The Relationship Between the Socioeconomic Demographics of Massachusetts and the Presence of Police Stations and Prisons

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In this ArcGIS map project, I decided to explore the relationship between the population characteristics of Massachusetts (MA) and the presence of Police Stations and Prisons respectively. I wanted to pursue a project topic that aligned with passions for environmental and social justice. In saying so, it is often that environmental and social justice be associated with the negative externalities of polluting factories and toxic waste sites disproportionately impacting communities of color or how we refer to others and the language we use to speak on those who do not look like us, and while these are very relevant and pressing topics to take a closer look into, I wanted to take my project in a slightly different direction. The objective of my project is to investigate another element of social justice to see if minority communities have to shoulder the majority of Massachusetts jails and prisons and bear the brunt of policing. Are block groups consisting of predominantly minority populations, lower income residents, or non-English speakers more likely to have a larger police and prison presence? If so, what kind of effects can this have on the culture and lifestyle of the people in those areas? Which block group, if any, is most likely to have a greater police and prison presence?

The population characteristics I will be looking into further are whether an area of MA qualifies for one or more of the “minority,” “income,” or “English isolation” titles from the criterion for Environmental Justice Block groups as defined by Executive Office of Energy and Environmental Affairs', MA Environmental Justice Policy, and the Equal Educational Opportunities Act. These Block Groups were identified with the 2010 group quarters totals in table P42, one of the Census 2010 redistricting (PL-94-171) files. Block Groups with 65% or more of their total population living in university housing and/or correctional facilities for adults

were removed from EJ. Additionally, block groups containing MCI-Concord and MCI-Framingham were eliminated" (MassGIS data 1). Information about the total population, average education level, town municipality ID, total number of households, the land area they make up, etc. was also provided for each block group. For a block group to qualify as a "minority," the percent "non-minority" or not Hispanic, white alone needed to be greater than or equal to 25% of the total population. For a region to constitute one of "income" concerns, the block group must have a median household income of less than or equal to 65.49% of the 2010 Massachusetts state median income, $62,133, which comes out to be $ 40,673. Lastly, to be considered an area of "English isolation," 25% or more households in the block group need to qualify for "linguistic isolation." Household language by linguistic isolation is defined by households in which no one 14 and over speaks English only, they all speak a language other than English at home, and one in which no one speaks English "very well". A block group in Massachusetts may qualify for none, one of these titles, two of these titles, or all three of these titles, they are not mutually exclusive.

ArcGIS is a great resource to explore the demographics of the state of MA, the distribution of these populations, and the consequent presence of different social organizations and resources. I began my project by importing the 'states', 'counties', 'rivers', 'majroads', and 'cities' layers from the Northeastern OneDrive > MGISdata > Usa data folder and standardizing them to the Massachusetts State Plane Coordinate System, Mainland Zone meters projection system along with the 'Police Stations', 'Prisons', and '2010 U.S. Census Environmental Justice Populations' layers I imported from the MassGIS database. This task was very helpful in aligning all of the information to one area of the map and allowed me to move forward in

clipping the ‘counties’, ‘rivers’, ‘majroads’, and ‘cities’ Usa layers to only the state of MA. I decided to leave the ‘states’ layer as is to give the map viewer some perspective of the location at the same time letting them know that the focus of the project is on the state of MA. After clipping these features, I was able to change the coloring, sizing, and organizing of the visible layer features that would best allow the viewer to see all of the components clearly. I decided that a light background was best to make out the minority, income, and English isolated block groups and elected to define the groups that satisfied the different combinations of the three categories, denoting these seven qualifications with a different color. The next step in the process was to utilize the ‘Select by Attributes’ query tool to distinguish subgroups from the larger topic groups in this project analysis using the information present in their Attribute Tables: the ‘MajroadsClip’ layer-> ‘Arterial’, ‘Freeway’, and ‘Interstate’, the ‘Police Stations’ layer -> ‘Local Police’, ‘State Police’, and ‘County Sheriff’, and the ‘Prisons’ layer -> ‘County Jail’ and ‘State Prison.’ These distinctions were more so for aesthetic comprehension reasons but would not necessarily have an effect on the outcome of my research. After this, I began to gather information about the relationship between the presence of an environmental justice (EJ) block group and the presence of a police station or prison using three different methods to prevent executionary error and affirm the results of my findings.

To better normalize how I will be defining the word ‘presence’ as it concerns police stations and prisons, I will be using a standard radius of 2 miles around each of the EJ block groups to qualify for the observed ‘presence’ of one or two of the institutions. I wanted to include all of the stations and correctional facilities that would still actively patrol and affect the EJ groups despite their residence not being directly within the neighborhoods themselves. The

first method I used to determine the fraction of police stations and prisons present in EJ block groups versus non-EJ groups was to take advantage of the 'Select by Location' query feature which allowed me to select all of the police stations and prisons that were located inside or within 2 miles of an EJ block group. This search isolated 223 of the 357 police stations and 19 of the 25 prisons in greater MA. Second, I utilized the 'spatial join' features provided by the ArcMap software. In order to answer my question "how many of the police stations and prisons in the state of Massachusetts reside inside or within 2 miles of environmental justice block groups?", I used a 'summarized spatial join' with the '2010 U.S. Census Environmental Justice Populations' layer as the destination layer appending the number of stations and prisons in each MA EJ block group to identify 223 police stations and 19 prisons in MA satisfying that criteria. The final method I used to investigate my research question was a process of buffering and intersecting. I established 2-mile buffers around each of the MA EJ block groups which allowed me to use the ArcToolbox > Spatial Analyst Tools > Intersect Tool to query for all of the point police stations and prisons that lied within the previously constructed buffer. This method, again, isolated 223 stations and 19 prisons that intersected their point locations with the EJ block group buffer. I was very happy to get consistent results from each of the methods.

As previously stated, the total number of police stations was 357 and the total number of prisons was 25 in the entirety of MA as outlined by the MassGIS database in 2010. Nonetheless, the three methods I employed to assess their distribution over the greater Massachusetts landscape consistently determined an outcome that 223 out of 357 or 62.5% or prisons and 19 out of 25 or 76.0% prisons are located inside or within 2 miles of the previously defined minority, income, and English isolated block groups. The two results respectively lend

themselves to slightly different conclusions; however, the two percentages are both too low to make any definitive conclusions about a correlation between EJ block groups and police and prison presence. Although this analysis lends itself to a conclusion that more than half of each institution respectively reside in minority, income, and English isolation EJ monitored areas, correlation does not mean causation. There are contributing external factors or 'confounding variables' not investigated in this project that could have affected this result. It is true that the map outlined a far smaller number of police stations and prisons in rural, predominantly white, upper-middle class, English speakers; however, this conclusion could be attributed to the decreased demands of a less urban setting, smaller populations, older age demographics, and a myriad of other factors. That being said, it is important to note that only 6 out of 25 of the county jails and state prisons resided in these aforementioned white, upper-to-middle class, English speaking block groups. A big topic in the environmental and social justice community is the extent to which "unattractive" landmark facilities are conveniently placed in these EJ block group areas with overall, "Landfills, hazardous waste sites, and other industrial facilities are most often located in communities of color" and "lead poisoning, climate change, and water contamination disproportionately affecting low-income communities and communities of color" (Bell). The findings of my ArcGIS project support this conclusion. Even so, it would be inaccurate to extrapolate 'facts' from these findings and project them onto the entirety of the continental United States. Because of this, I would have liked to analyze the topic of this project research on a national scale; however, Massachusetts was the only state I could find recent, concrete data on considering the factors I need for this project. I was also hoping to make connections between police and prison presence and crime rates, but again, this information was

not available to me for each EJ block group in MA and the data could not be translated into the ArcGIS software to aid in my research. Nonetheless, this project provided me with valuable insight into the socioeconomic demographics of the state of Massachusetts and the necessity for increased research into the different aspects of environmental and social justice.

Figure 1

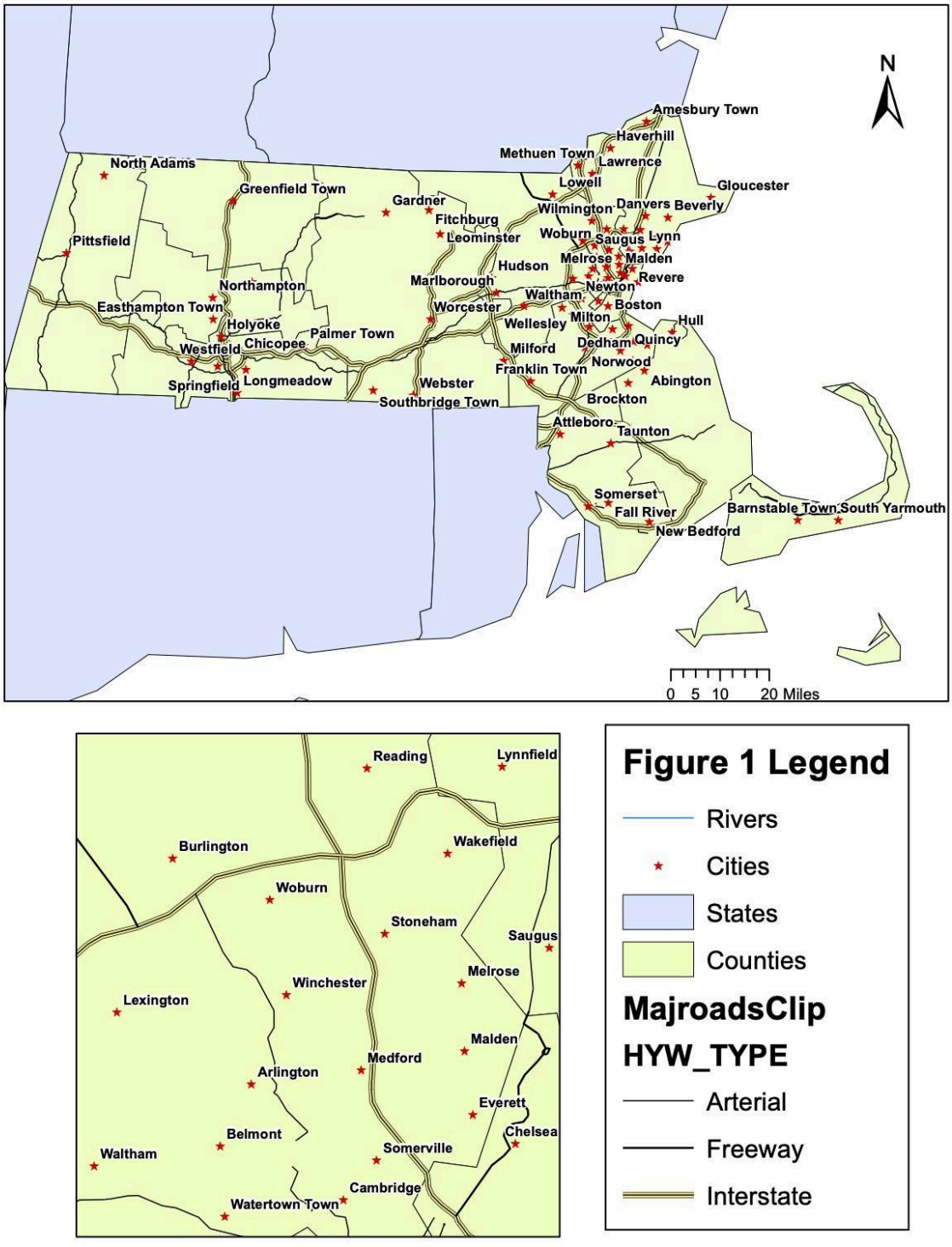
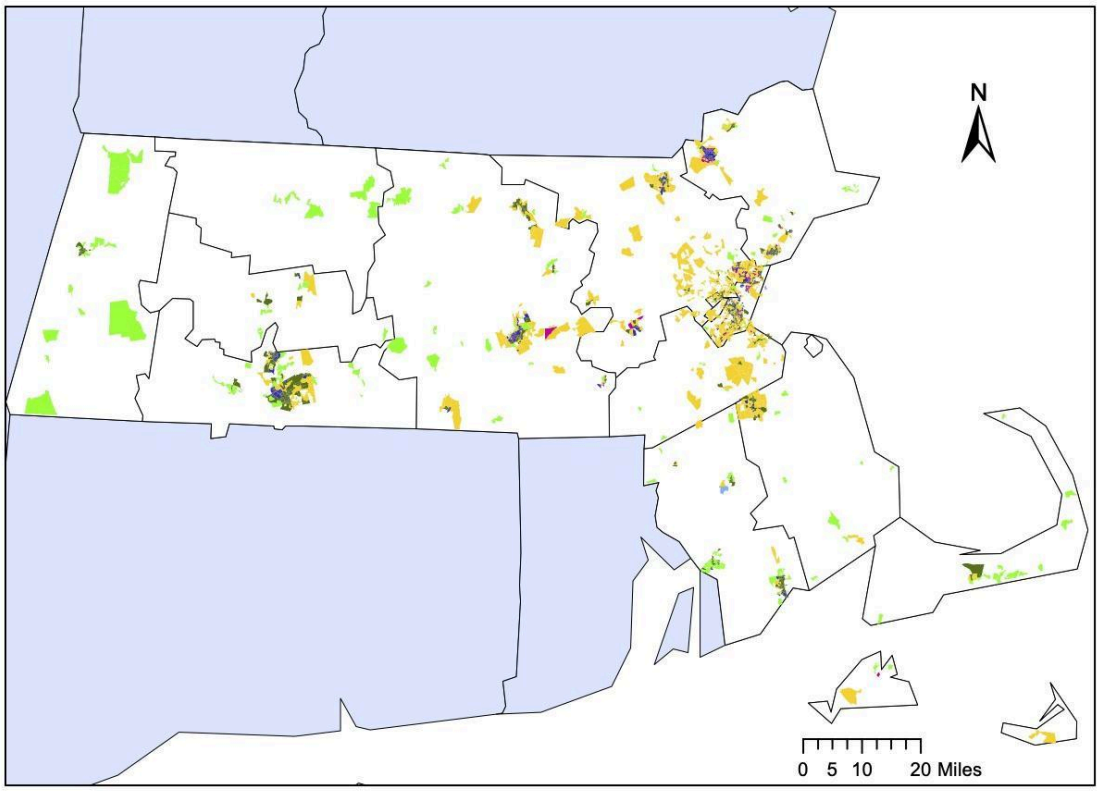


*Figure 1 shows what the map looks like clipped, all in the same Massachusetts projection

before analyzing the EJ block groups and police stations/prisons.

Figure 2



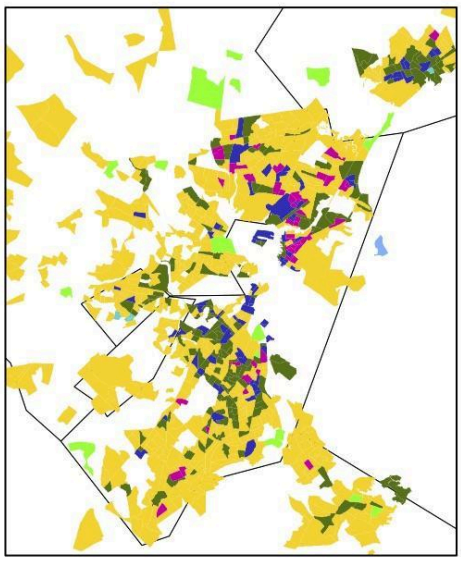


Figure 2 Legend

Counties

States

Environmental Justice 2010 Populations

EJ Criteria, by Block Group

Minority

Income

English isolation

Minority and Income

Minority and English isolation

Income and English isolation

Minority, Income and English isolation

*Figure 2 is a simplified version of the map with only select layers on so the viewer can better view the respective EJ block groups as they appear in Massachusetts. The bottom corner is

heavily zoomed in to the Boston area.

Figure 3

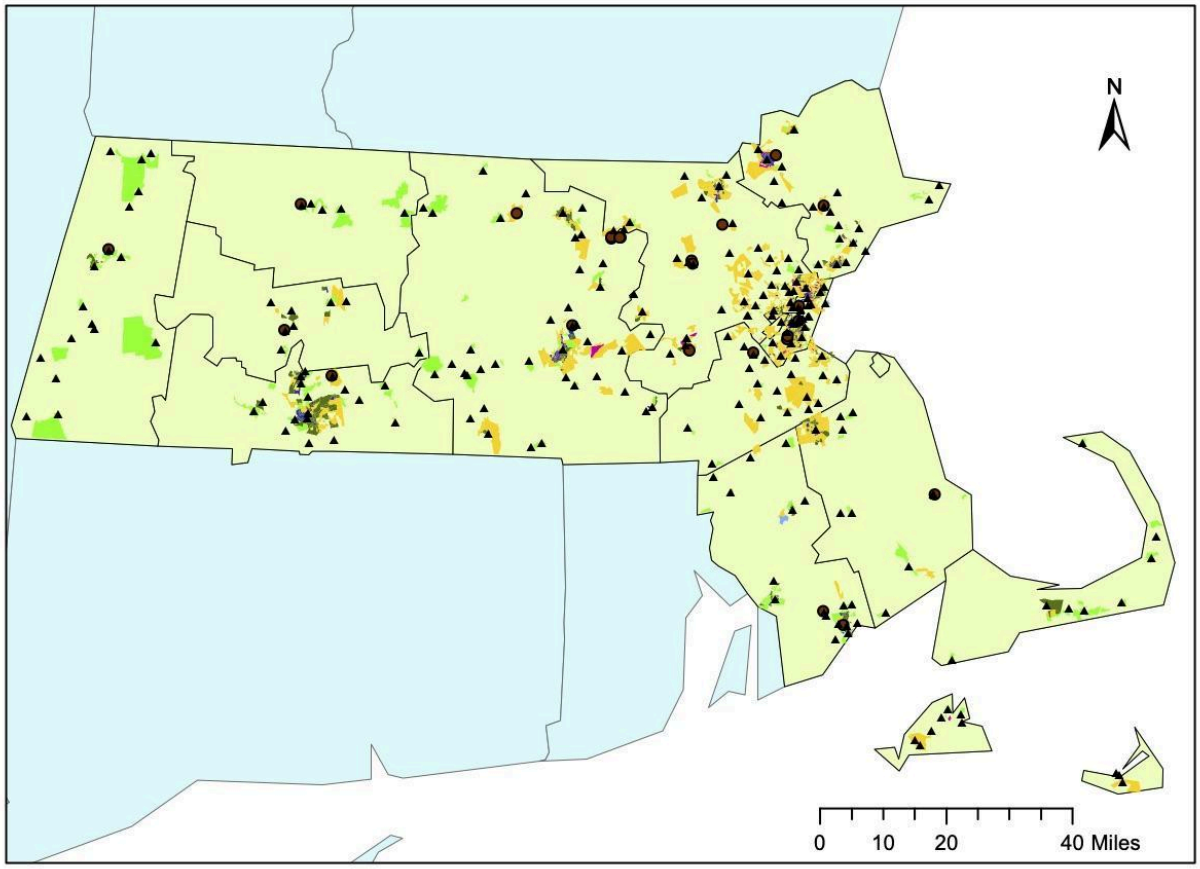


Figure 3

- Police Stations selection (2mi EJ, 223/357)
- Prisons selection (2mi EJ, 19/25)

Environmental Justice 2010 Populations

EJ Criteria, by Block Group

- Minority
- Income
- English isolation
- Minority and Income
- Minority and English isolation
- Income and English isolation
- Minority, Income and English isolation
- Counties
- States

Figure 3 is representative of my first method for calculating the distribution of police stations and prisons across MA EJ block groups. I used the 'Select by Location' feature to create the two new layers present in the map here.

Figure 4

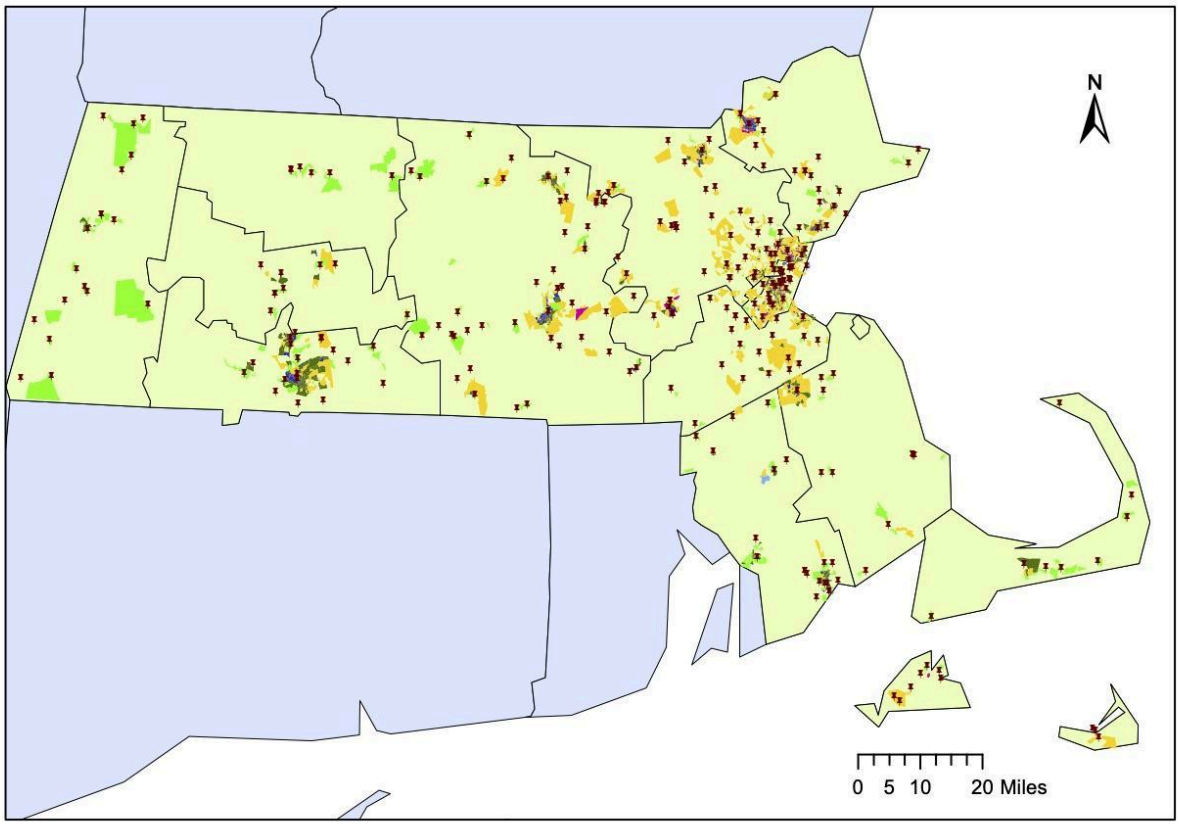


Figure 4 Legend

- Sum Stations and Prisons Join Layer (2mi EJ, 242/382)

Environmental Justice 2010 Populations

EJ Criteria, by Block Group

- Minority
- Income
- English isolation
- Minority and Income
- Minority and English isolation
- Income and English isolation
- Minority, Income and English isolation
- Counties
- States

Figure 4 is a visual of the summarized spatial join created in method 2. The auburn red pushpins represent the collective 19 and 223 prisons and police stations counted within the EJ block group land area.

Figure 5

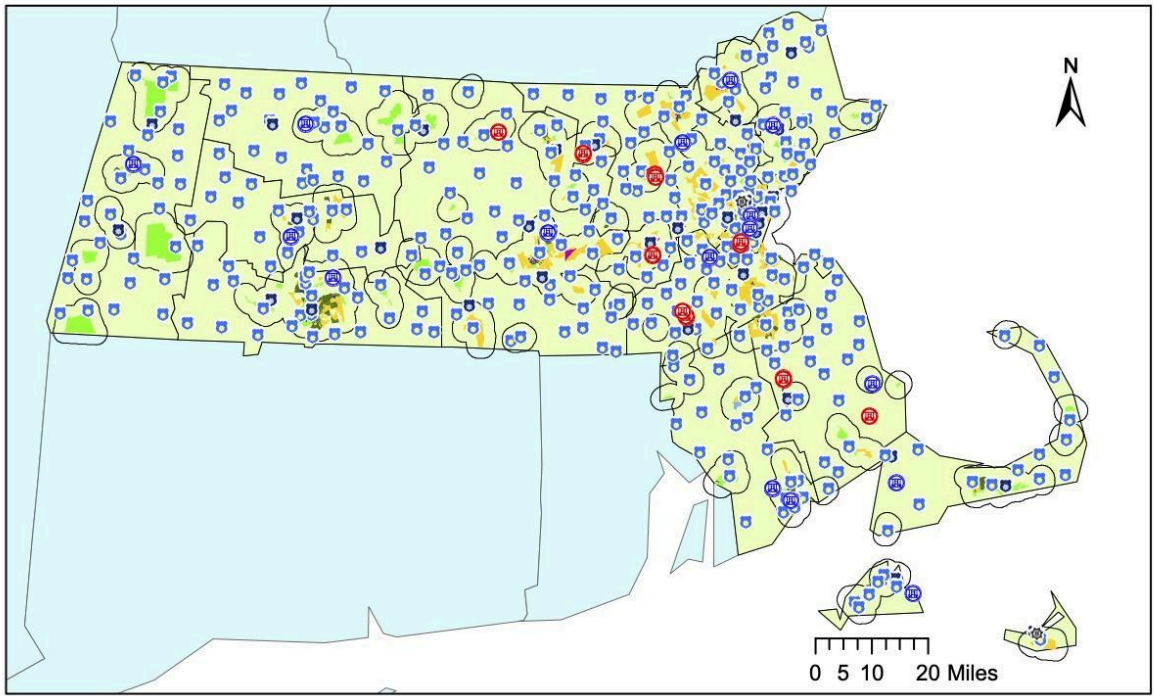


Figure 5 Legend

Prisons

TYPE

- County Jail
- State Prison

Police Stations

Jurisdiction

- Local Police
- State Police
- County Sheriff
- Buffer EJ

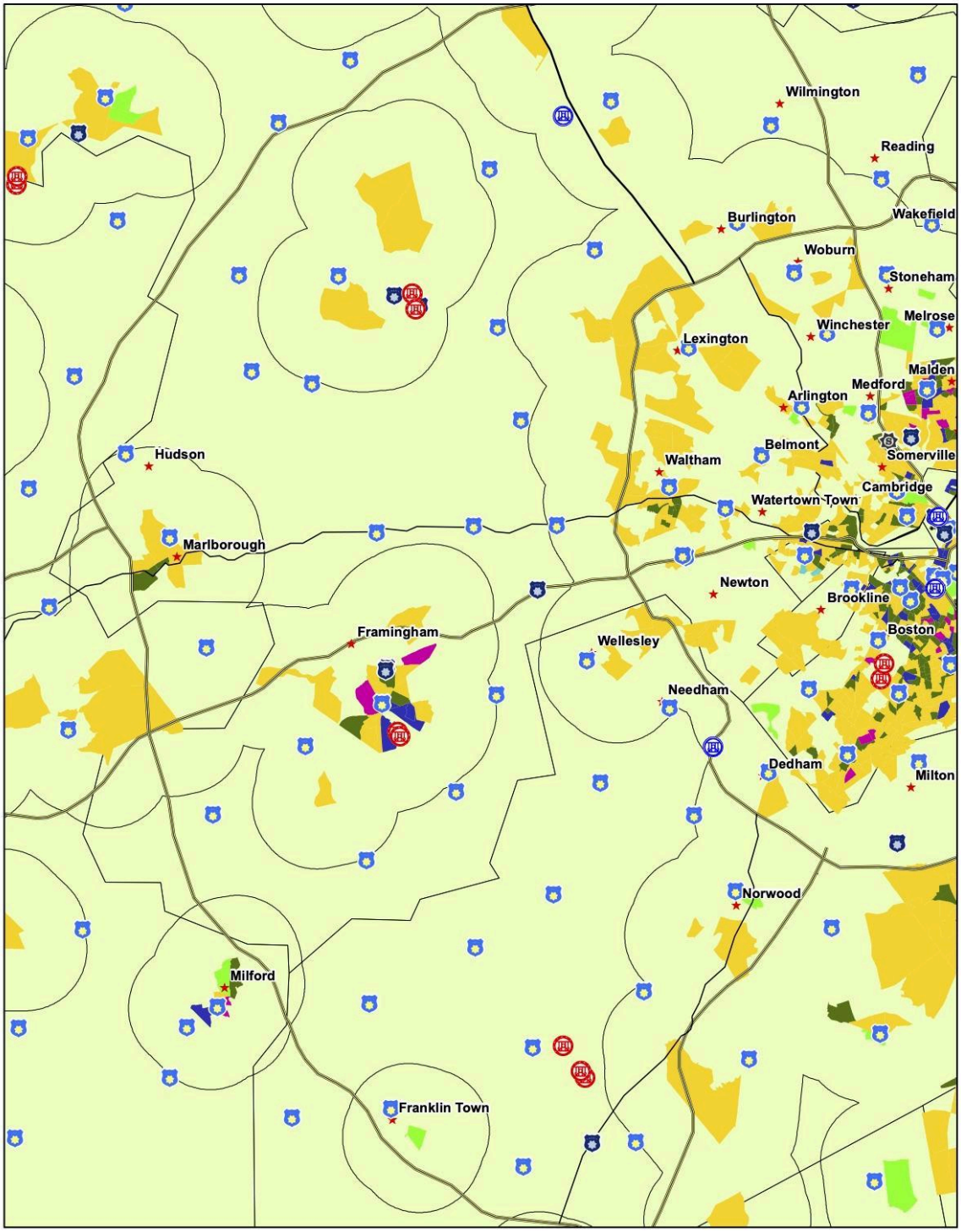
Environmental Justice 2010 Populations

EJ Criteria, by Block Group

- Minority
- Income
- English isolation
- Minority and Income
- Minority and English isolation
- Income and English isolation
- Minority, Income and English isolation
- Counties
- States

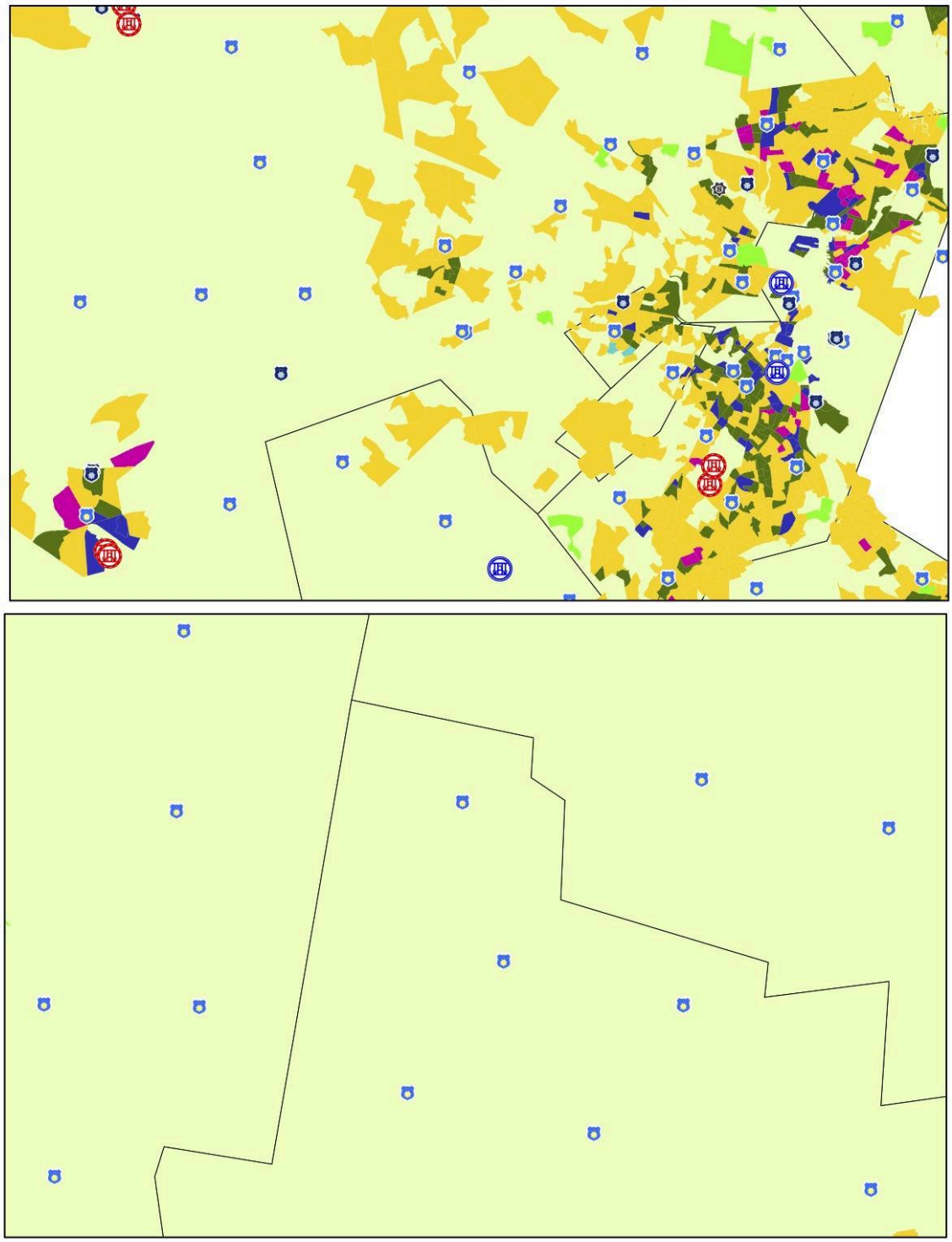
Figure 5 features a buffer around areas of Massachusetts that satisfy criteria of Environmental Justice Block Groups: Minority, Income, English Isolation, Minority & Income, Minority & English Isolation, Income & English Isolation, Minority, Income, & English Isolation.This buffer allows for an intersection with the Police Stations (Local, State, Sheriff) and Prisons (County and State) to identify how many are located inside the previously defined EJ areas (Method 3).

Figure 5: Zoomed in



*I am including this zoomed in view (1:400,000) of Figure 5, method three, to allow the viewer to better make note of how many police stations fall within the buffer zones, the legend is the same as the previous map.

Figure 6



*This last map, zoomed 1:200,000 in each map view respectively, allows for the comparison between the frequency of police stations and prisons in the region with the most EJ block groups (top) a region without any at all (bottom). The legend is the same as Figure 5.

References

Bell, Jasmine. "5 Things to Know About Communities of Color and Environmental Justice." *Center for American Progress*, 8 May 2017, www.americanprogress.org/issues/race/news/2016/04/25/136361/5-things-to-know-about-communities-of-color-and-environmental-justice/

MassGIS data 1 '2010 U.S. Census Environmental Justice Populations'- https://docs.digital.mass.gov/dataset/massgis-data-2010-us-census-environmental-justice-populations

MassGIS data 2 'Police Stations'- https://docs.digital.mass.gov/dataset/massgis-data-police-stations

MassGIS data 3 'Prisons'- https://docs.digital.mass.gov/dataset/massgis-data-prisons