Population growth and a changing socio-economic landscape

Luke Snell

CE394K

Fall 2015

Dr. Maidment

Contents

I.Introduction....4

II. Method....6

Future Work....18

Sources....19

Figure 1 – Percent Change in Household Median Income, Central East Austin, 2000-2014....4
Figure 2 – Historical population growth – Austin, TX....5
Figure 3 - Census Blocks, Block Groups, and Tracts....6
Figure 4 - Illustration of discrepancy in income data between 2000 and 2010.....7
Figure 5 - Illustration of discrepancy in demographic data between 2000 and 2010....7
Figure 6 - Location of Zone of Analysis - Central East Austin....8
Figure 7 - Percentage of population that is Hispanic in Central East Austin – 2000 and 2010....9
Figure 8 - Census block groups with a decrease in the percentage of Hispanic residents: 2000 - 2010....9
Figure 9 - Location of Census Block Group 484530009022....10
Figure 10 - Percent increase in population by Block Group., Central East Austin, 2000 to 2010, graph....11
Figure 11 - Total increase in population by Block Group, Central East Austin, 2000 to 2010, graph....11
Figure 12 - Percent Increase in Total Population - visual....12
Figure 13 – Central East Austin, Gross Median Rent - 2000 vs 2014....13
Figure 14 - Central East Austin, Percent Increase in Gross Median Rent, 2000 to 2014....14
Figure 15 - Percent change in Gross Median Rent - Central East Austin, 2000 to 2014, image....14
Figure 16 - Median Income, 2000 vs 2104, Central East Austin....15
Figure 17 - Percent change in median income, 2000 to 2014, Central East Austin....16
Figure 18 - Central East Austin Impervious Cover Change, 2006 - 2011....17

I. Introduction

The continued population growth of Austin, TX has resulted in dramatic changes to both the physical and cultural landscape of the city. Construction cranes are prevalent across the skyline and the cacophony of building dominates the senses in some parts of the city. There is a palpable sense of flux.

The heavy population growth of the previous decade has been accompanied by an increase in the median household income in much of the city. The following figure illustrates the percent change in the median income of Census Block Groups in Central East Austin between 2000 and 2014 The figure makes clear that the median household in Central East Austin is more affluent in 2014 than they were in 2000. Each block group showed an increase in median income of at least 89% over 2000 values and up to a 259% increase in one case.

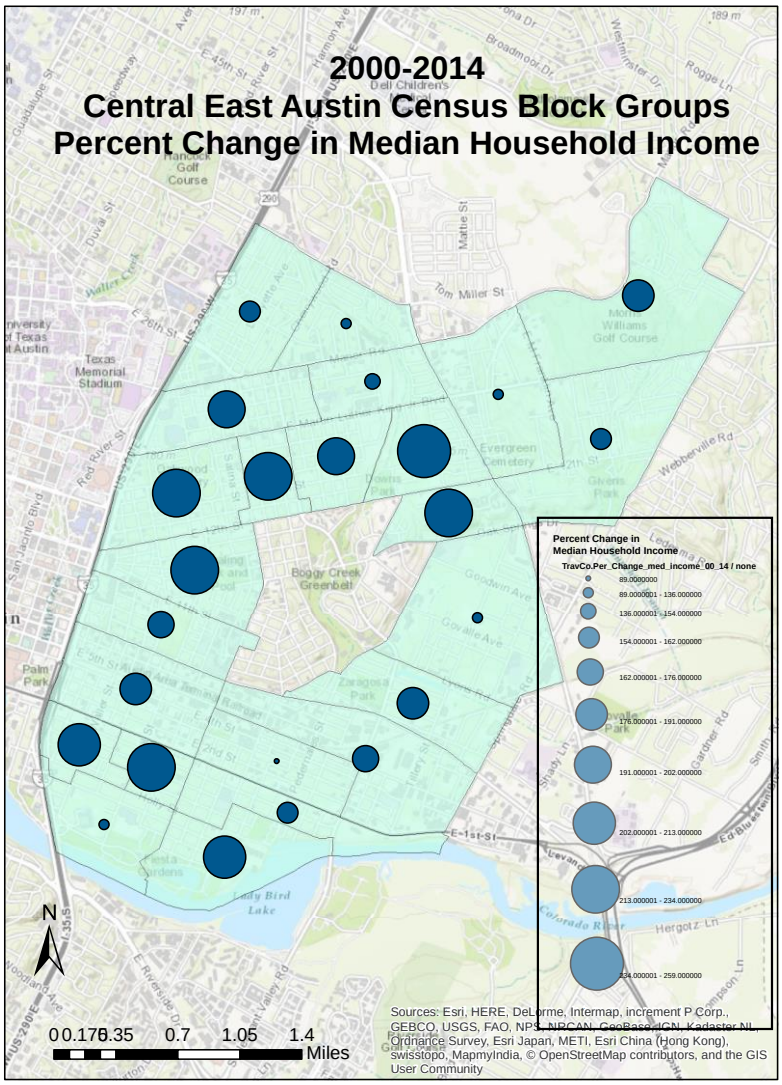


Figure 1 – Percent Change in Household Median Income, Central East Austin, 2000-2014

In addition to the increased wealth in Central East Austin, the city of Austin in general has seen explosive growth in the previous decades, as is evident from the following figure.

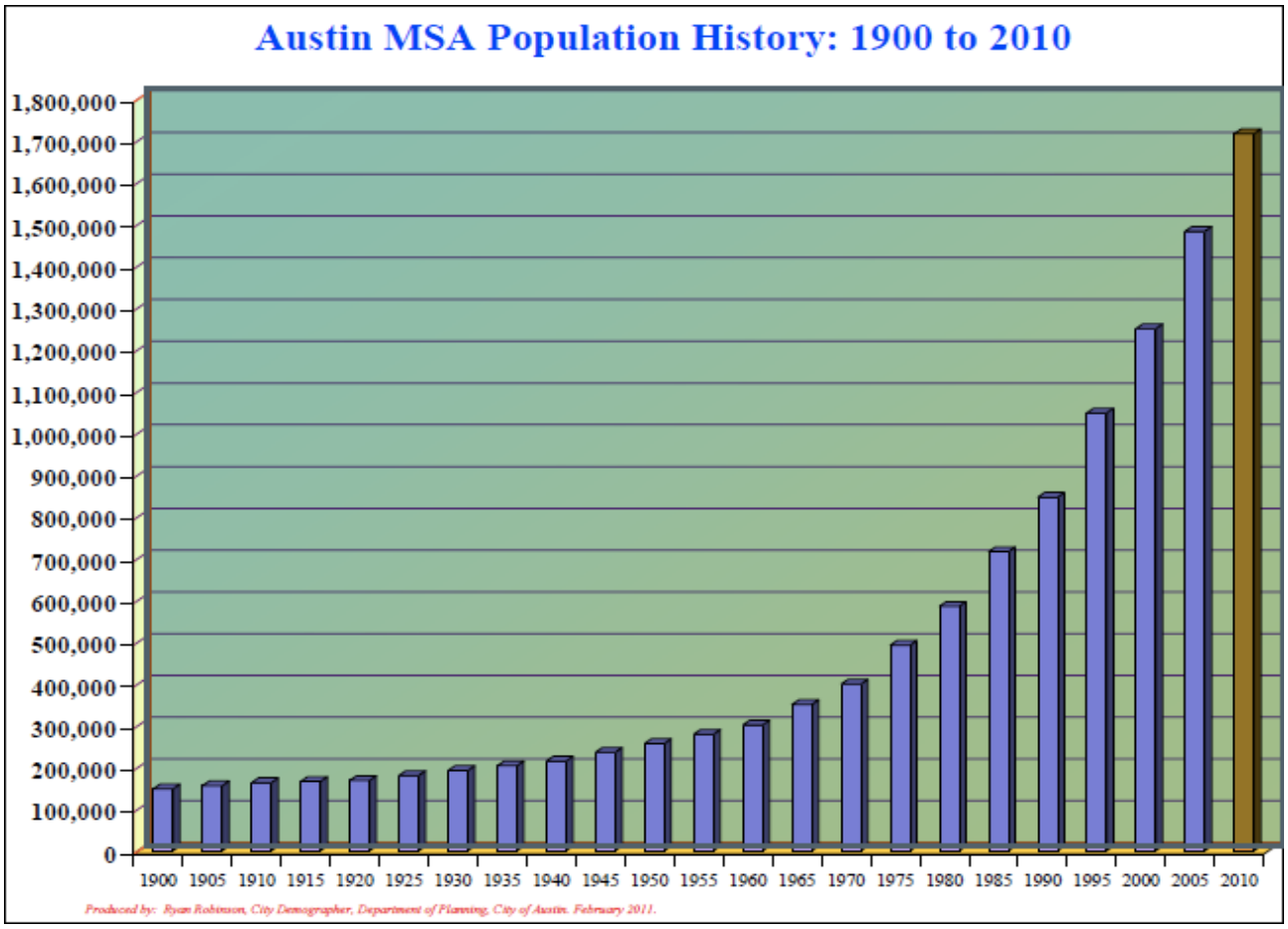


Figure 2 – Historical population growth – Austin, TX

While economic growth is generally viewed as positive, I was interested in exploring some of the other effects and challenges that economic and population growth can induce. Population growth increases housing demand which can decrease housing affordability and drive changes in the cultural fabric of a city. Additionally, as population increases, extra demands are placed on infrastructure and resources. Impervious land cover increases can intensify flood risk and reduce the quality of stormwater runoff.

I decided to investigate changes in income levels and demographics in certain neighborhoods and changes a portion of Central East Austin. I restricted my investigation to this area for two reasons. First, there was a lack of comprehensive data for the entire city for some parameters. Second, this area is known to be an area gentrification and rapid change.

II. Method

I gathered data from the US census to explore demographic trends and gathered data from the National Land Cover Dataset to explore land-use and changes in impervious cover.

To begin exploring demographic shifts over time, I looked at data from the US Census Bureau between 2000 and 2010 at the census block group level. A census block group is made up of census blocks, and census block groups are grouped into census tracts. According to the census bureau, census block groups are "are statistical divisions for census tracts, are generally defined to contain between 600 and 3,000 people, and are used to present data…" The following images give an idea of the varying levels for which census data is available.

Image (1): This image represents the Census Block, the most refined level of data available from the U.S. Census.

Image (2): The middle image represents a Census Block Group, which is made up of several census blocks.

Image (3): This image represents a Census Tract, which is made up of several Census Block Groups. In Travis County, where Austin, TX is located, there are 580 Census Block Groups.

(1) (2) (3)

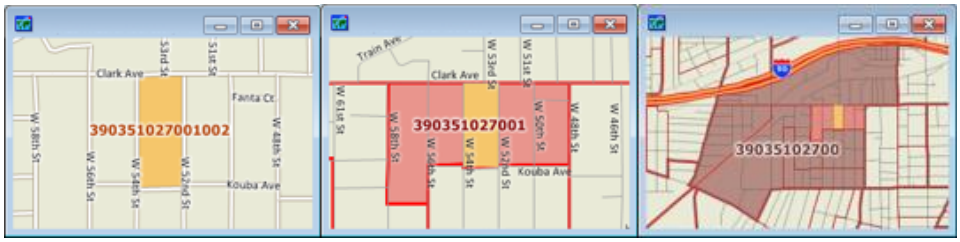
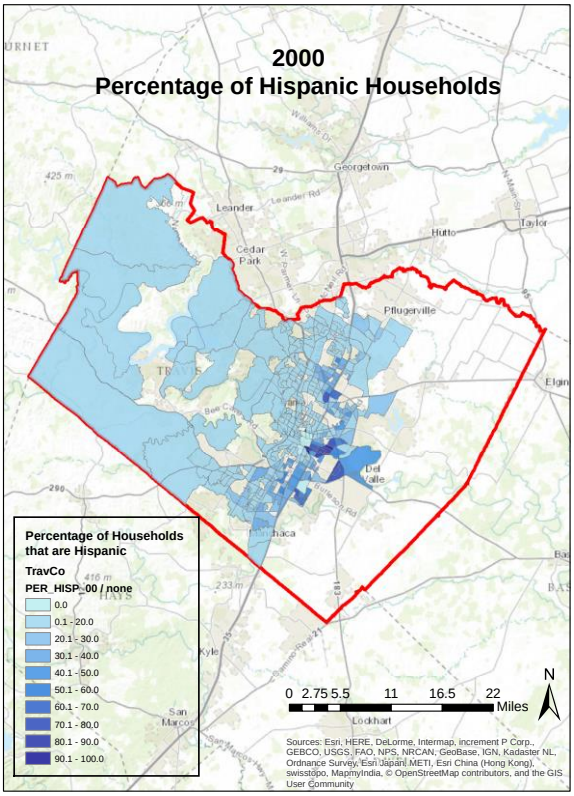


Figure 3 - Census Blocks, Block Groups, and Tracts

In 2000, the Census gathered detailed demographic data in the long form from 18 million surveys. In 2010, the Census only collected data in the short form, which does not supply the same level of detail as the long form. Instead, it sent out the long form to a fewer number of people over a longer time (11 million people over 5 years). As a result, the 2010 data is less statistically accurate than the 2000 data. It does, however, give a good starting place to begin starting to look at trends.

As the following two maps show, the data for 2000 census is incomplete for the census blocks in Travis County. There is data for all 580 census block groups in Travis County in 2010 and for only 516 in 2000.



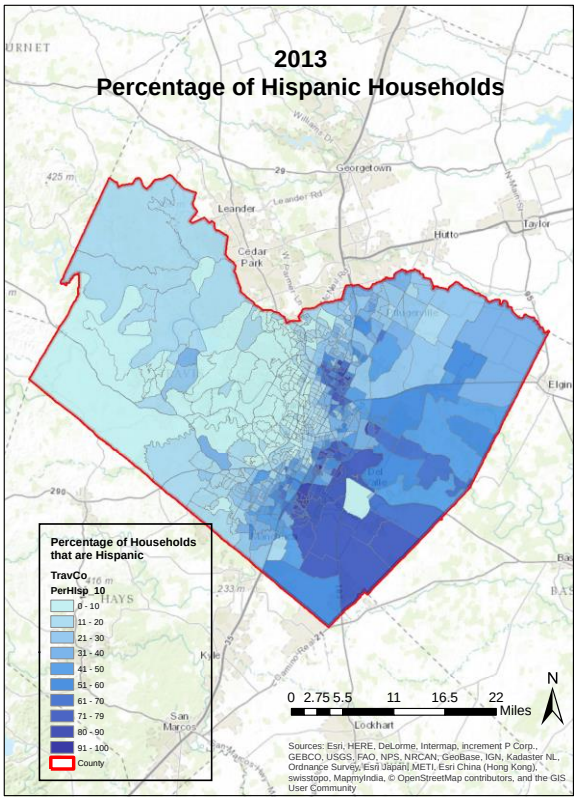
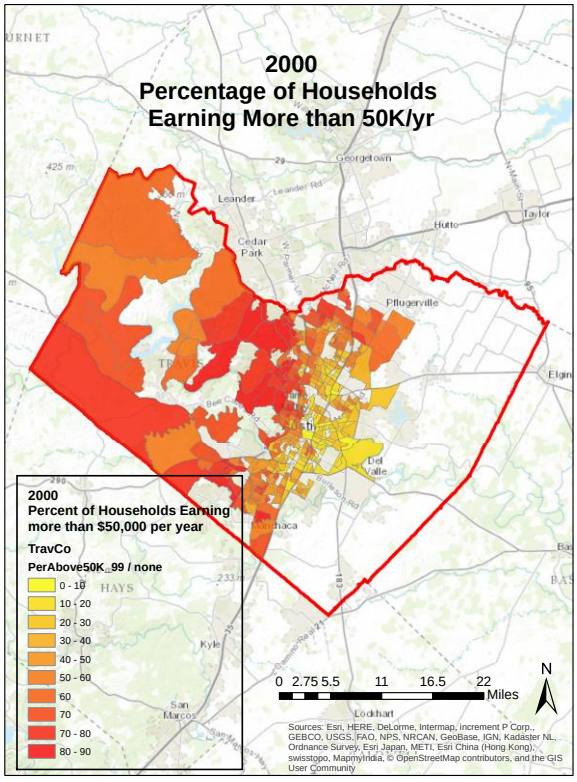


Figure 5 - Illustration of discrepancy in demographic data between 2000 and 2010



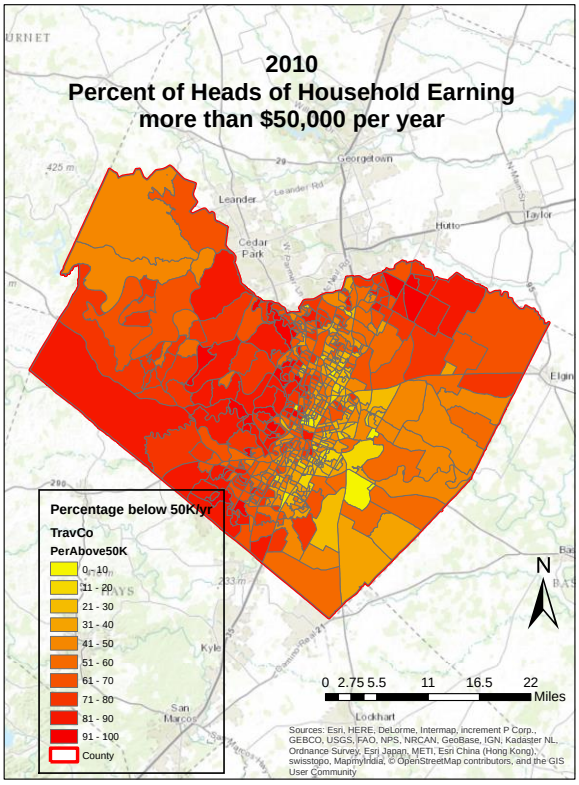


Figure 4 - Illustration of discrepancy in income data between 2000 and 2010.

Since evaluating trends on a county-wide basis was going to difficult due to the lack of consistent data, I decided to narrow my scope of investigation to Central-East Austin, an area that has been noted for its accessibility to downtown and its rapidly changing demographic landscape. This allowed me to focus on an on an area with a lot of rapid change and it allowed me to visualize trends across census block groups that had relatively consistent data in nearby block groups.

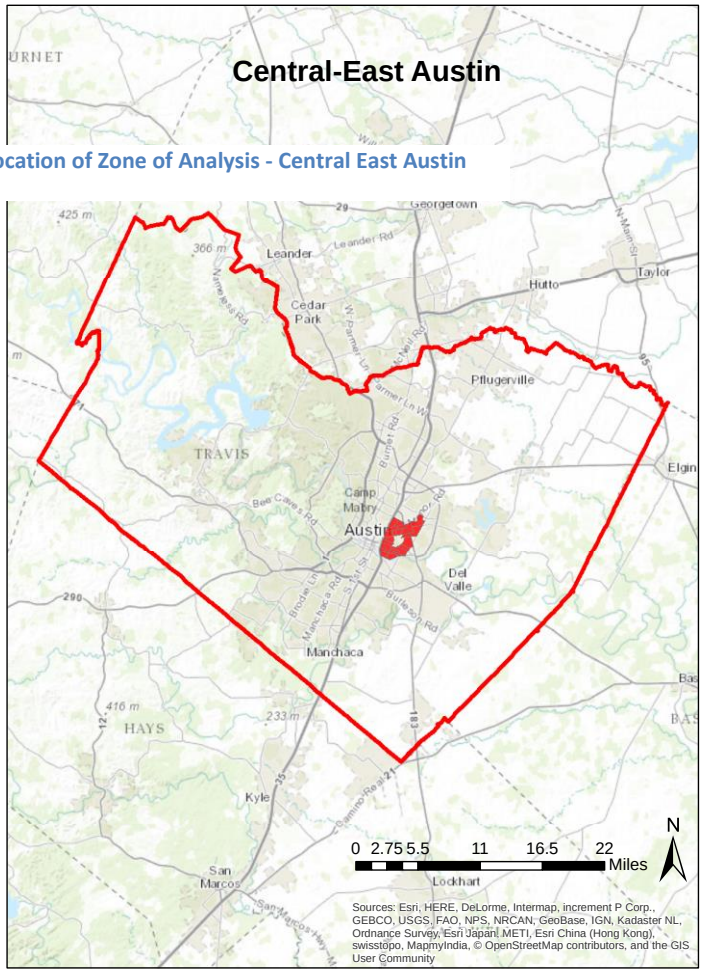
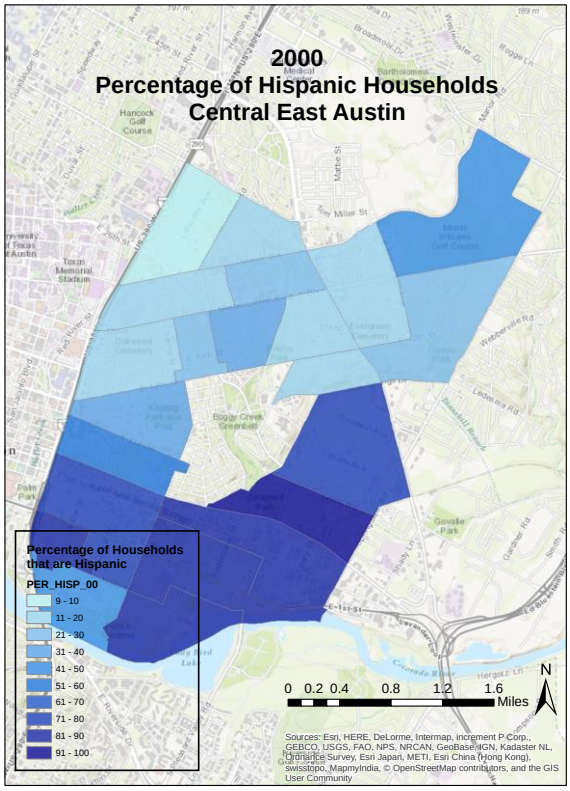


Figure 6 - Location of Zone of Analysis - Central East Austin

Once I had narrowed the region to look at, I recreated the demographic and income visualizations that I had created previously for the entire county. The following images allow us to visualize the demographic trends in the Central East Austin zone. As we can see, there is a marked decrease in the number of Hispanics as a percentage of the total population between 2000 and 2010.

Figure 7 - Percentage of population that is Hispanic in Central East Austin – 2000 and 2010



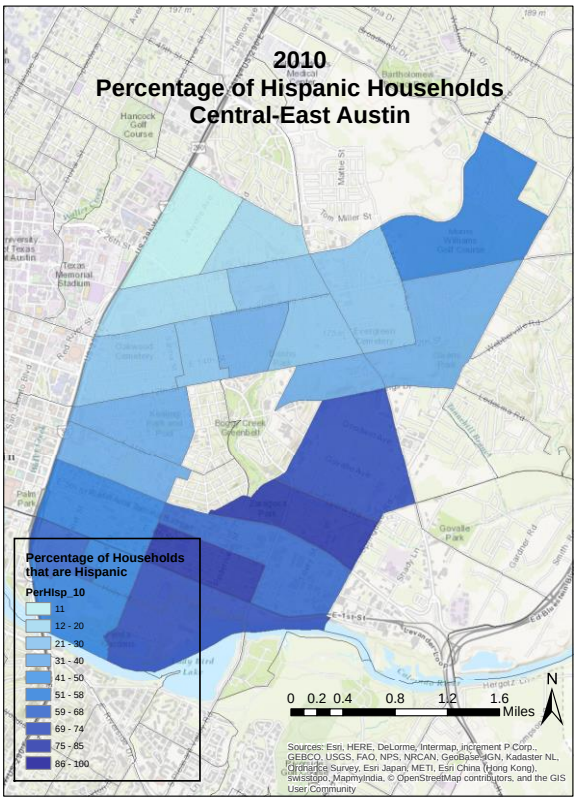
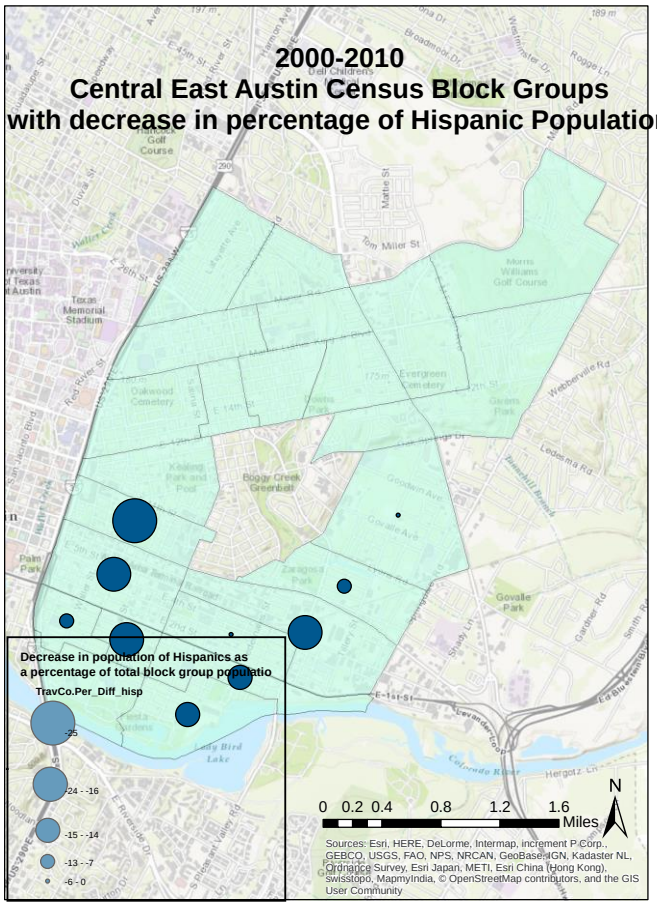


Figure 8 - Census block groups with a decrease in the percentage of Hispanic residents: 2000 - 2010



The decrease in the percentage of Hispanics as a percentage of the total does not tell us the whole story, however. If we look at a single block group and examine the population shifts, we can see that the picture is more dynamic than simple percent changes. To see what was happening at the block group level, I analyzed Census Block Group 484530009022.

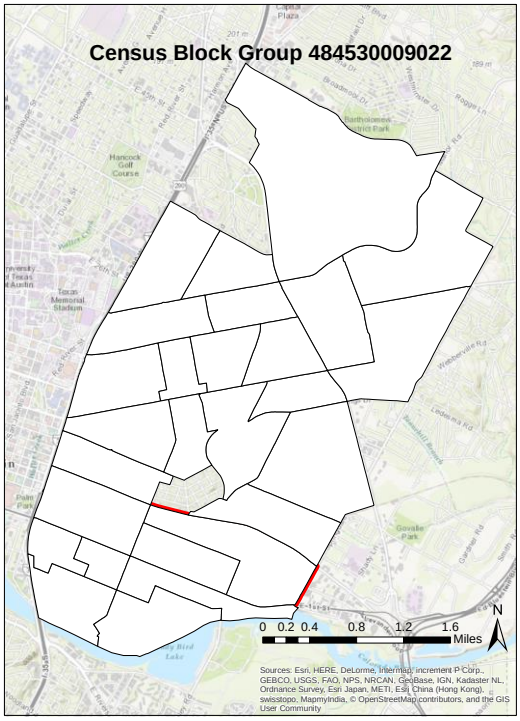
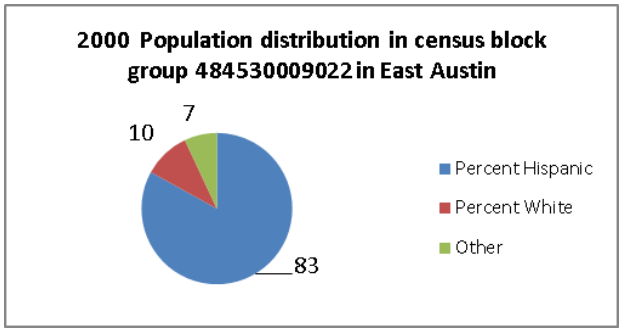
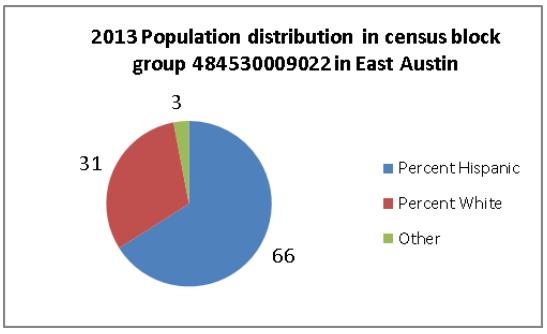


Figure 9 - Location of Census Block Group 484530009022

If we examine the population distribution and population increase for this block group, we can see some interesting trends between the year 2000 and 2013. From the charts below, we can see that the percentage of the population in this block group that is Hispanic decreased from 83% to 66% while the percentage of white residents increased from 10% to 31% between the years under consideration. While those percentages give us an idea of the trends occurring, what they do not capture is the absolute increase in population taking place in this census block.





To capture the total population growth taking place in Central East Austin, I examined total population growth between 2000 and 2010. By plotting the percentage growth in population for each census block group in Central East Austin, we can see that all of the block groups in the zone experienced an increase in population of at least 42%, with several showing increases in population in excess of 400%.

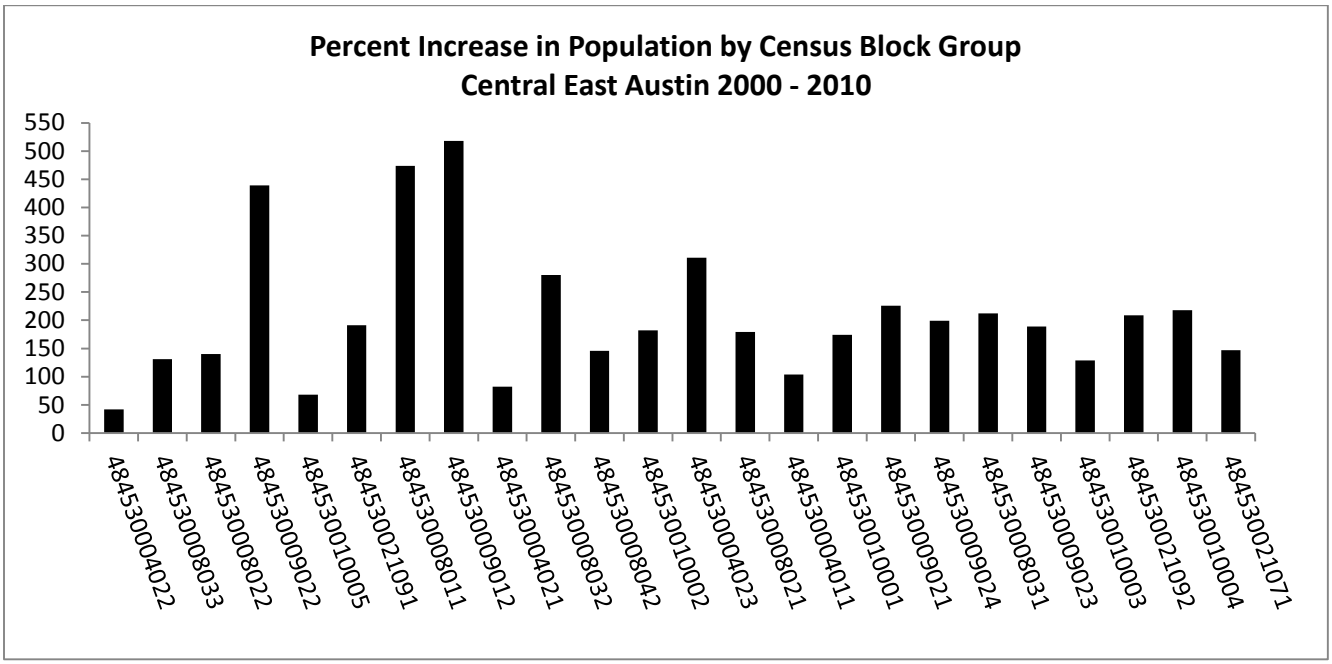


Figure 10 - Percent increase in population by Block Group., Central East Austin, 2000 to 2010, graph

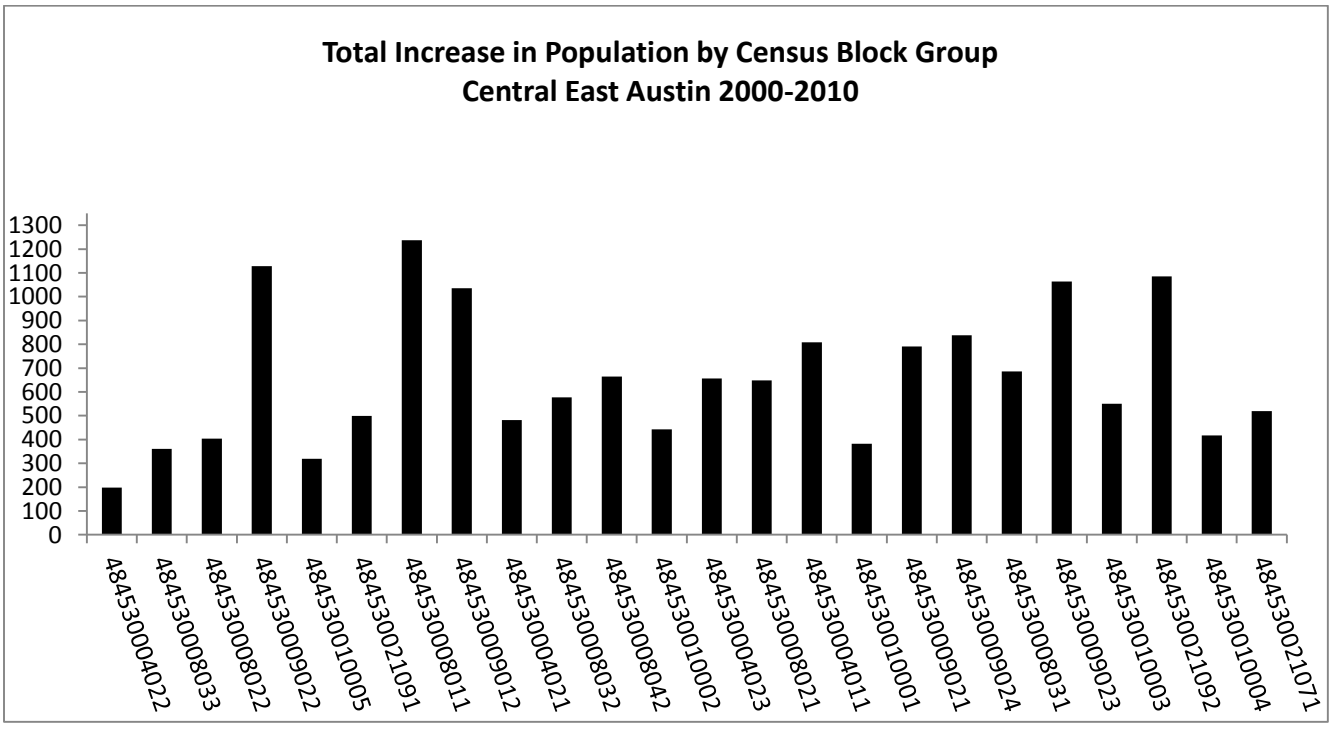
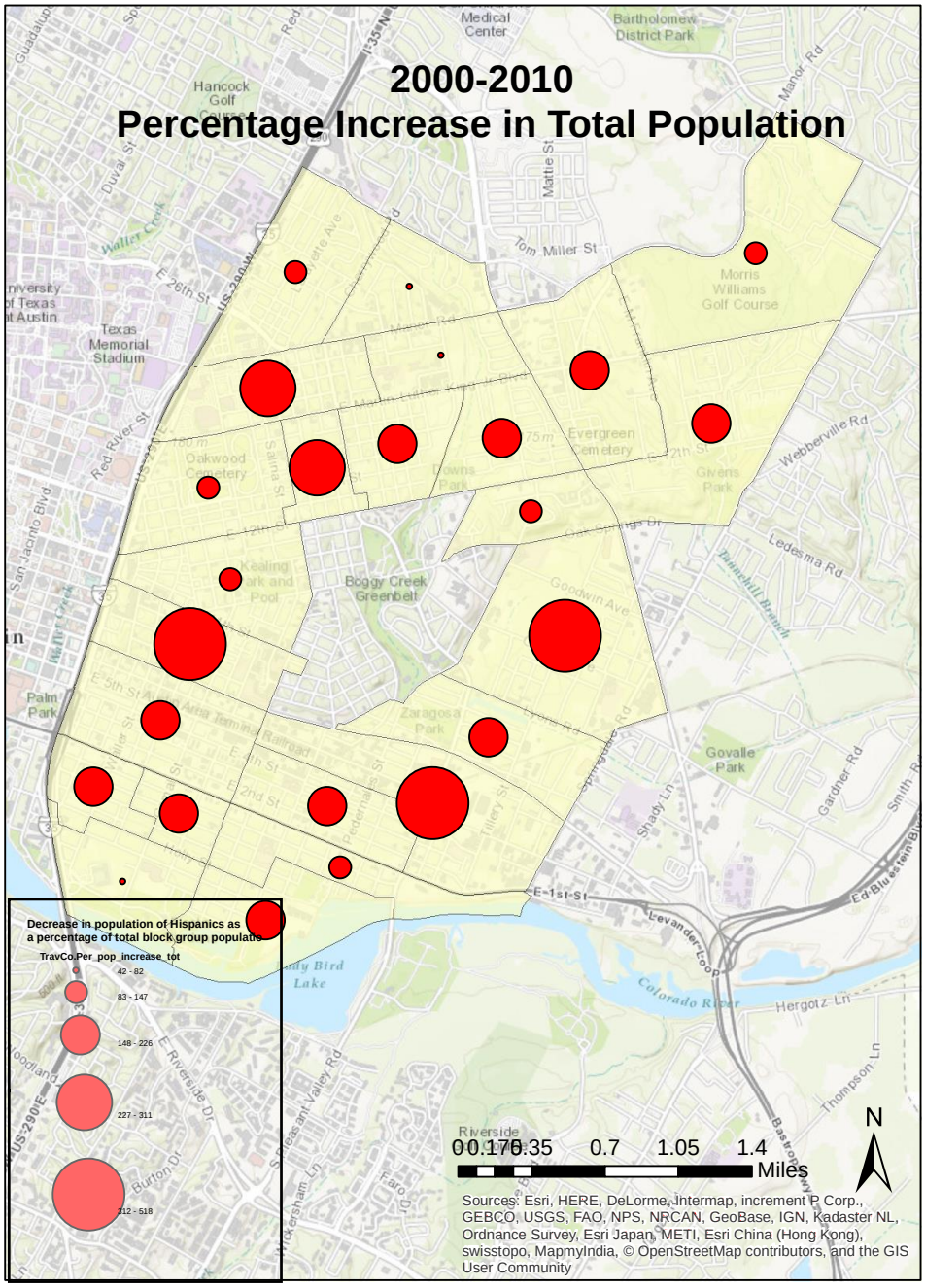


Figure 11 - Total increase in population by Block Group, Central East Austin, 2000 to 2010, graph

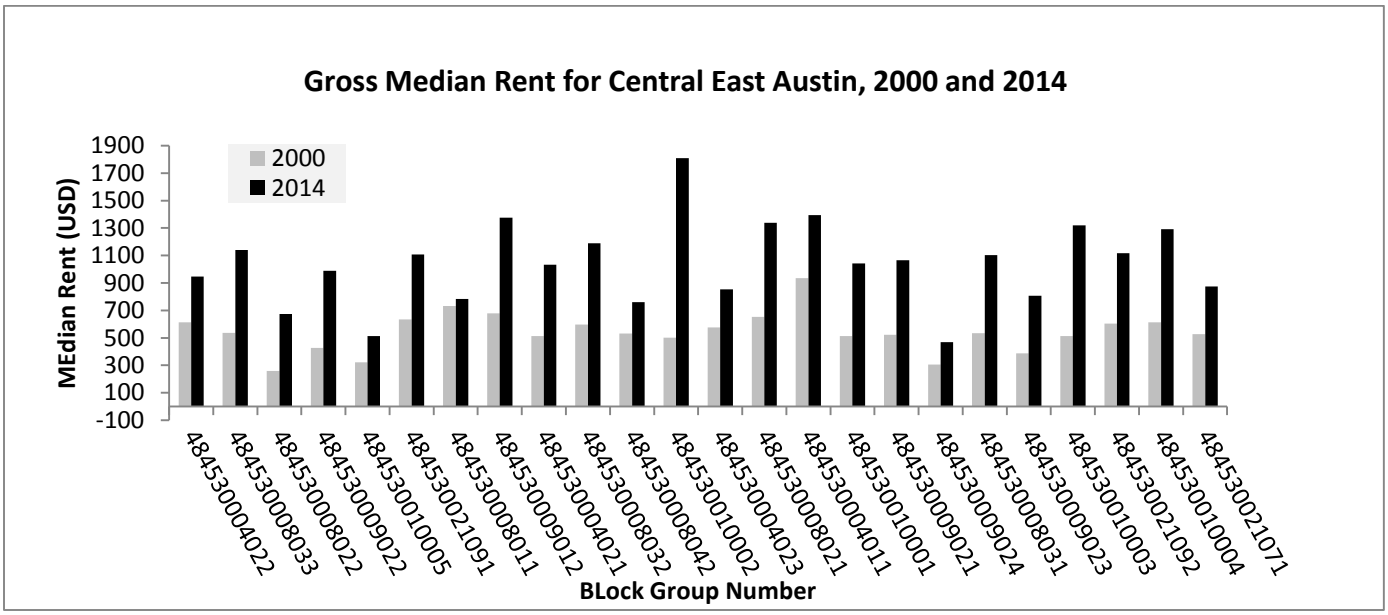
Figure 12 - Percent Increase in Total Population - visual



This map allows us to visualize the percentage population growth of census block groups in Central East Austin.

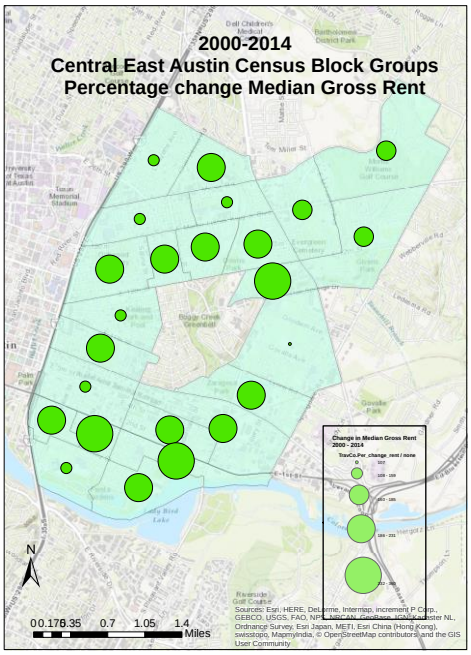
Figures ten through twelve indicate that both the populations of Hispaincs and Whites were growing between 2000 and 2010 but that the White population grew more and that the population of Hispanics as a percentage of the total was decreasing. Over this period, there was a 281% increase in population, from 8694 habitants to 24,484.

Now that I had established the level of population growth and the changing demographic landscape in Central East Austin, I wanted to explore how those changes had affected affordability in the area. As the following graphs and figure demonstrate, the explosive growth in this part of the city has been accompanied by an increase in the median gross median rent for the area over the last ten years. Figure 13 compares median rent prices between 2000 and 2014. Figure 14 expresses those changes as a percentage, which is greater than 300% in some cases. The average increase is 195.9%.



.

Figure 13 – Central East Austin, Gross Median Rent - 2000 vs 2014



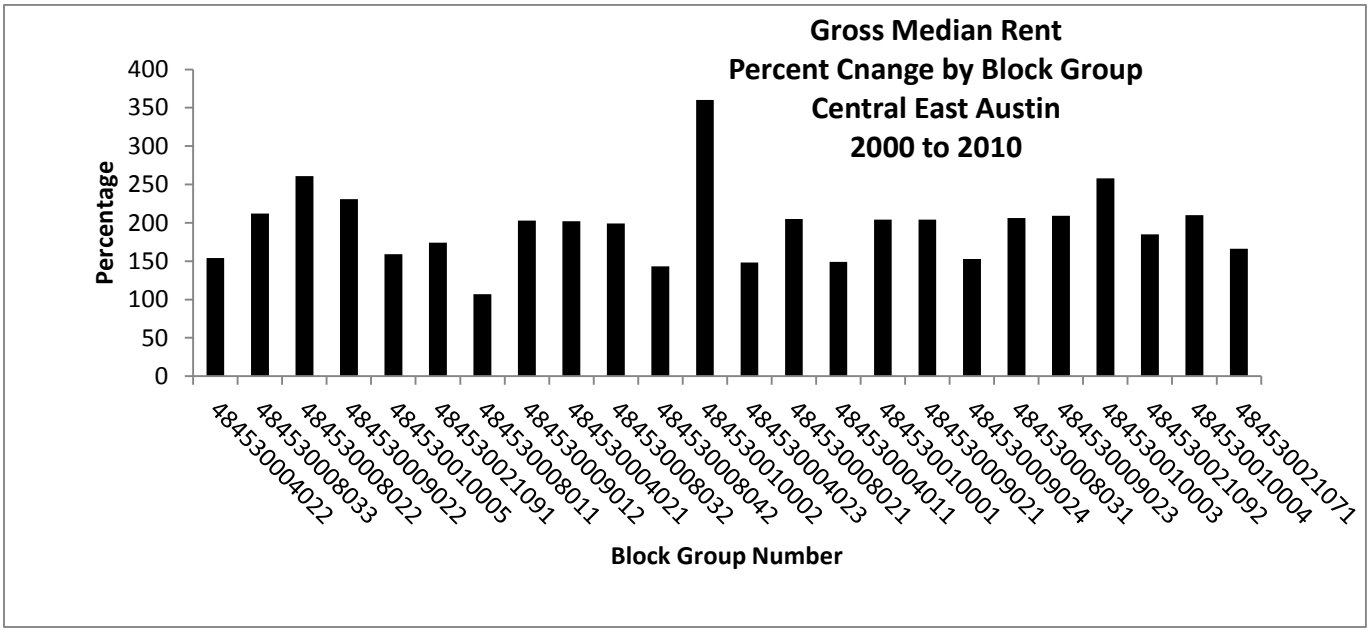


Figure 14 - Central East Austin, Percent Increase in Gross Median Rent, 2000 to 2014

Figure 15 - Percent change in Gross Median Rent - Central East Austin, 2000 to 2014, image

What we can see from the analysis this far is that the median rent in Central East Austin has increased, the population has increased, and the cultural/demographic landscape of the zone has changed. Now lets take a look at how the economic characteristics of the residents of this area have changed.

The following graphs show the changes in the median income of households in Central East Austin and the percent change in median income between 2000 and 2014. The graphs make clear that the typical resident of central East Austin in 2014 is more affluent than they were in 2000.

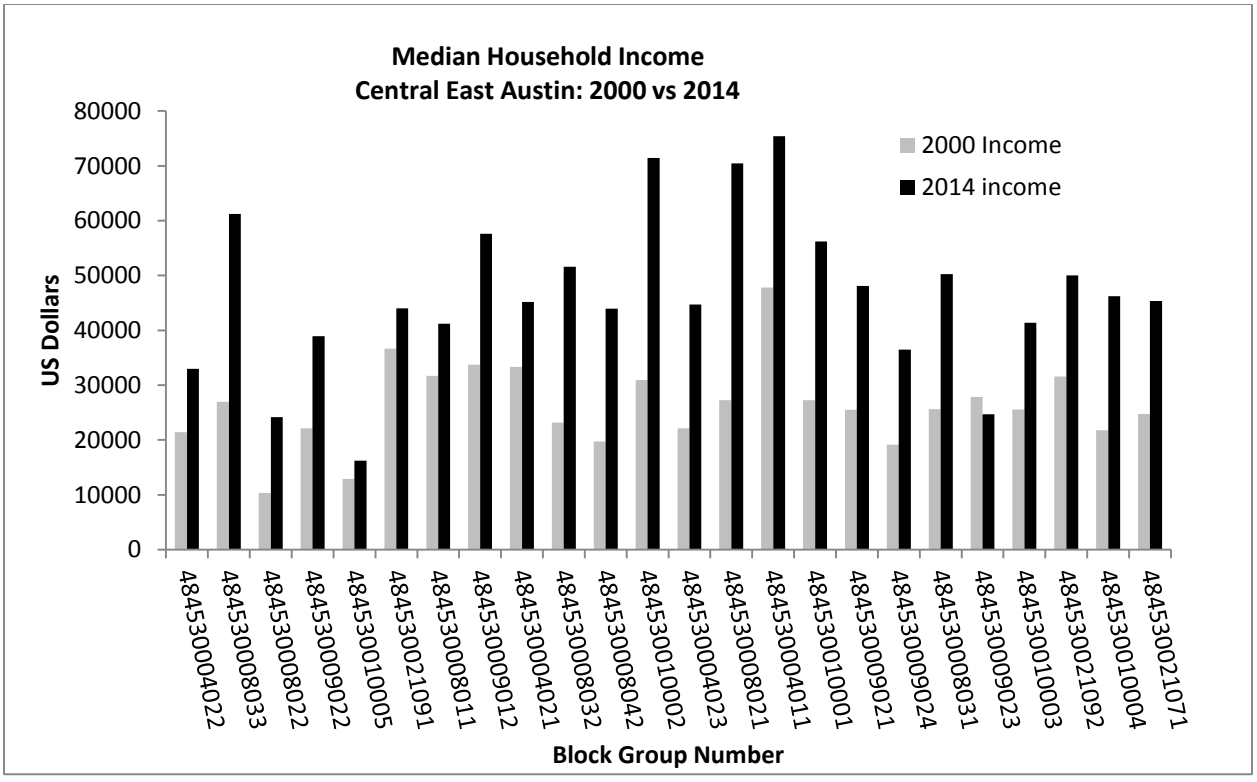


Figure 16 - Median Income, 2000 vs 2104, Central East Austin

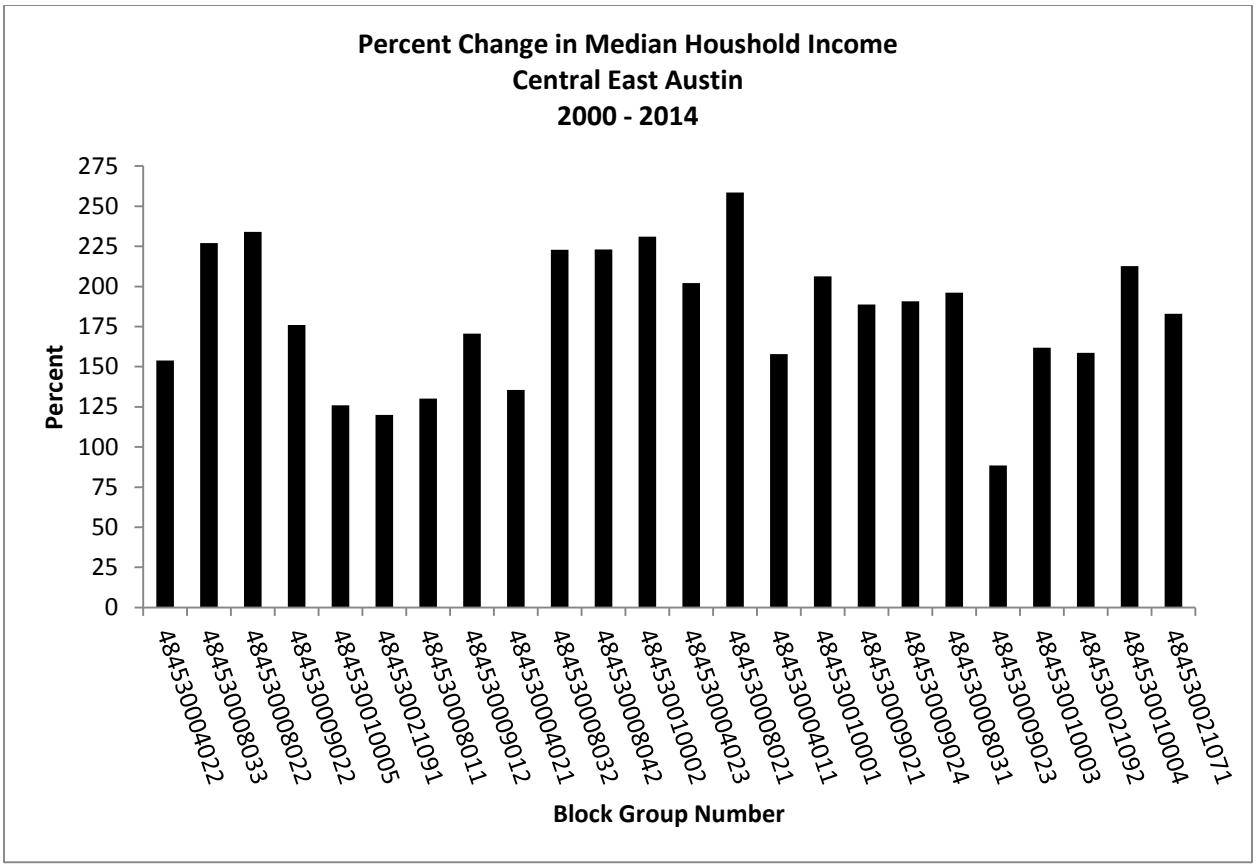


Figure 17 - Percent change in median income, 2000 to 2014, Central East Austin

The population growth in Central East Austin has resulted in a substantial increase in the impervious cover of the area. Using zonal statistics and a raster of 2006-2011 impervious land cover, I calculated that there has been an increase of 3.44% of impervious land cover in Central East Austin. This increase may, as mentioned earlier, increase flood risk and increase contamination of stormwater runoff. If the period between 2000 and 2006 had a similar increase in impervious cover, then the total increase over our time frame of interest between 2000 and about 2010 would be on the order of 7%.

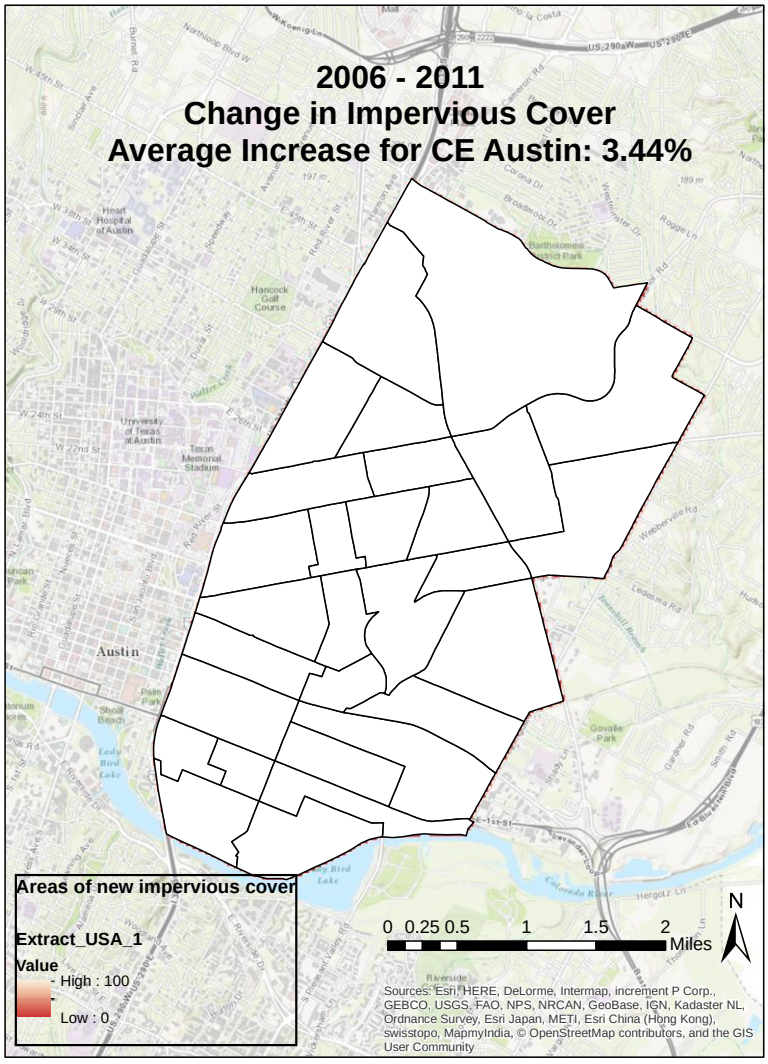


Figure 18 - Central East Austin Impervious Cover Change, 2006 - 2011

Future Work

I think an interesting continuation of this work would be to explore how the demographic changes outlined above have influenced water demand in this area and any modifications that the local water utility has had to make to accommodate the increased demand. I would also like to investigate the differences in water usage based on income level.

Sources

1. US Census Bureau; Census 2000, Summary File 3, Table P053; generated by Luke Snell; using American Factfinder; http://factfinder2.census.gov; (10 November 2015)
2. US Census Bureau; Census 2000, Summary File 3, Table P052; generated by Luke Snell; using American Factfinder; http://factfinder2.census.gov; (4 December 2015)
3. US Census Bureau; Census 2000, Summary File 1, Table H007; generated by Luke Snell; using American Factfinder; http://factfinder2.census.gov; (11 November 2015)
4. US Census Bureau; Census 2000, Summary File 1, Table QTH1; generated by Luke Snell; using American Factfinder; http://factfinder2.census.gov; (11 November 2015)
5. US Census Bureau; American Community Survey, 2014 American Community Survey 1-Year Estimates, Table B19013; generated by Luke Snell; using American Factfinder; http://factfinder2.census.gov; (4 December 2015)
6. US Census Bureau; American Community Survey, 2013 American Community Survey 1-Year Estimates, Table B03002; generated by Luke Snell; using American Factfinder; http://factfinder2.census.gov; (11 November 2015)
7. US Census Bureau; American Community Survey, 2014 American Community Survey 1-Year Estimates, Table B25064 ; generated by Luke Snell; using American Factfinder; http://factfinder2.census.gov; (12 December 2015)
8. US Census Bureau; Census 2000, Summary File 3, Table H063; generated by Luke Snell; using American Factfinder; http://factfinder2.census.gov; (4 December 2015)
9. City of Austin historical growth. Digital image. http://www.austintexas.gov/sites/default/files/files/Planning/Demographics/msa_pop_history_10.pdf. 3 Dec 2015.
10. Explanation of census block groups. https://www.census.gov/geo/reference/gtc/gtc_bg.html. 3 Dec 2015
11. Images of census block, block group, and census tract; http://www.caliper.com/Maptitude/Census2000Data/SummaryLevels.htm. 3 Dec 2015