American railways are in dire need of an upgrade. America’s population and highway congestion are only projected to increase, hampering our ability to travel freely and efficiently in the coming years. In particular, the Northeast Corridor between New York City and Boston is an area that will be disproportionately affected by increasing travel congestion. Plans, such as the PlaNYC (NYC.gov, 2007), have been proposed to tackle the transportation problems but do not focus on the area between Boston and NYC.

AMTRAK has proposed a plan for a next-gen High Speed Rail (HSR) to be developed between NYC and Boston with an estimated completion date of 2040 (AMTRAK Vision 2010). The goal of this project is to determine the areas and populations that benefit from the HSR and to persuade viewers that the development of High Speed Rail is a worthy investment in our future travel.

Data
US Census Data: NY, CT, NJ, MA, RI block group and town attribute data as well as vector polygons. ACS census data provided population attribute data for the block groups.

AMTRAK: Location of railway stations and railway schedules were collected to determine the geospatial position and time tables for the current Shore Line and HSR.

Tufts Data Lab: Nationwide vector network analysis data set was collected from the Tufts Data lab and used to determine the travel time from Boston, New York, and the railway stations.

Methods
In order to conduct the analysis, two computer programs were used: ArcMap 10.6.1 and Microsoft Excel 2016.

To plot out the paths of the Shore Line and High Speed Rail (Figure 1), US Census TIGER/LINE boundary data (US Census Bureau TIGER/LINE 2018) provided the polygons and attribute data of all towns and cities in New England. The Feature to Point tool determined the approximate locations of the stations placed by the rail lines in the vicinity of specified cities. The Points to Line tool plotted the railway line.

Shore Line travel times were collected from the AMTRAK timetable (AMTRAK NORTHEAST 2019) (Figure 2). The Measure tool was used to calculate the proportional distance of each rail segment, which was combined with time taken from the AMTRAK HSR proposal (AMTRAK Vision 2010), to derive the estimated HSR travel times (Figure 3).

The one-hour zones were built using Network Analyst tools and a Tufts Data Lab Network Dataset (Tufts Street 2018). A service area was created for each station within one hour of the major cities using 5 minute increments determined by each station’s excess driving time. Services area shapefiles were exported then combined using the Merge tool. A field was added to the attribute tables determining each polygon’s time distance from either NYC or Boston.

The Editor toolbar Clip feature discarded all extraneous polygons with time values above the minimum of any given area. The service areas were then clipped with Tufts Data Lab US State Polygons to discard areas that were covering bodies of water. Finally, a choropleth was quantified using the time data. This created four service areas, two for each city, for Shore Line and HSR analysis respectively (Figure 4) (Figure 5).

To create the dot density map for the High Speed Rail service areas, block group data from the Northeast was joined with 2017 population attribute data downloaded from the US Census ACS DEMOGRAPHIC AND HOUSING ESTIMATES 2013. ArcMap’s symbology tools and overlaid on the existing HSR service areas (Figure 8). The same population data was used to determine the total population within both HSR and Shore Line regions. The calculate geometry tool was used to determine the total coverage area (Figure 7).

Reference:


Conclusion
Transit upgrades are necessary to alleviate increasing population density and travel congestion problems. The proposed high speed rail would provide an enormous boon to travel in the Northeast and serve as an integral part of the Northeast’s travel needs. The Dot Density map alone reveals large populations in Connecticut, Rhode Island and Massachusetts that will experience improved access to New York and Boston. If the High Speed Rail proposal receives support from congress and local governments, vast swaths of people will be given greater access to the Boston and New York, the two major economic hotspots of the Northeast. Thousands of square miles of land would ripe for development due to their newfound proximity to key economic areas, especially areas of Connecticut and Rhode Island that have seen their economic development falter in recent years. We hope that our data and analysis can help garner support for the High Speed Rail and its future of the Northeast.