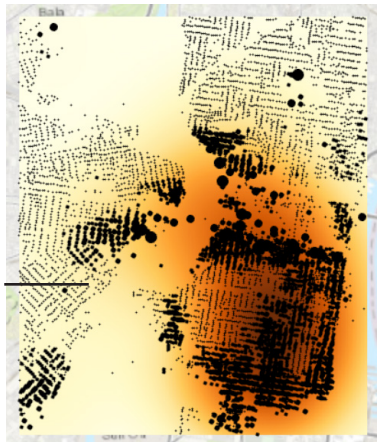
IDW_Pct_Pov



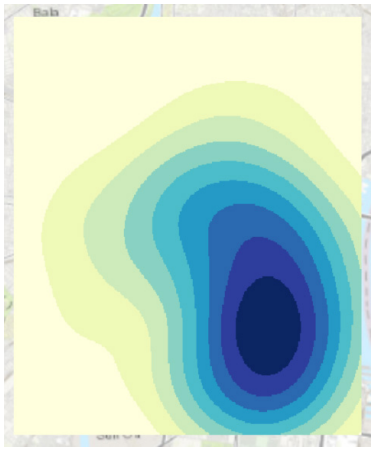
*slice*



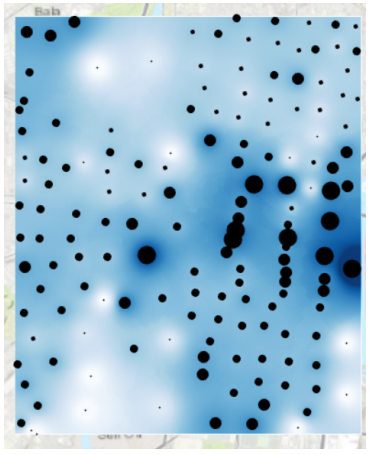
KD_NHWHITE



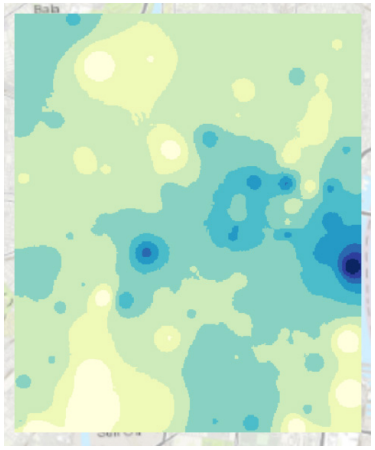
*slice*



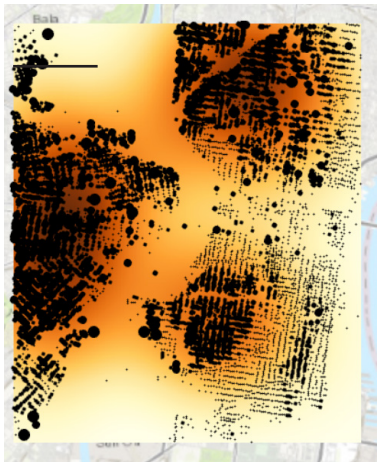
IDW_Med_Rent



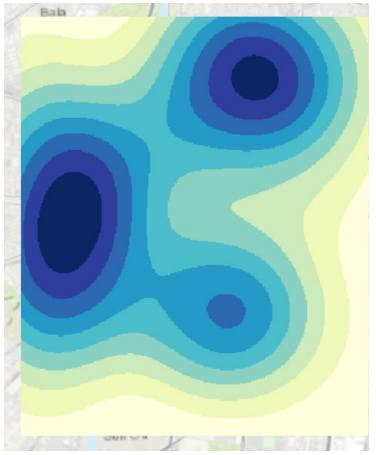
*slice*



KD_NHBLACK

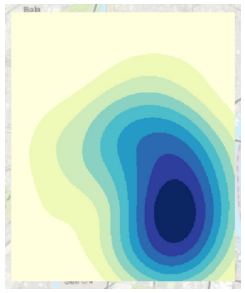


*slice*



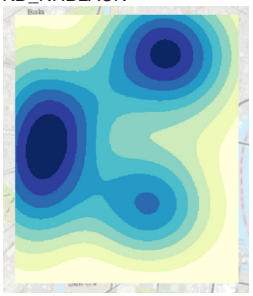
# Prediction Result

KD_NHWHITE



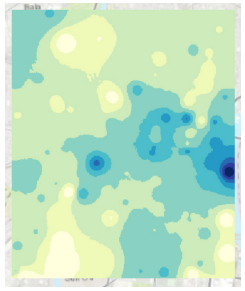
+

KD_NHBLACK



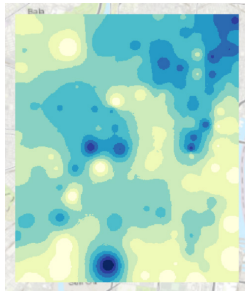
+

IDW_Med_Rent

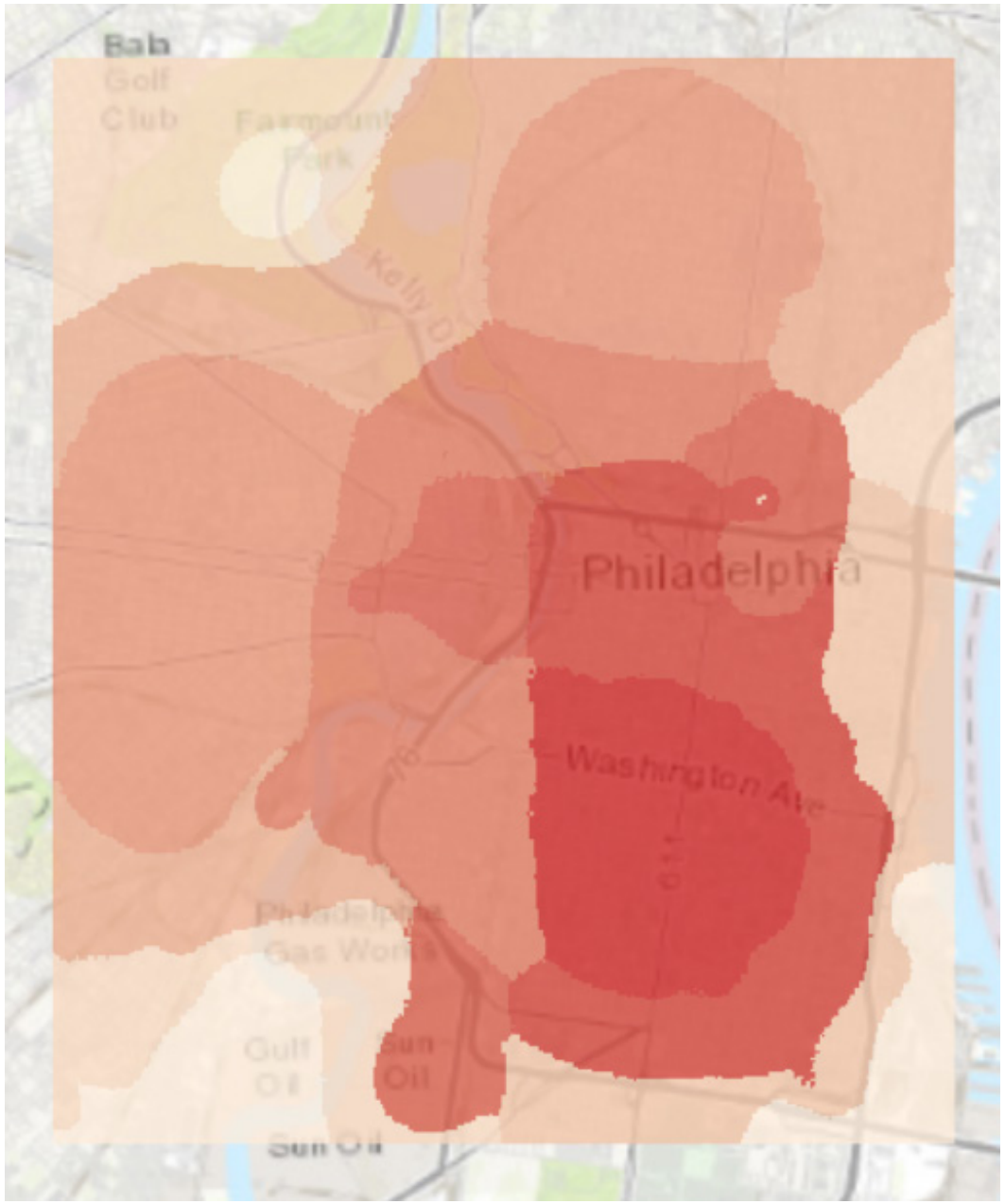


+

IDW_Pct_Pov



=




The raster that is produced when running the sliced versions of each IDW and Kernel Density raster of the predictive variables through the Iso Cluster tool indicates in darker red values where gun violence is likely to occur in central Philadelphia as determined by our nothern Philadelphia “training” data.