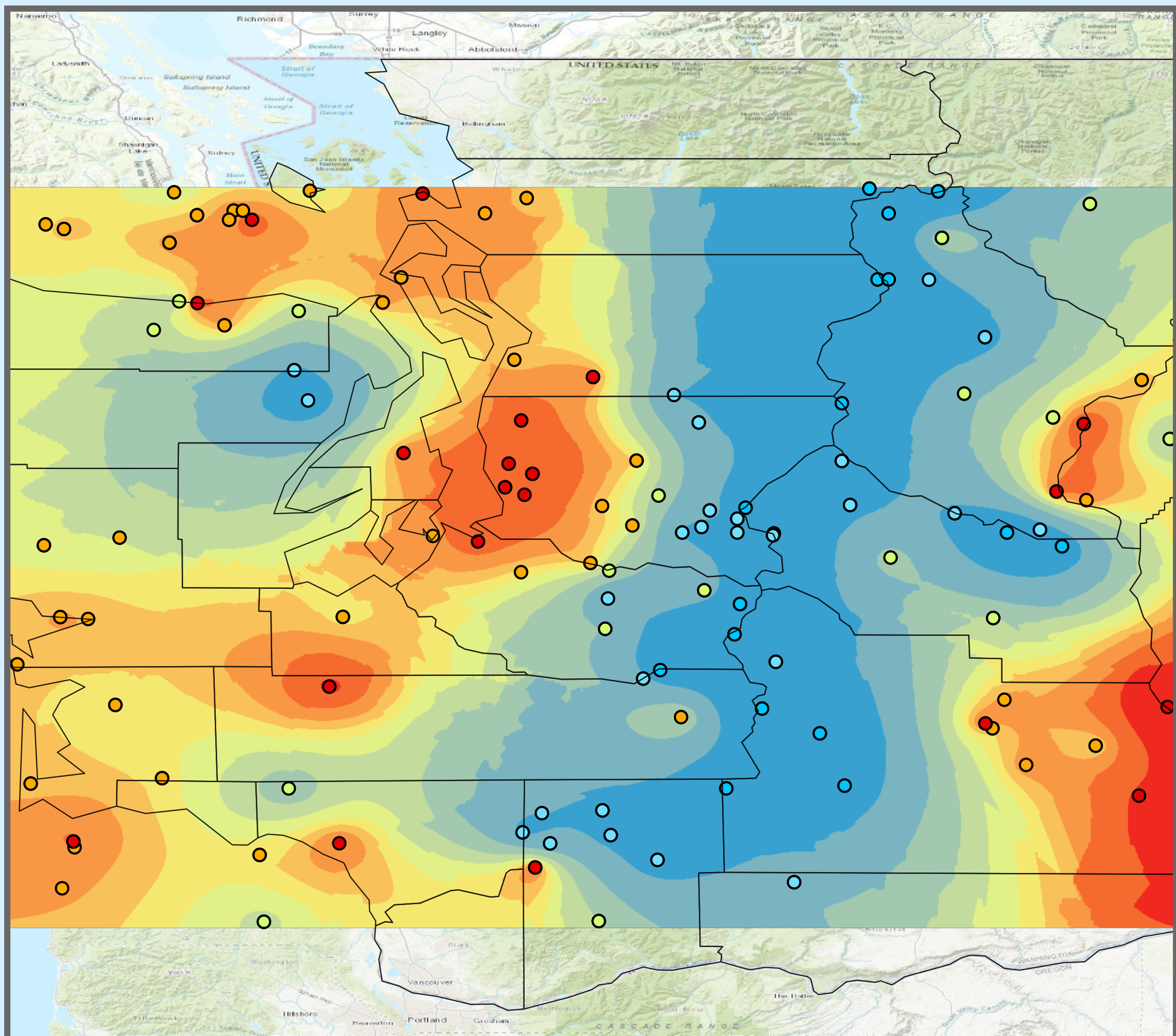


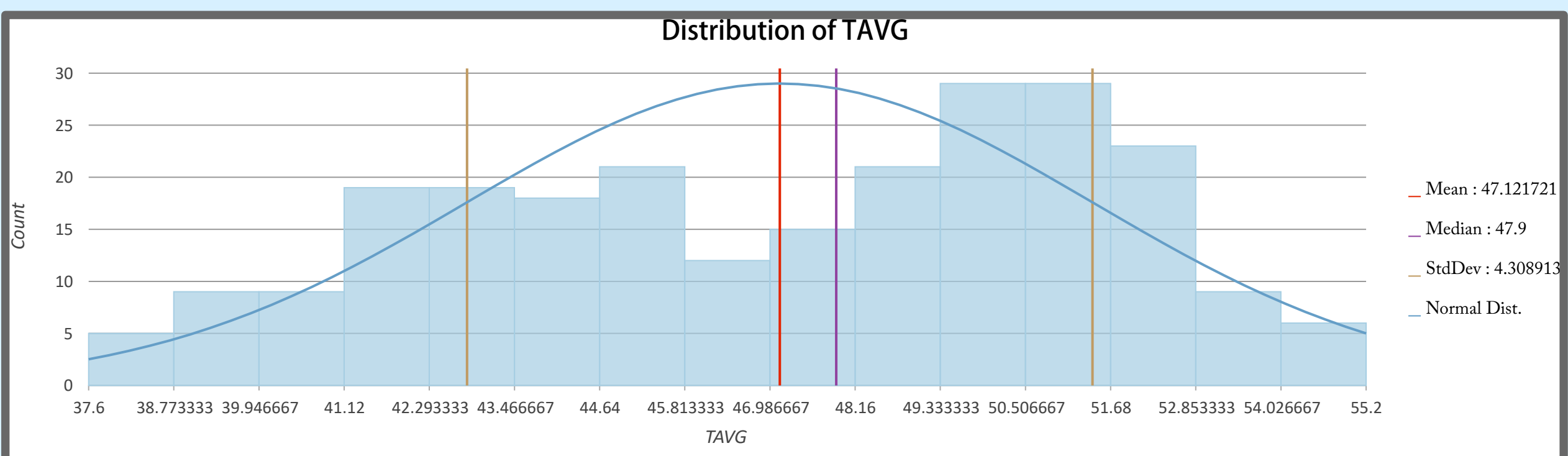
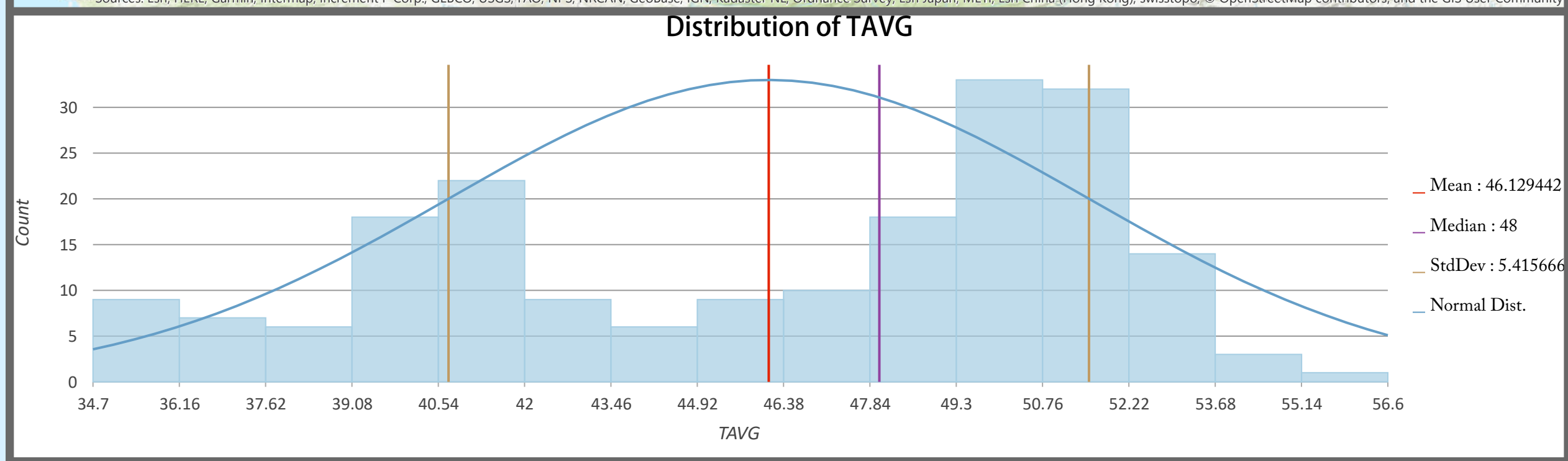
THE URBAN HEAT ISLAND EFFECT ON VEGITATION HEALTH: Seattle, WA

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1999-2000
Temperature

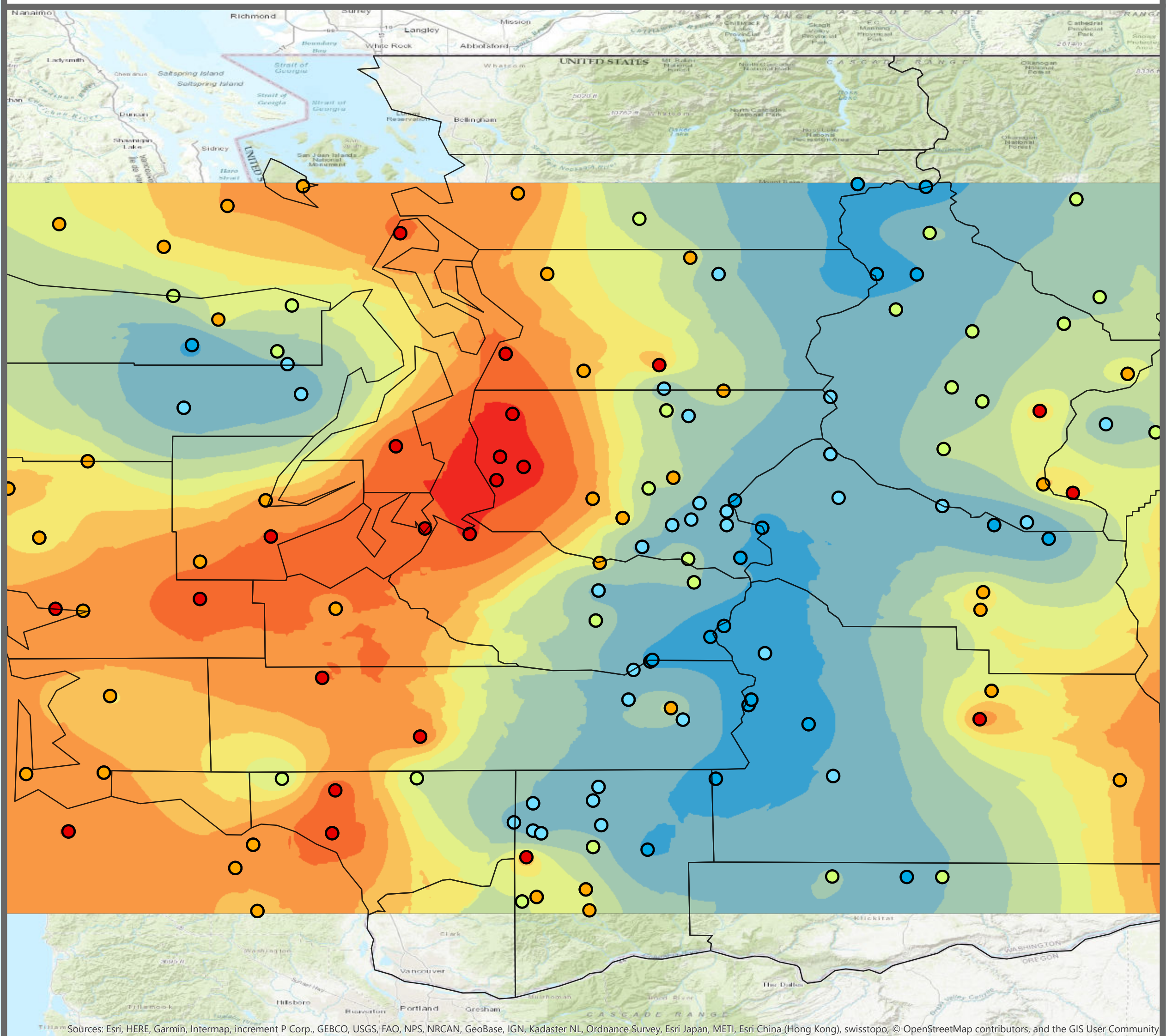
Washington Counties
1999-2000 Temperature Indices
TAVG
● ≤39.300000
● ≤43.900000
● ≤48.300000
● ≤51.300000
● ≤56.600000
Temperature
VALUE
■ ≤ 42.41
■ ≤ 45.44
■ ≤ 47.33
■ ≤ 48.55
■ ≤ 49.37
■ ≤ 49.95
■ ≤ 50.54
■ ≤ 51.45
■ ≤ 52.94
■ ≤ 55.46



2017-2018

Temperature

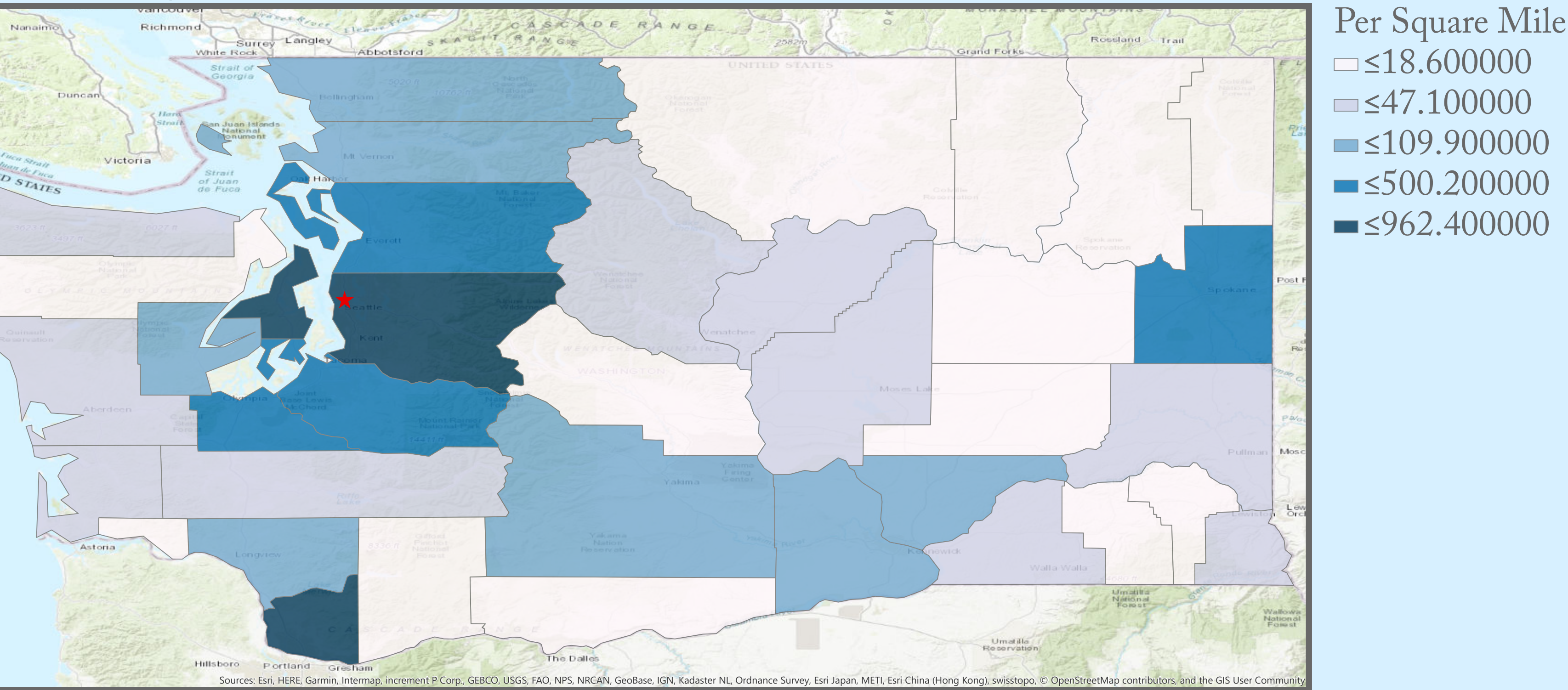
Washington Counties
2017-2018 Temperature Indices
TAVG
● ≤42.200000
● ≤45.900000
● ≤49.100000
● ≤51.900000
● ≤56.300000
Temperature
VALUE
■ ≤ 42.41
■ ≤ 45.44
■ ≤ 47.33
■ ≤ 48.55
■ ≤ 49.37
■ ≤ 49.95
■ ≤ 50.54
■ ≤ 51.45
■ ≤ 52.94
■ ≤ 55.46



Introduction

The associated study attempts to uncover the effect of heightened and rising temperatures in large urban areas on vegetation health. An increasingly relevant area of study following the advent of global warming, the associated “infernos” plaguing urban landscapes across the globe have the capacity to seep beyond concrete jungle walls to reap havoc on once lush and vibrant vegetation and ecosystems. Utilizing historical temperature data and Landsat aerial imagery for the greater Seattle metropolitan area, the resulting GIS analysis supports the extent to which increased urbanization has affected the surrounding landscape.

Washington State Counties: Population



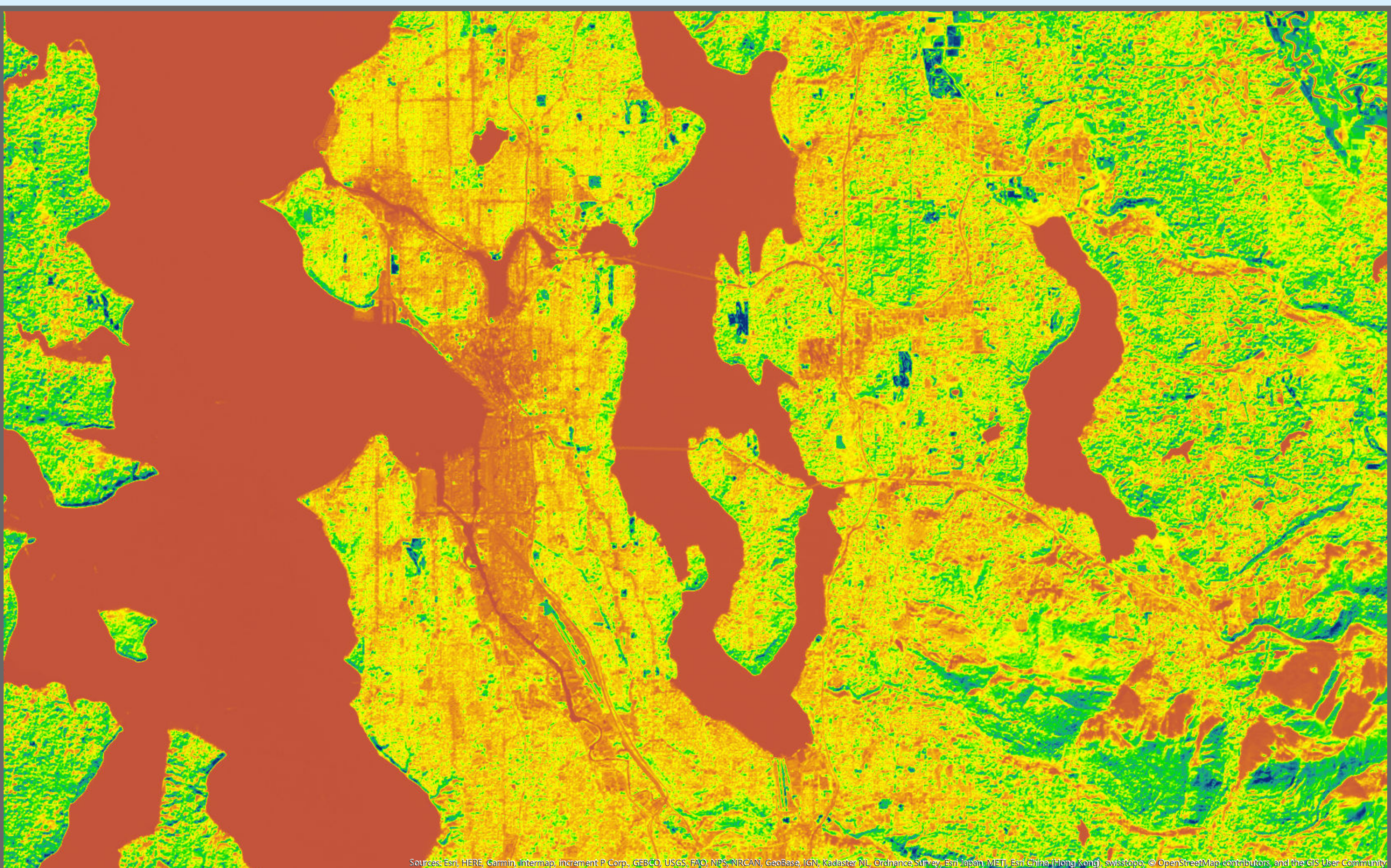
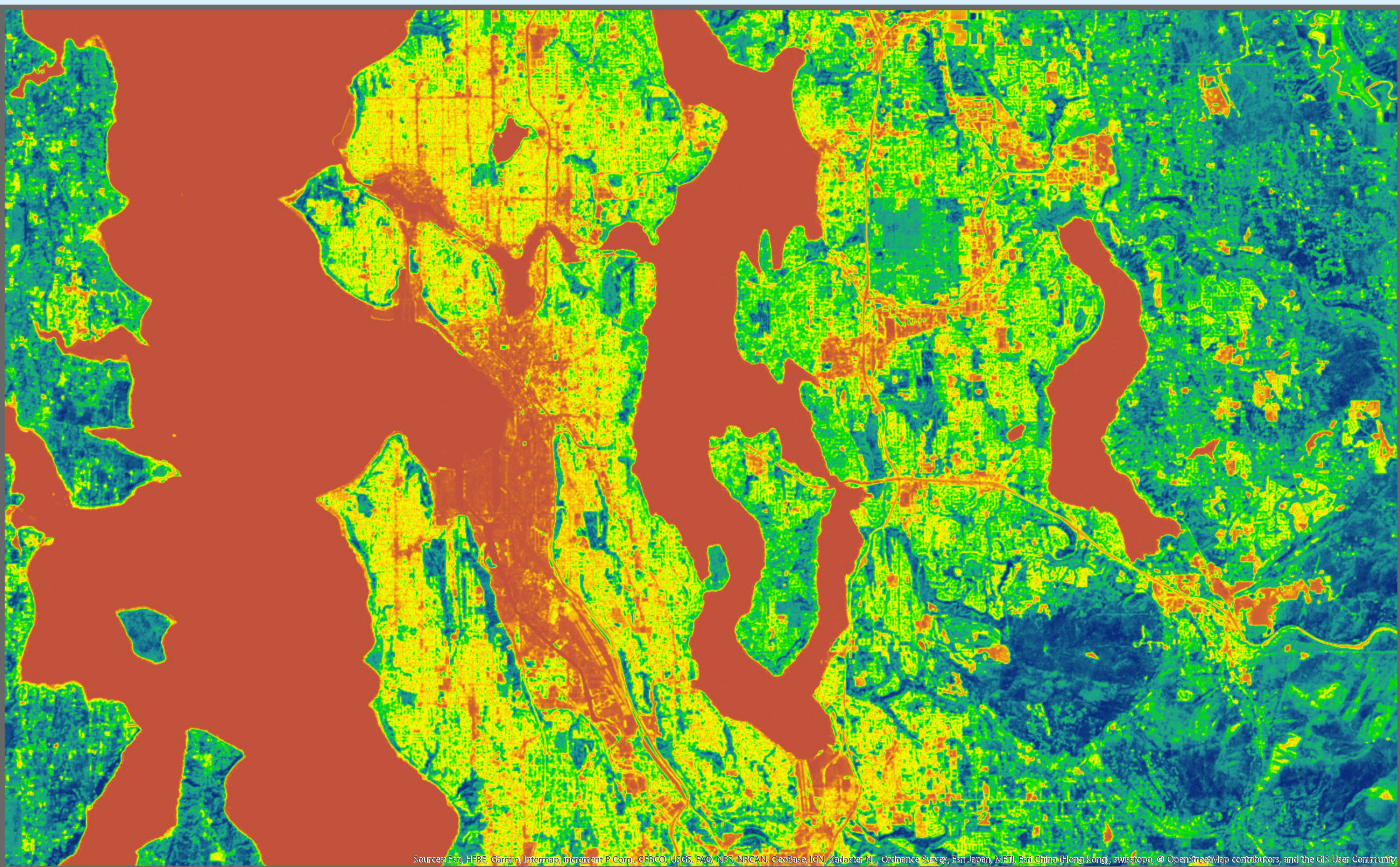
Results

Displaying a comparison of temperature indices collected across Washington state in 2000 and 2017, an Empirical Bayesian kriging method of geostatistical interpolation was utilized to subset the data by the temperature composition of each point, and specify the degree of associated overlap or area that vertex is projected to impact. Utilizing temperature data obtained from NOAA, the resulting analysis supports the increasing impact of the Urban Heat Island effect on the Seattle area, and the adjacent “Temperature” maps illustrate the spatial extent of associated heightened temperatures across the state. The accompanying histograms, communicating a shift in mean and median temperature averages from 2000 to 2018, further communicate the gradual change in climate conditions.

Inclusion of the “Washington State Counties: Population” map works to provide context behind the area of study by offering a larger scale projection of location, and a data symbology representative of population density per square mile. Further highlighting the city of interest as the epicenter of urbanization in the region, the corresponding US Census data boasts extremely dense populations in Seattle’s county of residence, King. When compared to the “Temperature” maps, the resulting analysis supports a correlation between population density and increased temperatures in highly urbanized areas.

“1999-2000 Landsat 7 Aerial Imagery” and “2017-2018 Landsat 8 Aerial Imagery” map renderings offer an analysis of the Normalized Vegetation Index (NDVI) for each associated time period. Through the utilization of red and infrared band combinations, the reflectance value and correlating NDVI values of encompassed features have been displayed. Depicting healthy vegetation in blue and green, as vegetation health declines and the absence of vegetation is more prevalent, the color scale shifts into yellow and orange with water primarily symbolized in red. Illustrating a severe decline in vegetation health and sprawl from 1999 to 2018, this analysis of infrared energy offers a descriptive account of urbanizations effect on the landscape.

1999-2000 Landsat 7 Aerial Imagery
NDVI Analysis of Vegetation Health



2017-2018 Landsat 8 Aerial Imagery
NDVI Analysis of Vegetation Health

Conclusion

Functioning as the foundation upon which this study was developed, the Urban Heat Island effect can be defined as a phenomena involving heightened temperature indices in metropolitan areas when compared to surrounding rural landscapes. As proved by the associated analyses and the compiling of their results, the impact of urbanization in Seattle is evident, and its implications on vegetation health is immense. Through the comparison of historical data and imagery, the drastic change in landscape composition can be connected to an intensifying urban heat island. Entailing heightened temperatures covering larger areas, and more dense populations locating in these growing metropolitan cities, it is likely vegetation health will only continue to decline.