Population and Housing Demand Projections for Metro Boston

Regional Projections and Provisional Municipal Forecasts

The Metropolitan Area Planning Council (MAPC) is the regional planning agency serving the people who live and work in the 101 cities and towns of Metro Boston. Our mission is to promote smart growth and regional collaboration. We work toward sound municipal management, sustainable land use, protection of natural resources, efficient and affordable transportation, a diverse housing stock, public safety, economic development, an informed public, and equity and opportunity among people of all backgrounds.

Population and Housing Demand Projections for Metro Boston
Regional Projections and Municipal Forecasts
EXECUTIVE SUMMARY
January 2014

Metro Boston has been home to an ever-changing population since long before the Mayflower came ashore, and the coming decades will be no exception. The forces of aging, growing diversity, and changing household preference will intersect to create a region in 2040 markedly different from the one that exists today. The outcomes of certain key questions will determine those differences: How many young workers will choose to stay in the region? Where will new families want to settle? Will seniors want to downsize or age in place? The answers only time will tell, but it is possible to anticipate a range of feasible outcomes and to assess what different scenarios might mean for housing demand, economic growth, school enrollment, and land use. Moreover, it is possible to influence what future comes to pass through the choices made at the local, regional, and state levels.

To help plan for this uncertain future, the Metropolitan Area Planning Council (MAPC) has prepared a dynamic model of future population, household, and housing demand for Metro Boston and its municipalities form a region of 4.45 million people and 1.7 million households as of the year 2010. These projections can be used by local, regional, and state agencies to set policies and make investments that anticipate the region's future needs and help to achieve shared goals. These projections will also inform all of MAPC's work to implement *MetroFuture: Making a Greater Boston Region*, the regional plan for sustainable and equitable development adopted in 2008.

Status Quo, or a Stronger Region?

Since the future cannot be predicted with certainty, identifying a range of possible futures may prove more useful than a single forecast. Our projections include two scenarios for regional growth. Each scenario reflects different assumptions about key trends. The "Status Quo" scenario is based on the continuation of existing rates of births, deaths, migration, and housing occupancy. Alternatively, the "Stronger Region" scenario explores how changing trends could result in higher population growth, greater housing demand, and a substantially larger workforce. Specifically, the Stronger Region scenario assumes that in the coming years:

- the region will attract and retain more people, especially young adults, than it does today;
- younger householders (born after 1980) will be more inclined toward urban living than were their predecessors, and less likely to seek out single family homes; and
- an increasing share of senior-headed households will choose to downsize from single family homes to apartments or condominiums.

Together, the two scenarios, summarized below, provide different windows into possible futures for the region.

Scenario Comparison			
	2010	**Status Quo, 2010 – 2040**	**Stronger Region, 2010 - 2040**
Population	4,458,000	+ 6.6%	+12.6%
Households	1,719,000	+ 17%	+23%
Housing Units	1,827,600	+ 17%	+24%
Percent Multifamily	51%	48% of new units	62% of new units
Labor Force Population	2,516,000	+0.4%	+6.9%

Which scenario is more likely to occur depends on decisions yet to be made. Individual households will make their own choices about where to live, but they will do so in a context influenced by public sector actions and investments. Policies to promote housing construction will facilitate the higher in-migration rates that characterize the Stronger Region scenario. Conversely, continued widespread opposition to new housing will likely result in less

production and higher costs, thereby maintaining the Status Quo. In other words, decisions made by the region's cities and towns help to determine how the future unfolds. If those communities are all planning for a shared vision of the future, they can make it more likely for that vision to be achieved.
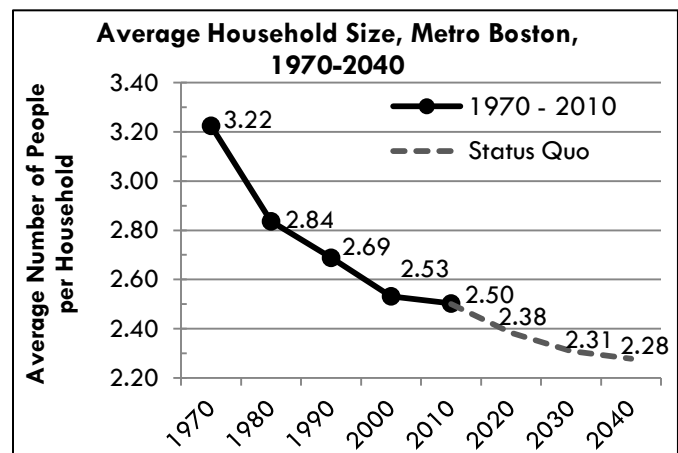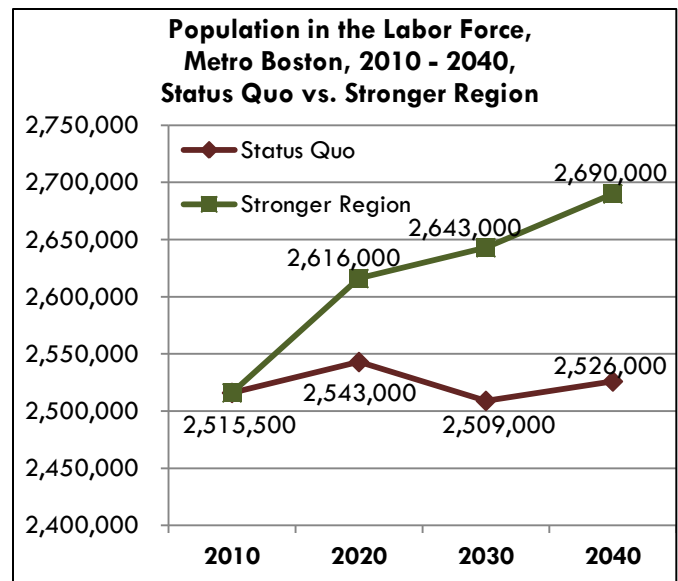
Of the two scenarios, Stronger Region is more consistent with the housing, land use, and workforce development goals of *MetroFuture* and has already been adopted by the Executive Office of Housing and Economic Development as the basis for the Commonwealth's multifamily housing production goal. As a result, **we recommend that municipalities, state agencies, and others use the *Stronger Region* scenario for planning purposes to ensure consistency across the many entities planning for the region's future.** By working together under the framework of a Stronger Region, communities will not only help ensure that every household in the region can afford a home, but will also help the region maintain a robust and growing workforce that forms the backbone of a competitive economy.

Key Findings

Slow growth is in store if the region keeps losing population to other states. The Status Quo scenario projects that the region will grow an average of 2.1% in each of the next three decades, one third more slowly than population growth over the last decade. Loss of population to other states is a major contributor to slow growth. Historically, more people move out of the region to other states or other parts of Massachusetts than the reverse; we estimate that this "net domestic outmigration" averaged about 10,000 people per year from 2000 to 2010. Births and international immigration were sufficient to keep the state growing over that same period, but both factors are likely to slow in the coming years.

Attracting more young people is critical to a growing economy. Over the coming decades, the Baby Boomers (born between 1945 and 1970) will be reaching retirement age, depleting the supply of our region's most critical asset: a skilled, well-educated workforce. By 2030, nearly one million workers now over the age of 40—39% of all workers in the region—will have left the labor force. The current population of young adults is barely sufficient to fill the positions vacated by retiring Baby Boomers, much less provide the labor force needed for robust economic growth. If the region stems the loss of population to other states and achieves a small net inflow (as the Stronger Region Scenario anticipates), the labor force could grow by 175,000 over the next 30 years, an increase of almost 7%.

New housing demand will outpace population growth due to declining household size. Despite relatively slow population growth under the Status Quo scenario, the region will see substantial demand for new units. With more single-person households (especially seniors), more divorced households, and fewer children per family, average household size is likely to decline 10% by 2040 under either scenario. In other words, an average group of people will form 10% more households on average and require 10% more housing units than they do today. Under either scenario, declining household size alone will result in approximately 86,000 additional households over the next ten years, which accounts for more than two-thirds

Population in the Labor Force, Metro Boston, 2010 - 2040, Status Quo vs. Stronger Region

**Average Household Size, Metro Boston, 1970-2040**

of Status Quo housing demand over that same time period. This phenomenon will cause a number of suburban communities to experience population declines even as new housing units are constructed.

A "senior sell-off" may provide most of the single family homes needed by younger families. While the aging of the Baby Boomer generation will cause the number of seniors in the region to swell considerably, over time the same generation will need fewer homes—especially single family homes—than it does today as its members downsize, move elsewhere, or pass away. Stronger Region anticipates that all cohorts born before

Net Housing Unit Demand by Cohort, Metro Boston, 2010-2020, Stronger Region Scenario
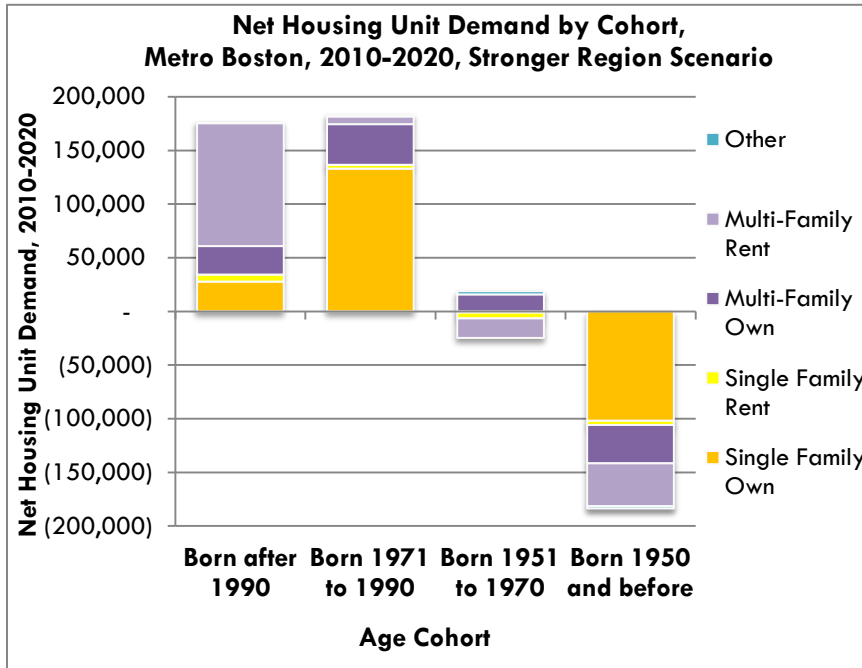
1971 will put 112,000 single family homes back on the market by 2020, enough to supply about 66% of demand from younger cohorts. Householders born between 1951 and 1970 will have a small net demand for condominiums in the next decade, but will free up even more single family homes in the subsequent decades. Meanwhile, the under-40 households critical to growing the labor force overwhelmingly prefer apartments and condominiums, but far fewer of these units will be freed up by older cohorts. As a result, nearly two-thirds of demand would be for multifamily housing in the Stronger Region scenario.

Many signs point to the resurgence of urban communities. Many urban municipalities—both the Inner Core and outlying Regional Urban Centers—experience a large influx of young people but lose them to suburban communities as those residents form families and settle down. However, these trends are changing. When compared to the 1990s, the last ten years saw more young people moving to urban communities and fewer of them moving out once they hit 30. An increasingly diverse population attracted by the job proximity, transit access, vibrancy, and cultural assets of urban areas is likely to drive continued population growth. Urban communities are projected to attract 52% (Status Quo) to 56% (Stronger Region) of new housing production, as shown in the chart on this page. This same chart also indicates that multifamily housing will be needed across the region, including 25% to 35% of production in suburban community types.

Housing Unit Demand by Type and Tenure, 2010 - 2030, Stronger Region Scenario Metro Boston Community Types
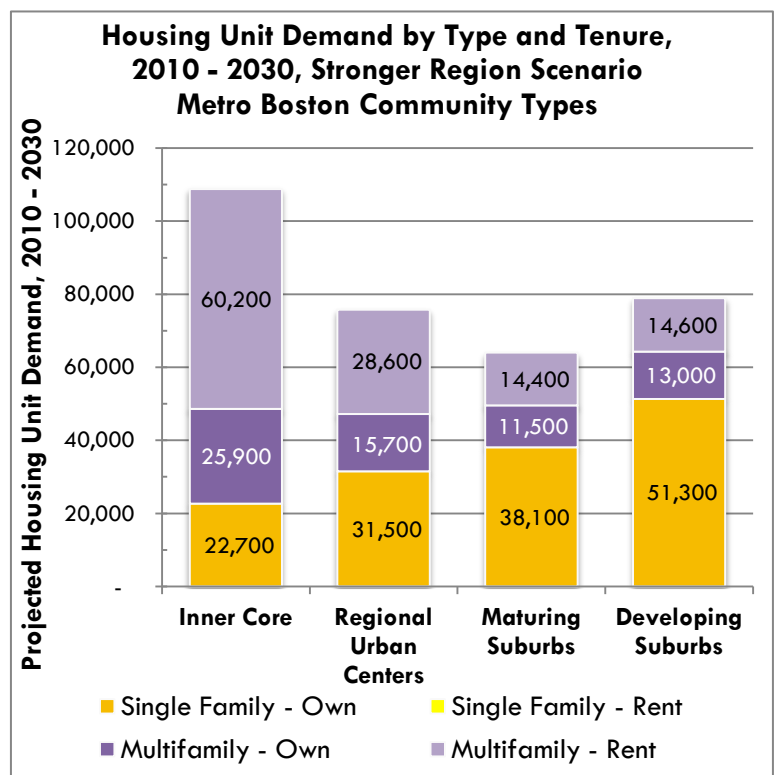
Under either scenario, the number of school-age children in the region and most municipalities peaked in 2000 and is likely to decline over the coming decades. As shown in the chart below, the region's school-age population peaked in 2000, when the Baby Boomers were in their prime child-rearing years (age 30 to 55). Now there are fewer adults in that age range so the number of births (and subsequent school-age children) has begun to decline. The population aged 5 to 14 is now 6% smaller than it was at the 2000 peak, and it is projected to fall another 8% to 9% by 2020 and decline more slowly thereafter under the Status Quo scenario. If the region attracts and retains more young adults under the Stronger Region scenario, the school-age population may rebound slightly but will remain 6% lower in 2040 than it was in 2010.
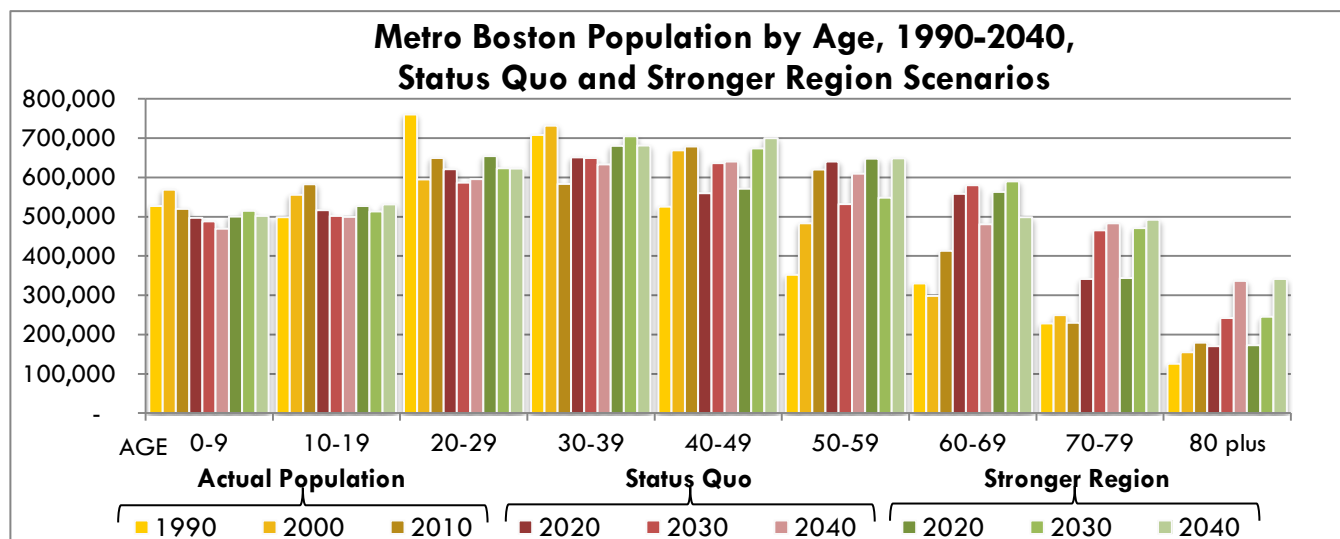
While we cannot be certain how the future will unfold, we can be sure that the region will change in interesting ways that impact the economic fortunes and quality of life for those living in it. The regional trends driving that change are powerful and not likely to be quickly reversed or altered. Nevertheless, not every community in the region will experience the same changes over the coming decades. Due to local circumstances, some will change a lot, while others may remain largely the same. MAPC's methods account for the diversity of communities across the region by using municipal-specific estimates of migration rates, fertility, mortality, and housing occupancy, giving these projections great local validity and relevance. However, we cannot account for all the unique dynamics of every city and town in the region, and those local dynamics may change more rapidly than large-scale regional trends. MAPC will continue to maintain and improve these projections over time as new data and new methods become available, and as we work with our member municipalities to track local growth patterns and to set policies that will encourage sustainable development over time.

About the Projections

Development of these projections was supported by an advisory team comprising academic experts, state agencies, neighboring regional planning agencies (RPAs), and member municipalities. MAPC reviewed reports from other regions nationwide to assess the current state of practice and also reviewed prior projections for our region to assess their accuracy and identify opportunities for improvement. The "Metro Boston" region refers to 164 cities and towns in Eastern Massachusetts, including the entire MAPC district as well as all or portions of five neighboring RPAs. This region coincides with the extent of the travel demand model used by the Boston Metropolitan Planning Organization.

Data sources for the projections include Decennial Census data from 1990, 2000, and 2010; American Community Survey (ACS) data from 2005 to 2011; fertility and mortality information from the Massachusetts Community Health Information Profile (MassCHIP); housing production information from the Census Building Permit Survey database; and MAPC's Development Database.

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Visit www.mapc.org/data-services/available-data/projections for additional appendices, including comparisons to previous MAPC projections and recently-released projections from the Donahue Institute at UMass Amherst.

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Introduction

Metro Boston has been home to an ever-changing population since long before the Mayflower came ashore, and the coming decades will be no exception. The forces of aging, growing diversity, and changing household preference will intersect to create a region in 2040 markedly different from the one that exists today. The outcomes of certain key questions will determine those differences: How many young workers will choose to stay in the region? Where will new families want to settle? Will seniors want to downsize or age in place? The answers only time will tell, but it is possible to anticipate a range of feasible outcomes and to assess what different scenarios might mean for housing demand, economic growth, school enrollment, and land use. Moreover, it is possible to influence what future comes to pass through the choices made at the local, regional, and state levels.

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- an increasing share of senior-headed households will choose to downsize from single family homes to apartments or condominiums.

The Status Quo scenario projects population growth of approximately 6.6% over the next three decades, with a corresponding need for 305,000 housing units, and an increase of 11,000 people in the labor force. Stronger Region entails a population increase of 12.6% and housing demand of 435,000 new units, with over 175,000 additional people in the labor force.

Which scenario is "more likely" to occur depends on decisions yet to be made. Public policies to promote housing production and build livable communities may influence residential housing choices by providing more attractive and affordable options to live in the region. These two scenarios—with their interconnected forecasts of population, housing demand, and workforce growth—can be the basis for making policies and investments that share a consistent vision of the future, preferably one that comports with local, state, and regional goals. In 2012, the Executive Office of Housing and Economic Development adopted the Stronger Region scenario as the basis for the Commonwealth's multifamily housing production goal, and is now working to coordinate local and state policies to support the achievement of that goal. The municipal-level detail available in these projections will help communities not only ensure that every household in the region has a home they can afford, but also to ensure that the region can support the king of robust and growing workforce that is the backbone of a competitive economy.

Each scenario is expressed through a variety of different forecasts and statistics:
- Projected population by age for the region and municipalities
- Change in households by householder age, type, and size, for the region and municipalities
- Total housing unit demand for the region and municipalities
- Housing unit demand by unit type and tenure (renter/ownership) for the region, subregions, and Community Types
- Workers in the labor force, by age, for the region

A summary comparison of the two scenarios is provided in Table 1.

Table 1. Comparison of the two scenarios

	Current	Status Quo, 2010 – 2040	Stronger Region, 2010 - 2040
Population	4,458,000	+ 292,600 (6.6%)	+ 560,900 (12.6%)
Households	1,718,099	+ 288,000 (17%)	+ 395,000 (23%)
Housing Units	1,827,591	+ 305,400 (17%)	+ 435,300 (24%)
Percent Multifamily	50.8%	48.4% of new units	61.7% of new units
Median Age	39 yrs.	43.2 yrs.	42.9 yrs.
Labor Force Population	2,516,000	+ 11,000 (0.4%)	+ 175,000 (6.9%)

About the Analysis

MAPC developed these projections through a process lasting more than a year, advised by the Massachusetts Department of Public Health, the MA Department of Transportation, the Dukakis Center at Northeastern University, the Harvard Joint Center for Housing Studies, the Donahue Institute at UMass Amherst, the Federal Reserve Bank of Boston, other regional planning agencies, and member municipalities (see Appendix C for a complete list of advisory group participants.) MAPC reviewed methodologies from other regional planning agencies nationwide to assess the current state of practice and also reviewed prior projections for this region to assess their accuracy and identify opportunities for improvement. (Please refer to the website for a memo summarizing the methodologies reviewed.)

As used in this report, the "Metro Boston" region refers to 164 cities and towns in Eastern Massachusetts, including the entire MAPC district as well as all or portions of Old Colony Planning Council, Southeast Region Planning and Economic Development District, Central Massachusetts Regional Planning Commission, Northern Middlesex Council of Governments, and Merrimack Valley Planning Commission. This region coincides with the extent of the travel demand model used by the Boston Metropolitan Planning Organization and the scope of the MetroFuture land use model (Figure 1).

Figure 1. MetroFuture Population and Housing Projection Modeling Region.

Data sources for the projections include Decennial Census data from 1990, 2000, and 2010; American Community Survey (ACS) data from 2005 to 2011; fertility and mortality information from the Massachusetts Community Health Information Profile (MassCHIP); and the Census Building Permit Survey database. For a complete description of the methodology, please see Appendix B.

Key Trends: Regional Migration

A detailed understanding of the dynamics of migration into and out of the region is fundamentally important to forecasting the region's future population. Approximately 97,000 people move into the region each year from other states, whereas an average of 103,000 people move out each year to other states. The loss of population represented by the difference between these two figures is termed *net domestic outmigration* and averaged 6,200 people per year from 2007 – 2011. The region also experiences net outmigration to other regions in Massachusetts, at the rate of about 4,400 people per year.

Migration rates vary widely by age, as shown in Figure 2, which depicts the number of people moving into, out of, or within the region from 2006 – 2010. This chart demonstrates that the number of people moving to a different house within the region is, not suprisingly, much larger than the number moving into or
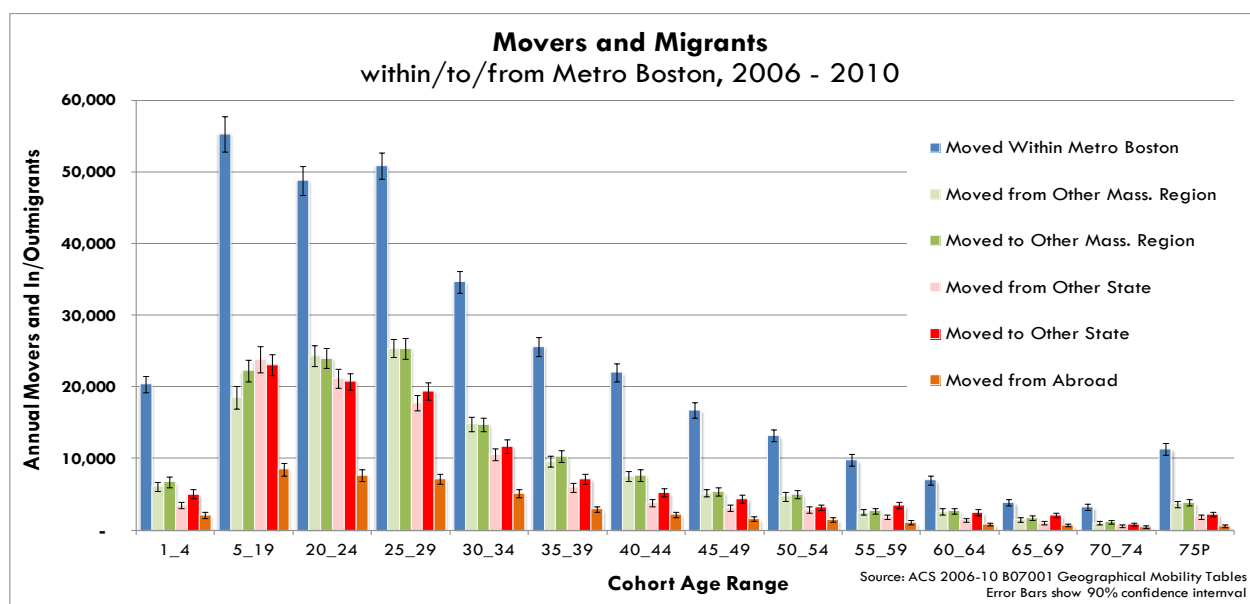
Figure 2. Movers and Migrants: Migration within, to, and from Metro Boston, 2006–2010.

out of the region. It also shows the overall differences in mobility by age and the relative stability of older cohorts. Only 5 – 7% of residents 55 or older moved in the past year, whereas a third of the population 20 – 29 lived in a different place a year ago. More than 50% of all people moving to or from another state are between the ages of 15 and 29.

Comparing the number of movers to and from other states yields estimates of net domestic migration by age, as shown in Figure 3. This chart shows that positive net domestic migration occurs only for ages 18 to 24; all other age groups are more likely to move out of the region than to move into it. Of particular concern is the substantial net outmigration of people age 25 to 49, because it depletes the number of workers—especially skilled workers—available to employers in the region. It is also notable that net
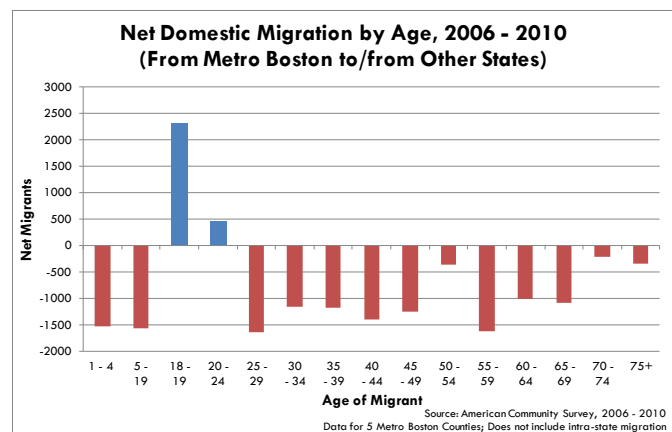
Figure 3. Net Domestic Migration by Age, 2006–2010.

outmigration rates for residents age 60 to 69 are comparable to other age groups, and those for residents over the age of 70 are quite low. Contrary to some conventional wisdom, the region is not experiencing a dramatic exodus of senior citizens to places with warmer climates, lower taxes, or other attractive features.

These patterns of net domestic outmigration have characterized Metro Boston for many decades, but there are signs that the trends are changing. Since before the beginning of the Great Recession, domestic outmigration rates have decreased and inmigration rates have risen. In contrast to a 30,000 person outflow in 2007, the two rates achieved relative parity from 2008 to 2011, including two years of net positive migration (Figure 4). Three factors may help to explain the recent patterns: lower overall mobility rates during recessionary periods, lower housing prices following the crash of 2008, and the state's stronger economic performance relative to other

Metro Boston Domestic Migration Flows, 2005-12

Source: American Community Survey 1-yr estimates

Figure 4. Metro Boston Domestic Migration Flows, 2005–2012.

states during the recession and recovery. While there was a slight uptick in outmigration during 2012, it is possible that migration rates may yet return to historic levels, the recent years indicate that the region can attract and retain residents given the right economic and housing market conditions.

The Status Quo scenario assumes that domestic migration rates continue at the average of the past five to seven years, resulting in overall net domestic outmigration of 10,500 people annually. The Stronger Region scenario anticipates that outmigration from the region continues to slowly decline by 1% per year, and that inmigration increases by 0.75% per year. As a result, the region would experience annual net domestic inmigration of 10,400 people by 2020 and thereafter. Most cohorts over the age of 40 would still experience net outmigration, but at much smaller rates, and the $25 - 39$ year old cohorts, which currently lose people to other states, would see net inmigration of 3,600 people per year.

Key Trends: Housing Occupancy

Future housing demand is a function of how many households form or dissolve over the coming decades, the type of housing (single family or multifamily) that those households are likely to occupy, and whether they are likely to rent or own. The *headship rate* is the probability that an individual of a specified group is a head of household. Higher headship rates mean there are relatively more households associated with a population. Figure 5 shows headship rates by age for Metro Boston from $1990 - 2010$. Two conclusions

Headship Rates by Age, 1990 - 2010, Metro Boston

Figure 5. Headship Rates by Age, Metro Boston, 1990–2010.

can be drawn from this data: first, headship rates increase with age. A group of 75-year-olds will need 12% more units than the same size group of 55 year olds, and those households are likely to have fewer

people. Second, headship rates have fluctuated over time while retaining a consistent pattern by age. Headship rates during the 2010 Census were slightly lower overall than 2000 rates, possibly due to economic conditions that caused more people to be a member of another household rather than the head of their own. Our projections assume that current headship rates will continue into the future decades; if in fact they return to the levels of 2000 or 2010, then the number of households and housing demand may be even higher than our projections.

Future demand for various types of housing units can also be estimated from current occupancy patterns.

Figure 6 shows how patterns of housing occupancy vary with age. Householders younger than 34 are overwhelmingly likely to rent housing in a multifamily structure. Residency in single family homes rises steeply after age 34, peaking at 59% for householders 45 to 54 years old. After age 70, the tendency of householders to live in single family home slowly declines by about 6% per decade, counterbalanced mostly by increasing occupancy in multifamily rental units. Across the age spectrum, occupancy in multifamily ownership units (condominiums) ranges from 15% to 21% of total households.
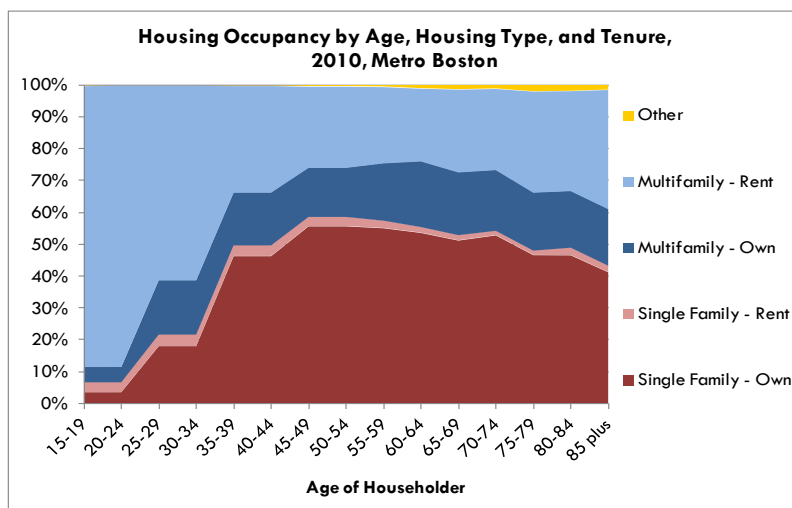
Figure 6. Housing Occupancy by Age, Housing Type, and Tenure, Metro Boston, 2010.

There are indications that these trends are changing. From 2000 to 2010, the percent of households living in single family homes declined across the age spectrum, as shown in Figure 7. In 2000, 25% of householders age 25-34 lived in a single family home, but by 2010 that figure had declined by seven percentage points to 18%. For those aged 35-44, single family occupancy dropped four percentage points.

Figure 7. Change in Single Family Occupancy Rates, Metro Boston, 2000–2010.

Households headed by someone age 55 to 69—the leading edge of the Baby Boom generation—were also much less likely to live in single family homes than were people of the same age ten years prior.

It is possible that some of this shift away from single family occupancy was the result of financial conditions during and after the Great Recession, as unemployment, stagnant wages, and more restrictive mortgage regulations may have delayed home purchases for many 25 − 44 year olds. Other factors suggest that single family occupancy rates are not likely to fully rebound any time soon, and that the shift toward multifamily may continue: stagnant wages and financial uncertainty may cause some younger households to delay home buying; a greater share of new households forming will be led by members of racial and ethnic minorities who are more likely to live in multifamily housing than are Non-Hispanic White households of similar age and income; seniors who have seen the value of their retirement savings diminished by stock

market declines or rising health care costs may seek to sell their homes to capture the appreciated value; the growing share of families with only one child may feel less need for single family homes; and consumer preference for housing in convenient, transit-rich locations may steer households toward multifamily options.

The Status Quo scenario assumes that future households of a given age and type (family or nonfamily) have the same housing occupancy patterns as do similar households today. That is, we assume that preference for single family homes will not rebound to the levels of 2000, but will remain where it is today. The Stronger Region scenario anticipates that the financial and cultural factors described above result in a continued shift toward multifamily occupancy. Specifically, we assume a 2 − 5% decline in single family occupancy for 35 − 44 year olds in the coming two decades (comparable to what occurred from 2000 to 2010) and a 1 − 3% decline for 45 − 54 year olds from 2020 − 2030. In other words, we anticipate that householders currently 25 − 34 years old will delay and—to a limited extent—forgo altogether single family housing when compared to older generations. We also anticipate that older householders (those over 65) will slightly accelerate the rates at which they transition out of single family homes, with single family occupancy declining 1 − 2% from current rates in 2020 and 2030, comparable to or slightly smaller than the shifts that this generation experienced over the past decade.

Key Trends: Intermunicipal Migration

The patterns of population and household movement *within* the region will of course also be a primary driver for municipal level population change and housing demand. Just as the region experiences net in-migration of some cohorts and outmigration of others, so do its individual cities and towns. Some are magnets for young professionals in small non-family households; other communities attract large numbers of families with children. While future location decisions will depend in large part on the type and cost of housing in each community, not to mention other assets such as schools and public safety, the patterns of migration observed from 2000 − 2010 may be instructive in projecting future migration patterns.

Figure 8 shows estimated net migration by age from 2000 to 2010 for each of the region's Community Types and the City of Boston. (See next page for a map of Community Types.) The horizontal axis shows the age in 2000, and the values indicate the net migration for that same cohort over the subsequent ten years. Positive values on the chart indicate that there are more people of a given age moving in than are moving out; negative values indicate net outmigration. Because there is also net migration to and from the region, the in and outflows for individual municipalities or Community Types do not sum to zero.
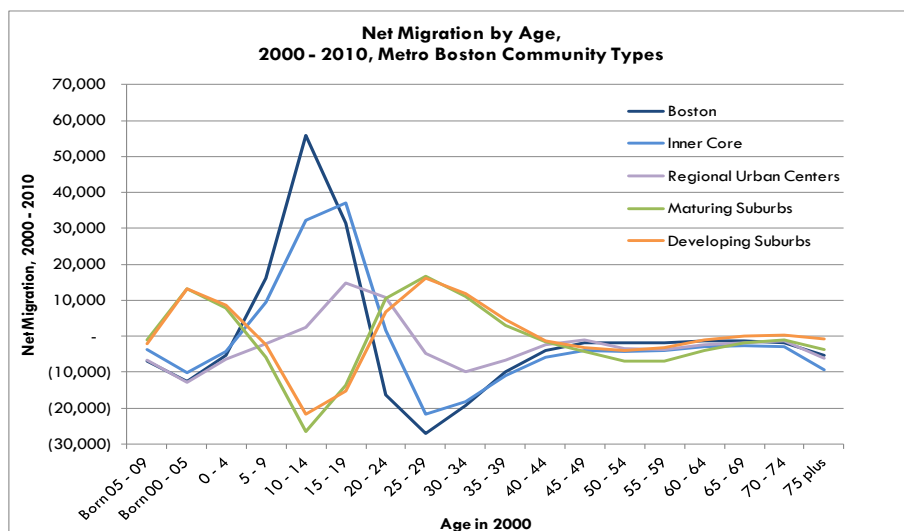
Figure 8. Net Migration by Age, Metro Boston Community Types, 2000–2010.

Immediately obvious is the fact that urban communities as a whole experience net outmigration of children before they reach the age of 15, inmigration of college-age residents and young adults, and outmigration of people during their prime household and family formation years (20 to 39.) Conversely, suburban communities as a whole experience inmigration of school-age children, outmigration of residents entering their college years, and inmigration of young adults who were 20 – 39 at the beginning of the decade. Regional Urban Centers (Figure 9) have migration patterns similar to the Inner Core but have fewer and smaller colleges and universities and so do not have the same peak of college age residents. All Community Types experience modest outmigration of residents over the age of 40.

The reasons for these patterns are intuitive: the region's numerous top-notch colleges and universities attract large numbers of students from outside Massachusetts and abroad, most of whom choose to live in the Inner Core; and many young adult in-migrants to the region also choose to locate in urban areas for the amenities they offer. However, concerns about school quality and safety, not to mention housing preferences, subsequently cause those same young adults to move out of urban areas and to suburban communities in their early thirties and afterwards, when they form families and have children. As with regional migration and housing occupancy, there are indications that these trends may also be changing. National survey data suggest that younger householders are more inclined to remain in vibrant, mixed-use urban settings than were previous cohorts. A proliferation of walkable urban amenities and new transit services may retain households looking to reduce their transportation expenditures. Many urban school districts are improving and there is a growing variety of alternatives to public school districts. Job growth in urban communities since the recession has outpaced the recovery in suburban areas. Already, the traditional outmigration of younger householders and young families from urban to suburban settings may slow has slowed down; from 2000 to 2010, urban municipalities attracted or retained an additional 30,000 people as compared to the 1990s. This trend may accelerate if continued investments in schools, public safety, and amenities make urban living more attractive.

The Status Quo Scenario assumes continuation of current intermunicipal migration patterns into the future, with minor adjustments applied to account for a ensure full utilization of the existing housing stock, to account for development activity already underway, or to correct for known aberrations in the 2000 – 2010 estimates (such as a single large development that affected the migration estimates but is not likely to be repeated regularly.) The Stronger Region scenario anticipates that the preference for urban living increases slightly among residents who are 25 to 40 years old, as well as their children under the age of 5; we assume that approximately 10% of those residents who otherwise would have moved out of urban communities choose instead to stay. There is also a corresponding 10% decrease in the migration of those same cohorts to the low-density Developing Suburbs.
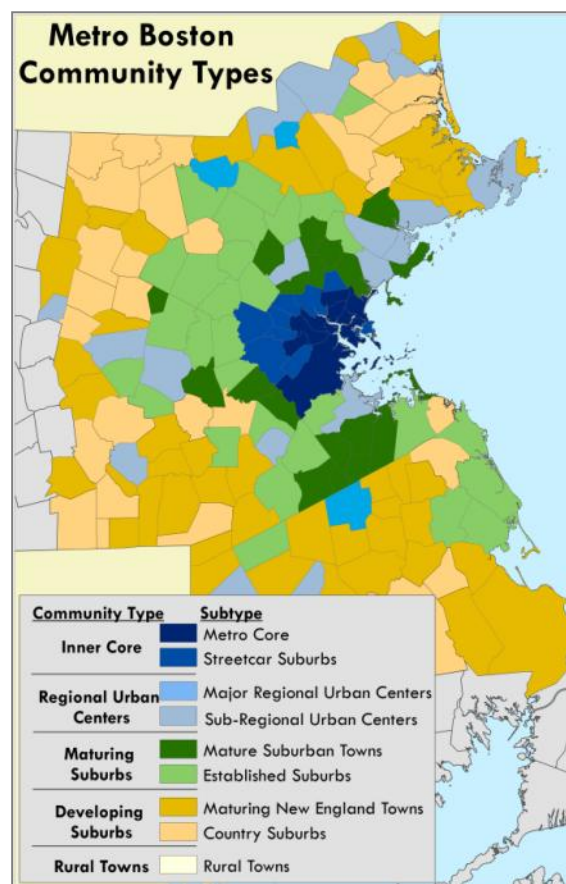
Figure 9. Map of Metro Boston Community Types.

Total Population Projections

If the Status Quo continues, the region is likely to grow by 100,000 people by 2020 (2.25%) and 293,000 by the year 2040, a total increase of just 6.6% over 30 years. By 2040, the population of the region may reach 4.75 million people, up from 4.46 million today. Figure 10 shows population change by age from 2000 – 2040. The Baby Boomer population, age 30 to 55 years old in 2000, is now moving into its retirement years and its members will all be over the age of 75 by the year 2040. While the population of this cohort will slowly decline over time due to mortality and migration, enough will stay and survive to push the over-65 population to above 1 million by the year 2030—174% of what it was in 2010. By 2030, 21% of the region's residents will be over the age of 65, up from 13% today. Meanwhile, the number of residents *under* the age of 65 is likely to decline by 5.1% between 2010 and 2030, equivalent to nearly 200,000 people. In particular, the number of children under the age of 15 is likely to decline by 6.5% by 2020, and 10.5% by 2040, continuing a trend that has been underway since 2000, as the Baby Boomers began aging out of their prime family-rearing years.
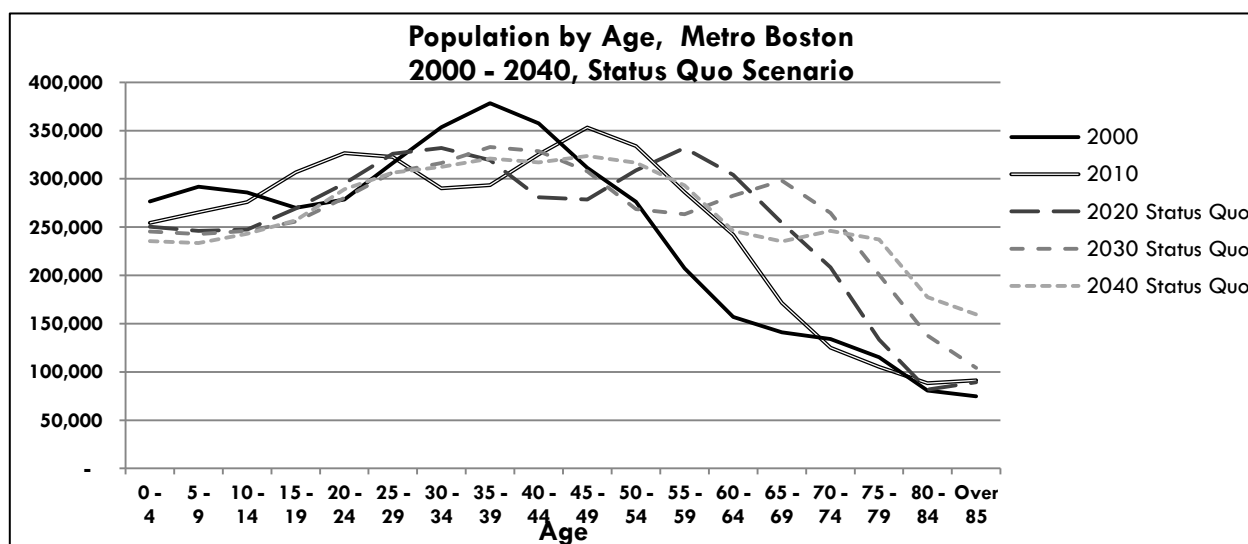
Figure 10. Population by Age, Metro Boston, 2000–2040, Status Quo.

The population of the region will become increasingly diverse, led by rapid growth of the Hispanic population, which could more than double by 2040 (Figure 11). In fact, growth in the Hispanic population alone is likely to be greater than overall population growth in the region. Meanwhile, outmigration, mortality, and low birth rates will cause a decline of 16% in the population of Non-Hispanic White residents between 2010 and 2040.
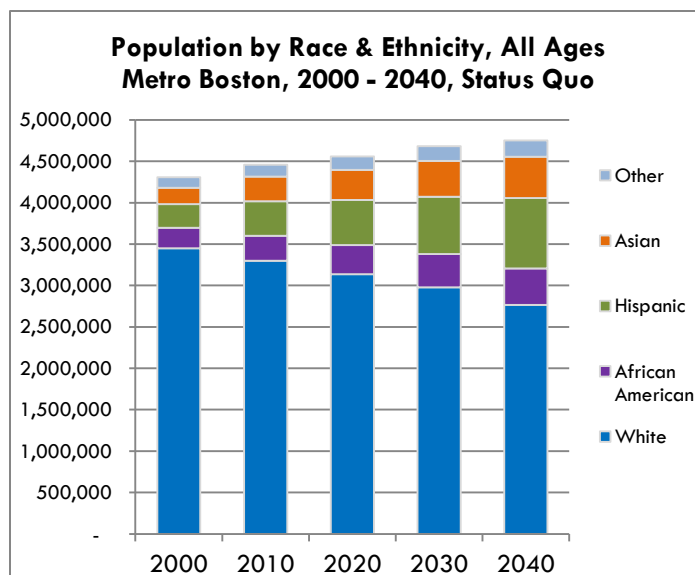
Figure 11. Population by Race and Ethnicity, All Ages, Metro Boston 2000–2040, Status Quo.

The diversification of the region will be especially pronounced among young people (Figure 12). In 2010, one third of the region's residents under the age of 20 were people of color (up from one quarter in 2000.) By 2040, nearly half of young people will be Hispanic or members of a non-White race. Meanwhile, the number of White Non-Hispanic residents under the age of 20 may decline by 31%. Similarly, people of color will comprise a growing share of the senior population, increasing from 12% of the over-65 population in 2010 to 23% in 2030 and 31% in 2040.

Total Population: Stronger Region

The Stronger Region scenario, which assumes slightly higher in-migration rates and slightly lower outmigration rates, anticipates more substantial regional growth, especially among younger and middle age cohorts (Figure 13). The region's population would grow by 4.6% between 2010 and 2020, and by 12.6% by the year 2040. The total increase of 561,000 residents would push the region past 5.0 million people in the year 2040.

While the senior population would grow just as rapidly as under the Status Quo, the population under 65 would remain relatively steady until 2030 after which point it might increase by 1.7% (Figure 14). In particular, the region's population between ages 30 and 45 would rebound to levels near where it was in 2000. The population under 15 could decline by 5.5% from 2010 to 2020, after which point it would rebound slightly for a total decline of 4.6% from 2010 to 2040.
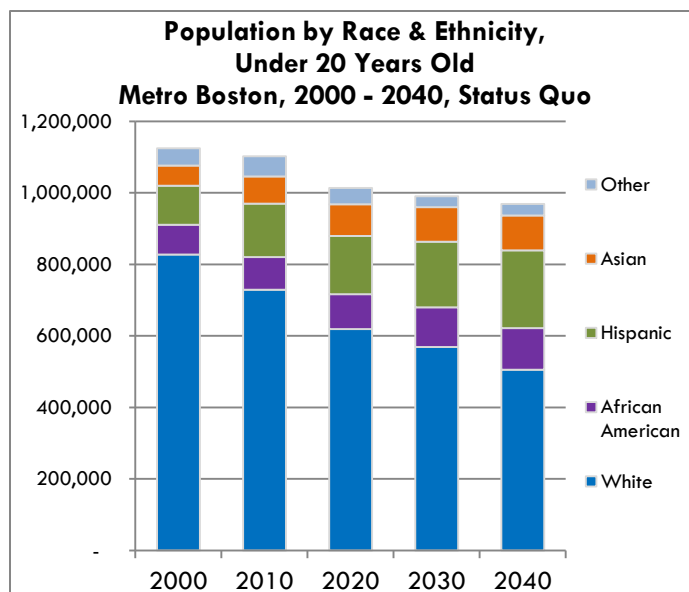
Figure 12. Population by Race & Ethnicity, Under 20 Years Old, Metro Boston, 2000–2040, Status Quo.
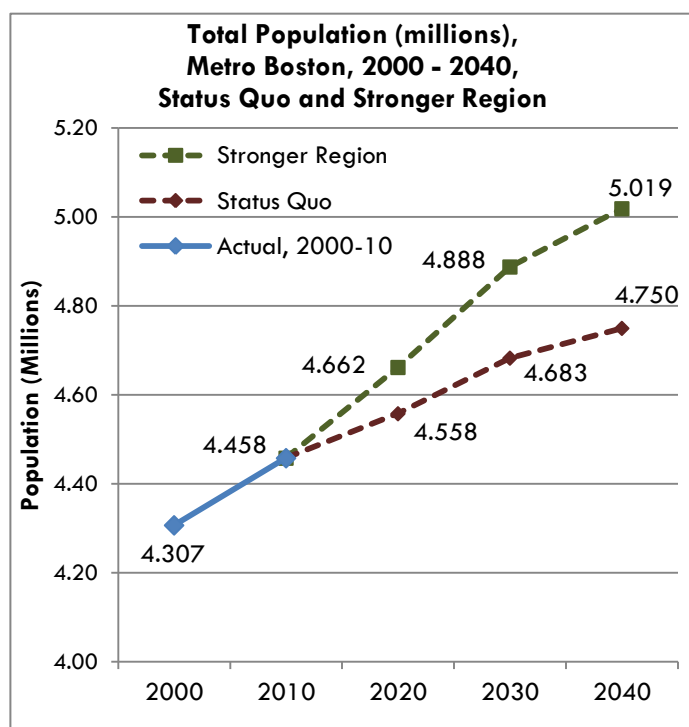
Figure 13. Total Population, Metro Boston, 2000–2040, Status Quo and Stronger Region.
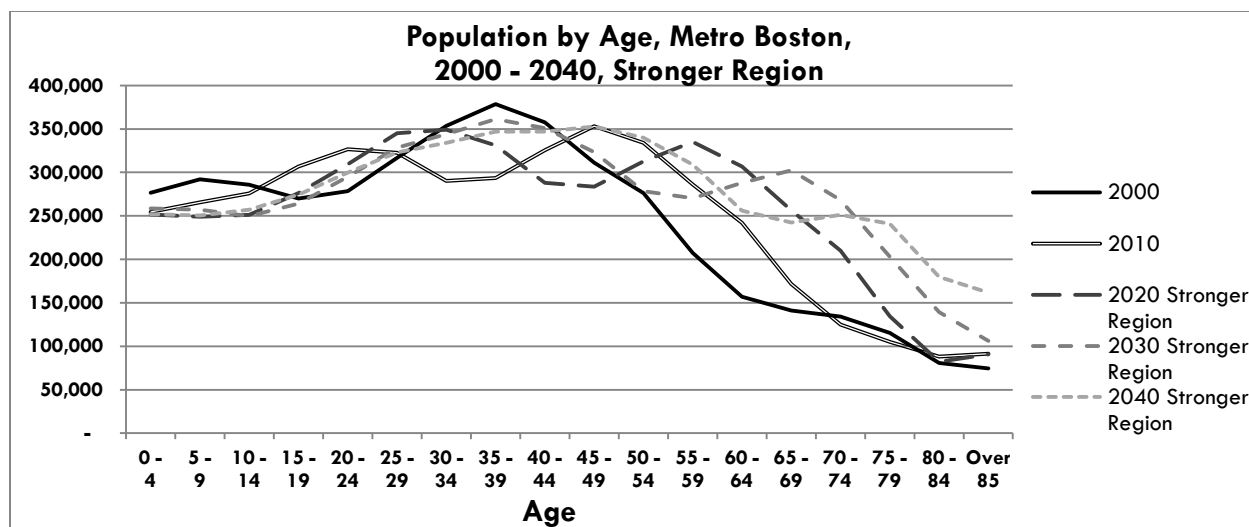
Figure 14. Population by Age, Metro Boston, 2000–2040, Stronger Region.

The patterns of racial and ethnic change in the region would remain largely similar to the Status Quo Scenario, with a somewhat more rapid increase in residents of color. The Non-Hispanic White population would decline more slowly as well, losing just 10% of its 2010 population.
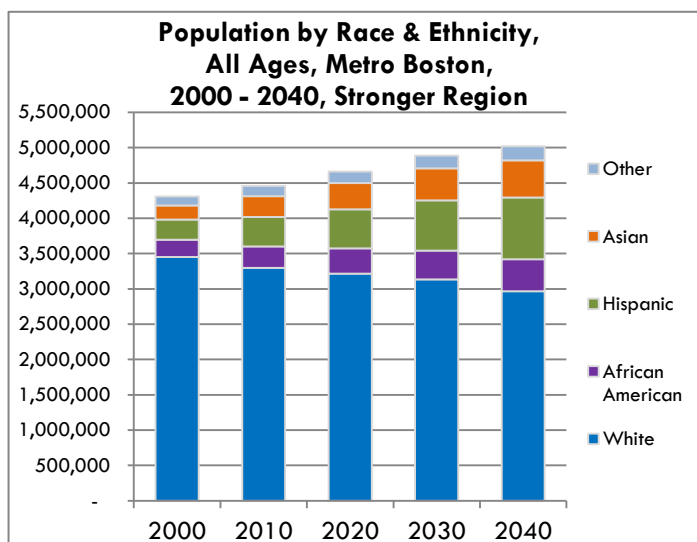
Figure 16. Population by Race and Ethnicity, All Ages, Metro Boston, 2000–2040, Stronger Region.
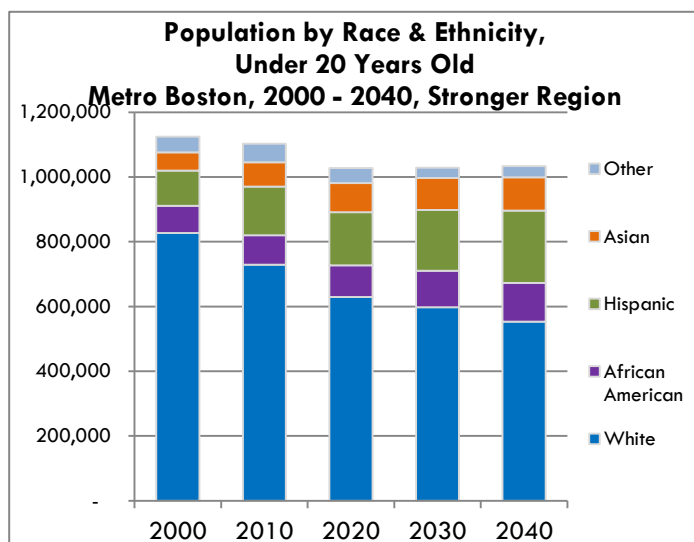
Figure 15. Population by Race and Ethnicity, Under 20 Years Old, Metro Boston, 2000–2040, Stronger Region.

Household Change Projections

The population changes likely to ensue in the coming decades will also bring changes in the number, type, and size of households in the region[1]. Even with population growth of just 2.25% over the next ten years, the Status Quo would have an additional 127,000 households, an increase of 7.4%. Population growth alone will require approximately 40,000 housing units, an increase of 2.4%. Additional increases in the number of households will be driven by declining household size. A growing share of households will be headed by someone over the age of 65, accompanied by a rapid rise in the number of people living alone. Meanwhile, the number of large households will grow very slowly, if at all. As a result, average household size is likely to decline from 2.50 people in 2010 to 2.28 in 2040, with the fastest decline anticipated in the next decade. If the average household has fewer people, the same population will be distributed among a larger number of households (and housing units.) We estimate that declining household size *alone* will result in approximately 86,000 additional households over the next ten years, more than two thirds of the total increase in households.

Just as the aging of the Baby Boomer generation will dominate the overall population dynamics of the region in the coming decades, it will also have a substantial influence on household change. The number of householders over the age of 65 will nearly double over the next 30 years, and their share of all households will increase from 22% in 2010 to 34% by 2040 (Figure 17). Meanwhile, the number of younger householders will change only slightly from one decade to the next, and most age groups under 65 will see a decline in the number of households between 2010 and 2040. The projected number of householders by age is shown in the chart below.
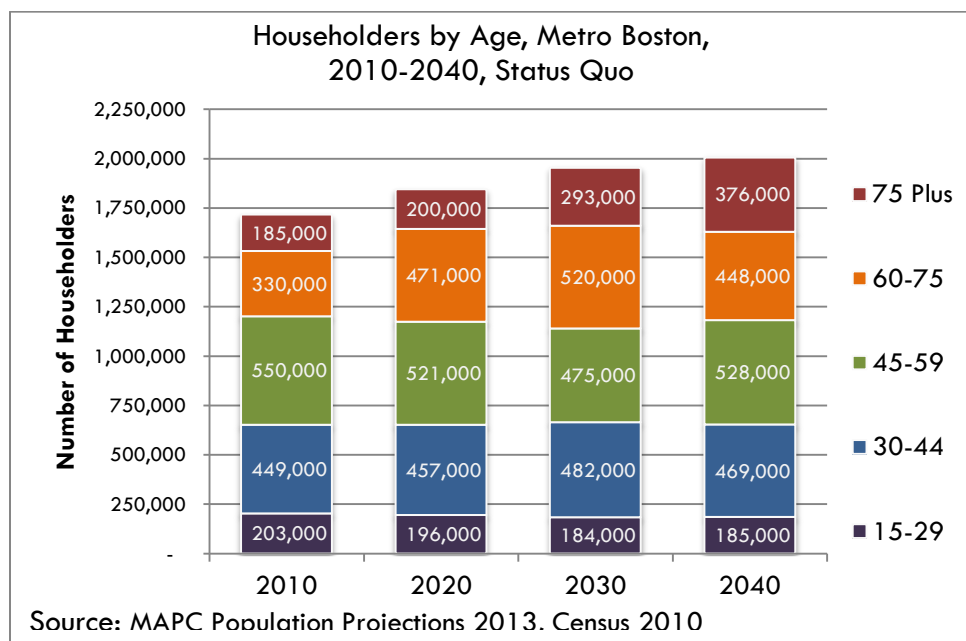
Figure 17. Householders by Age, Metro Boston, 2010–2040, Status Quo.

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[1] A *household* is defined as all the persons who share a housing unit as their usual place of residence. Each household has one *householder*, usually the person in whose name the housing unit is owned or rented. A *family household* is one in which one or more occupants are related to the householder by birth, marriage, or adoption.

Corresponding with the increase in older households, the number of single-person households and 2 -3 person family households will increase, while the number of large family households and non-family households of all sizes will not change appreciably over the next thirty years (Figure 18). The number of single person households is likely to increase by 29%, with small family households growing 19%. The relative stasis in the number of large family households is attributable to the decline in the 30-55 year old population, the residents most likely to head such households. Non-Family households of two or more people make up a small fraction of the total households currently (8.1%); their number is likely to remain stable over the coming decades and they will decline as a share of the total households.
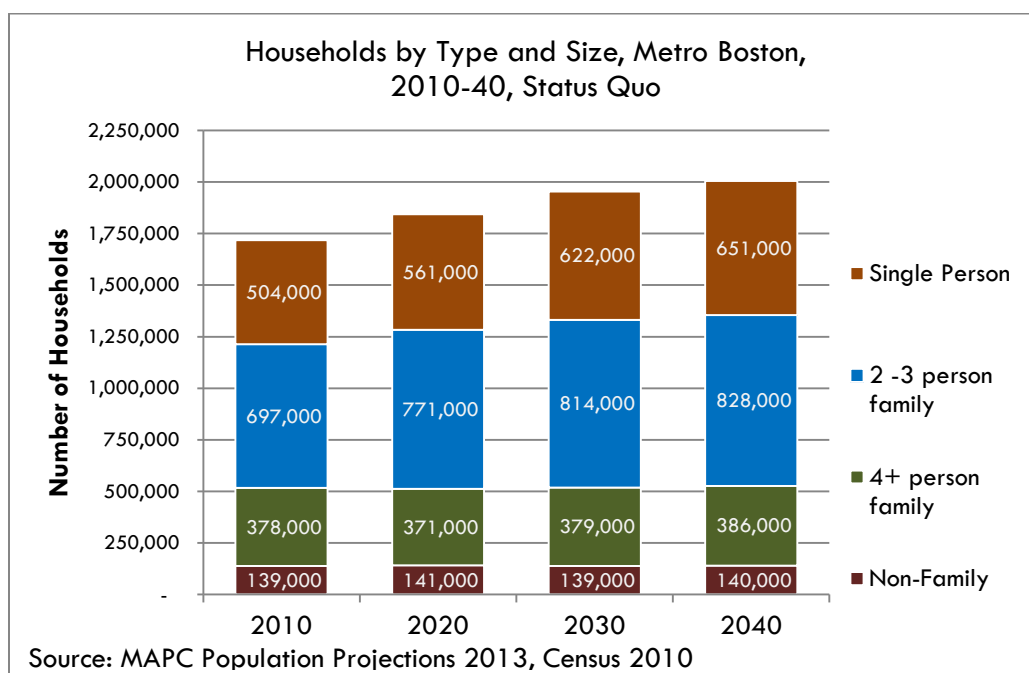
Figure 18. Households by Type and Size, Metro Boston, 2010–2040, Status Quo.

Figure 19 and Figure 20 show how the advancing age of householders is driving the changes in the composition of households. In 2010, Baby Boomers between the ages of 40 and 65 comprise more than half of all households and, and more than a quarter of these Baby Boomer households are large families. By 2040, the total number of Baby Boomer households may be slightly smaller due to mortality and outmigration, but many more of these households are small families or people living alone.

Households by Age and Type, Metro Boston, 2010
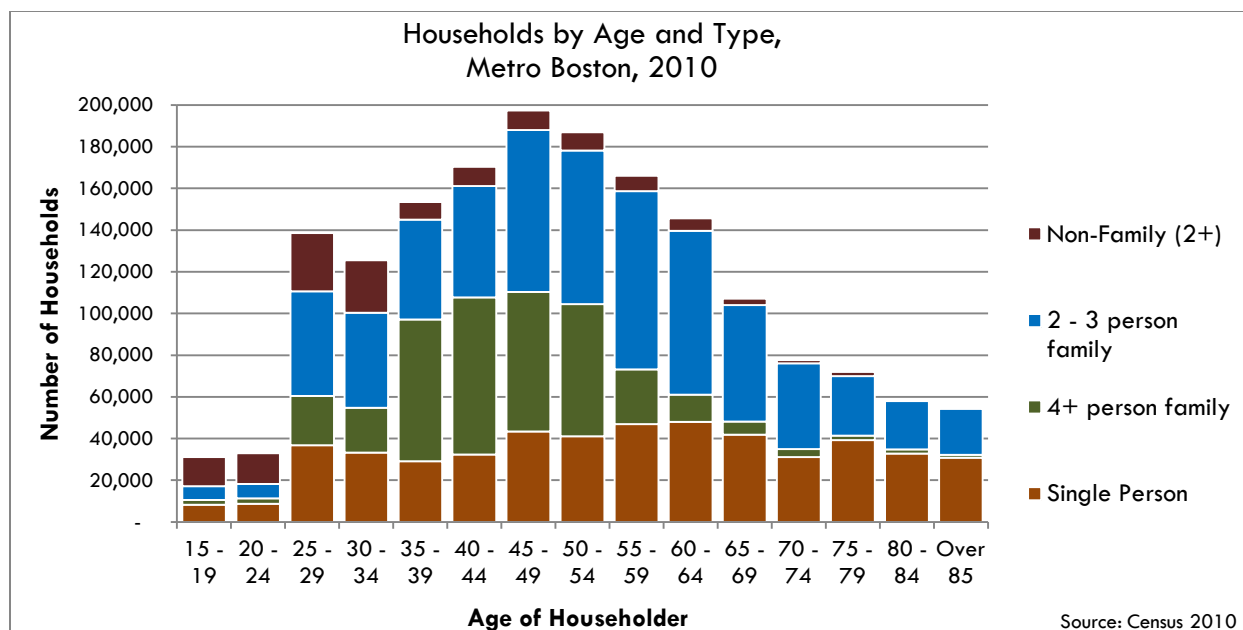
Figure 19. Households by Age and Type, Metro Boston, 2010.

Households by Age and Type, Metro Boston, 2040, Status Quo
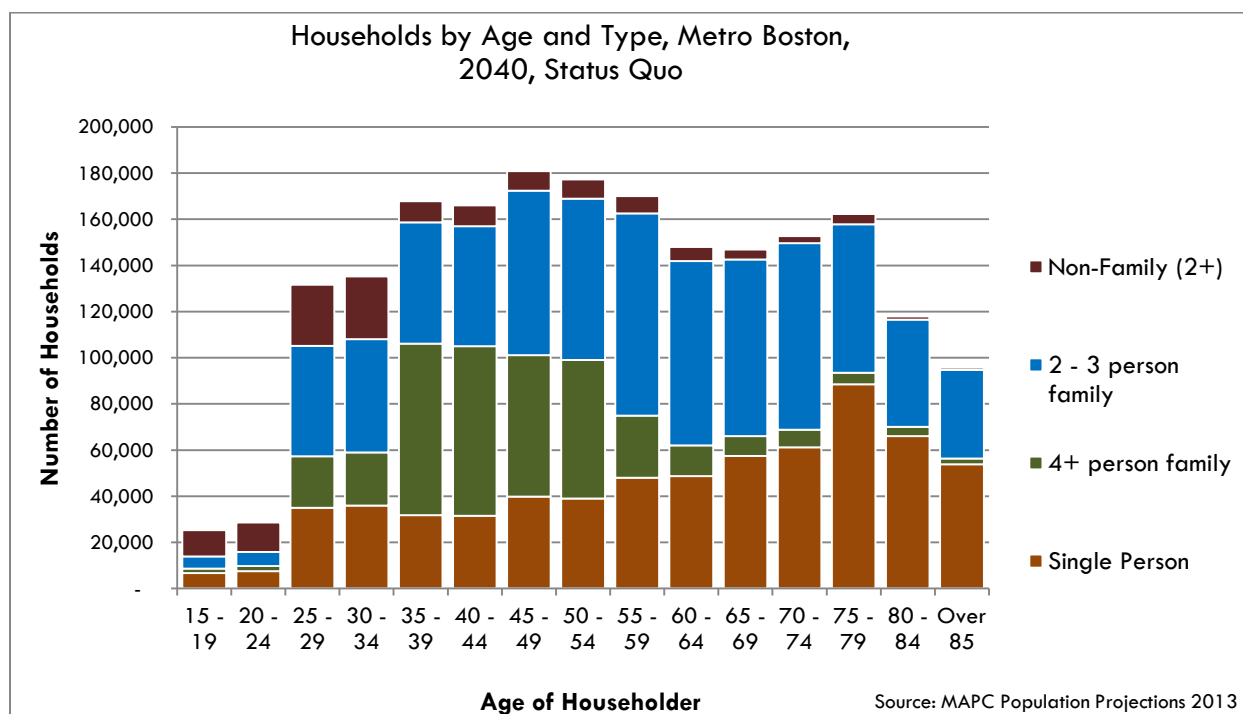
Figure 20. Households by Age and Type, Metro Boston, 2040, Status Quo.

As a result of the shift toward single person and small household families, the average household size in the region is likely to decline by almost 9% over the coming decades, continuing a trend that has been underway since 1970 if not before (Figure 21). (The slower rate of decline between 2000 and 2010 is likely a result of economic conditions in 2010 that resulted in reduced household formation and more "doubling up", rather than a persistent trend.)
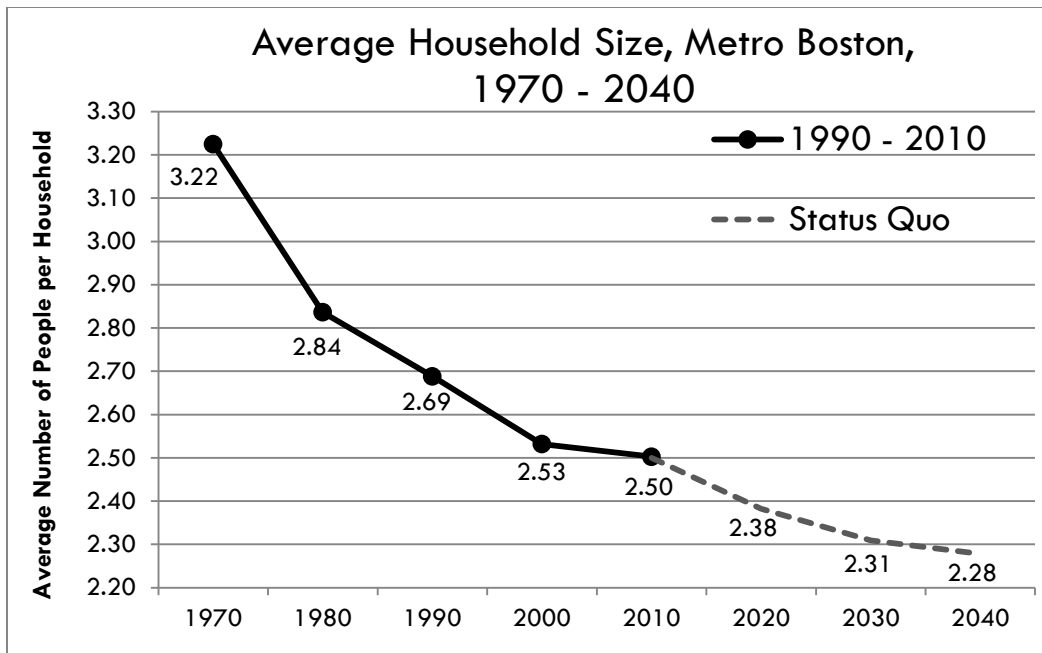
Figure 21. Average Household Size, Metro Boston, 1970–2040.

Household Change: Stronger Region

The household change in the Stronger Growth scenario will reflect many of the same demographic and household dynamics that underlie the Status Quo scenario, with a substantial growth in the number of over-65 householders and single person households, accompanied by continued declines in household size. However, this scenario entails more robust household growth, primarily as a result of increased in-migration and retention of younger adults. As described previously, thirty-year population growth in the Stronger Region scenario (12.6%) is nearly double that of Status Quo (6.6%). The region would likely see 395,000 new households over 30 years, versus 288,000 new households under the Status Quo. Despite the substantially larger population increase in the Stronger Growth scenario, the difference in household growth is not so dramatic when comparing the two scenarios: 23% increase under Stronger Growth versus 17% under Status Quo (2010 - 2040.) This smaller difference is because even with no population increase whatsoever, the number of households would increase by nearly 10% due to declining household size. After accounting for this phenomenon, population increases in the two scenarios are expected to result in approximately 120,000 additional households in the Status Quo and 227,000 units in the Stronger Region scenario, a ratio comparable to the difference in population change.

Almost all of this difference results from greater number of householders under 65 years old. Instead of seeing declines in the number of younger and middle-age householders, the number of under-65 householders would increase by 5.6%, as shown in Figure 22. Senior households will remain the fastest growing segment of the region, comprising 33% of households in 2040 (up from 22% today, but slightly less than the 34% anticipated by the Status Quo.)
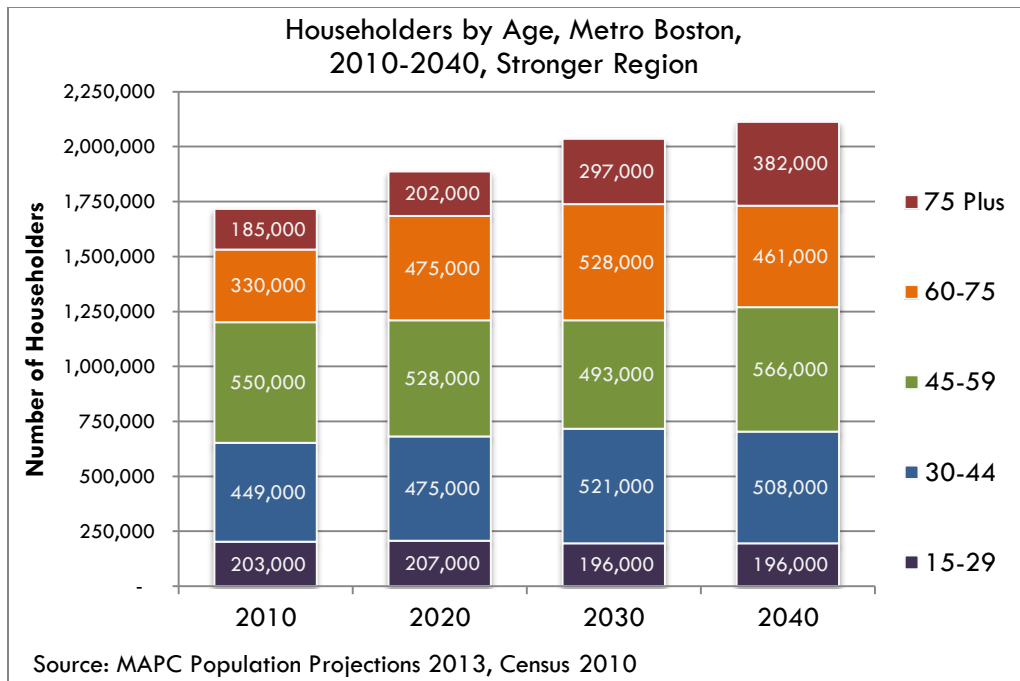
Figure 22. Householders by Age, Metro Boston, 2010–2040, Stronger Region.

With a modest increase in the number of householders under the age of 65, the region will also be less likely to see a decline in the number of large family households (Figure 23). The number of single person and small family households will still grow rapidly, but large family households and Non-Family households of more than two people may grow by 10% and 7% respectively (versus 2% or less in the Status Quo.)
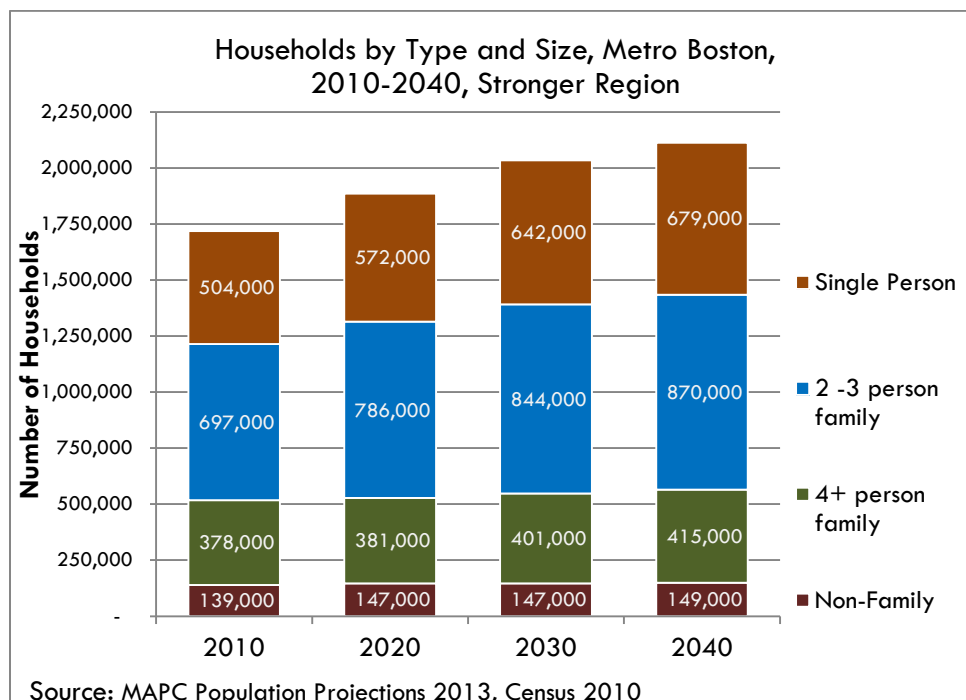
Figure 23. Households by Type and Size, Metro Boston, 2010–2040, Stronger Region

Figure 24 and Figure 25 depict the number and type of households by age in 2040 for the Stronger Growth scenario, and the differences between the two scenarios. Figure 25 shows that the majority of the additional households associated with the Stronger Growth scenario (in 2040) will be headed by someone under the age of 50.
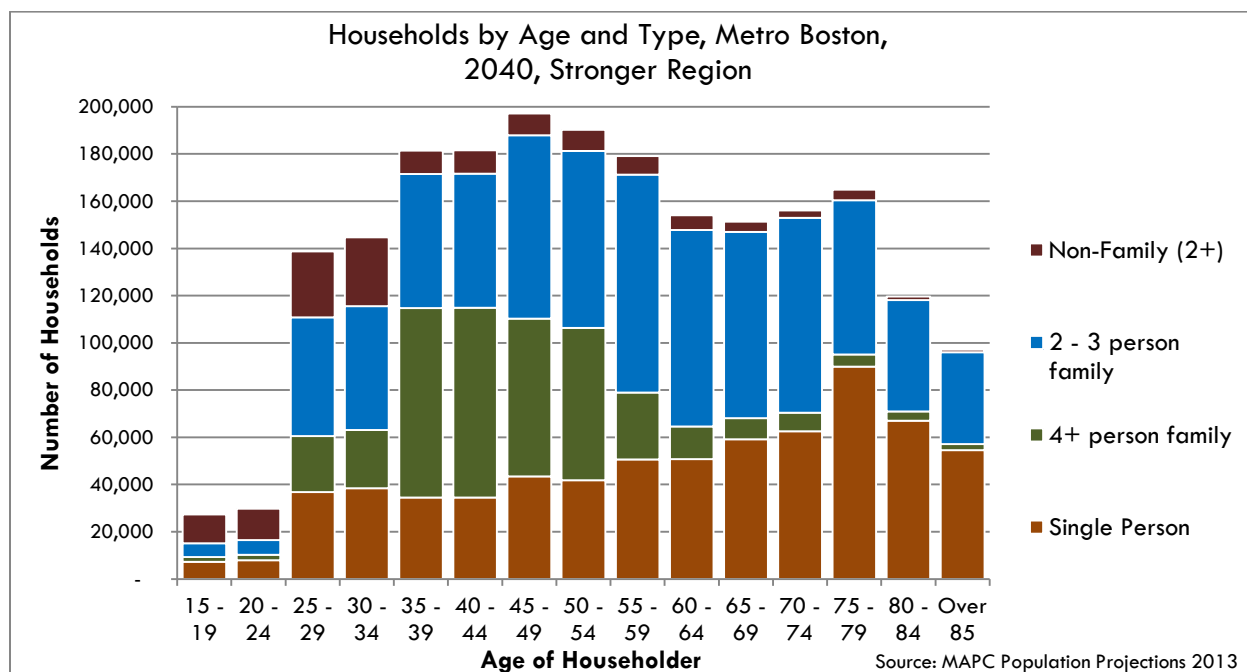
Figure 24. Households by Age and Type, Metro Boston, 2040, Stronger Region.
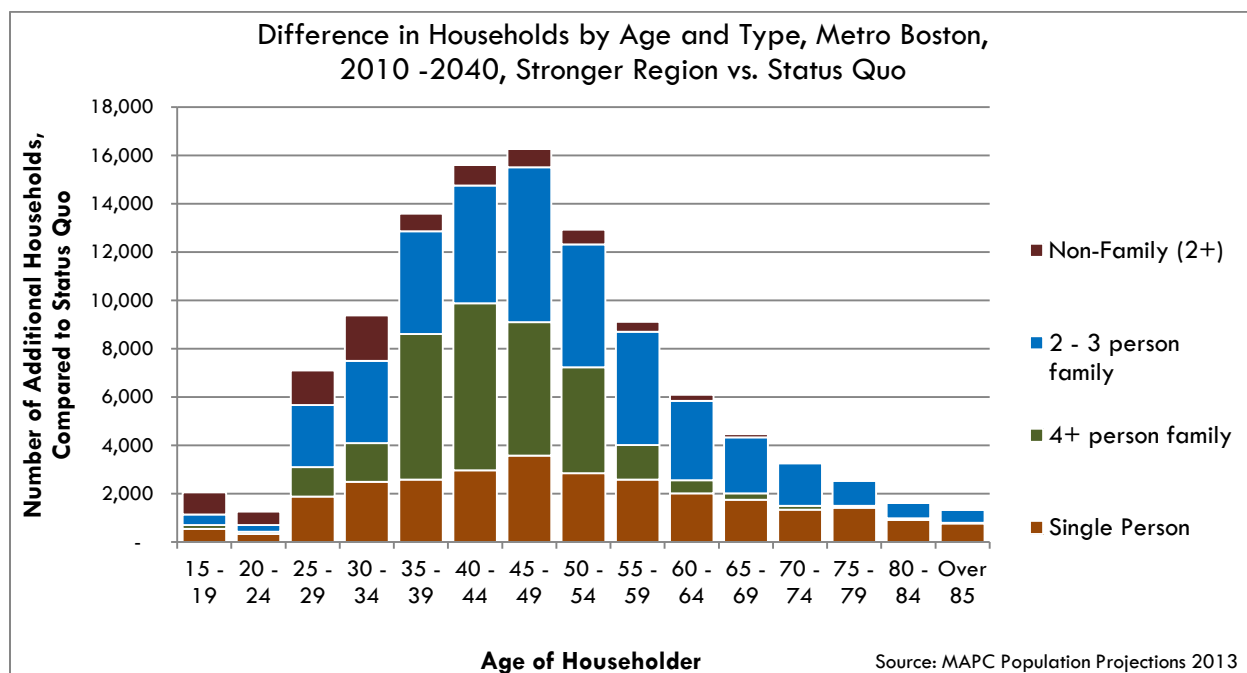
Figure 25. Difference in Households by Age and Type, Metro Boston, 2010–2040, Stronger Region vs. Status Quo.

Housing Unit Demand Projections

Growth in the region's households will be accompanied by a corresponding rise in housing unit demand, and the changing age, size, and type of households will determine the specific type, tenure, and size of units needed to satisfy growing demand. Each of additional 127,000 new households by 2020 in the Status Quo scenario will need a new housing unit to occupy. Furthermore, additional units will be needed to achieve and maintain a healthy vacancy rate for both ownership and rental units in the region. Consequently, the Status Quo scenario anticipates that the region will need new 133,600 housing units over the coming decade, and 300,000 new units over the three decades from 2010 – 2040.

The information presented in the section on household change allows us to anticipate what types of units will be needed, since households of different types, sizes, and ages have different housing occupancy patterns. Young adult householders tend to occupy multifamily rental housing, middle-age family households disproportionately live in single family homes, and senior householders progressively shift toward multifamily housing as they age. Figure 26 shows net housing unit demand by age for the period 2010 – 2020. Please note—this chart does not show the net demand for each age category, but rather the marginal change in demand for *each five year age cohort* as it ages during the ten year period. We chose this presentation for the data since conventional housing demand charts (demand by age group) may depict dramatic swings in demand that are the result of unequal cohort sizes, when in fact most if not all of the households are already housed and are likely to remain in the same or a similar unit over the next ten years. In contrast, the chart below shows the *marginal change in demand* that results from household formation, dissolution, mortality, and aging.
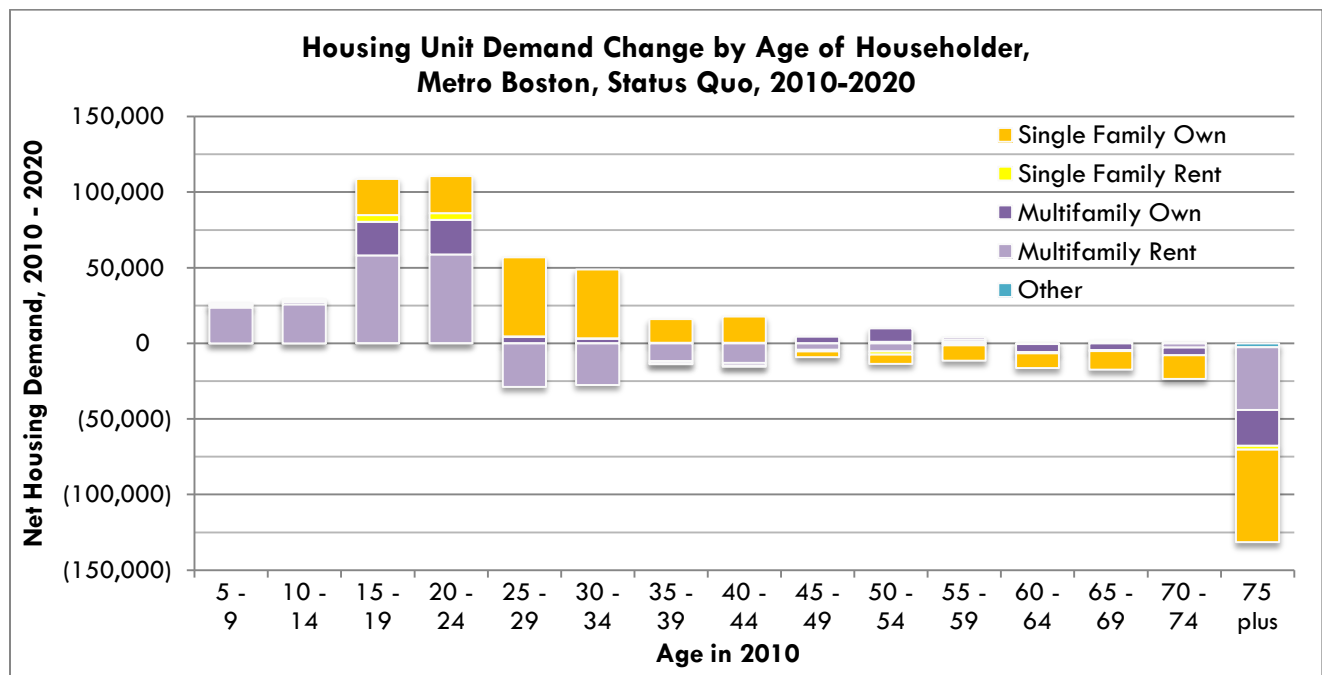
Figure 26. Housing Unit Demand Change by Age of Householder, Metro Boston, 2010–2020, Status Quo.

This chart shows that cohorts under the age of 45 in 2010 will have a net increase in housing demand as they age over the next ten years, with the greatest net demand associated with the cohort between the ages of 15 and 24 in the year 2010 (who will be 25 to 34 by 2020.) Conversely, all cohorts who were 45 or over in 2010 will need fewer housing units than they do today, as a result of mortality, outmigration,

or transition to nursing homes or other group quarters situations. As those processes occur, the units that they currently occupy will come back on the market and will be available to other households.

Figure 26 also shows the different types of housing in demand or being vacated by each cohort. People currently between the ages of 5 and 25 are likely to form 275,000 new households over the coming decade, which will predominately occupy multifamily housing, mostly rentals. Ages 25 to 34 are likely to form about 49,000 new households overall, but they are also at an age where households commonly transition from apartments to condominiums or single family homes. As a result, this cohort will have a net demand for 98,000 single family homes and 7,100 condominiums, and will potentially put 56,000 multifamily rental units back onto the market. All cohorts that were 45 or older in 2010 will need fewer units overall ten years from now, with a net decline of 127,000 single family units and 76,000 multifamily units, enough to supply about 66% of single family demand and 55% of multifamily demand for younger cohorts. It is worth noting that while overall demand is negative, there is a net positive demand of 14,500 condominiums for householders currently age 45 to 59; after accounting for the net negative demand for rental housing, these cohorts will need 6,500 new multifamily units over the next ten years.

A number of general conclusions can be drawn from Figure 26: First, *the net increase in housing demand will be driven by younger residents forming new households*, not by growth in the number of Baby Boomer households; second, *the units freed up by the declining number of older households are a substantial element of the region's supply*, and the choices made by seniors will have an important impact on the existing units that will potentially be available to younger households; third, *the availability of both rental and ownership multifamily housing is fundamental to attracting and maintaining younger residents*.

Similar charts for the periods from 2020 – 2030 and 2030 – 2040 show similar trends, with an increasing number of existing units being freed up as the baby boomers continue to age in the 2020s and 2030s. The result is that demand for additional units will be somewhat smaller in the decades after 2020. Figure 27 shows the total demand by housing unit type for each decade, including both occupied units and additional units needed to achieve and maintain a healthy vacancy rate[2]. We project that the region will need 133,600 new units between 2010 and 2020, 113,000 new units from 2020 – 2030, and 54,000 units from 2030 – 2040. Across all three decades, the demand is split almost evenly between multifamily and single family housing, with multifamily units comprising 51% of the demand over the next decade, 47% in the 2020s, and 52% in the 2030s.

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[2] In consultation with Barry Bluestone of the Dukakis Center at Northeastern University, we have estimated a healthy "natural vacancy" rate of 1.5% for ownership units (single family or condominium) and 7.0% for rental units. Using these figures, we estimate that Metro Boston had a shortage of 5,500 vacant rental units in 2010 and a surplus of approximately 3,000 ownership units. These figures indicate that the region needs to produce "extra" rental units in order to achieve a healthy vacancy rate that helps to moderate prices and increase availability for renters; meanwhile, there is an excess of for-sale units that can help to meet future demand without adversely affecting the vacancy rate.

**Total New Housing Unit Demand,
Metro Boston, 2010 - 2040, Status Quo**

Legend:
- Other
- Multi-Family -Rent
- Multi-Family -Own
- Single Family -Rent
- Single Family -Own

Y-axis: Net Housing Unit Demand

2010-20: 61,700 (Single Family -Own), 26,900 (Multi-Family -Own), 41,300 (Multi-Family -Rent)
2020-30: 55,500 (Single Family -Own), 20,800 (Multi-Family -Own), 32,300 (Multi-Family -Rent)
2030-40: 23,500 (Single Family -Own), 7,200 (Multi-Family -Own), 21,000 (Multi-Family -Rent)

Source: MAPC Population Projections 2013

Figure 27. Total New Housing Unit Demand, Metro Boston, 2010–2040, Status Quo.

In addition to the type of units needed, we also examined changing needs for units of different sizes, specifically the need for units with three or more bedrooms to house larger families. We estimated the number of large families (four-plus person family households) associated with each cohort and the net change in the number of these households over the next decade. Consistent with previously noted observations about household formation and dissolution, we found that there will be an increase of 141,600 large families headed by someone who was under the age of 35 in 2010, and a decrease in the number of large families headed by someone 35 or older in 2010 (Figure 28). The net difference is negative 7,200 households, indicating fewer large families in the future than there are today. However, this does not necessarily indicate that there is no need for the construction of new units with three or more bedrooms. Even though an individual family household may shrink as children leave home, married couples divorce, or a spouse dies, the new, smaller household does not immediately move to a smaller unit of the same type. As a result, some smaller households may end up "overhoused," living in larger units that are effectively unavailable to the large families that need them. Conversely, some large families may currently be living in "undersized" units of only two bedrooms, so a decline in their household size may not create an opportunity to move out and free up a larger unit for another family. Unfortunately, available Census data do not provide the details needed to assess the extent or magnitude of the current housing size mismatch, or to estimate how it may change in the coming decades. Although we can conclude that the total number of large families is likely to decline, we can also surmise that there will still be a need for large units to house new families, though the number and type of those units will depend on the housing preferences and options available for households currently living in larger units.

Change in 4+ Person Family Households by Householder Age, Metro Boston, 2010-20, Status Quo
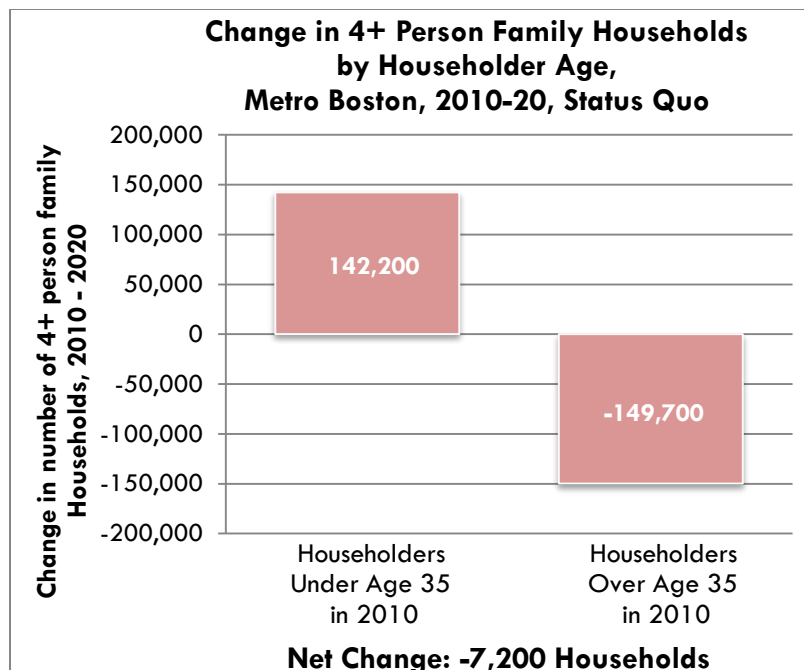
Figure 28. Change in 4+ Person Family Households by Householder Age, Metro Boston, 2010–2020, Status Quo.

Housing Unit Demand: Stronger Region

As described previously, population growth under the Stronger Region scenario is nearly double that of the Status Quo, primarily through the increased attraction and retention of younger adults. Household growth and housing unit demand are also higher in the Stronger Region scenario—32% higher in the case of housing unit demand. Total housing unit demand would be 176,000 units from 2010 – 2020, and 435,000 units from 2010 – 2040, an increase of 10% over the next decade and 24% over the 30-year forecast period.

In addition to the increased in-migration and retention rates that characterize the Stronger Region, this scenario also anticipates continued changes in housing occupancy patterns. In particular, it anticipates that younger householders (those born after 1975) will delay—or to a modest extent forgo altogether—their move to single family homeownership; and that senior householders will transition out of single family housing to multifamily housing at a rate slightly higher than they do today. As discussed above, both of these trends are consistent with changes in housing occupancy observed over the past ten years as well as other indicators of changing housing preference and financial capacity for homeownership. The anticipated housing unit demand by age is depicted in Figure 29.
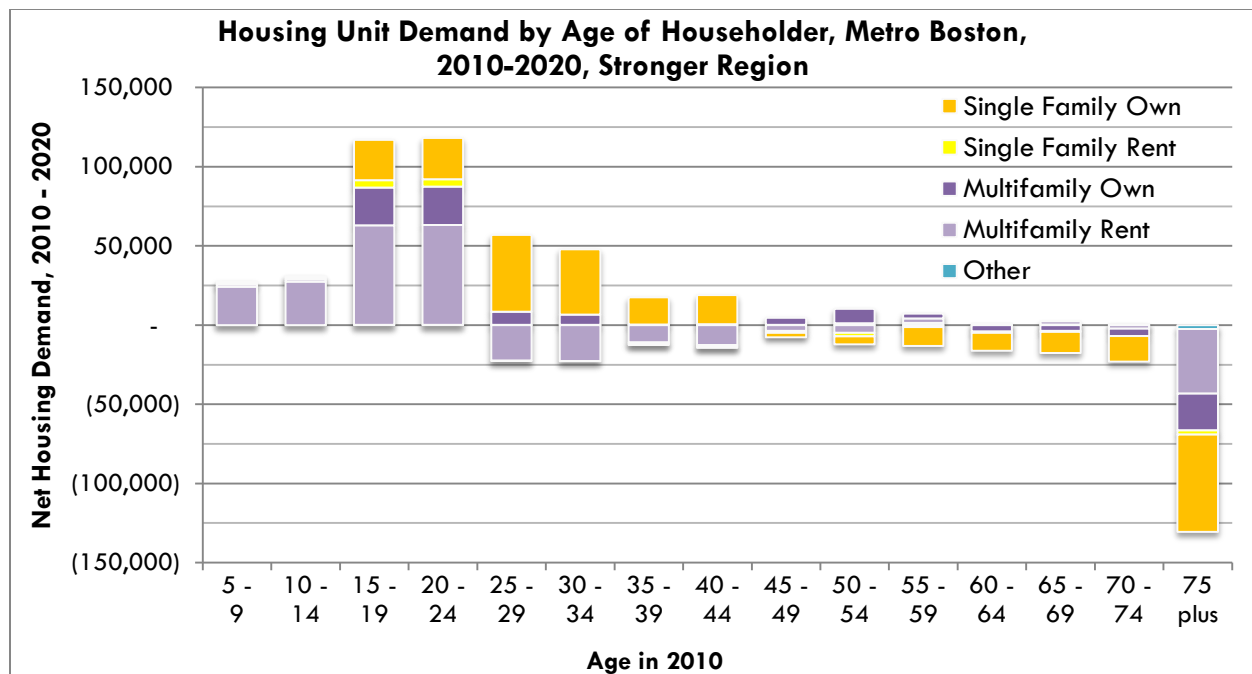
Figure 29. Housing Unit Demand by Age of Householder, Metro Boston, 2010–2020, Stronger Region.

This chart shows overall housing demand patterns similar to that of the Status Quo, though total demand is approximately 32% higher. As with the Status Quo, most demand is attributable to household formation by residents currently under the age of 40; demand for householders currently between the age of 25 and 44 is marked by transition from multifamily to single family housing; and people over the age of 45 have overall reduced demand for all types of housing, with the exception of net positive demand for multifamily ownership for householders currently between the ages of 45 and 59. While the general pattern is similar to the Status Quo, the anticipated changes in housing occupancy for younger and older cohorts result in notable differences in demand at each age group. The differences between the two scenarios are depicted in Figure 30.

This chart shows that three quarters of the increased demand in the Stronger Region scenario is attributable to householders currently under the age of 40, and that most of that demand is for multifamily housing. Householders currently between the ages of 25 and 34 will need about 7,800 fewer single family homes (about 8% fewer than under the Status Quo) due to a slightly increased preference for multifamily housing. In addition, Senior householders currently 55 or over would experience slightly higher need for multifamily housing, though only in the case of the 55 – 59 year olds would there be net positive demand. The slightly more rapid transition to multifamily housing among seniors would free up an additional 5,200 single family homes that would help to satisfy demand for younger households.

Housing Unit Demand by age of householder, Metro Boston, 2010-2020, COMPARISON: Stronger Region vs. Status Quo

Source: MAPC Population Projections 2013
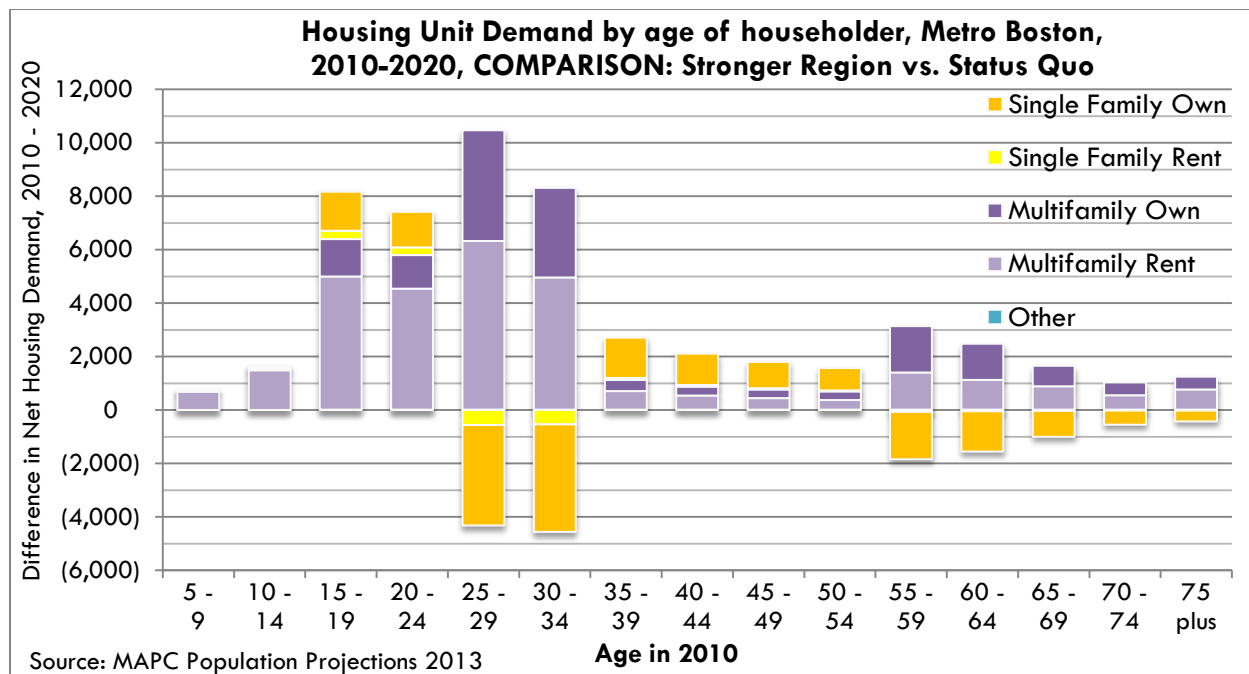
Figure 30. Housing Unit Demand by Age of Householder, Metro Boston, 2010–2020, Comparison of Stronger Region and Status Quo.

Figure 31 compares the overall demand by housing unit type. Not only is housing unit demand higher in every decade, but because of the characteristics of the population who is attracted and retained in the region, as well as the anticipated changes in housing unit occupancy, most if not all of the additional demand is in the multifamily market. Multifamily housing comprises 66% of demand in the coming decade, 58% in the 2020s, and 60% in the 2030s. Condominiums comprise about 37% of the multifamily demand through 2030 and slightly less (20%) in the 2030s. Single family housing demand is lower in the coming decade by about 6,000 units and higher by about 5,400 units and 14,700 units in the subsequent decades as the young adults retained in the state age into the years when they are most likely to occupy single family homes. In both scenarios, net housing demand is highest in the coming decade and declines thereafter as the Baby Boomers—who occupy a large portion of the current housing stock—age well into their senior years and free up more units through mortality, migration, or movement to group quarters.

Total New Housing Unit Demand, Metro Boston, 2010-2040, Status Quo and Stronger Region
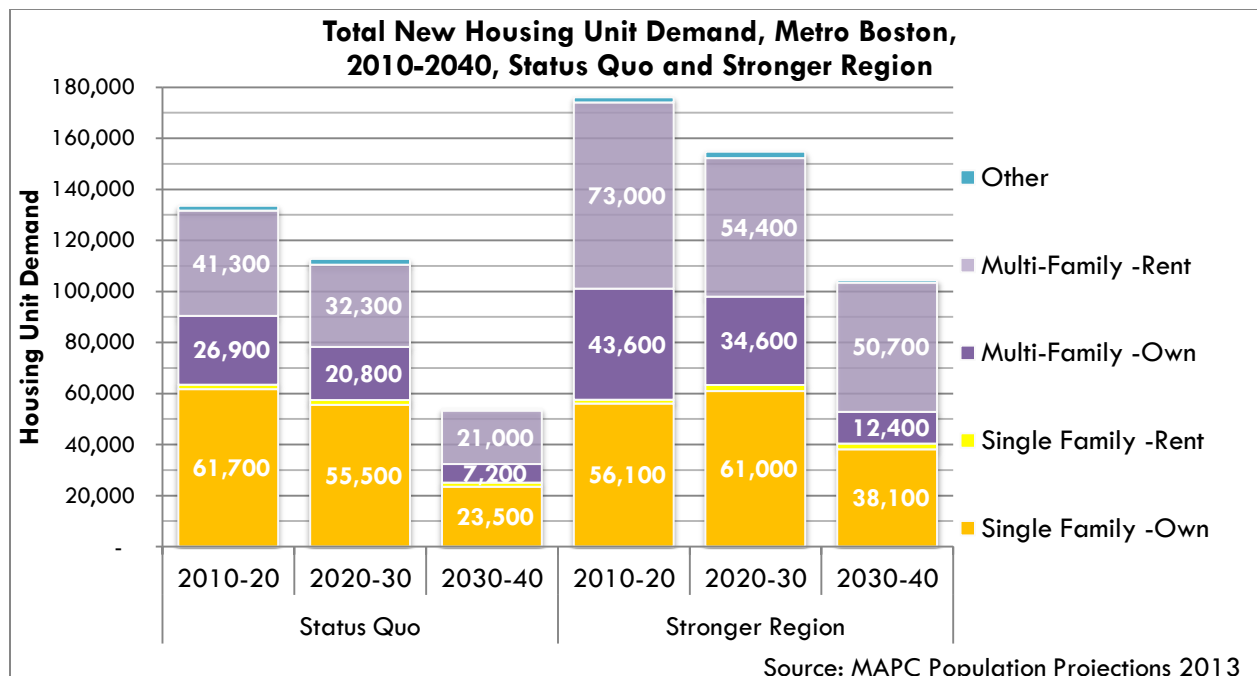
Figure 31. Total New Housing Unit Demand, Metro Boston, 2010–2040, Status Quo and Stronger Region.

The Stronger Region scenario is also likely to require increased production of 3+ bedroom units for larger families (Figure 32). In contrast to the Status Quo scenario, there is a small net increase in the number of large family households in the region, as fewer large households headed by someone over 35 leave the region, and as more are created by younger households. As a result, there may be a net increase of 2,300 large families over the next ten years. However, as discussed previously, the number of units needed to accommodate these families is likely much greater because some older families are likely to stay in their existing unit even as the family shrinks.

Change in 4+ Person Family Households by Householder Age, Metro Boston, 2010-2020, Status Quo and Stronger Region
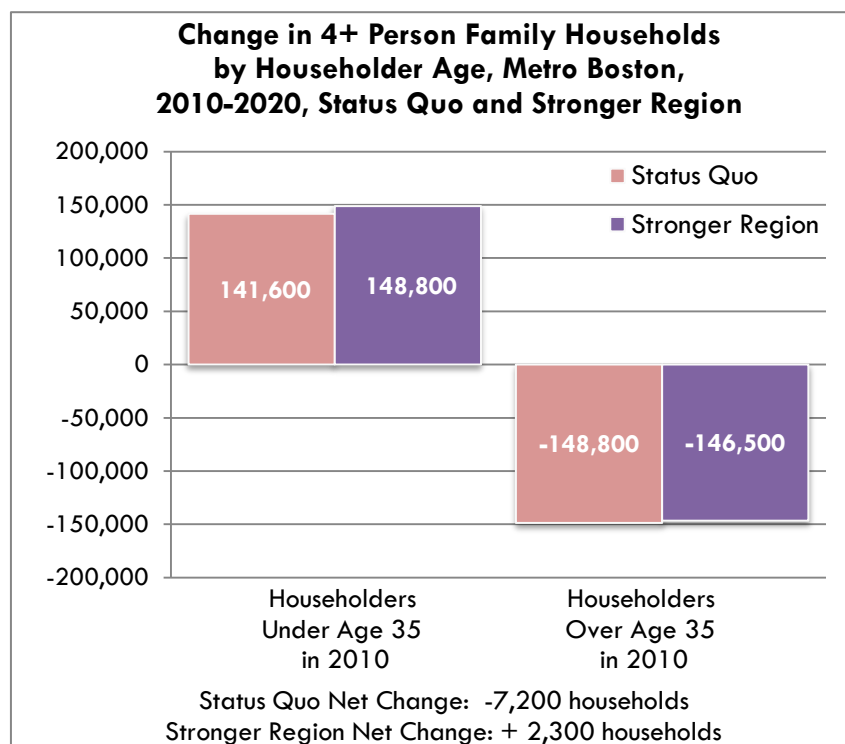
Figure 32. Change in 4+ Person Family Households by Householder Age, Metro Boston, 2010–2020, Status Quo and Stronger Region.

Labor Force Projections

Demographic shifts over the coming decades will have profound implications for the region's workforce and our economic competitiveness. Baby Boomers (age 40 – 65 in 2010) comprised 49% of the region's labor force in 2010. Over the coming decades, this population will be aging well into its retirement years, depleting the supply of our most critical asset: a skilled, well-educated workforce. In fact, these residents make up such a large portion of our workforce that if current trends continue, the region in 2030 may have fewer people in the labor force than it did in 2010. Consequently, attracting and retaining young workers is critical to supporting the region's economic growth.

In 2010, there were an estimated 2,516,000 Metro Boston residents in the labor force (either working or officially unemployed and looking for work), out of a total of 3,662,000 residents 15 years and older. Figure **33** shows population and labor force participation by age. It shows the large population of Baby Boomers age 40 – 65 who comprise 49% of the labor force, and it also shows how the proportion of the population in the labor force is lowest for residents under the age of 25 (many students) and over the age of 65 (retirees.) It should be noted that labor force participation does not end at age 65; some seniors continue full time or part time work for many years after that age. Nevertheless, the series of charts clearly shows that as the Baby Boomers age into their retirement years, a growing share of this very large cohort will be leaving the labor force. In fact, the number of retirees (over 65 and not in the labor force) may *nearly double* by the year 2040, growing from 470,000 residents to 870,000. By 2030, nearly one million workers now over the age of 40 will have left the labor force—39% of all workers in the region. By 2040, more than 18% of the region's residents will be retirees, up from 11% in 2010.

This anticipated wave of retirement is troubling because the region does not have a corresponding wave of young workers ready to fill the jobs vacated by retirees. Most of the so-called "Echo Boomers," roughly age 15 to 29 in 2010, are already in the labor force, and the cohorts currently younger than 15 are likely to be smaller than their predecessors. In addition, the Echo Boomers are the segment of the population most likely to move out of the region over the coming two decades. As a result of the slow growth at the younger end, the region's labor force is expected to grow by just 27,200 workers over the coming ten years, a rate of 1.1%. From 2020 – 2030, as retirement of the Baby Boomers hits its peak and the effects of the Echo Boom are diminished, the labor force may decline by more than 34,000 workers by 2030, ending up 6,700 workers *below* where it was in 2010. A slight recovery may ensue as a result of other demographic factors, putting the region at about 11,000 workers above 2010 levels by the year 2040.
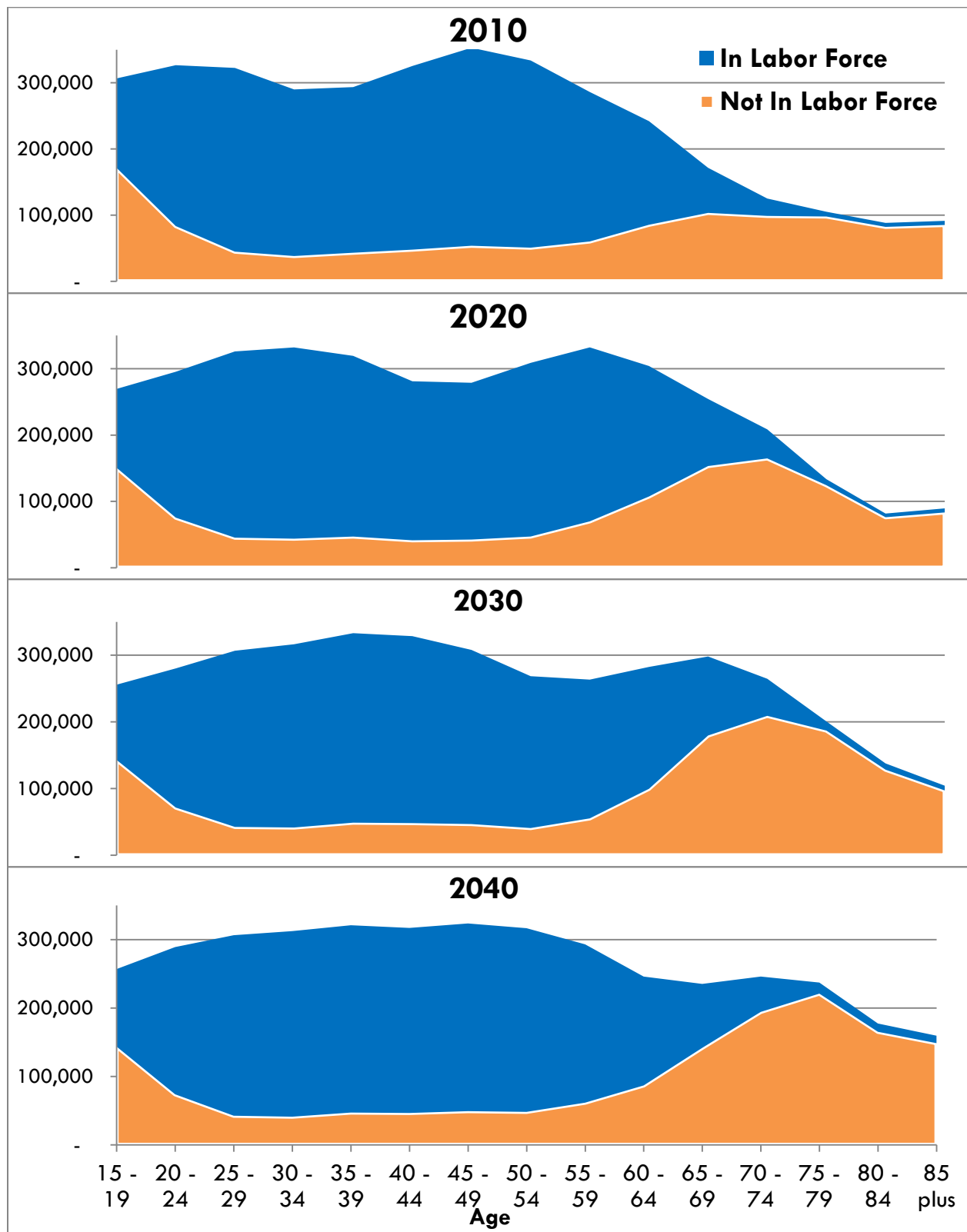
Figure 33. Population by Age and Labor Force Status, Metro Boston, 2010–2040, Status Quo.

Population by Age and Labor Force Status, Metro Boston, 2010 – 2040, Status Quo								
	2010		2020		2030		2040	
AGE	In Labor Force	Not in Labor Force	In Labor Force	Not in Labor Force	In Labor Force	Not in Labor Force	In Labor Force	Not in Labor Force
15 - 19	135,300	171,500	118,800	150,600	112,800	143,000	113,300	143,700
20 - 24	243,300	83,500	219,900	75,400	208,600	71,600	215,300	73,900
25 - 29	277,800	44,800	280,800	45,200	264,100	42,600	263,900	42,500
30 - 34	251,900	38,200	288,300	43,700	274,800	41,600	271,300	41,100
35 - 39	250,500	43,100	272,400	46,900	284,100	48,900	273,900	47,100
40 - 44	277,700	47,800	239,700	41,300	280,400	48,300	270,500	46,600
45 - 49	299,400	53,700	236,300	42,400	261,100	46,800	274,400	49,200
50 - 54	283,100	50,800	261,800	47,000	227,700	40,800	268,500	48,200
55 - 59	226,100	60,100	262,300	69,800	208,100	55,400	231,500	61,600
60 - 64	156,700	85,400	196,800	107,300	182,800	99,600	159,200	86,800
65 - 69	68,200	103,400	101,100	153,200	118,500	179,600	93,500	141,800
70 - 74	26,300	98,800	43,800	164,700	55,600	209,100	51,700	194,300
75 - 79	7,200	97,900	9,100	124,300	13,700	187,000	16,200	221,000
80 - 84	6,000	82,200	5,600	76,000	9,400	128,400	12,100	165,200
85 plus	6,200	85,100	6,100	83,300	7,100	97,300	10,900	148,700
TOTAL	2,515,500	1,146,300	2,542,800	1,271,100	2,508,800	1,440,000	2,526,300	1,511,700

Labor Force: Stronger Region

The increased attraction and retention of residents, especially young adults, is a key element of the Stronger Region scenario that may mitigate the labor force decline that occurs as Baby Boomers retire. The higher level of population growth might help the labor force to grow by 101,000 people over the coming decade, a rate of 4%. The subsequent decade would see slower growth of 26,000 workers, followed by more robust growth during the 2030s, finally achieving a labor force 6.9% higher than today's in 2040.

Figure 34 shows the positive impact that higher attraction and retention rates will have on the region's labor force. The difference grows from 73,000 workers in 2020 to 164,000 workers in 2040. While there is no silver bullet to achieving the positive migration rates anticipated by the Stronger Region scenario, these findings demonstrate that attracting and retaining younger adults is a fundamental prerequisite to a growing economy. If we want our economy to grow by more than 1% over thirty years, we need to plan for housing more people.
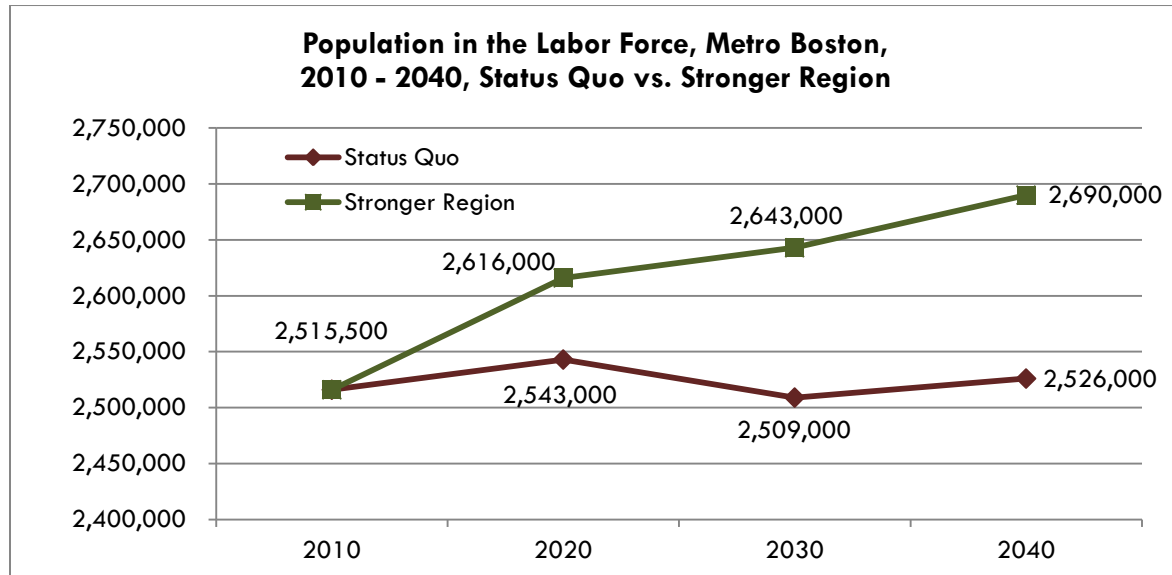
Figure 34. Population in the Labor Force, Metro Boston, 2010–2040, Status Quo vs. Stronger Region.

Municipal Projections

Just as the region at large will experience dramatic demographic shifts over the coming decades, so will many of its communities. With the aging of the Baby Boomers, every municipality in the region is likely to see an increase in the over-65 population by the year 2030, and the region-wide decline in school-age children will reverberate across the vast majority of cities and towns. In communities with an aging population and slow housing production rates, the population may decline even as households and housing demand continues to increase. This phenomenon was observed in twenty municipalities from 2000 – 2010[3], and is likely to deepen and spread to more than 50 municipalities in the Status Quo scenario.

The Stronger Region scenario anticipates that the region will be able to attract and retain more people, especially younger workers, and that the region's urban municipalities will be more attractive to younger families, resulting in less outmigration to suburban communities. As a result fewer municipalities might lose population over the coming decades, and a larger number of cities and towns (nearly 30) would experience a growing school-age population.

Our municipal-level projections include forecasts of population by age, households by householder age, and total housing unit demand for each city and town from 2010 – 2030. These projections are described below and municipal level detail can be found in a series of accompanying tables and community profiles.

Municipal Population Change Projections

Population projections for individual cities and towns are influenced by a variety of different factors, including fertility and mortality rates as well as age-specific migration rates. Figure **35** shows fertility rates for individual cities and towns, based on births from 2007 to 2009. Birth rates are highest (more than 60 births per 1,000 females between 15 and 44) in approximately twenty municipalities, mostly in the Inner Core or Regional Urban Centers, many of which are home to large immigrant and non-White communities (e.g., Chelsea, Everett, Revere, Malden, Lowell, Brockton, etc). Lower birth rates (fewer than 46 births per 1,000 females, and in some cases fewer than 35 births) are observed in many lower-density suburbs outside of Route 128. MAPC uses the age-specific fertility rates for each municipality to project future births, so towns with low birth rates and a declining number of women under the age of 44 (due to slow housing production and little inmigration) are likely to see substantial declines in the number of births and corresponding school-age children.
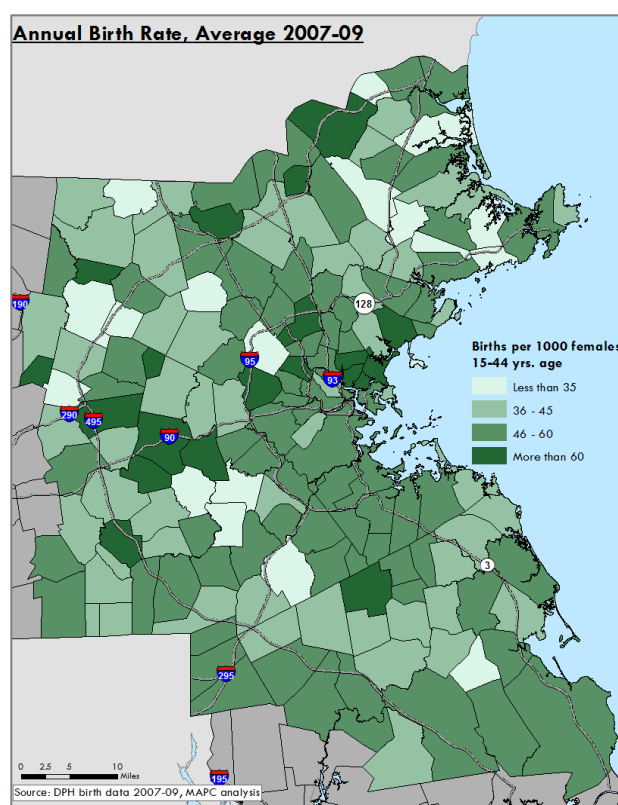
Figure 35. Map of Annual Birth Rate, 2007–2009.

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[3] These municipalities were Amesbury, Avon, Beverly, Chelmsford, Hamilton, Holliston, Hull, Medfield, Melrose, Millis, Newbury, Rockland, Sherborn, Somerville, Stoughton, Taunton, Watertown, Wayland, Weston, and Weymouth

Migration rates by Community Type were presented in a chart in the "Key Trends" section of the report. That chart showed that people are more likely to move to Suburban communities under the age of 15 or between the ages of 25 and 44; while urban communities (especially the Inner Core) see robust inmigration from 15 to about age 35.

Municipal Population Change: Status Quo

Projected Status Quo population change for each city and town in the region is presented on Appendix A, Map 1. Maps 2 and 3 depict the change in populations under 15 and 65-plus, respectively. Figure 36 summarizes the population change by MAPC Community Type; it indicates that the population under 15 is likely to decline for all Community Types except the Inner Core, and that all Community Types will see substantial increases in the population over 65, reflecting the aging of the Baby Boomers. Suburban communities overall will see a small uptick in the population between 25 and 40, but it will be more than offset by deep declines in the number of people between the ages of 40 and 55 resulting in a net decrease of 77,000 people between 25 and 55. Regional Urban Centers will also see a net decline in the population 25 – 55. Meanwhile, the Inner Core Community Type might see substantial gains in these age groups, with the population increasing by 38,000 people between age 25 and 55.

As shown on Map 2 in the Appendix, of the100-plus communities likely to see population growth overall under the Status Quo scenario, fewer than 20 will see growth in the school-age population, and most of these are in the Inner Core of the region, inside Route 128.
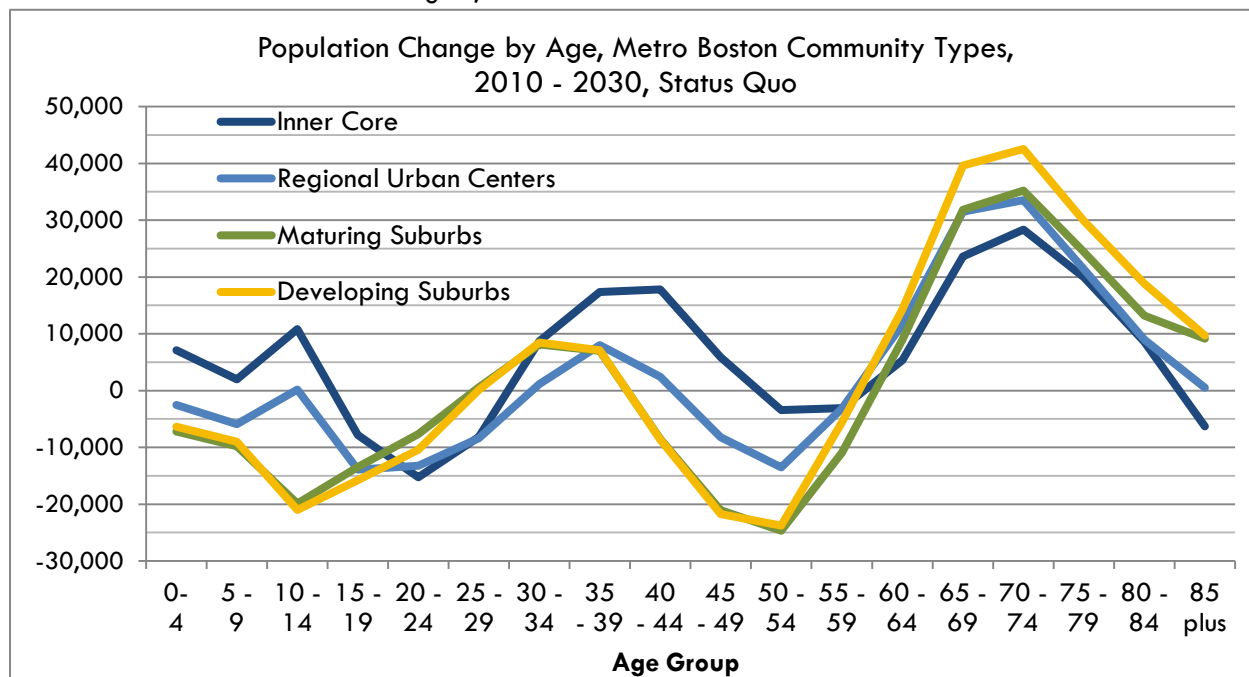
Figure 36. Population Change by Age, Metro Boston Community Types, 2010–2030, Status Quo.

Figure 37 presents the same population change as a percent of the year 2010 population. It shows that the percentage decline in young- and middle-age adults is most severe in suburban communities, and that Developing Suburbs will experience the highest percentage increases of over-65 age groups. Resulting from these dramatic increases in the over-65 population and declines most younger age groups, many communities, especially Developing Suburbs, will see the median age of the population increase by seven or eight years, in many cases pushing the median age past 45 or even 50 years old.
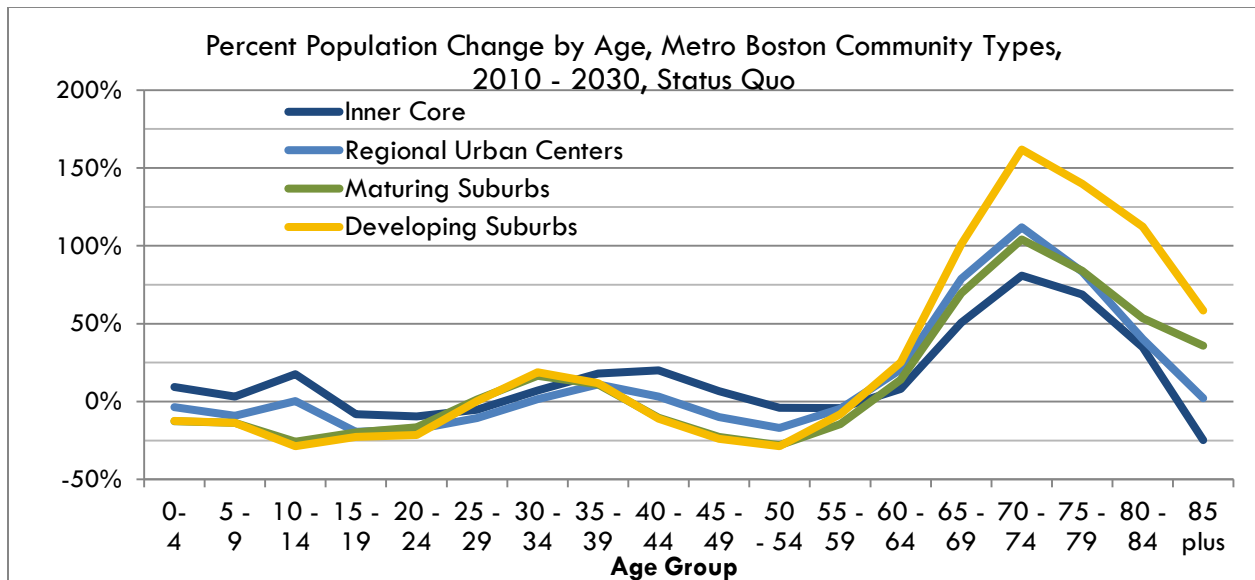
Figure 37. Percent Population Change by Age, Metro Boston Community Types, 2010–2030, Status Quo.

The reasons for these Community Type differences in population change can be partly explained by Figure 38. The Inner Core now has an extraordinarily large population between the ages of 15 and 29; part of this is because these municipalities attract very large numbers of college and university students, but it also reflects the "Echo Boomers" born between 1980 and 1990. This extraordinarily large population of twenty-somethings means that even if they move out of the region or out to suburban communities at the same rates as their predecessors, the resulting population of 35 to 49 year-olds in 2030 will be much larger than it is today (by about 41,000 people.) With higher birth rates the norm in many urban communities, this also translates into a somewhat larger school-age population.
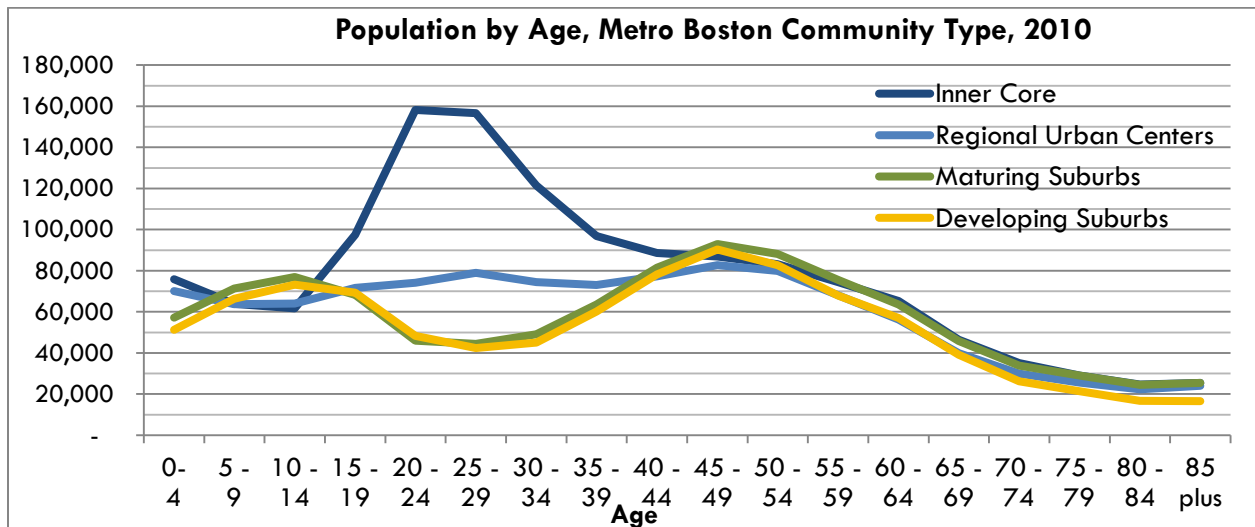
Figure 38. Population by Age, Metro Boston Community Type, 2010.

Meanwhile, suburban communities have large Baby Boomer populations between the ages of 40 and 65 but relatively few residents age 25 to 39. Furthermore, housing policy in many suburban communities over the past 20 years has discouraged the in-migration of residents in their family formation years. Even if

large numbers of Echo Boomers move to suburban communities in the coming decades they will not be able to fully replace the very large Baby Boomer cohort that has characterized these communities since 1990 or before. The resulting decline in young- and middle-age residents will in turn have repercussions on the number of births and school-age children in those municipalities.

Municipal Population Change: Stronger Region

The Stronger Region scenario anticipates higher population regionwide and a slightly increased preference for young adults to remain in the Inner Core instead of moving to suburban communities (Figure 39). All community types would experience a higher level of growth, with the Inner Core and Regional Urban Centers experiencing the largest numeric increases relative to the Status Quo, and the Maturing Suburbs experiencing the largest relative increase.
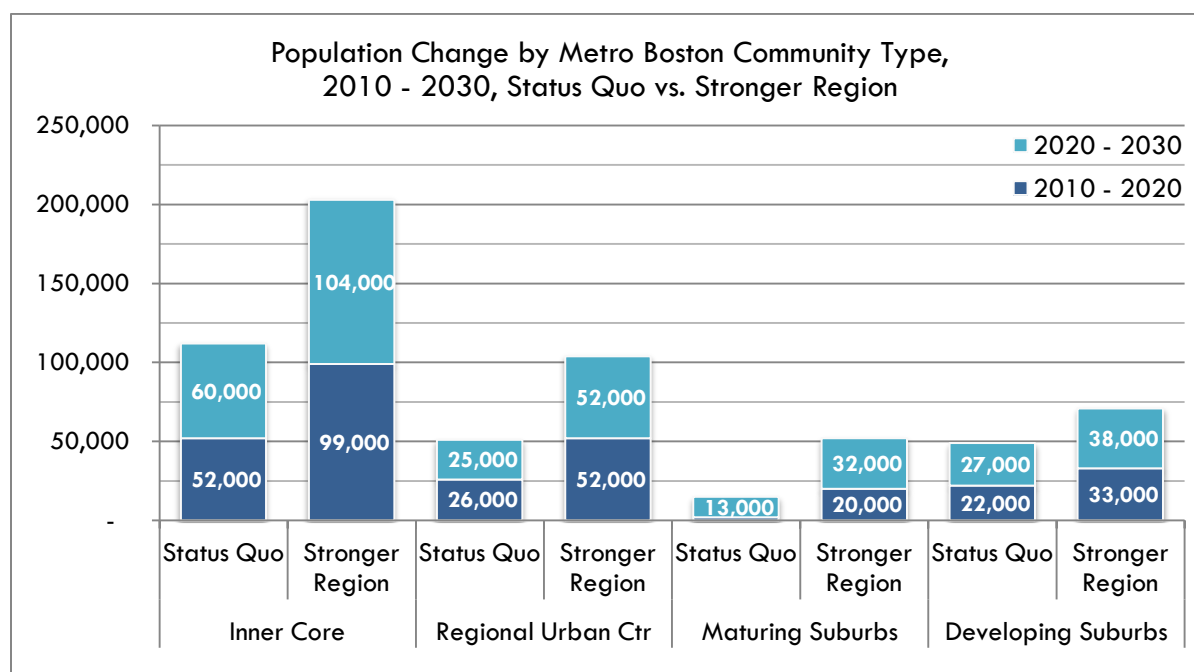
Figure 39. Population Change by Metro Boston Community Type, 2010–2030, Status Quo vs. Stronger Region.

As shown on Map 4 in Appendix A, fewer municipalities might experience a decline in population—fewer than 35 in Stronger Growth versus more than 55 in the Status Quo.

The projected change in population by age is shown in Figure 40. The patterns are similar to the Status Quo but with some notable differences highlighted by the subsequent comparison chart (Figure 41): the decline in school-age children in Suburban communities is approximately 10% less in Stronger Region than in Status Quo (a difference of about 7,600 children), and the decline in Suburban population age 25 to 55 is about 42,000 versus 77,000 in the Status Quo. The growth of school-age children in urban communities is about twice what it would be in the Status Quo, with the Regional Urban Centers seeing a slight net gain in this population instead of substantial losses (Figure 42). The number of school-age children in the Inner Core alone might increase by nearly 34,000. Overall, [30] municipalities would see an increase in the population under 15 (Appendix A, Map 5.) The population over 60 is effectively identical in the two scenarios (Appendix A, Map 7), but the increased population of younger adults and children in Stronger Growth means that the median population does not advance as quickly as it would under the Status Quo (Appendix A, Map 8). Fewer towns would see median age increase by more than 6 years.
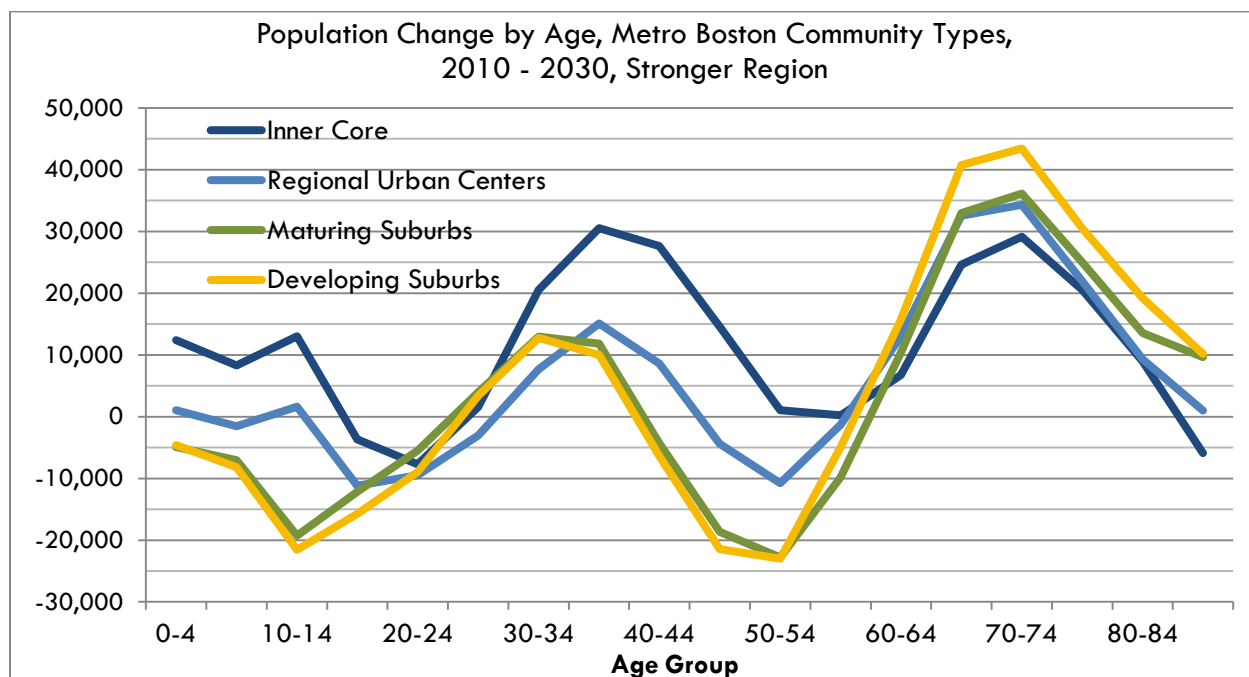
Figure 40. Population Change by Age, Metro Boston Community Types, 2010–2030, Stronger Region.
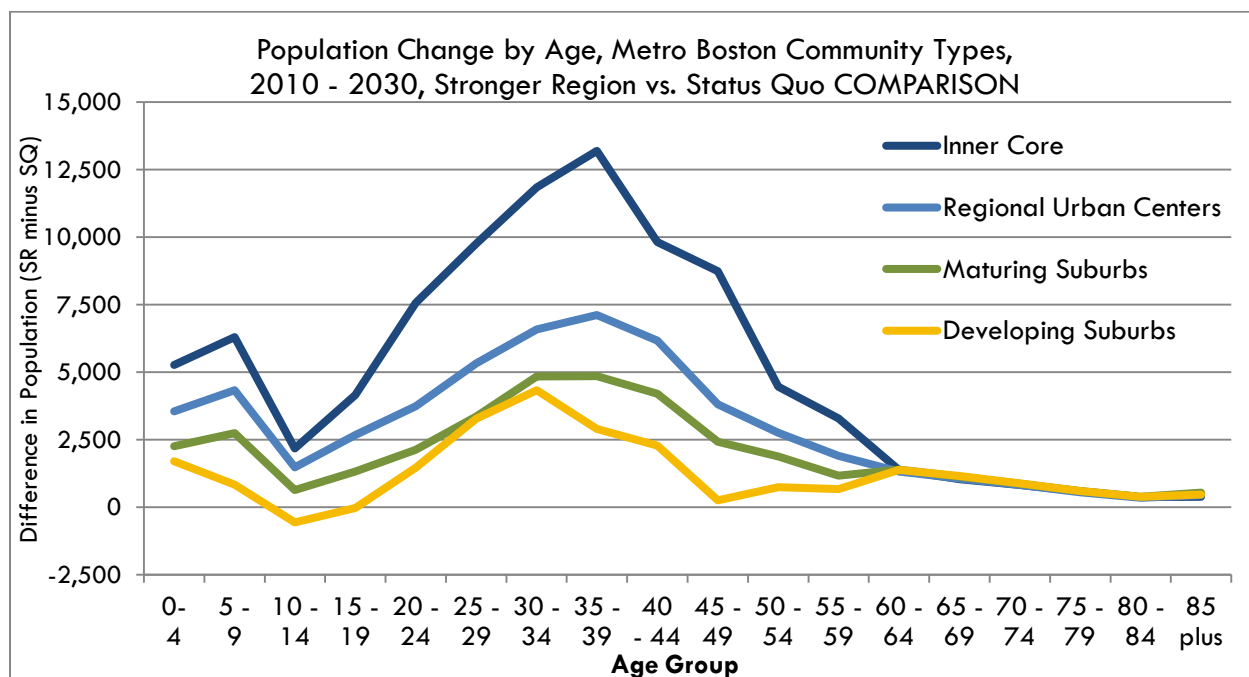
Figure 41. Population Change by Age, Metro Boston Community Types, 2010–2030, Difference between Stronger Region and Status Quo.
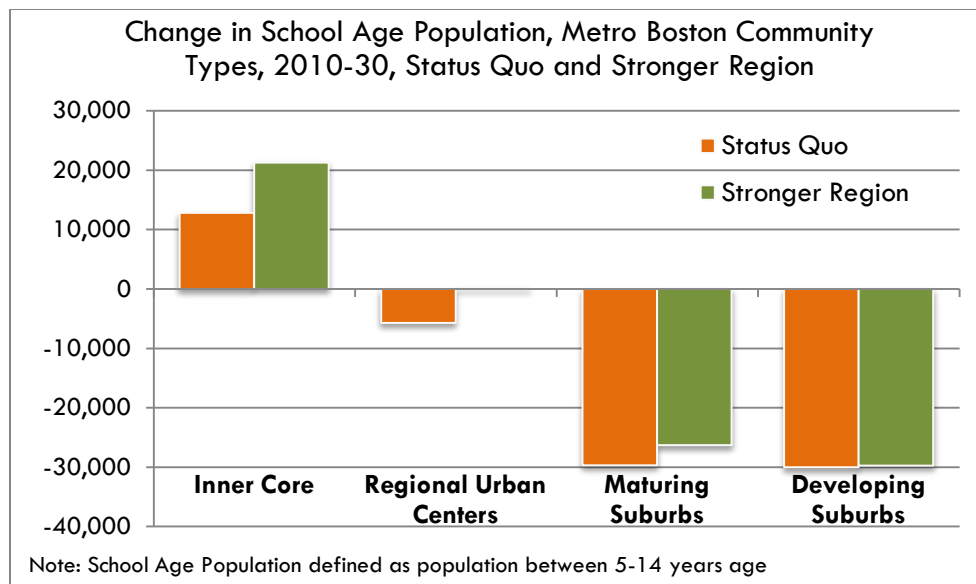
Figure 42. Change in School Age Population, Metro Boston Community Types, 2010–2030, Status Quo and Stronger Region.

Municipal Household Growth and Housing Demand Projections

As discussed previously, the number of households is a function not only of the number of people in a municipality, but also their age. Older residents have a much higher headship rate, meaning that they are more likely to be a head of household. As a result, there are likely to be more households, and more associated housing units, for a group of 75-year olds than for the same number of 55 year-olds. This tendency has significant implications for municipalities with a large number of Baby Boomers aging into their senior years, and it may result in an increasing number of households even as the total population of a town declines.

Municipal Household Growth and Housing Unit Demand: Status Quo

The Status Quo growth in senior households (households headed by someone older than 65) is illustrated in Map 9 of Appendix A, which depicts the percent of senior households in the year 2030. Currently, senior households comprise anywhere from 16% (Lawrence) to 32% (Concord) of all households in Metro Boston municipalities. By 2030, seniors will comprise more than 36% of householders in the vast majority of municipalities—in some towns, more than half of all householders will be over the age of 65. This dramatic increase in the share of senior households will have serious implications for local services and tax revenue as a greater number of taxpayers and renters are on a fixed income.

The growing number of senior households will also have implications for housing unit demand. In most municipalities, one-third to one-half of all housing units will be occupied by single- or two-person senior households, and therefore unavailable to new households moving into the community. As a result, housing unit demand will continue to rise, even as population remains steady or declines. Map 9 in Appendix A depicts projected housing unit demand by municipality for the Status Quo scenario. Specific housing demand estimates for each municipality can be found in the tables and community reports that accompany these projections.

Figure 43 summarizes the demand by housing unit type for the two decades in the forecast period. Consistent with the regional projections, housing demand is split almost evenly between single family and multifamily units, though there is substantial variation across Community Type. In the Inner Core, 73% of demand over the next 20 years will be for units in multifamily housing, mostly rental (only 30% of multifamily demand is for condominium units.) In Regional Urban Centers, about half (49%) of demand will be for single family housing. The single family share is even higher in suburban communities, but even so, multifamily housing comprises more than 26% of demand in Developing Suburbs and 31% of demand in Maturing Suburbs, even under the Status Quo. We estimate that the two suburban Community Types need to collectively produce an average of 1,800 multifamily housing units annually through the year 2020, just to meet the Status Quo demand.

Housing Unit Demand by Type and Tenure, Metro Boston Community Types, 2010 - 2030, Status Quo

Legend:
- Other
- Multifamily-Rent
- Multifamily-Own
- Single Family

	Inner Core		Regional Urban Ctr		Maturing Suburbs		Developing Suburbs	
	2010-20	2020-30	2010-20	2020-30	2010-20	2020-30	2010-20	2020-30
Multifamily-Rent	21,500	15,600	9,200	7,200	3,800	3,900	4,900	4,300
Multifamily-Own	8,000	7,800	5,900	4,300	4,200	2,900	5,500	3,900
Single Family	8,500	10,400	14,000	12,800	17,200	14,900	27,500	22,000

Figure 43. Housing Unit Demand by Type and Tenure, Metro Boston Community Types, 2010–2030, Status Quo.

Municipal Household Growth and Housing Unit Demand: Stronger Region

The Stronger Region scenario projects housing unit demand approximately 34% higher than Status Quo, and anticipates that some portion of younger households will choose to remain in urban areas rather than decamping to the suburbs (specifically, outmigration rates are reduced by 10%, Figure 44.) All Community Types are projected to have higher housing demand than under the Status Quo, with urban communities seeing the largest increase (51% higher for the Inner Core and 39% for Regional Urban Centers.) Maturing Suburbs would require 32% more new housing units than under the Status Quo, while the low-density Developing Suburbs would see the smallest bump (10% higher than Status Quo.)

Housing Unit Demand by Type and Tenure, Metro Boston Community Types, 2010 - 2030, Stronger Region

Legend:
- Other
- Multifamily-Rent
- Multifamily-Own
- Single Family

	Inner Core		Regional Urban Ctr		Maturing Suburbs		Developing Suburbs	
	2010-20	2020-30	2010-20	2020-30	2010-20	2020-30	2010-20	2020-30
Multifamily-Rent	34,800	25,400	16,400	12,200	8,300	6,100	8,500	6,100
Multifamily-Own	13,800	12,100	9,200	6,500	7,100	4,400	7,800	5,200
Single Family	7,900	14,300	14,000	16,500	17,500	18,900	26,900	23,700

Figure 44. Housing Unit Demand by Type and Tenure, Metro Boston Community Types, 2010–2030, Stronger Region.

Most of the increased demand in would be for multifamily housing. Single family homes would comprise just 20% of demand in the Inner Core and 40% in Regional Urban Centers (down from 26% and 49% under Status Quo), and multifamily housing would comprise fully one-third of housing demand in Developing Suburbs and 41% of demand in Maturing Suburbs. This level of demand translates into annual production rates of 10,500 multifamily housing units per year from 2010 to 2020, and approximately 7,800 such units per year from 2020 – 2030.

Low-Income Household Affordability

In addition to projecting the total number and type of units likely to be needed over the coming decade, MAPC also estimated the number of households at various income levels so as to estimate potential changes in the need for subsidized housing. Our estimates draw from existing U.S. Department of Housing and Urban Development (HUD) guidance on calculating affordable housing need, with additional modifications or innovations added as a result of the structure of our data and specificity of projections. We estimate both the increase in low income households as well as the units needed to address existing shortfalls in the stock.

Given the nation's economic uncertainty, it is beyond the scope of these projections to estimate changes in income distribution over the coming decades. Instead our projections assume that the distribution of household income levels remains constant within each householder age group over the coming decades. Figure 45 shows how income distribution varies across householder age groups:
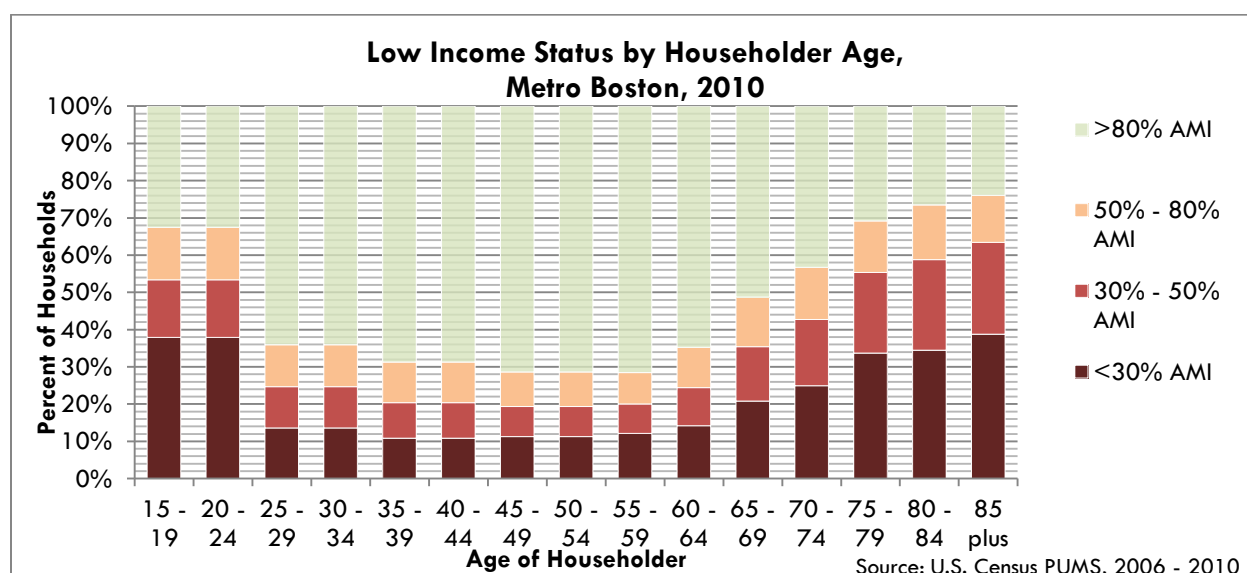
Figure 45. Low Income Status by Householder Age, Metro Boston, 2010.

Regionwide, approximately 28% of households earned less than 50% of Area Median Income (AMI)[4] from 2006 – 2010, and another 11% earned between 50% and 80% of AMI. The share of lower income households varies distinctly by age, however. Not surprisingly, most households under the age of 25 (of

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[4] The AMI is midpoint of the area income distribution. Half of all households make more than the AMI, and half make less. The AMI is a more useful measure of income level than average income, because it is not skewed by extremely high or low values. For the purposes of this report, percent of AMI is a better indicator of low household income levels than percent of the federal poverty level, since AMI accounts for the higher cost of living in the Boston area than in other parts of the country.

which there are relatively few) are low income. Between the ages of 25 and 65, only 32% of households qualify as low income (<80% AMI); but this number climbs steeply thereafter, and seniors are low income at nearly twice the rate (62%) of younger households. While the distribution of income varies by age, the current age distribution of the population means that there are roughly the same number of low income households in each category, as shown in Figure 46. Householders over 65 currently comprise 22% of households and 34% of low-income households.
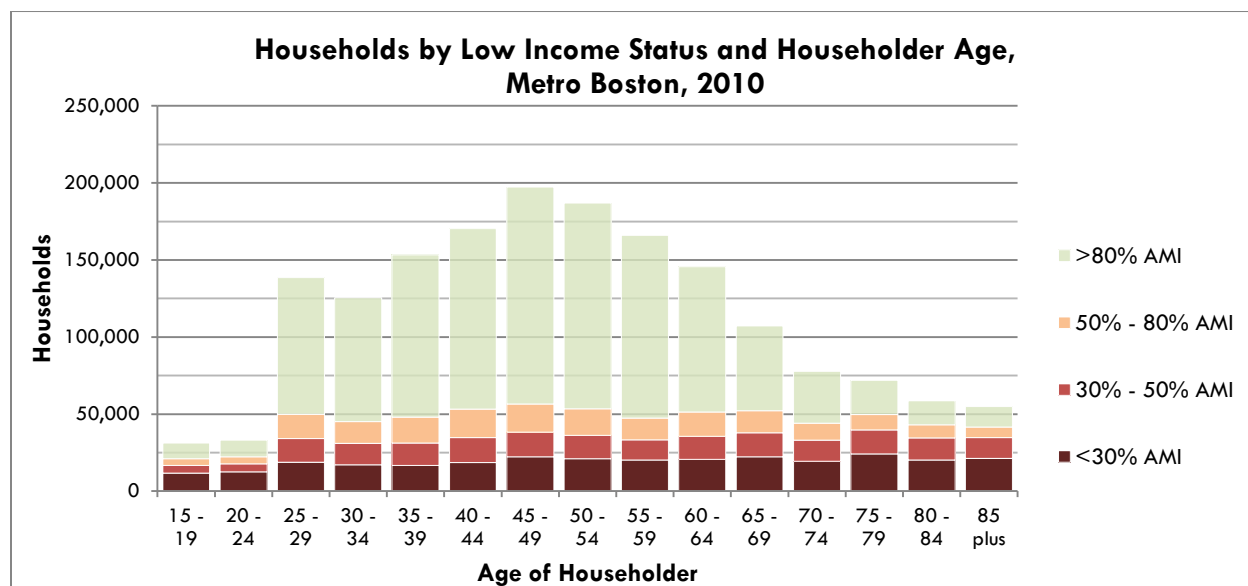
Figure 46. Households by Low Income Status and Householder Age, Metro Boston, 2010.

As the population ages, a greater share of households will be in age categories with higher share of low income households. Figure 47 shows households by age and income status in the year 2030. By that time, senior households may comprise 33% of all households, and 48% of low income households.
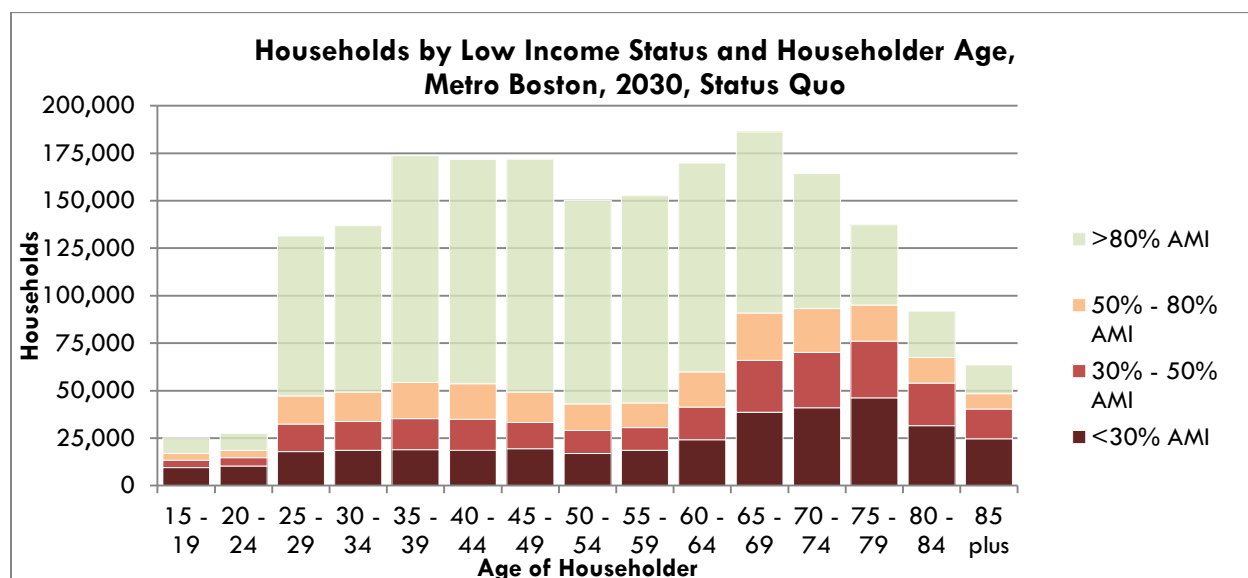
Figure 47. Households by Low Income Status and Householder Age, Metro Boston, 2030, Status Quo.

As we did with housing unit type, it is worthwhile to measure the marginal change in income status by cohort rather than measuring the change for specific age groups, which can swing dramatically as a result of demographic change. Figure 48 shows change in households by householder age in 2010.
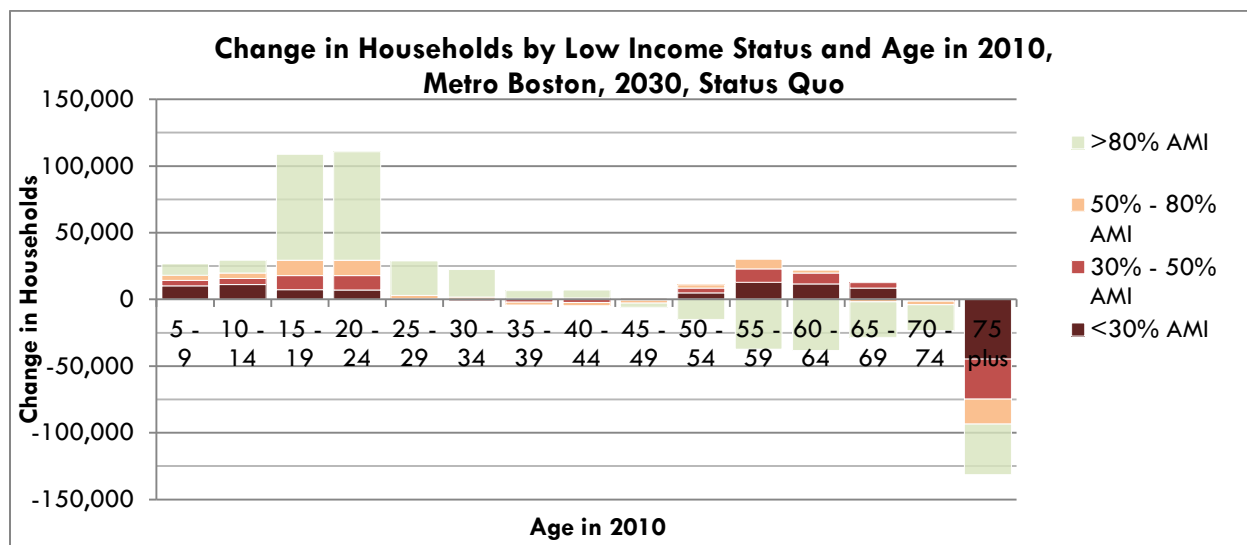
Figure 48. Change in Households by Low Income Status and Age in 2010, Metro Boston, 2030, Status Quo.

Householders currently under the age of 25 will need 96,500 new affordable units by 2020, when they will range in age from 15 to 34. There is little net increase in low income households for those currently between 25 and 49. Meanwhile, householders currently between the ages of 50 and 70 are likely to need 74,000 new affordable units as they age. The number of low income households headed by someone currently 70 or over is likely to decline by 98,000 over the coming decade, possibly freeing up exiting units that could re-enter the market. Altogether, we estimate an increase of 50,000 households at <50% AMI, and 17,000 households at 50% – 80% AMI by 2020, equivalent to more than half all the new households over the next decade.

This increase in low-income households is termed *Demographic Demand*. For both the region and its municipalities we can estimate the increased or decreased number of low or moderate income households likely to occur as a result of population growth, aging, and changing size. A projected increase of 1,000 households might comprise 300 very low or extremely low income households, 200 low income households, and 500 households above 80% AMI.

In most municipalities, the projected increase in households below 50% of AMI ranges comprises 25% to 50% of the total household increase, with households at 50% to 80% of AMI constituting another 11% to 15% of household growth. Much higher shares expected in small and rapidly aging communities where the number of fixed income senior householders is likely to increase substantially, and where the number of households above 80% AMI may even decline as a result of fewer working-age residents.

Addressing the housing needs of new low income households is only one element of addressing the region's profound affordability problem. It is also necessary to create housing that will achieve a more equitable distribution of affordable choices and will reduce housing cost burden of households that are paying more than 30% of their gross household income for housing. We calculate two metrics that measure different aspects of affordable housing need: the Cost Burden Gap and the Fair Share Gap, depicted on maps 12 and 13 of Appendix A.

- The *Cost Burden Gap* indicates the number of housing units needed at the specified income level to accommodate the households at that income level. If there are 1,000 low income households but only 500 housing units affordable to them, in a municipality with 10,000 housing units, then the Cost Burden Gap is 500 units or 5% of total housing stock[5]. The Cost Burden gap can be calculated at the regional level or for individual municipalities.

  Regionwide, the Cost Burden Gap is 269,000 units below 50% of AMI, about 15% of the region's 2010 total housing stock and 63% of the total number of households at that income level. The 50 – 80% AMI gap is 28,000 units (2% of housing stock.) At the municipal level, the low income (<50% AMI) cost burden ranges from upwards of 25% of housing stock in the low-income communities of Lawrence, Chelsea, Lynn, Everett, and Revere; to less than 5% of housing stock in roughly ten low-density suburbs with a very small low-income population.

- The *Fair Share Gap* indicates the mismatch between the number of households at a given income level in a municipality, and the number that would be expected if households at each age level have the same income characteristics as the regional average for that age group. For example, if a municipality were expected to have 2,000 low-income households based on regional headship rates and income distribution tables, but only had 1,000 such households in a town of 10,000 households, the Fair Share Gap would be 1,000 households or 10% of occupied housing stock. Municipalities with more low income households than expected would be characterized as having no gap. The Fair Share Gap can only be calculated for individual municipalities or subregions, not the region overall.

  The Fair Share Gap at the less than 50% AMI level ranges from zero for the 28 municipalities with more low income households than expected to as high as 15 to 20% for approximately 20 municipalities. Overall, those municipalities with a Fair Share Gap are expected to have about 91,000 more low income households than they actually do. The Fair Share Gap is smaller at the 50 – 80% AMI level, generally ranging from 2 to 5% of total households; 61 of municipalities have no Fair Share Gap at this level.

These three metrics of low income household growth (Demographic Demand) and existing affordable housing need (Cost Burden Gap and Fair Share Gap) can be used in combination to help target the share of new housing units that should be affordable at a given income level for a municipality to keep pace with increased demand and make reasonable progress toward regional housing affordability goals. For example, if 30% of all new units in a municipality were affordable to low income households, those units might satisfy Demographic Demand but not yield headway on closing the Fair Share or Cost Burden gaps. An additional increment of low income housing production would be necessary in order to make progress and close the gaps. Local production targets based on the size of those gaps would position municipalities with the largest existing shortfalls—either due to the current lack of low-income households or the largest cost burden problem—to make the most substantial progress. For example, if Demographic Demand for low income units comprised 30% of total demand in a municipality, and there was a 5% Fair Share Gap and a 3% Cost Burden Gap for low income housing, the target for low income units would be 38% of total production. Applying this same target to all municipalities would resolve approximately 10% of the region's Cost Burden Gap and 14% of the Fair Share Gap by the year 2020, but would require some municipalities to achieve a low income share of more than 50% of total production.

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[5] We do not account for affordable housing units effectively unavailable to low-income households because they are occupied by households who could afford a more expensive unit.

Appendix A:
Maps

Total Population Change, 2010-2030

Status Quo Scenario

Amesbury, -550
Salisbury, 310
Merrimac, -160
Newburyport, -690
West Newbury, -210
Newbury, -560
Haverhill, 3,730
Groveland, 610
Georgetown, 1,070
Rowley, 550
Ipswich, -160
Methuen, 8,450
Lawrence, 8,170
North Andover, 1,640
Boxford, -870
Topsfield, -480
Hamilton, -490
Essex, 160
Rockport, -550
Tyngsborough, -500
Dracut, 770
Andover, 2,380
Middleton, 1,180
Wenham, -540
Gloucester, -2,110
Pepperell, 150
Dunstable, 20
Lowell, 580
Tewksbury, -1,200
North Reading, 1,080
Danvers, 2,640
Beverly, 360
Manchester, -230
Groton, 970
Westford, -300
Chelmsford, -1,750
Billerica, 70
Wilmington, 580
Reading, 1,470
Lynnfield, -430
Peabody, 3,840
Salem, 1,550
Marblehead, -520
Shirley, 1,090
Ayer, 40
Littleton, 810
Carlisle, -290
Bedford, 1,530
Burlington, 2,040
Woburn, 2,040
Stoneham, 110
Wakefield, 110
Lynn, 4,110
Swampscott, -370
Harvard, -60
Boxborough, -270
Acton, 1,000
Concord, 180
Winchester, -560
Melrose, -370
Saugus, 760
Lancaster, 1,090
Lexington, 1,660
Medford, 3,290
Malden, 8,160
Revere, 11,270
Nahant, -50
Bolton, 150
Stow, 510
Maynard, -220
Lincoln, -640
Arlington, 350
Everett, 9,680
Chelsea, 2,510
Clinton, 730
Hudson, 1,190
Sudbury, -950
Weston, 160
Waltham, 3,740
Belmont, 1,380
Somerville, 8,230
Cambridge, 12,470
Watertown, 2,430
Winthrop, -130
Berlin, 290
Marlborough, 3,540
Wayland, -1,030
Newton, 1,050
Brookline, 7,220
Boston, 47,330
Northborough, -1,080
Southborough, 600
Framingham, 2,490
Natick, 430
Wellesley, -1,300
Needham, 820
Westborough, 390
Ashland, 2,620
Milton, 790
Quincy, 9,720
Hull, -1,270
Hopkinton, 1,030
Sherborn, -510
Dover, -290
Dedham, 1,830
Cohasset, 1,790
Hingham, 1,560
Scituate, -650
Upton, 2,470
Holliston, 1,020
Medfield, -1,010
Westwood, -110
Braintree, 4,440
Weymouth, -960
Norwell, 430
Milford, 2,510
Millis, -820
Norwood, 560
Canton, 1,290
Randolph, 2,370
Hanover, 320
Northbridge, 4,160
Medway, -300
Walpole, 1,580
Holbrook, -120
Avon, -150
Rockland, -580
Abington, 2,960
Marshfield, -580
Hopedale, -280
Mendon, 480
Norfolk, 390
Sharon, -520
Stoughton, -900
Brockton, 70
Whitman, 430
Hanson, 740
Pembroke, 330
Duxbury, -20
Uxbridge, 3,060
Bellingham, 1,020
Franklin, 1,230
Wrentham, 110
Foxborough, 160
East Bridgewater, 870
Millville, 620
Blackstone, 280
West Bridgewater, 370
Halifax, -230
Kingston, 1,290
Plympton, 50
Easton, -620
Plainville, 810
Mansfield, -460
Bridgewater, 210
North Attleborough, 1,190
Norton, 250
Raynham, 2,630
Middleborough, 3,910
Carver, 710
Plymouth, 6,140
Attleboro, 2,020
Taunton, -1,190
Lakeville, 750

Total Population Change

- Population Decline
- 1 - 2,000
- 2,001 - 6,000
- 6,001 - 12,000
- Greater than 12,000

0 2.5 5 10 Miles

Source: MAPC analysis

Total Population less than 15 yrs. age change, 2010-2030

Status Quo Scenario

Total Population Change

- Decline >1,250
- Decline 500-1,250
- Decline up to 500
- 1 - 2,500
- Greater than 2,500

0   2.5   5   10
Miles

Source: MAPC analysis

Total Population over 65 yrs. age Change, 2010-2030

Status Quo Scenario

Total Population Change

- Up to 1,500
- 1,501 - 3,000
- 3,001 - 5,500
- 5,501 - 11,000
- More than 11,000

0 2.5 5   10
▬▬▬▬ Miles

Source: MAPC analysis

Change in Median Age, 2010-2030
Status Quo Scenario

Change in Median Age

- Increase up to 3 years
- Increase 4 - 6 years
- Increase 7 - 8 years
- Increase over 8 years

Label shows Median age in 2010

0 2.5 5 10
Miles

Source: MAPC analysis

Total Population Change, 2010-2030
Stronger Region Scenario

Amesbury, 120
Merrimac, 0
Salisbury, 530
West Newbury, -160
Newburyport, -50
Newbury, -500
Haverhill, 6,710
Groveland, 820
Georgetown, 1,170
Rowley, 600
Ipswich, 160
Pepperell, 250
Dunstable, 60
Methuen, 10,900
Lawrence, 12,650
North Andover, 2,390
Boxford, -790
Topsfield, -420
Hamilton, -300
Essex, 250
Rockport, -400
Dracut, 1,610
Tyngsborough, -400
Groton, 1,100
Westford, -60
Chelmsford, -680
Andover, 3,300
Tewksbury, -240
Middleton, 1,480
Danvers, 3,740
Wenham, -430
Manchester, -110
Gloucester, -1,070
Shirley, 1,340
Ayer, 250
Littleton, 1,050
Carlisle, -230
Billerica, 1,570
Wilmington, 1,380
North Reading, 1,620
Reading, 2,510
Lynnfield, -90
Peabody, 6,130
Beverly, 2,290
Harvard, 30
Boxborough, -220
Acton, 1,700
Bedford, 2,000
Burlington, 3,180
Wakefield, 1,190
Salem, 3,690
Marblehead, 180
Lancaster, 1,370
Bolton, 210
Stow, 590
Maynard, 200
Concord, 680
Lincoln, -460
Woburn, 3,870
Stoneham, -90
Melrose, 730
Saugus, 1,910
Lynn, 8,860
Swampscott, 140
Clinton, 1,390
Berlin, 330
Hudson, 1,740
Sudbury, -510
Lexington, 2,510
Winchester, 160
Medford, 6,050
Malden, 12,390
Revere, 14,990
Nahant, -300
Arlington, 2,150
Everett, 12,410
Chelsea, 5,020
Marlborough, 5,560
Wayland, -700
Weston, 460
Waltham, 6,890
Belmont, 2,420
Somerville, 18,680
Cambridge, 18,460
Winthrop, 60
Northborough, -740
Southborough, 910
Framingham, 6,000
Wellesley, -450
Natick, 1,870
Needham, 1,860
Newton, 4,440
Brookline, 10,380
Boston, 91,830
Westborough, 890
Ashland, 3,310
Sherborn, -460
Dover, -220
Dedham, 2,940
Milton, 1,700
Hull, -70
Hingham, 1,080
Cohasset, 1,930
Hopkinton, 1,220
Holliston, -710
Medfield, -690
Westwood, 300
Norwood, 1,880
Canton, 2,080
Randolph, 3,960
Braintree, 6,110
Weymouth, 1,990
Scituate, -140
Upton, 2,620
Millis, -630
Medway, 20
Walpole, 2,260
Norwell, 550
Milford, 3,930
Holbrook, 350
Rockland, -130
Hanover, 670
Marshfield, 210
Northbridge, 4,680
Hopedale, -130
Mendon, 550
Bellingham, 1,490
Norfolk, 710
Sharon, -20
Stoughton, 210
Avon, 20
Abington, 3,480
Brockton, 4,730
Whitman, 840
East Bridgewater, 1,260
Hanson, 1,020
Pembroke, 930
Duxbury, 370
Uxbridge, 3,200
Millville, 670
Blackstone, 520
Franklin, 2,150
Wrentham, 220
Foxborough, 640
Easton, 10
West Bridgewater, 550
Bridgewater, 1,050
Halifax, -40
Plympton, 90
Kingston, 1,650
Plainville, 1,060
North Attleborough, 2,020
Mansfield, -380
Norton, 800
Raynham, 3,030
Plymouth, 7,710
Attleboro, 4,090
Taunton, 1,310
Middleborough, 4,130
Carver, 1,000
Lakeville, 1,040

Total Population Change

- **Population decline** (red)
- **1 - 2,000** (orange)
- **2,001 - 6,000** (yellow)
- **6,001 - 12,000** (green)
- **More than 12,000** (dark green)

0   2.5   5   10 Miles

N

Source: MAPC analysis

Total Population less than 15 yrs. age change, 2010-2030

Stronger Region Scenario

Total Population Change

- Decline >1,250
- Decline 500-1,250
- Decline 0- 500
- 1 - 2,500
- Greater than 2,500

Source: MAPC analysis

Total Population over 65 yrs. age change, 2010-2030

Stronger Region Scenario

Amesbury, 2,160
Salisbury, 1,310
Merrimac, 1,060
Newburyport, 2,720
West Newbury, 680
Newbury, 1,440
Haverhill, 7,140
Groveland, 1,380
Georgetown, 1,470
Rowley, 1,390
Methuen, 6,040
Lawrence, 5,530
North Andover, 3,540
Boxford, 1,090
Ipswich, 2,150
Rockport, 1,040
Dracut, 3,510
Topsfield, 800
Hamilton, 1,090
Essex, 630
Gloucester, 4,690
Pepperell, 2,450
Dunstable, 520
Tyngsborough, 1,900
Andover, 3,580
Middleton, 1,630
Wenham, 500
Manchester, 630
Lowell, 6,910
Groton, 2,340
Westford, 3,480
Chelmsford, 3,360
Tewksbury, 3,940
North Reading, 1,830
Danvers, 3,360
Beverly, 3,730
Shirley, 1,030
Ayer, 810
Billerica, 4,470
Wilmington, 3,020
Reading, 2,550
Lynnfield, 660
Peabody, 5,960
Littleton, 1,860
Carlisle, 670
Wakefield, 2,840
Marblehead, 3,310
Harvard, 500
Boxborough, 910
Acton, 3,160
Bedford, 1,660
Burlington, 2,180
Woburn, 3,910
Stoneham, 1,870
Salem, 2,470
Saugus, 2,200
Swampscott, 1,580
Lancaster, 1,430
Concord, 2,630
Winchester, 1,390
Melrose, 2,320
Lynn, 5,250
Lexington, 3,230
Medford, 2,560
Malden, 3,570
Everett, 2,280
Revere, 3,490
Nahant, 610
Bolton, 840
Stow, 1,290
Maynard, 1,040
Lincoln, 1,090
Arlington, 3,440
Belmont, 1,700
Somerville, 2,150
Chelsea, 1,130
Winthrop, 1,860
Clinton, 1,310
Berlin, 770
Hudson, 2,380
Sudbury, 2,170
Waltham, 3,350
Watertown, 2,520
Cambridge, 3,760
Weston, 1,230
Marlborough, 4,240
Wayland, 1,270
Newton, 8,150
Brookline, 3,600
Boston, 35,150
Hull, 2,010
Northborough, 1,680
Framingham, 4,890
Wellesley, 1,860
Southborough, 1,890
Natick, 3,170
Needham, 2,770
Westborough, 2,110
Ashland, 2,250
Dedham, 3,010
Milton, 3,100
Quincy, 8,230
Cohasset, 1,100
Sherborn, 370
Dover, 560
Westwood, 1,580
Braintree, 3,020
Weymouth, 4,730
Hingham, 2,880
Scituate, 2,120
Hopkinton, 2,530
Holliston, 1,610
Medfield, 1,460
Norwood, 2,690
Canton, 2,380
Randolph, 2,890
Norwell, 1,380
Upton, 1,960
Millis, 1,010
Medway, 2,010
Walpole, 3,130
Holbrook, 740
Rockland, 1,720
Hanover, 1,710
Milford, 2,910
Northbridge, 2,490
Hopedale, 560
Norfolk, 1,820
Sharon, 1,990
Stoughton, 2,260
Avon, 450
Abington, 2,190
Marshfield, 4,010
Mendon, 1,060
Franklin, 4,840
Brockton, 6,990
Whitman, 1,560
Hanson, 1,360
Pembroke, 2,210
Uxbridge, 2,980
Millville, 500
Bellingham, 1,830
Blackstone, 1,330
Wrentham, 1,760
Foxborough, 1,640
East Bridgewater, 2,040
Duxbury, 2,340
Easton, 2,750
West Bridgewater, 890
Halifax, 940
Kingston, 2,340
Plainville, 1,040
Mansfield, 3,590
North Attleborough, 2,95?
Norton, 3,270
Bridgewater, 3,280
Plympton, 710
Attleboro, 4,520
Raynham, 2,140
Middleborough, 4,810
Carver, 1,890
Plymouth, 11,030
Taunton, 5,390
Lakeville, 1,840

Total Population Change

	Up to 1,500
	1,501 - 3,000
	3,001 - 5,500
	5,501 - 11,000
	More than 11,000

0   2.5   5   10
Miles

Source: MAPC analysis

Change in Median Age, 2010-2030

Stronger Region Scenario

Change in Median Age
- Increase up to 3 yrs.
- Increase 4 - 6 yrs.
- Increase 7 - 8 yrs.
- Increase over 8 yrs.

Label shows Median Age in 2010

0   2.5   5   10
                  Miles

Source: MAPC analysis

Share of householders over 65 yrs. age, 2030

Stronger Region Scenario

Amesbury, 19%
Salisbury, 24%
Merrimac, 22%
Newburyport, 24%
West Newbury, 19%
Newbury, 22%
Haverhill, 20%
Groveland, 25%
Georgetown, 19%
Rowley, 18%
Methuen, 23%
Lawrence, 16%
North Andover, 22%
Boxford, 22%
Ipswich, 26%
Rockport, 32%
Pepperell, 17%
Dunstable, 17%
Tyngsborough, 15%
Dracut, 21%
Andover, 22%
Topsfield, 26%
Hamilton, 21%
Essex, 22%
Gloucester, 26%
Lowell, 17%
Middleton, 25%
Wenham, 29%
Manchester, 30%
Groton, 17%
Westford, 17%
Chelmsford, 26%
Tewksbury, 23%
North Reading, 20%
Danvers, 27%
Beverly, 24%
Shirley, 19%
Ayer, 20%
Billerica, 20%
Wilmington, 20%
Reading, 23%
Lynnfield, 29%
Peabody, 31%
Littleton, 21%
Carlisle, 21%
Wakefield, 23%
Salem, 21%
Marblehead, 26%
Harvard, 20%
Boxborough, 14%
Acton, 18%
Bedford, 28%
Burlington, 27%
Stoneham, 23%
Saugus, 27%
Lynn, 20%
Swampscott, 27%
Lancaster, 22%
Concord, 32%
Woburn, 25%
Melrose, 24%
Lexington, 29%
Winchester, 25%
Medford, 24%
Malden, 19%
Everett, 20%
Revere, 23%
Nahant, 29%
Bolton, 16%
Stow, 21%
Maynard, 21%
Lincoln, 28%
Arlington, 24%
Belmont, 25%
Somerville, 15%
Chelsea, 15%
Clinton, 21%
Hudson, 23%
Sudbury, 20%
Waltham, 21%
Watertown, 23%
Cambridge, 18%
Winthrop, 25%
Berlin, 28%
Marlborough, 19%
Weston, 29%
Wayland, 26%
Newton, 26%
Brookline, 21%
Northborough, 20%
Framingham, 22%
Wellesley, 26%
Boston, 18%
Southborough, 20%
Natick, 22%
Needham, 26%
Westborough, 20%
Ashland, 18%
Sherborn, 23%
Dover, 23%
Dedham, 28%
Milton, 26%
Quincy, 23%
Hull, 23%
Hopkinton, 14%
Holliston, 21%
Westwood, 30%
Cohasset, 26%
Upton, 17%
Medfield, 20%
Norwood, 26%
Canton, 26%
Randolph, 22%
Braintree, 26%
Weymouth, 24%
Hingham, 31%
Scituate, 27%
Milford, 21%
Millis, 19%
Walpole, 25%
Holbrook, 24%
Norwell, 24%
Northbridge, 20%
Medway, 17%
Norfolk, 17%
Sharon, 21%
Stoughton, 25%
Avon, 27%
Abington, 19%
Rockland, 21%
Hanover, 23%
Marshfield, 22%
Hopedale, 22%
Mendon, 18%
Foxborough, 22%
Brockton, 20%
Whitman, 18%
Hanson, 19%
Pembroke, 19%
Duxbury, 26%
Uxbridge, 20%
Bellingham, 19%
Franklin, 17%
Wrentham, 18%
Easton, 21%
West Bridgewater, 26%
East Bridgewater, 21%
Halifax, 23%
Kingston, 23%
Millville, 15%
Blackstone, 19%
Plainville, 22%
Mansfield, 15%
Bridgewater, 21%
Plympton, 22%
North Attleborough, 17%
Norton, 19%
Raynham, 22%
Attleboro, 20%
Taunton, 22%
Middleborough, 23%
Carver, 24%
Plymouth, 22%
Lakeville, 20%

Share of householders over 65 yrs. age, 2030

- 16% - 25%
- 26% - 35%
- 36% - 45%
- 46% - 54%

Labels show share of householders over 65 yrs. in 2010

0   2.5   5   10
Miles

Source: MAPC analysis

N

Housing Unit Change, 2010-2030

Status Quo Scenario

Housing Unit Change

- Decline
- 1 - 1,000
- 1,001 - 3,500
- 3,501 - 7,000
- More than 7,000

Labels show Percent change in housing units

Source: MAPC analysis

Housing Unit Change, 2010-2030

Stronger Region Scenario

Amesbury, 10%
Salisbury, 10%
Merrimac, 19%
Newburyport, 7%
West Newbury, 11%
Newbury, 10%
Haverhill, 20%
Groveland, 35%
Georgetown, 34%
Rowley, 29%
Methuen, 33%
Lawrence, 30%
North Andover, 20%
Boxford, 9%
Ipswich, 11%
Rockport, 2%
Pepperell, 23%
Dunstable, 31%
Tyngsborough, 15%
Dracut, 17%
Andover, 21%
Topsfield, 6%
Hamilton, 3%
Wenham, 6%
Essex, 22%
Gloucester, 5%
Groton, 35%
Lowell, 13%
Tewksbury, 12%
Middleton, 39%
Danvers, 21%
Beverly, 13%
Manchester, 8%
Westford, 20%
Chelmsford, 8%
Shirley, 39%
Ayer, 9%
North Reading, 25%
Peabody, 27%
Marblehead, 8%
Littleton, 31%
Billerica, 17%
Wilmington, 20%
Reading, 21%
Lynnfield, 8%
Salem, 14%
Carlisle, 11%
Wakefield, 13%
Harvard, 10%
Bedford, 23%
Burlington, 23%
Woburn, 16%
Stoneham, 6%
Saugus, 15%
Lynn, 15%
Swampscott, 8%
Lancaster, 35%
Boxborough, 10%
Acton, 22%
Concord, 17%
Lexington, 18%
Winchester, 10%
Medford, 14%
Malden, 24%
Melrose, 10%
Revere, 33%
Nahant, 4%
Bolton, 30%
Stow, 32%
Maynard, 11%
Lincoln, 2%
Arlington, 10%
Belmont, 14%
Everett, 33%
Chelsea, 23%
Clinton, 13%
Berlin, 43%
Hudson, 16%
Sudbury, 14%
Waltham, 15%
Somerville, 27%
Watertown, 14%
Cambridge, 13%
Winthrop, 6%
Marlborough, 22%
Wayland, 6%
Weston, 13%
Newton, 11%
Brookline, 14%
Boston, 19%
Northborough, 7%
Southborough, 37%
Framingham, 13%
Wellesley, 7%
Natick, 13%
Needham, 12%
Hull, 3%
Westborough, 14%
Ashland, 33%
Sherborn, 4%
Dover, 10%
Dedham, 20%
Milton, 17%
Quincy, 21%
Cohasset, 35%
Hingham, 16%
Scituate, 7%
Hopkinton, 31%
Holliston, 8%
Medfield, 10%
Westwood, 17%
Braintree, 24%
Weymouth, 10%
Norwell, 18%
Upton, 70%
Milford, 23%
Medway, 19%
Millis, 5%
Norwood, 12%
Canton, 18%
Randolph, 23%
Holbrook, 9%
Walpole, 23%
Rockland, 7%
Hanover, 21%
Marshfield, 14%
Northbridge, 43%
Hopedale, 11%
Norfolk, 32%
Sharon, 13%
Stoughton, 6%
Avon, 11%
Abington, 34%
Mendon, 30%
Bellingham, 21%
Franklin, 27%
Foxborough, 13%
Brockton, 11%
Whitman, 16%
Hanson, 28%
Pembroke, 21%
Duxbury, 18%
Uxbridge, 44%
Blackstone, 19%
Millville, 46%
Wrentham, 12%
Easton, 12%
West Bridgewater, 22%
East Bridgewater, 26%
Halifax, 12%
Kingston, 29%
Plainville, 25%
Mansfield, 22%
Bridgewater, 21%
Plympton, 34%
North Attleborough, 16%
Norton, 25%
Raynham, 37%
Attleboro, 19%
Taunton, 10%
Middleborough, 33%
Carver, 23%
Plymouth, 27%
Lakeville, 28%

Housing Unit Change

	Up to 1,000
	1,001 - 3,500
	3,501 - 7,000
	More than 7,000

Label shows percent change in housing units

0 2.5 5 10
Miles

N

Source: MAPC analysis

Low Income Fair Share Gap
(share of 2010 Housing Units)

Fair Share Gap
Disparity between expected and observed households <50% AMI

🟦	No Fair Share Gap
🟩	< 5%
🟨	5% -10%
🟧	10%-15%
🟥	15%-25%
⬜	No Data/ Outside Region

Source: MAPC analysis
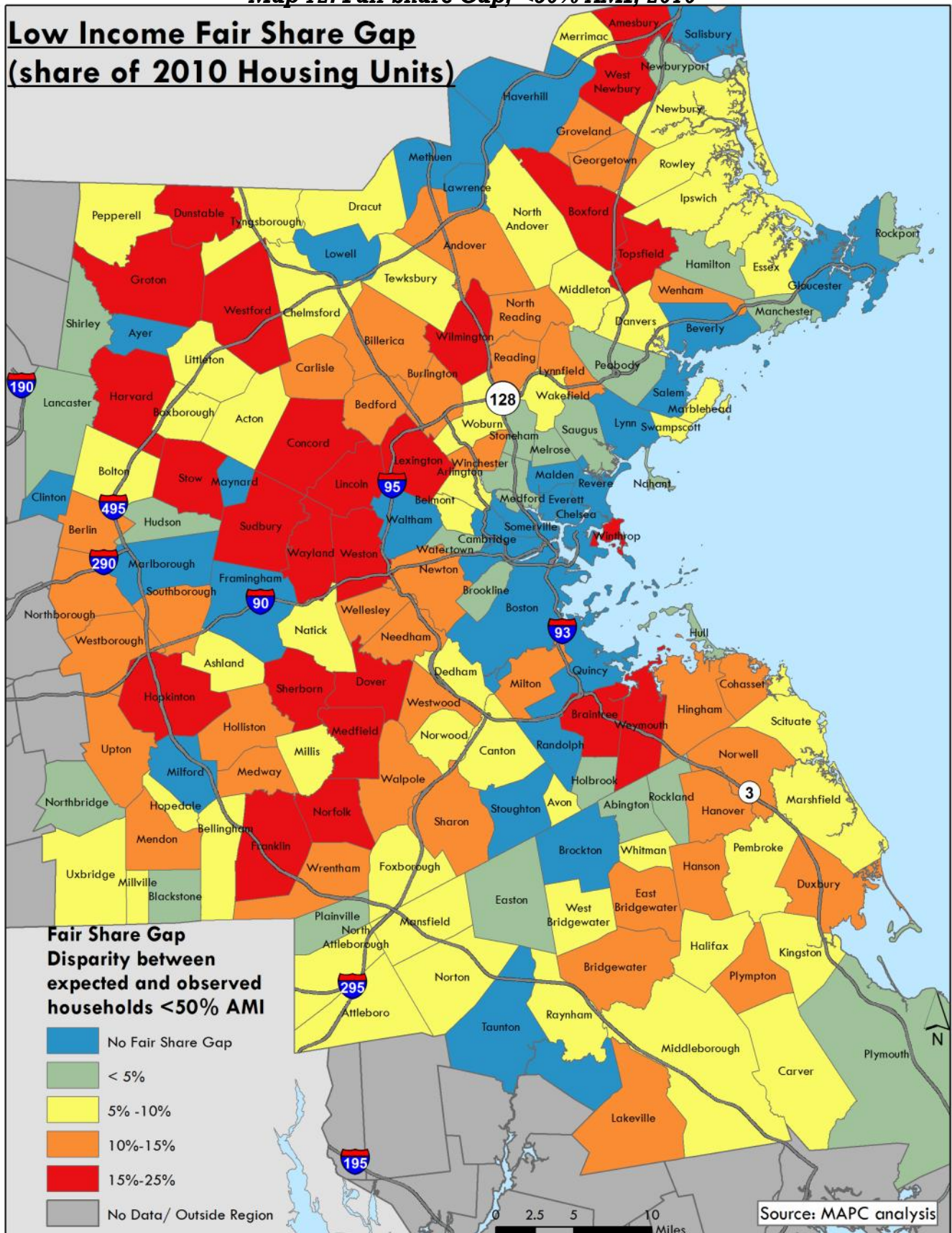
Low Income Cost Burden Gap (share of 2010 Housing Units)

Cost Burden Gap:
Disparity between households <50% AMI and units affordable at that level

- No Cost Burden Gap
- <5%
- 5% - 10%
- 10% - 15%
- 15% - 35%
- No Data / Outside Region

Source: MAPC analysis

0   2.5   5   10 Miles
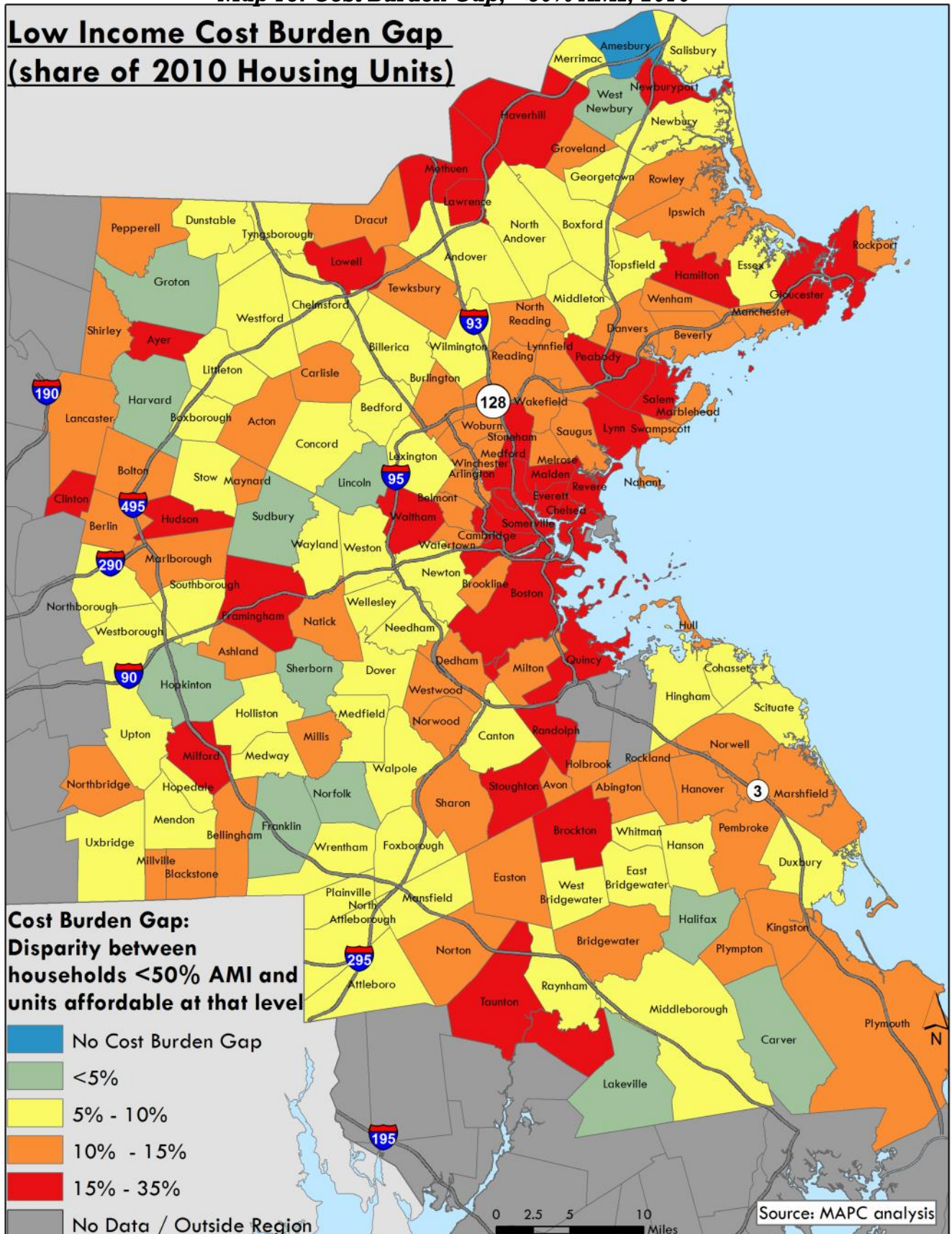
Appendix B:
Methodology

Metro Boston Population, Household, and Housing Unit Projections Methodology

The population and household demand projections utilize a cohort survival methodology with age- and race-specific fertility and mortality rates. We use disaggregated and adjustable age- and race-specific migration rates. Group quarters residents are estimated as a percent of the population, after migration; fertility rates will not apply to the group quarters population. Household demand is derived from age-specific headship rates from the decennial census, further disaggregated into household type and size based on American Community Survey estimates. Projections by age-race-sex cohort prepared at the regional level serve as the control total, with municipal projections constituting population by age, householders by age, households, and group quarters.

Projections of future housing demand by type are based on age-specific housing preferences derived from Public Use Microdata at the regional level. Housing type preference (single/multi-family), tenure, and income, based on the age of the householder, are used to create was a synthetic housing demand for the current year and future years, with the difference between the two indicating the magnitude and type of new housing unit demand for the region/municpality. At the municipal level, PUMS estimates are adjusted to reflect existing housing stock (single/multi family) to derive totals for subregions, and MAPC-defined Community Types. We also account for currently vacant units that may be sold or rented as the market returns to a natural vacancy rate as well as the additional units needed over and above household growth to achieve and maintain a healthy vacancy rate.

The projection area comprises a 164-municipality region that includes the entire MAPC district as well as all or portions of Old Colony Planning Council, Southeast Region Planning and Economic Development District, Central Massachusetts Regional Planning Commission, Northern Middlesex Council of Governments, and Merrimack Valley Planning Commission. Where necessary to analyze migration rates or other factors, a five-county approximation of the region was used, comprised of Essex, Middlesex, Norfolk, Plymouth, and Suffolk counties. The projections model was structured so that key inputs could be modified to test the sensitivity of the projections to different assumptions about future trends. Specifically, the model scenarios incorporate different assumptions about the total amount of net migration and demographics of migrants; housing type preference by age; and intraregional migration.

Data Inputs and Sources:
- Base population-
    - Population by age (5-year increments, 18 age groups), gender, and race/ethnicity (Non-Hispanic White, Non-Hispanic Black, Asian Pacific Islander, Other Non-Hispanic, Hispanic): Decennial Census
    - Group quarters share of population: 2010 Census
- Fertility & Mortality-
    - Births, 2007 – 2009; Deaths, 2006 – 2008 (by age and race of mother/deceased): MassCHIP
    - Births and Deaths, projected annual rate of change (for total population): US Census
- Migration-
    - Total migration in/out of region (to/from elsewhere in MA, other states, international): County flow data American Community Survey 2005-09 and 2000 Census
    - Population characteristics of interstate in- and out-migrants: Age: ACS; Race: PUMS
    - Births and Deaths by Age, 2000-2009: MassCHIP
    - Households-Headship rates (AKA household formation rate) by age of householders (6 age groups): Decennial Census

- - - o Household type (family/nonfamily) and size of household by age (3 age groups) and race of householder: American Community Survey
- Housing Units-
  - o Housing unit type (single/multi-family), tenure, income by age of householder (3 age groups): PUMS

Base/ Current Population:

Regional scale- Population by age (5-year age cohorts), sex, and race (NHW, NHB, NHAPI, HIS, OTH)-total and household population for 2010; Municipal level- Population by age (5-year age cohorts) and sex- total and household population.

Mortality:

Annual mortality rates are calculated by dividing the total deaths by the estimated population (interpolated from 2000 & 2010 Census) in each cohort for last 3 years of available data (2006-08). In comparison to DPH mortality rates, MAPC rates are higher for age groups less than 5, 35-50, and over 75. DPH rates are notably higher for 50-75 year olds, and to a lesser extent 20-24 year olds.

The inverse, i-e, annual survival rate is then calculated and 10-year survival rates are derived by accounting for age-progression of a cohort through the decade. (Eg- The decade survival rate for population 30-34 year old in 2010 accounts for their progression into the 35-39 year and 40-44 year old cohorts. Similar methodology is followed for deriving the decade survival rate for new borns-assuming progression through the under-5 and 5-9 year age cohorts.) These rates are then applied to the base (total) population to get the surviving population. At the regional scale, the survival rates are age, sex, and race specific while at the municipal level, the rates are age and sex specific numbers for each municipality.

Fertility:

Fertility rates are calculated by dividing annual births (MassCHIP) by the interpolated cohort population in households (Census Estimates adjusted to match 2010 population counts.) for the most recent 3 years of available data (2007-09). The MA Department of Public Health has also estimated birth rates for the same time period, which did not utilize the Census 2010 population counts. Notable differences between the two estimates are:
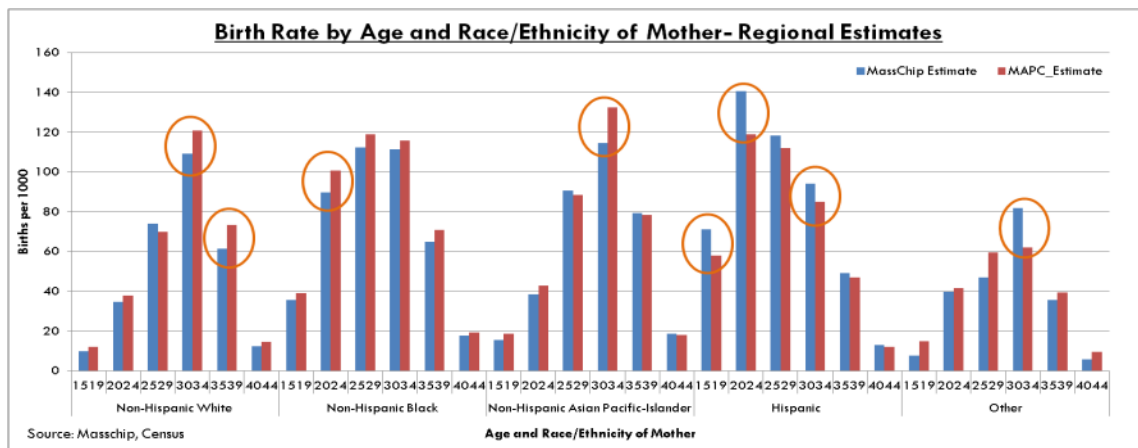
- MAPC birth rates for the 30 – 39 year-old White cohorts are higher than the MassCHIP rates.
- MAPC rates for the Black population are generally higher than MassCHIP rates, especially for 20 – 24 year olds
- MassCHIP rates for 30-34 year old Asians are lower than the MAPC estimate (>130 per 1,000), but is mirrored by a higher MassCHIP estimates for Other Race/Ethnicity in the same age range.
- MassCHIP birth rates for Hispanics are higher at all ages, peaking at 140 births per 1,000 for the 20 -24 year old cohort.

Similar to mortality rates, decade fertility rates account for the age progression into subsequent cohorts. For the regional scale, fertility rates are age and race specific and at the municipal scale, fertility rates are age specific for each municipality.

The rates are then applied to surviving household population to get the new born population. At the regional level, new-borns are allocated race as per the mother's race, and corresponding survival rates applied to the new born population. The surviving population is then equally distributed to the under-5 and 5-9 year old cohorts for the forecast year. At the municipal level, the surviving new born population is allocated to the 2 subsequent cohorts.
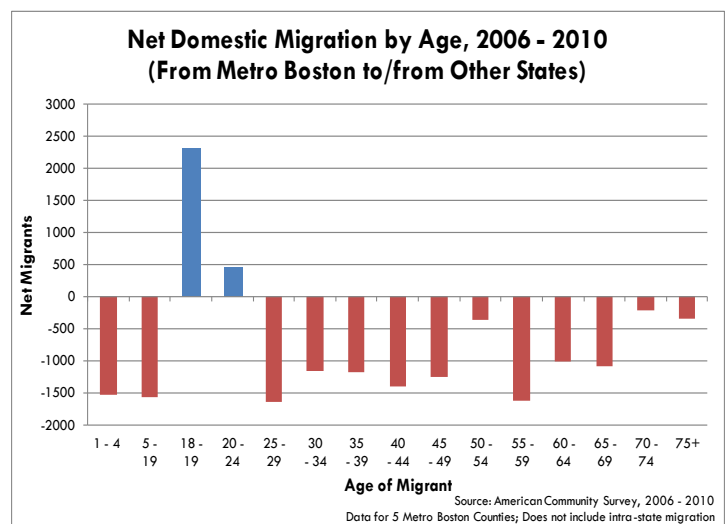
Migration:

Gross migration method is used at the regional level. ACS 2006 – 2010 Geographic mobility tables for the 5-county region and the ACS 2005-09 county-to-county flows are used to estimate total number of people moving within Metro Boston, to or from other portions of Massachusetts, to or from other states, and from other countries.

At the regional level, migration to-and-from rest of MA, and remaining 49 states to the 5 county region is estimated as a percent of the 2010 base population for those regions (rest of MA and 49 states). For future years (2020 and onwards), census estimates for the states are used and projected population for the region is

Net Domestic Migration by Age, 2006 - 2010
(From Metro Boston to/from Other States)

Source: American Community Survey, 2006 - 2010
Data for 5 Metro Boston Counties; Does not include intra-state migration

subtracted to get the base population. The migration rate is annual, and assumptions for change in annual migration rate (both from within MA and other states) are made for the Stronger Region scenario. Total migrants for the 10-year period are then estimated and allocated to age cohorts based on the composition of in and out migrants from ACS 2006-10. To allocate race, PUMS data on the racial composition of migrants by age is used. International migration is assumed as a fixed number annually and age and race allocations are made as per ACS and PUMS data. The difference between total in and out migrants (both from rest of MA and other states) is the net migration for the region for each age and race cohort. Net migrants by age and race are then divided equally to get migrants by age, race, and sex.

At the municipal level, vital statistics method is used to estimate net migration for each age cohort. Base population in 2000 for each 5-year age cohort minus the deaths in the cohort and subsequent cohort from 2000-2009 is the expected population for the cohort. This 'expected' population is compared to the actual 2010 cohort population (i-e- 5-9 year old expected population is compared to 15-19 population in 2010)

to derive the net migration for the 2000 cohort. Both net-migration number and rates (net migration number/ 2000 cohort population) are derived. For new born population, total births from 2000-09 are used as the base and compared to population below 10 years age in 2010. For net out-migration, the rate is applied to the surviving population, and for net positive migration, the net migration number is used. In some cases, adjustments are made to the net migration number where the patterns from 2000-10 were caused due to particular cases namely, major construction of senior housing or closure or realignment of military facilities, events that are not likely to occur again and hence the rates were adjusted to reflect likely patterns.

Based on the 1) survival rate; 2) fertility rate; and 3) migration trends, regional population forecasts by age, race, and sex and municipal forecasts by age and sex are calculated for the 10-year period. Municipal totals by age and sex are adjusted to match regional total to get adjusted municipal population totals by age and sex. Group Quarter population is estimated as a share of the total estimated population for all age cohorts except college age population (age 15-24 yrs.) for which the group quarter population is held constant at 2010 numbers.

Households & Housing Units:

Regional headship rates for family and non-family households by age are applied to the future year household population to get households by type and by age of householder. PUMS data is used to calculate other attributes for households by age- such as household size, income, housing unit occupancy and tenure. The process is repeated to get a synthetic 2010 household count by each of those attributes. The difference between the base year (2010) and future year (2020) is the net change in households and housing units respectively.

At the municipal level, regional headship rates are retained and households estimated by age of householder and type (family/ non-family). Housing unit preferences are adjusted to reflect existing housing unit stock for each city and town; e.g. regional housing unit preferences by household attributes would lead to lower multifamily units than current stock in most inner-core communities. To adjust for this, 2007-11 ACS housing unit stock numbers are used to adjust the housing unit preferences for each household type. Synthetic 2010 household and housing unit numbers are subtracted from the 2020 projected numbers to get the net change for the ten-year period.

Existing vacancy by tenure is compared to 'natural' vacancy rates i-e- the vacancy rate at which the housing costs are within the 'healthy' range. We assume a healthy vacancy rate of 1.5% for ownership units, and 7% for rental stock. Over- and under supply of housing unit stocks is accounted for to estimate the housing demand with vacancy. For estimates beyond 2020, the 'natural' vacancy rates are multiplied with the housing unit demand numbers to get the 2020-30 demand numbers and onwards. This assumes that the existing stock is at the natural levels beginning 2020 for future years.

Please see Appendix F for a list of formulas used.

Appendix C:
Projections Advisory Team

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We would like to thank the following individuals for their participation in the projections advisory team and other contributions to the development of these forecasts.

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