UMASS DONAHUE INSTITUTE

Section III. Long-Term Regional Population Projections

excerpt from:

Long-term Population Projections for Massachusetts Regions and Municipalities

Prepared for the
Office of the Secretary of the Commonwealth
of Massachusetts

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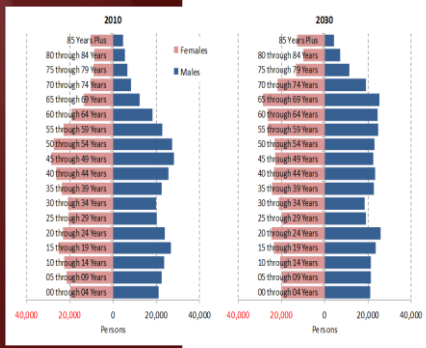

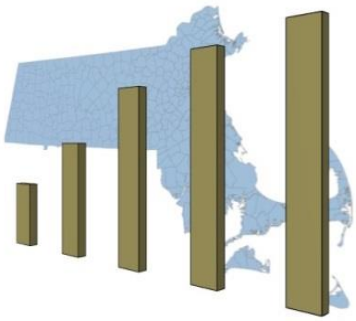

March 2015

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III. Long-Term Regional Population Projections

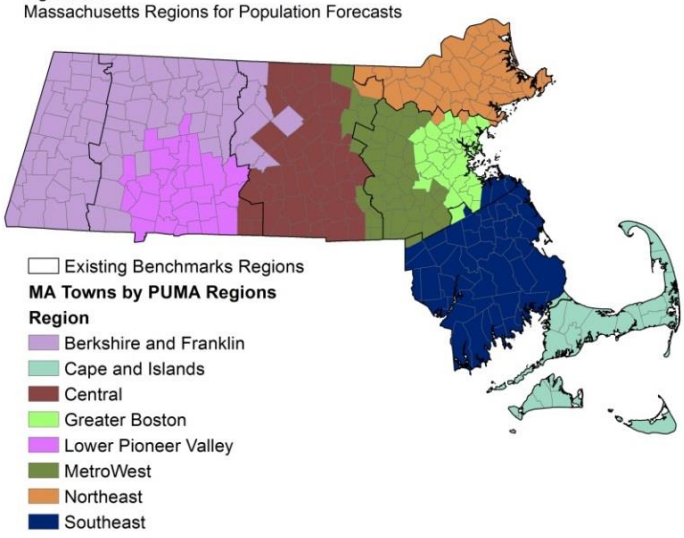
A. Introduction

This section presents long-term regional population projections for eight Massachusetts regions for years 2010 through 2035. The forecasts are presented in five-year increments (i.e. 2010, 2015, 2020, etc.) and broken down by age and gender. These projections were developed by Dr. Henry Renski of the University of Massachusetts Amherst in collaboration with the Population Estimates Program of the Economic and Public Policy Research Unit of the UMASS Donahue Institute. Funding for this project was provided by the Office of the Secretary of the Commonwealth.

The ultimate goal of this project was to develop long-term projections by age and sex for the 351 municipalities in the Commonwealth of Massachusetts. To do so, our method first requires the production of regional-level population projections. It is common for municipal projections to be derived from regional-level projections, in part, because key information on migration patterns does not typically exist for small geographies. We first develop regional projections to take advantage of the superior data sources and then allocate these results to the individual municipalities in each region according to a separate distributing formula. In this way, the regional projections serve as 'control totals' for municipal projections. Beyond their use in creating municipal projections, our regional forecasts have additional value in that their production helps shed light on the demographic forces driving population change across different parts of the Commonwealth.

We developed projections for eight separate regions (Figure 3.1), whose specific boundaries approximate the "Massachusetts Benchmarks" regions often used to characterize the distinct sub-economies of the state. But whereas the Benchmarks regions are based on counties, data limitations required us to make some boundary approximations.[1]

Figure 3.1:
Massachusetts Regions for Population Forecasts



[1] The data required to estimate the domestic migration component of our model are reported by Public Use Micro-sample Areas (PUMAs) as defined by the U.S. Census Bureau. PUMAs do not typically match county boundaries. The boundaries of our forecast regions were designed to match PUMA boundaries and also municipal boundaries, so as to match municipal-level vital statistics data.

Our projections are based on a demographic accounting framework for modeling population change, commonly referred to as a cohort-component model.[2] The cohort-component approach recognizes only four ways by which a regions population can change from one time period to the next. It can add residents through either births or in-migration, and it can lose residents through deaths or out-migration.

The cohort-component model also accounts for regional difference in the age profile of its residents. Birth, death, in- and out-migration rates all vary by age and across regions. To account for this, a cohort-component model classifies the regional population into five-year age "cohorts" (e.g. ages 0-4, 5- 9,… 80- 84, and 85 and older) and develops separate profiles for males and females. We use data from the recent past (primarily 2005 to 2010) to determine the contribution of each component to the changes in the population within each age-sex cohort. The counts are converted into rates by dividing each by the appropriate eligible population. We then apply these rates to the applicable cohort population in the forecast launch year (for us, 2010) in order to measure the anticipated number of births, deaths, and migrants in the next five years. The number of anticipated births, deaths and migrants are added to the launch year population in order to predict the cohort population five years into the future. As a final step, the surviving resident population of each cohort is aged by five years, and becomes the baseline for the next iteration of projections.

Our approach to cohort-component modeling in this projections series introduces several methodological innovations not found in the standard practice of cohort-component modeling. Most follow a net-migration approach, where a single net migration rate is calculated as the number of net new migrants (in-migrants minus out-migrants) divided by the baseline population of the study region. While commonly used, this approach has been shown to lead to erroneous projections—particularly for fast growing and declining regions (Isserman 1993). Instead, we use a gross-migration approach that develops separate rates for domestic in- and out-migrants. The candidate pool of in-migration is based on people not currently living in the region, thereby tying regional population change to broader regional and national forces.[3] We further divide domestic in-migrants into those originating in from neighboring regions and states and those coming from elsewhere in the U.S. to further improve the accuracy of our estimates. This type of model is made possible by utilizing the rich detail of information available through the newly released Public Use Micro-Samples of American Community Survey.

While we take pride in using highly detailed data and a state of the art modeling approach, no one can predict the future with certainty. Our projections are simply one possible scenario of the future—one conditioned largely on whether recent trends in births, deaths and migration continue into the foreseeable future. If past trends continue, then we believe that our model should provide an accurate reflection of population change. However, past trends rarely continue. Economic expansion and recessionary cycles, medical and technological breakthroughs, changes in cultural norms and lifestyle preferences, regional differences in climate change, even state and federal

[2] A more detailed description of our methodology is provided in Section IV. of this report: *Technical Discussion of Methods and Assumptions.*

[3] The rationale behind the development of a distinct in-migration rate is that the potential population of in-migrants is not the people already living in the region (as assumed in a net migration approach), but those living anywhere but.

policies – all of the above and more can and will influence birth, death and migration behavior. We humbly admit that we lack the clairvoyance to predict what these changes will be in the next two decades and what they will mean for Massachusetts and its residents. Of particular note is the consideration that the data used for developing component-specific rates of change were largely collected for the years of 2005 to 2010. This period covers, in equal parts, periods of relative economic stability and severe recession. It is difficult to say, for example, whether the gradual economic recovery will lead to an upswing in births following a period where many families put-off having children, or whether birth rates will rebound slightly and thus return to the longer-term trend of smaller families. We expect economic recovery to lead to greater mobility, however, we do not know if this will result in relatively more people moving in or out of Massachusetts. Likewise, we cannot predict the resolution of contemporary debates over immigration reform, housing policy, and/or financing of higher education and student loan programs. Nor can we even begin to assess whether climate change will lead to a re-colonization of the Northeast, which has been steadily losing population to the South and Southwest for the past several decades. Making predictions like these is far beyond our collective expertise and the scope of this study.

These caveats are not meant to completely dismiss the validity of our projections, but rather to situate them in a reasonable context. Population change tends to be a gradual process for most regions in the Northeast. Most of the people living in a region five years from now will be the same ones living here today – only a little bit older. Regions with an older resident population can expect to experience more deaths as these people age. Places with large number of residents in their late twenties and thirties can expect more births in the coming years. A large number of U.S. residents in grade school today will mean a larger pool of potential college students ten or fifteen years down the road. These are many trends that we can anticipate with relative certainty, and which are reflected in the regional results that follow.

B. Analysis by Region

1. Berkshire/Franklin Region

Summary

The Berkshire/Franklin county region consists of 76 communities spanning the Commonwealth's western and northwestern borders (Figure 3.1a). It is predominantly rural with its primary population and employment centers in Pittsfield in Berkshire County and Greenfield in Franklin County.

The Berkshire/Franklin region experienced slight population decline of approximately 2,300 residents over the past decade (2000 to 2010)—equivalent to an annualized rate of growth of -0.1%. Our model predicts that recent trends of slow decline will continue through 2015 and then temporarily reverse between 2015 and 2030, with more in-migration from retiring baby boomers coupled with a reduction in domestic out-migration, as the region includes fewer persons in the younger cohorts more prone to leave the region. The effect of retirement-fueled growth will be only temporary however, as increasing deaths associated with an aging population will eventually erode all gains. The regional population is expected to peak in 2030 at 238,425 residents—about 2,300 more than were counted in the 2010 Census—and then start to slowly decline again towards 2035. (Figures 3.1b & 3.1c). This said, the region may be thought of as very stable over the time series in terms of total population. The population varies by less than 5,000 from the highest to lowest point in the 2010 to 2035 time series with a 25-year increase of just 1.1%.

Figure 3.1a
The Berkshire/Franklin Region

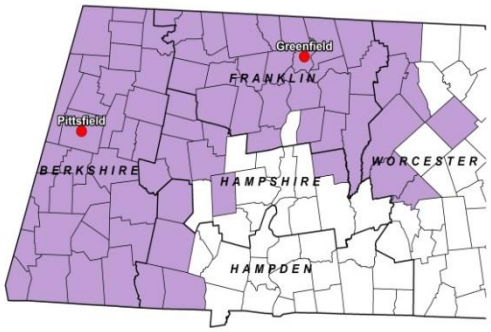


Figure 3.1b
Recent and projected population, Berkshire/Franklin

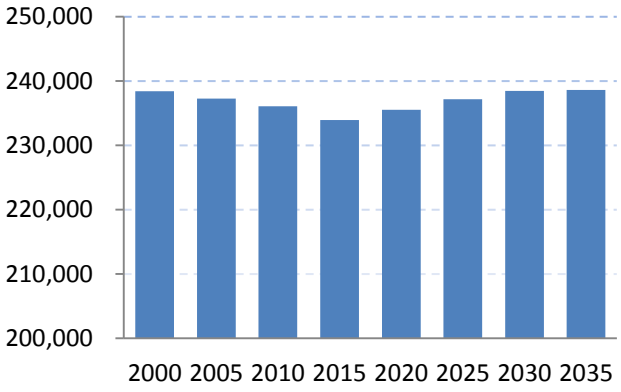


Figure 3.1c
Annualized rates of population change, Berkshire/Franklin

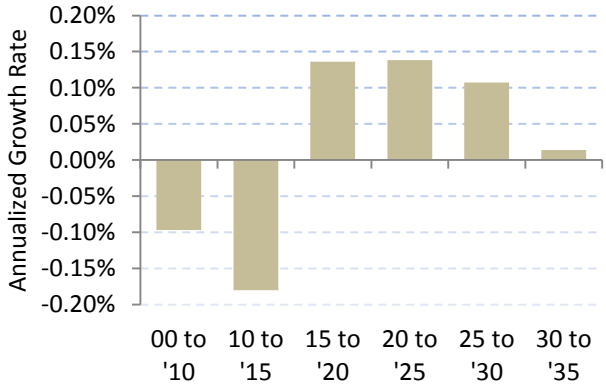


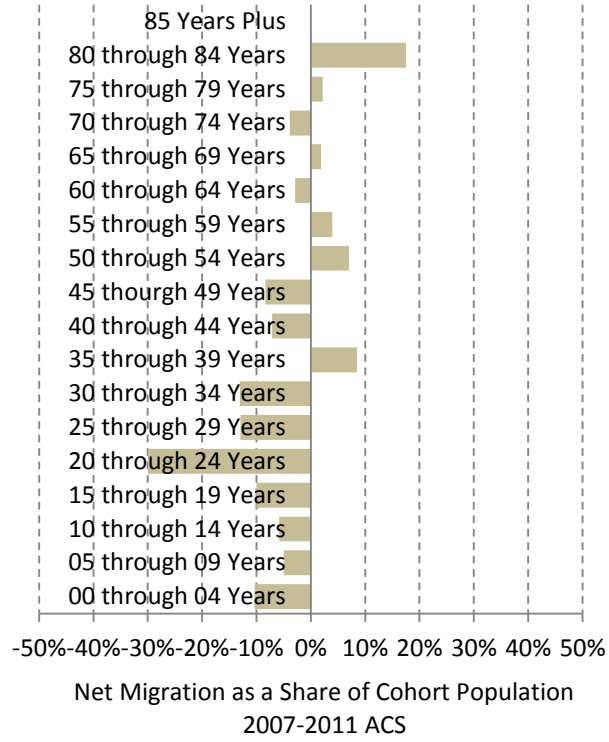
Table 3.1
Summary Results: Estimated Components of Population Change, Berkshire/Franklin

	2010-2015	2015-2020	2020-2025	2025-2030	2030-2035
Starting Population	236,058	233,932	235,525	237,153	238,425
Births	10,577	10,166	10,079	9,900	9,781
Deaths	12,886	14,582	16,415	18,386	20,633
Natural Increase	*-2,310*	*-4,416*	*-6,336*	*-8,485*	*-10,851*
Domestic In-migration, MA & Border	31,141	33,300	33,393	33,885	34,467
Domestic In-migration, Rest of U.S.	12,681	13,571	14,068	14,546	14,948
Domestic Out-migration	48,113	45,305	43,924	43,096	42,814
Net Domestic Migration	*-4,292*	*1,566*	*3,536*	*5,335*	*6,601*
Net International Migration	*4,475*	*4,444*	*4,428*	*4,422*	*4,416*
Ending Population	233,932	235,525	237,153	238,425	238,592

Table 3.1 above shows future estimated components of population change for the region. While births decrease over time, the number of deaths will increase, leading to decreasing net population change due to natural events. At the same time, the number of in-migrants increases over time while the number of out-migrants decreases: resulting in increasing population due to migration. Together, these sum to the population variations anticipated from one period to the next. In the case of all components, the predicted trends are very much related to the age structure of the region and how recent trends in migration-by-age will affect future populations.

Domestic out-migration has been the Berkshire/Franklin region's major source of population loss in recent years. ACS data for the 2007-2011 period indicates that the region lost 57,435 residents due to domestic out-migration, while gaining only 43,995 new residents from other regions in the state

Figure 3.1d: Age profile of net domestic migrants, Berkshire/Franklin, 2007-2011, American Community Survey



and the U.S. The region has gained some new residents in the 35- 39 age group, however all other in-migrants have been in the older cohorts aged 50 and above. Out-migrants have predominantly been teens and young adults—groups presumably leaving the region for college or to seek job prospects elsewhere (Figure 3.1d).

Age Profile

Assuming the Berkshire/Franklin region remains an attractive lifestyle and retirement destination, the continued in-migration of thirty-somethings and the elderly is expected to offset the population loss due to out-migration of youth (Figure 3.1e). Starting around 2020, domestic in-migration will begin to surpass domestic out-migration coinciding with the aging of the millennials into their thirties and the expansion of the U.S. elderly population. The steady decrease in out-migration shown in Figure 3.1e is largely the result of the shrinking number of 15-29 year olds in the region. So while we assume that the *rates* of youth out-migration are constant over time, the total number of out-migrants is expected to decrease as the millennials begin to age out of their teens and twenties. In short, there will be fewer young people moving into the high-out-migration cohorts, resulting in less out-migration.

Figure 3.1e: Projected levels of domestic in and out-migration, Berkshire/Franklin, 2010-2035

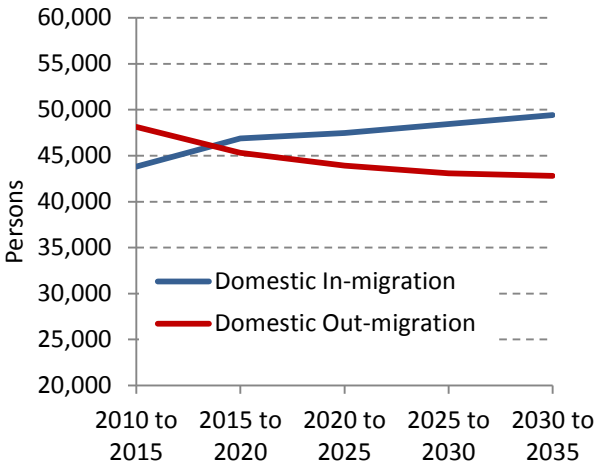
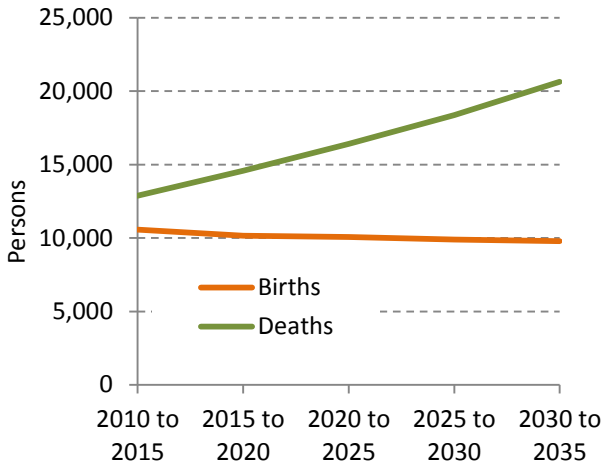


Figure 3.1f: Projected levels of births and deaths, Berkshire/Franklin, 2010-2035



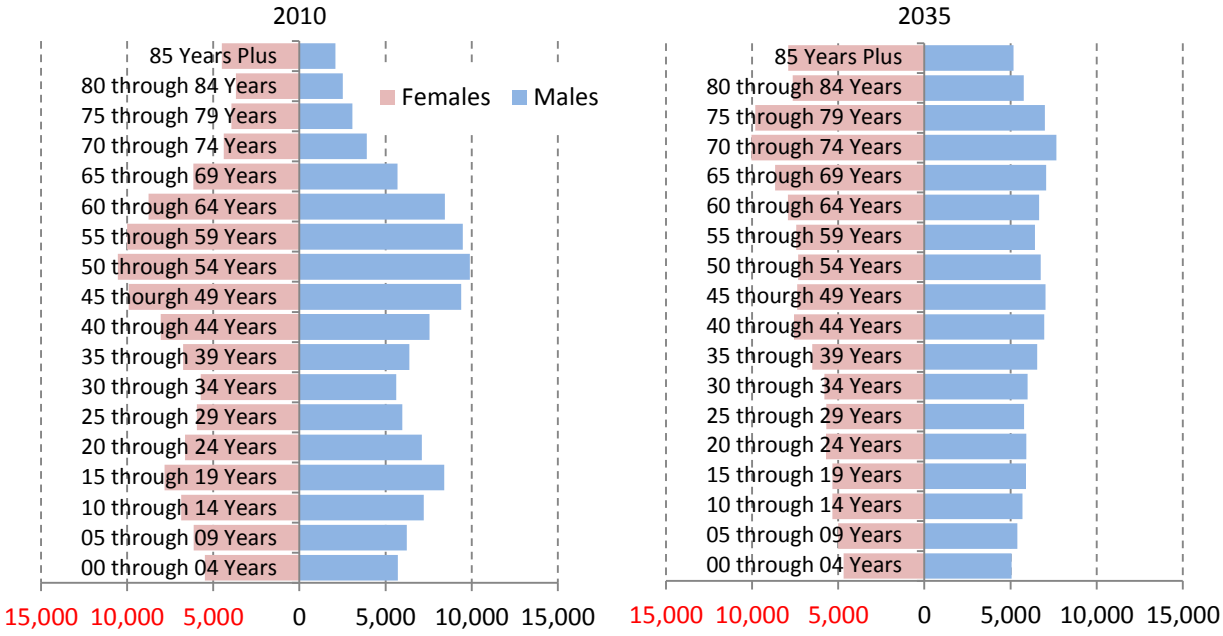
A smaller portion of the region's recent population loss has been due to natural decline, i.e. more deaths than births; however, this is expected to play a much larger role in population loss in the years ahead. Between 2005 and 2010, there were 10,833 births in the region compared to 11,513 deaths, resulting in a net loss of 680 residents. Over time, we anticipate a steady increase in deaths coupled with a slight decline in the number of births (Figure 3.1f). Generally, the number of deaths rises with an aging population. This is particularly true in regions, such as the Berkshire/Franklin region, with a large, growing population 70 years and older—ages when mortality rates begin to show a marked increase.

The out-migration of youth, importation of retirees and older residents, and the general lull in young families combine to paint a portrait of the Berkshire Region that is relatively old and getting

older. In 2010, a third of the region's population was between the ages of 45- 64—cohorts roughly analogous to the baby boomer generation. We also find a secondary concentration (21%) between the ages of 10-25—ages associated with the millennial generation or echo boomers (Figure 3.1g). By 2030, the baby boomers will have moved into 65-years and older cohorts, with the millennials entering their thirties. The aging of the millennials is less pronounced than their boomer parents because many leave the region rather than age in place. Also pertinent is the relative scarcity of residents between the ages of 20 and 30 in the region in 2010—the age where we might expect people to start their families over the coming decade.

Assuming recent trends persist, the Berkshire/Franklin population of the next 25 years will be considerably older than today. In 2010, roughly 32% of the region's population was 55-years or older. By 2035, this share will increase to 44%. In the next twenty-five years, we expect stagnancy or a relative decline in the population share of nearly all cohorts except those over 65. Figure 3.1g, below, shows the change in the age and gender composition of the region anticipated by 2035 compared to 2010. Figure 3.1h shows the population by age at 2000, 2010 and then projected at 5-year intervals through 2035, demonstrating how the population ages forward through the time-series.

Figure 3.1g
The age and gender composition of the Berkshire/Franklin population, 2010 (actual) vs. 2035 (forecasted)



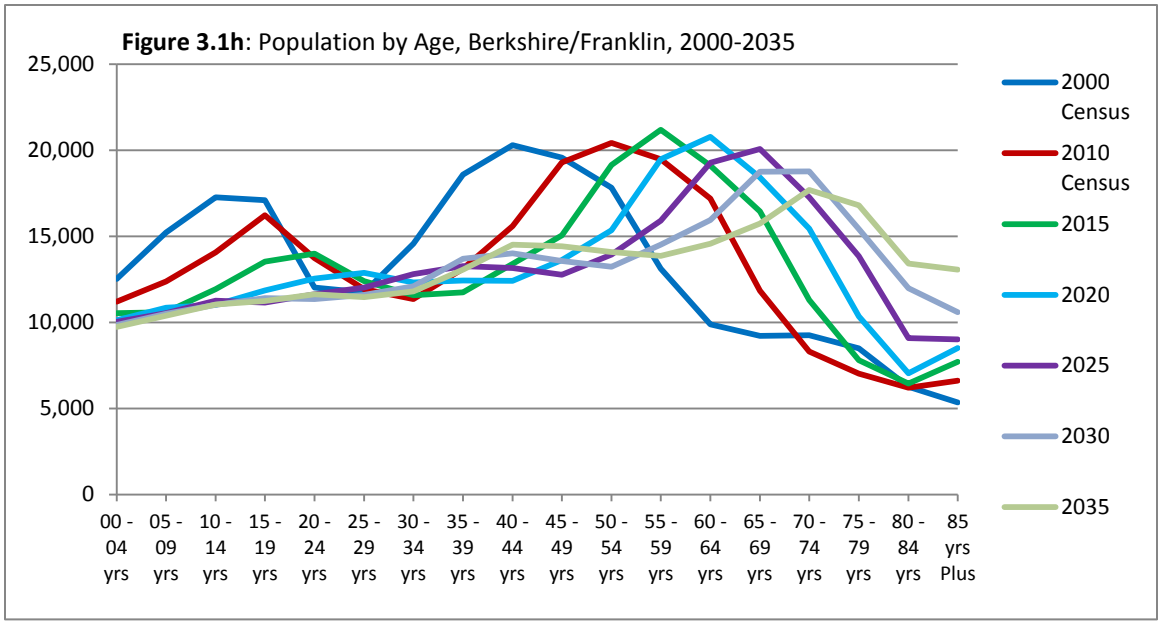


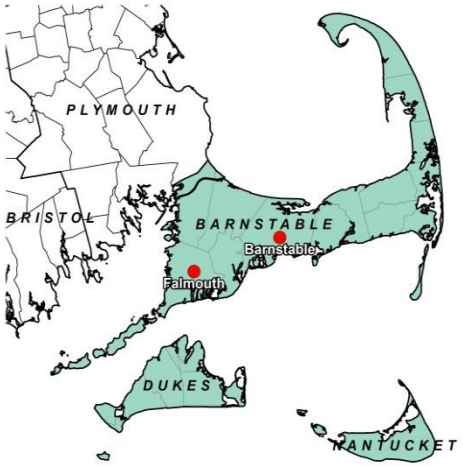
Figure 3.1h: Population by Age, Berkshire/Franklin, 2000-2035
25,000
20,000
15,000
10,000
5,000
0
00 - 04 yrs
05 - 09 yrs
10 - 14 yrs
15 - 19 yrs
20 - 24 yrs
25 - 29 yrs
30 - 34 yrs
35 - 39 yrs
40 - 44 yrs
45 - 49 yrs
50 - 54 yrs
55 - 59 yrs
60 - 64 yrs
65 - 69 yrs
70 - 74 yrs
75 - 79 yrs
80 - 84 yrs
85 yrs Plus
2000 Census
2010 Census
2015
2020
2025
2030
2035

2. Cape and Islands Region

Summary

The Cape and Islands region covers the eastern-most reaches of the Commonwealth, including 23 communities in Barnstable, Dukes and Nantucket counties. Its largest (year-round) population centers are Barnstable and Falmouth (Figure 3.2a).

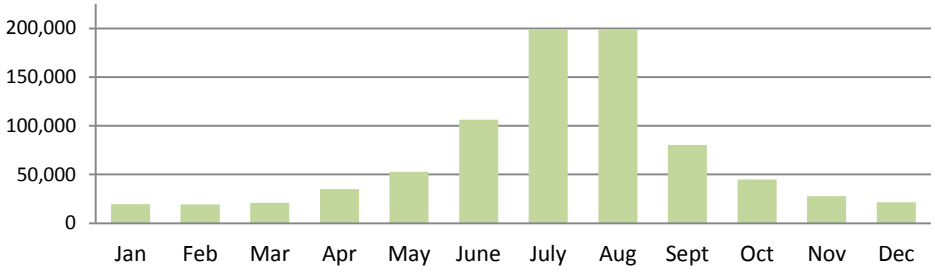
Figure 3.2a
The Cape & Islands Region



Before describing population and population change in the Cape and Islands region, it is important to first note that our projection series accounts only for the "resident" population of the region, as captured by the U.S. Census Bureau. During significant portions of any given year, however, the region is also home to a large number of "seasonal" residents not counted by the Census Bureau and, likewise, not considered in the scope of this projection series.

Estimates produced by the Cape Cod Commission, using survey data on second homes indicate that the seasonal population on Cape Cod, when averaged over a full year, is equivalent to 68,856 full-time residents in addition to the 215,888 counted by the U.S. Census Bureau in 2010 (Figure 3.2b).[4] The extent of this seasonal population is also apparent in Census Bureau housing unit data. Out of 3,221 U.S. counties tallied in Census 2010, the three Cape and Island counties all rank in the top 100 in terms of vacant/seasonal units as a percent of all housing units. Nantucket County ranks 9th at 58%; Dukes County ranks 14th at 54%; and Barnstable County is 75th at 36%. In terms of the total number of vacant/seasonal housing units, Barnstable County, with 56,918 units, has the 4th largest number in of all counties in the United States, just behind Maricopa County Arizona and Lee and Palm Beach counties in Florida.[5]

Figure 3.2b: Second Home Population Estimate , Cape Cod, 2010

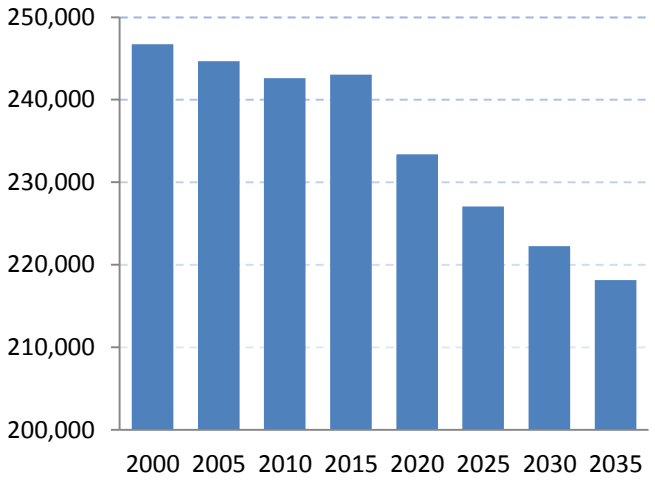


Source Data: Cape Cod Commission 2015. Calculations based on UMass Donahue Institute's *Second Home Owner Survey* 2008 and 2010 U.S. Census.

[4] For more information on the estimate of full-time resident equivalency, contact the Economic Development Department of the Cape Cod Commission in Barnstable, MA at http://www.capecodcommission.org.
[5] Source: U.S. Census Bureau, DP-1: Profile of General Population and Housing Characteristics, 2010 Census.

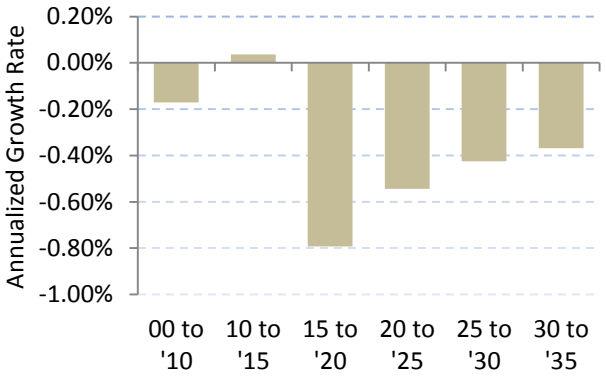
Between 2000 and 2010, the Cape and Islands region experienced a net loss of just over 4,000 residents, much of which was due to the out-migration of youth and a large number of deaths characteristic of an older resident population. Our model shows a slight increase in population from 2010 to 2015 to align the region with recent U.S. Census Bureau estimates for the area,[6] but the recent trend of population loss continues for the rest of the time period. From 2010 to 2015, the population increases to just over 243,000 persons, but then starts to lose population again at a level of about 6,225 persons on average every five years through 2035 (Figure 3.2c).

Figure 3.2c
Recent and projected population, Cape & Islands



Annualized growth from 2010 to 2015 is minimal—just 0.04%—and is followed by a decrease of -0.8% from 2015 to 2020 (Figure 3.2d). From 2000 to 2010, the region decreased by -0.17%. In the 2015 to 2020 period, decreasing population in the region is driven largely by the outflow of young people from the region. After 2020, the decrease is due largely to vital events as the number of deaths increasingly outnumbers the number of births in an aging region.

Figure 3.2d
Annualized rates of population change, Cape & Islands



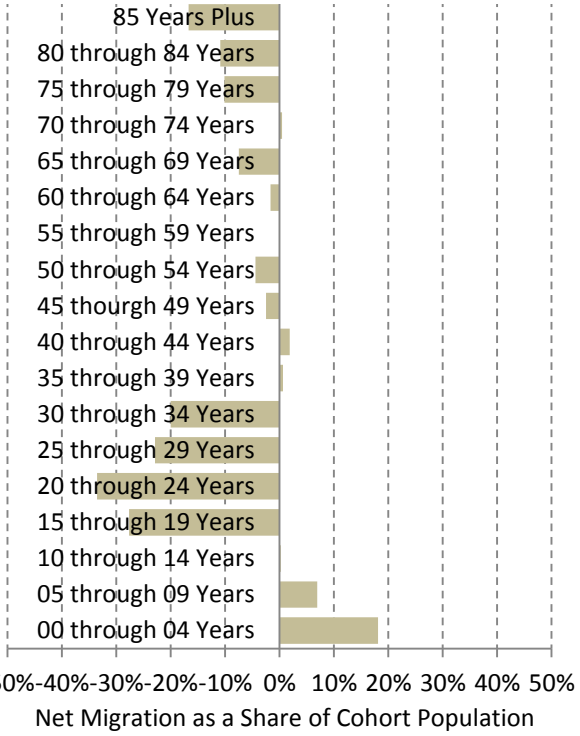
The Sources of Population Change

The anticipated population loss in the Cape and Islands is due to both the net domestic out-migration predicted in the model and the net result of more deaths than births in the region. American Community Survey PUMS data for the 2007 to 2011 period shows an annual outflow of 11,527 persons from the region compared to an inflow of just 7,546. Over a five-year period, this amounts to a net domestic loss of about 20,000 people.

[6] See Methods section of this report for details on how 2015 population for each region is aligned to U.S. Census Bureau population estimates through 2013 and 2014.

According to the ACS data, nearly all age groups are contributors to the net outflow from the region; however out-migration is particularly high among the region's youth, many of who presumably leave the region for college or job prospects while in their late teens through their twenties and mid-thirties (Figure 3.2e). Out-migration numbers will decline as the number of young residents associated with out-migration continues to shrink. Note that the *rates* of out-migration by age will be the same, according to our model; however the population of young persons in the region subject to this rate will is expected to decline over time.

Figure 3.2e
Age profile of net domestic migrants, Cape & Islands, 2007-2011, American Community Survey



When evaluating the migration component for Cape Cod, however, it should be noted that while the American Community Survey is our only *direct* source of gross-migration data by age and sex at the state or sub-state geographic level, it is based on sample survey data and therefore prone to sampling error. Because Cape Cod is the smallest region in our projection series, it can be considered the most prone to this sampling error out of all eight sub-state regions. Thus, both the migration levels and the distribution of the migration to each age group in this model are subject to dispute or revision through the analysis of other data sources when available.

Further complicating migration measurement in the Cape Cod region is the high level of seasonal, part-time, or "snowbird" residents. These populations are difficult to capture accurately in all types of direct migration data available. These data include: IRS migration data, which captures in- and out-migration for the total population down to the county level, the old Census long form (used in 2000), and the ACS survey.

Because of the variances due to measurement error as well as varying residency rules among the different sources of migration,[7] the resulting net levels of migration for this region differ significantly by source. The ACS county-to-county flow data indicates a net outflow of 4,539 per year from 2005 to 2009 and 2,437 per year during the 2007 to 2011 period.[8] This equates to 22,695 and 12,185 net out-migrants, respectively, for each of the five-year periods we use in creating

[7] The American Community Survey defines residency as a place where a person lives for "at least two months"; the decennial Census count defines residency as where a person lives "most of the time"; and IRS migration data is based on the filer's declared place of residence for tax purposes.

[8] Source: U.S. Census Bureau, 2005-2009 American Community Survey and 2007-2011 American Community Survey County-to-County Migration Flows. For more information see: http://www.census.gov/hhes/migration/data/acs/county-to-county.html

migration rates for the UMDI V2015 projection series. The ACS PUMS migration data,[9] which provides age/sex detail but which is subject to larger sample error, suggests a larger net outflow of 5,670 persons per year in 2005 to 2009 and 3,981 per year in the 2007 to 2011 period, or five-year totals of 28,350 and 19,905, respectively. In contrast, net migration estimates created by the U.S. Census Bureau for use in their annual county-level population estimates, based on IRS tax-returns and Medicare enrollment data, indicate much lower levels of net outflow: 2,871 in the 2005 to 2009 period—or 574 average per year. In the 2007 to 2011 period these estimates indicate net *positive* migration of 380 person's average per year, or 1,899 for the five-year period.[10]

As an alternative to using these direct sources of migration data, one can also estimate migration levels indirectly. One commonly used cohort-component method estimates net migration for each age/sex cohort as a residual of births, deaths, and the difference between the Census 2000 and 2010 counts. In an application of this method, we take the Census 2000 population for a given town by age and sex, age all of its cohorts forward by ten years, add the number of births in the town from 2000 to 2010, and subtract deaths from 2000 to 2010. This gives us our "anticipated" 2010 population. The difference between the "anticipated" and the actual population (the Census 2010 count) is attributed to net-migration and is converted into a migration rate that is carried forward for the rest of the time series.

Using a residual-survival method for estimating migration, we do see a different pattern of net-migration by age than that observed in the ACS data. This method, however, also predicts population loss in the region at about the same level as the ACS-based, gross migration model that we use in this V2015 projection series. Figure 3.2f, below, shows the resulting total population projected for the region using four different methods of projecting population change: a cohort-survival method calculating net-migration, two alternate variations of a Hamilton-Perry or "cohort-change-ratio" method,[11] and the ACS-based gross-migration model that we use in the UMDI V2015 projection series.[12] For most points in the time series, the variation from the highest to the lowest result from any given model is about 4,000 to 5,000 people.

[9] Source: U.S. Census Bureau American Community Survey 5-year Public Use Microdata Sample Data 2005-2009 and 2007-2011. For additional information see: http://www.census.gov/acs/www/data_documentation/pums_data/

[10] Sources: U.S. Census Bureau: Cumulative Estimates of the Components of Resident Population Change for Counties of Massachusetts: April 1, 2000 to July 1, 2009 (CO-EST2009-04-25, March 2010) and Annual Resident Population Estimates, Estimated Components of Resident Population Change, and Rates of the Components of Resident Population Change for States and Counties (CO-EST2013-ALLDATA, March 2014).

[11] In our example of a cohort-change-ratio method, we take the ratio of an age/sex cohort population age (*a*) at time (*t*) to the cohort population age (*a-10*) at time (*t-10*) and apply that ratio, by age and sex, to the base and future base populations.

[12] Researchers interested in obtaining detailed results of the alternative series shown here may contact the UMDI Population Estimates Program for information.

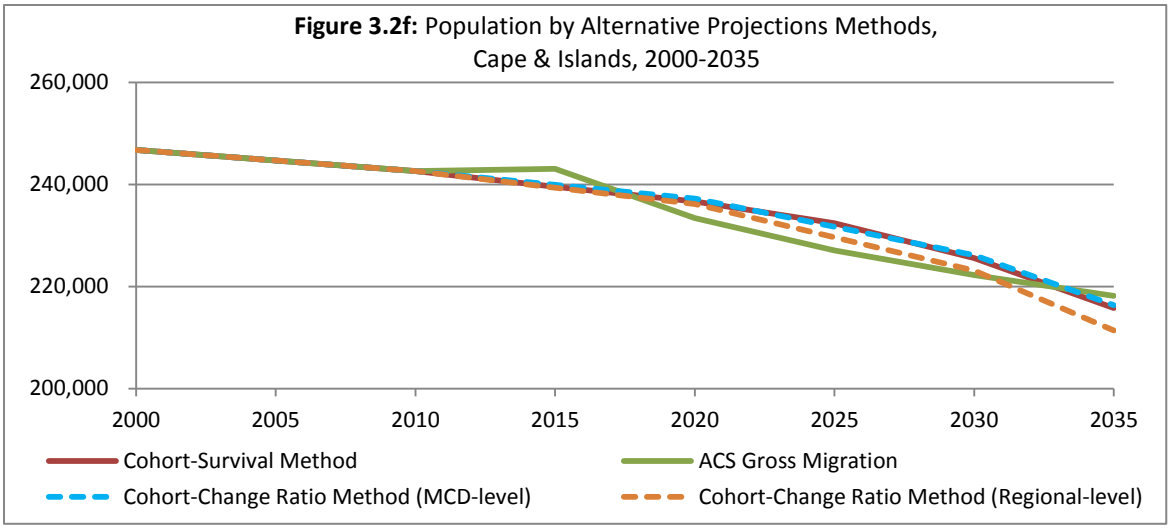


Figure 3.2f: Population by Alternative Projections Methods, Cape & Islands, 2000-2035

It should be further noted that all four of the alternative models presented here are based on birth, death, and migration trends experienced in the Cape Cod region from 2000 forward. The Cape region experienced strong and steady growth for many decades leading up to 2000, with the 2000 to 2010 period representing a reversal of those trends. A projection model that based its future migration trends on a longer history of the region, for example the 1990 to 2000 period, would likely predict continued growth in this region rather than decline. Figure 3.2g below shows the example of a cohort-change-ratio model that uses the ratios observed from 1990 to 2000 averaged with the 2000 to 2010 ratios, as compared to some of the alternative models based on just the 2000 to 2010 data.

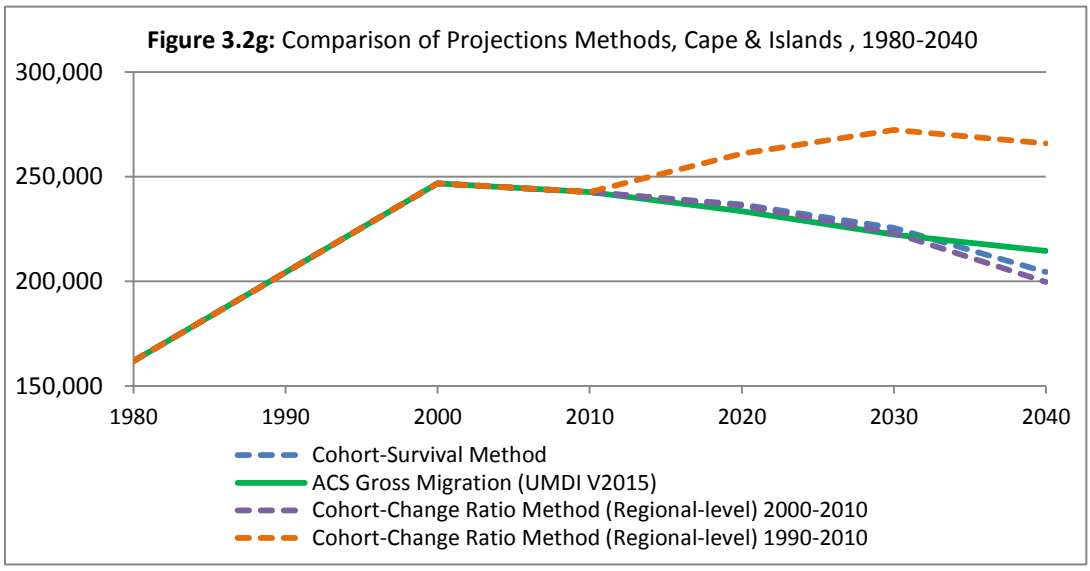


Figure 3.2g: Comparison of Projections Methods, Cape & Islands , 1980-2040

In our vintage 2015 projection series we do choose to use a migration period (2005 to 2011) that we feel is reasonably likely to reflect migration patterns over the next 20 years, and we select a source of direct migration data (ACS PUMS) that allows us to examine both in and out-migration by

age and by sex. However, it should be clear from the above discussion that these do represent choices and assumptions in our model which are subject to variation in any other given model.

While out-migration is mitigated in our model in the 2010 to2015 period, when we adjust migration rates to meet Census 2014 estimates,[13] it increases again from 2015 to 2020 before gradually diminishing when using the ACS-based rates. In-migration generally increases throughout the period, holding steady through 2020 and then increasing thereafter as the millennials in the greater U.S. start to age into the 35-44 age group now associated with slight in-flow in the Cape region according to the ACS data. These age groups further increase the inflow by bringing their children with them. While most other age-groups have been contributing to out-migration, this increased inflow, together with diminishing out-flow, is just enough to finally yield net-positive migration by 2035 (Table 3.2 and Figure 3.2h.). Finally, throughout the time series, positive international migration, at roughly 6,000 new residents in each 5-year period, steadily off-sets the losses through domestic outmigration that we predict in the region after 2015.

Table 3.2
Summary Results: Estimated Components of Population Change, Cape and Islands

	2010-2015	2015-2020	2020-2025	2025-2030	2030-2035
Starting Population	242,595	243,036	233,398	227,050	222,232
Births	10,035	10,176	9,920	9,714	9,544
Deaths	16,015	16,778	17,174	18,090	19,239
Natural Increase	*-5,980*	*-6,602*	*-7,254*	*-8,376*	*-9,695*
Domestic In-migration, MA & Border	25,852	25,729	26,224	26,573	26,890
Domestic In-migration, Rest of U.S.	16,031	15,464	16,015	16,581	17,162
Domestic Out-migration	41,435	50,161	47,252	45,508	44,359
Net Domestic Migration	*448*	*-8,968*	*-5,013*	*-2,354*	*-307*
Net International Migration	*5,973*	*5,932*	*5,919*	*5,912*	*5,904*
Ending Population	243,036	233,398	227,050	222,232	218,133

Population loss due to vital events has an even larger influence than migration on population change in the region, and its influence only increases throughout the time period. According to U.S. Census estimates, Barnstable County, which accounted for 89% of the region's population in 2010, shows the highest rate of population loss due to natural decrease (deaths over births) in the state, at 5.3 per thousand compared to 2.9 statewide.[14] From 2005 to 2010, the region experienced 11,193 births compared to 13,959 deaths.

[13] See Methods section of this report for details on how 2015 population for each region is aligned to U.S. Census Bureau population estimates through 2013 and 2014.
[14] Source: U.S. Census Bureau Population Division, CO-EST2013-ALLDATA, March 2014 and NST_EST2013_ALLDATA, January 2014.

With the number of births essentially flat over the next twenty-five years, the gap between deaths and births will continue to widen, leading to increasing population loss through the period (Table 3.2 and Figure 3.2h). By the 2030 to2035 period, the region is projected to have a 2:1 ratio of deaths over births with 19,239 deaths compared to just 9,544 births.

Figure 3.2h
Projected levels of domestic in and out-migration, Cape & Islands, 2010-2035

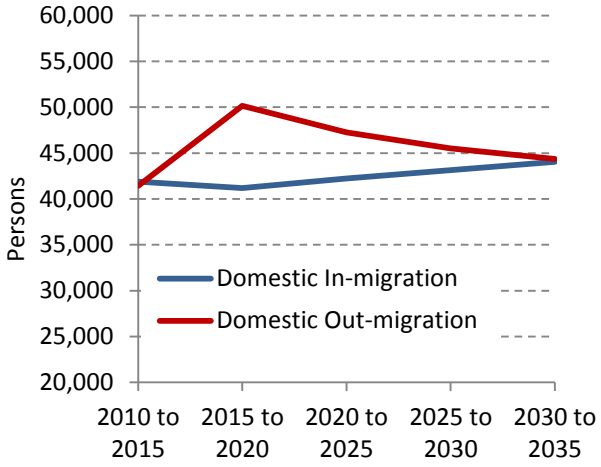
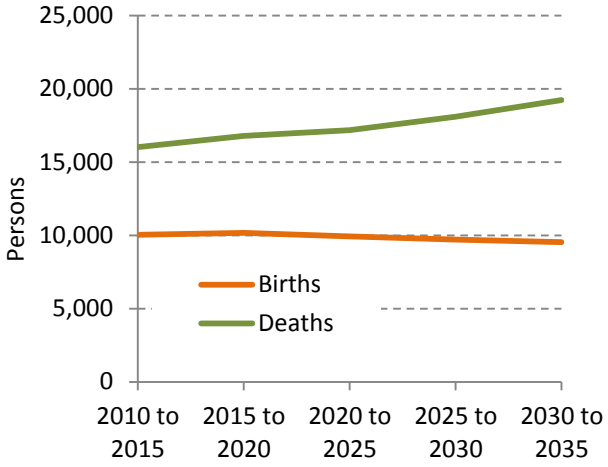


Figure 3.2i
Projected levels of births and deaths, Cape & Islands, 2010-2035



Age Profile

The increasing number of deaths over births is a trend playing out in many other parts of the Northeast and even the U.S. as the large population of baby boomers moves into their seventies and eighties, when mortality rates rise considerably. In the Cape region this effect is exacerbated by a regional age profile that is notably older than both the state and the nation. Figure 3.2j shows a sizable population mass among persons 45- 69 years old in 2010. In the Cape and Islands this group accounts for 39% of the regional population, compared to roughly 32% for the state and 30% for the nation. There is also a far larger share of elderly residents in the Cape and Islands. In 2010, residents 70 years and older comprised 9% of the U.S. population and 10% of the state population compared to 17% in the Cape and Islands.

The next twenty years will bring a sizable upward shift and consolidation of the population profile among persons in their sixties, seventies, and eighties. By 2035, roughly 35% of the population will be 65-years or older—compared to 24% in 2010. From 2010 to 2035, the region loses population in every cohort younger than 65. Of particular interest in the 2010 age profile is the near absence of the children of the baby boomers (the millennials) as a secondary bulge—as you might commonly find in other regions. This is a result of the massive out-migration of people moving into and through their college years and their twenties. Only some of these will to return the Cape and Islands as they approach their thirties and forties and start families of their own.

Figure 3.2j: The age and gender composition of the Cape & Islands population, 2010 (actual) vs. 2035 (forecasted)

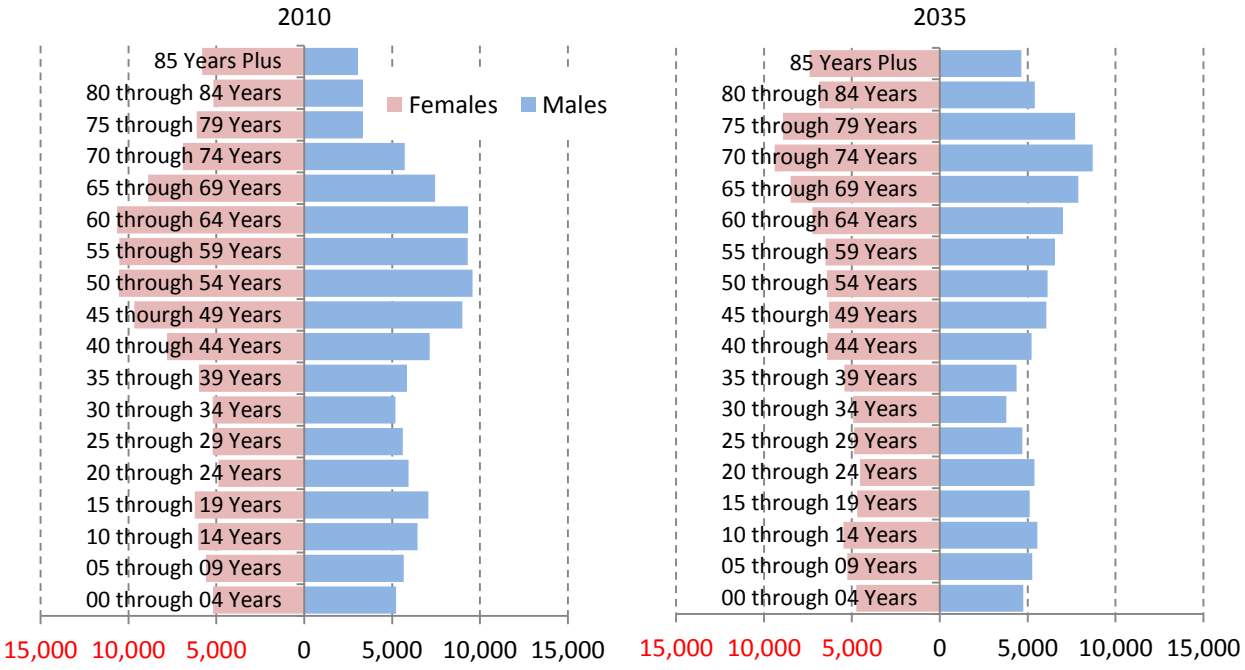
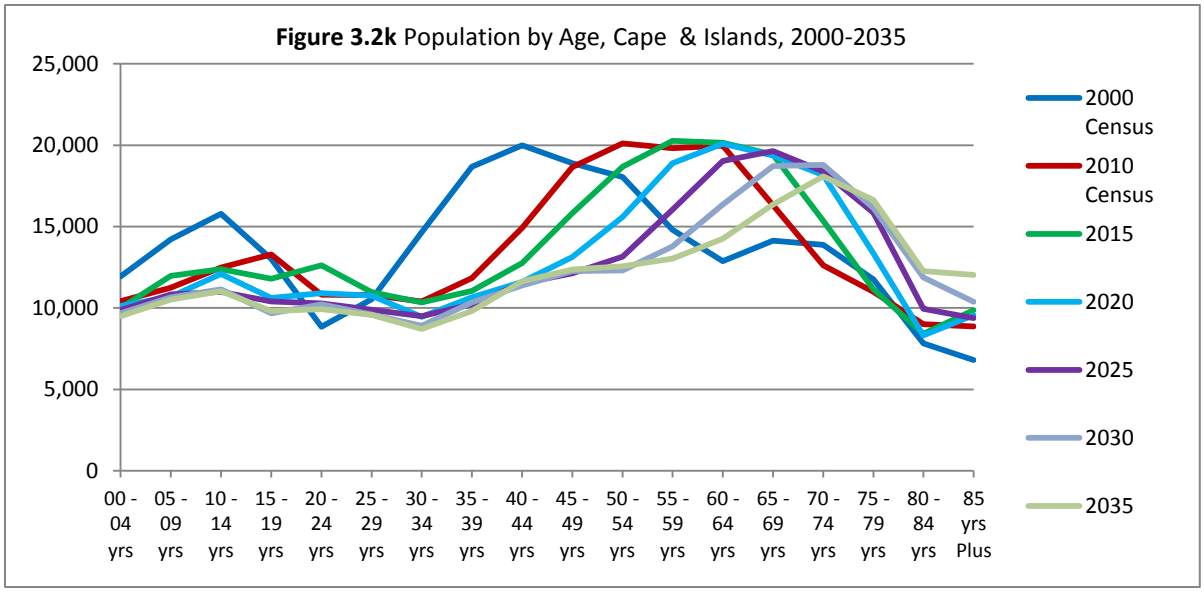


Figure 3.2k below shows the Cape and Islands population by age at 2000, 2010 and then projected at five-year intervals through 2035, demonstrating how the population ages forward through the time-series.

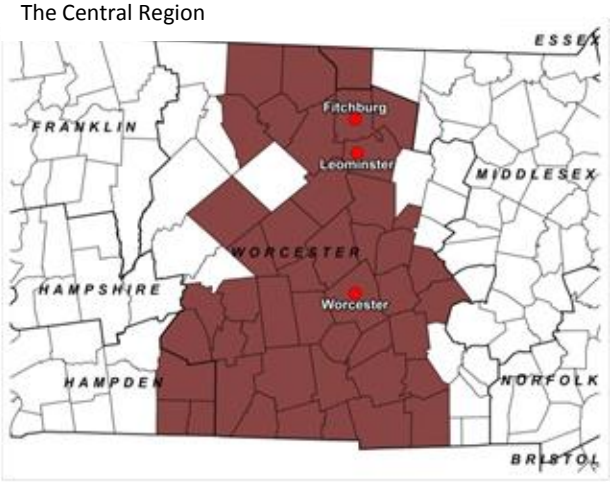


3. Central Region

Summary

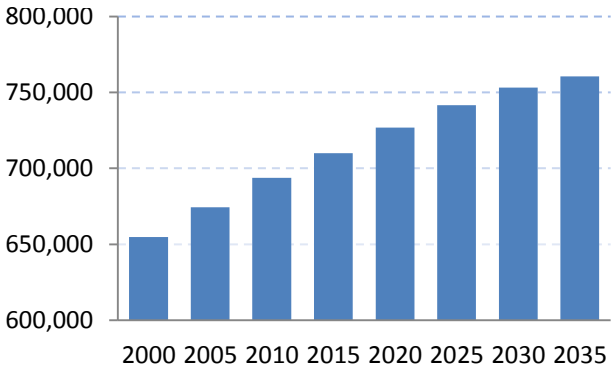
The Central region lies on the western fringe of the 495 Corridor. It includes 46 communities anchored by the city of Worcester, with secondary industrial/population centers, Leominster and Fitchburg, to the north (Figure 3.3a).

Figure 3.3a:
The Central Region



The Central region added just under 40,000 residents during the 2000s (Figure 3.3b), and our projections anticipate continued population growth over the next several decades with the region increasing by another 33,000 people from 2010 to 2020 and another 26,000 from 2020 to 2030. By 2035, we anticipate a population of about 760,506 in the region, as comp

Figure 3.3b: Recent and projected population, Central Region

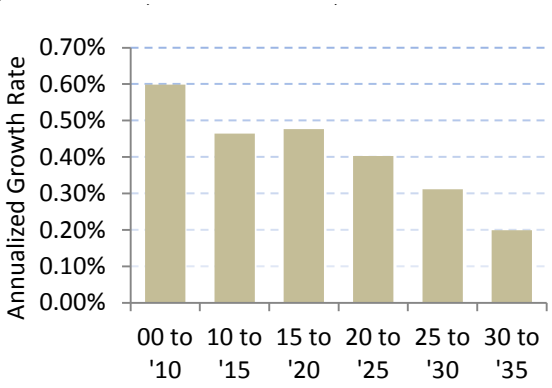


The rate of population growth will slowly diminish as the number of deaths begins to rise with the aging of the regional population over time. Between 2000 and 2010, the Central region experienced a relatively robust annualized population growth rate of 0.6% per year (Figure 3.3c). By the end of our forecast period (2025 to 2030) the annualized rate is expected to slow to 0.2% percent per year.

The Sources of Population Change

The growth of the Central region over the past deca more births than deaths in the region. Between 200 region, compared to 28,966 deaths, resulting in a natural increase of just over 13,000. This reflects the age composition of the region which, as of 2010, has a fairly substantial number of residents in their later twenties and thirties and relatively few elderly residents.

Figure 3.3c: Annualized rates of population change, Central Region



Over the next several decades, however, the gap between births and deaths is expected to narrow, leading to a slowdown in the rate of population growth (Figure 3.3e). The number of deaths is expected to rise with the aging of the population—growing from roughly 29,000 from

2005 to2010 to over 39,000 during the 2020 to2025 period. This coincides with the aging of the resident population, particularly the sizable baby boom generation, which will begin moving into its seventies by 2030. By 2025, deaths already start to outnumber births and start to cut into overall population growth.

Table 3.3 Summary Results: Estimated Components of Population Change, Central Region

	2010-2015	2015-2020	2020-2025	2025-2030	2030-2035
Starting Population	693,813	709,922	726,839	741,487	753,027
Births	41,652	38,503	38,621	38,481	38,227
Deaths	32,382	35,623	39,756	44,585	49,991
Natural Increase	*9,270*	*2,880*	*-1,134*	*-6,104*	*-11,763*
Domestic In-migration, MA & Border	99,545	104,065	104,868	105,706	106,783
Domestic In-migration, Rest of U.S.	34,006	33,820	34,722	35,637	36,583
Domestic Out-migration	142,321	139,241	139,290	139,177	139,598
Net Domestic Migration	*-8,695*	*-1,389*	*298*	*2,177*	*3,797*
Net International Migration	*15,609*	*15,393*	*15,482*	*15,478*	*15,474*
Ending Population	709,922	726,839	741,487	753,027	760,506

Figure 3.3d
Projected levels of domestic in and out-migration, Central Region, 2010-2035

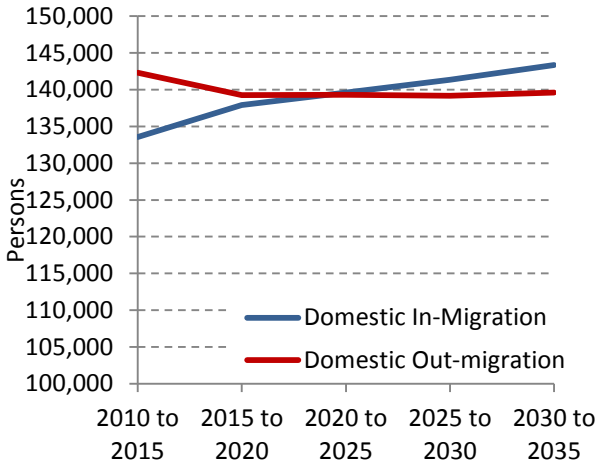
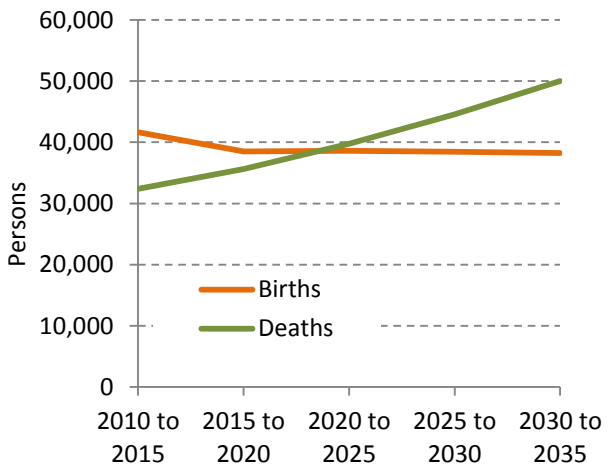
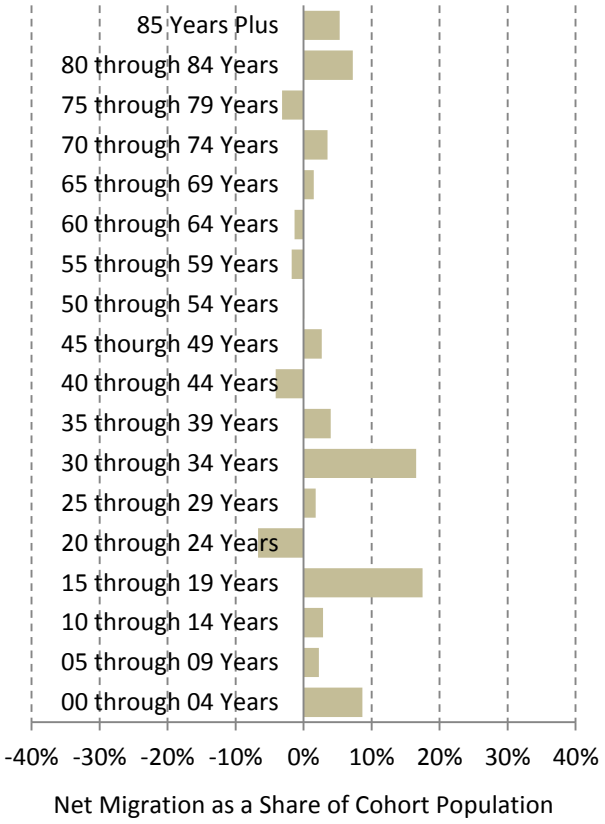


Figure 3.3e
Projected levels of births and deaths, Central Region, 2010-2035



On the positive side, ACS migration data from 2007 to 2011 suggests that the region tends to attract, on net, persons in their later twenties and thirties (Figure 3.3f). These cohorts bring their children with them and also contribute to the number of births in the region. Future projections assume that the region will continue to attract a steady stream of these young families. Accordingly, the number of births is expected to hold fairly steady over the next twenty-five years, hovering around 38,000 for each of the five-year increments from 2020 through 2035.

Figure 3.3f
Age profile of net domestic migrants,
2007-2011 American Community Survey



Home to several large colleges and universities, the Central region is also a net importer of persons in the 15- 19 age group although many in this cohort leave the region following graduation, as suggested by net negative out-migration among those in their early twenties. The region also appears to be a relatively attractive destination for some of the elderly cohorts.

As the millennial population moves into its thirties and more in-migrant baby boomers moving into their seventies and eighties, our model predicts that in-migration will increase into the region, contributing increasingly to population gain through the time series. By the 2030 to 2035 period, the number of domestic in-migrants will exceed the number of domestic out-migrants by almost 3,800 persons, while international immigrants continue to contribute to population gain in the region (Table 3.3).

Age Profile

As with other regions around the state, the Central region of the future will be home to many more elders, as the baby boomers age into the older age brackets. By 2035, 23% of the region's population will be aged 65-or older compared to just 13% in 2010. However, compared to many other regions around the state, the Central region is expected to show a relatively evenly distributed age profile, meaning that while the number of elders increases, younger adults and children are also well represented in the area (Figure 3.3g).

Figure 3.3g: The age and gender composition of the Central Region population, 2010 (actual) vs. 2035 (forecasted)

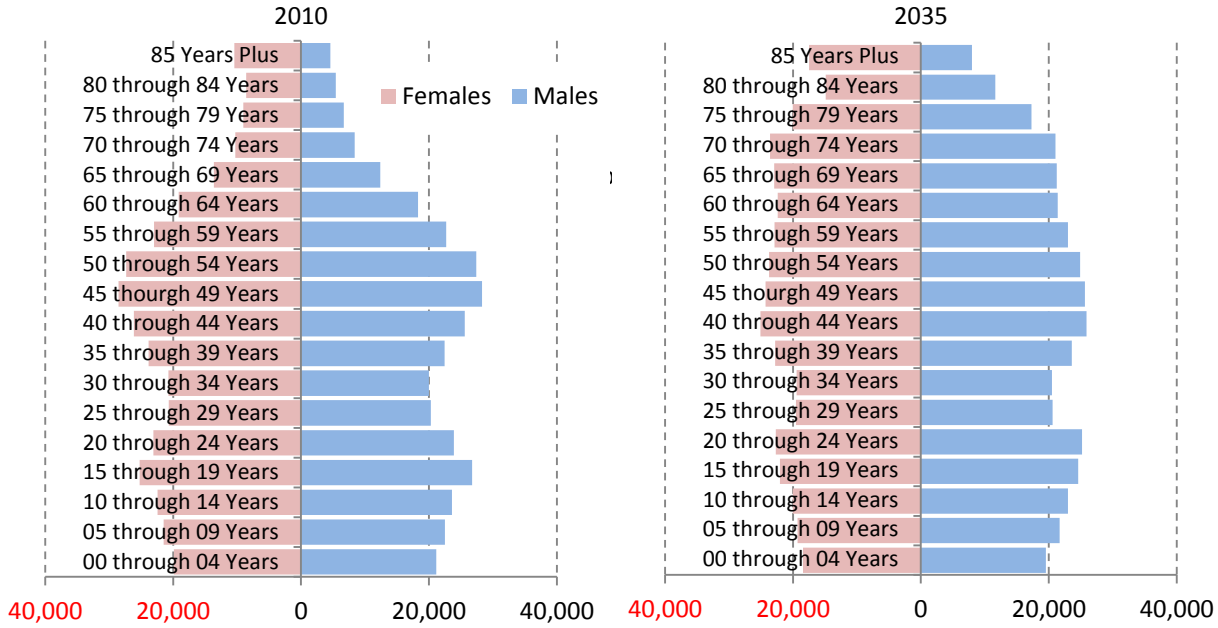
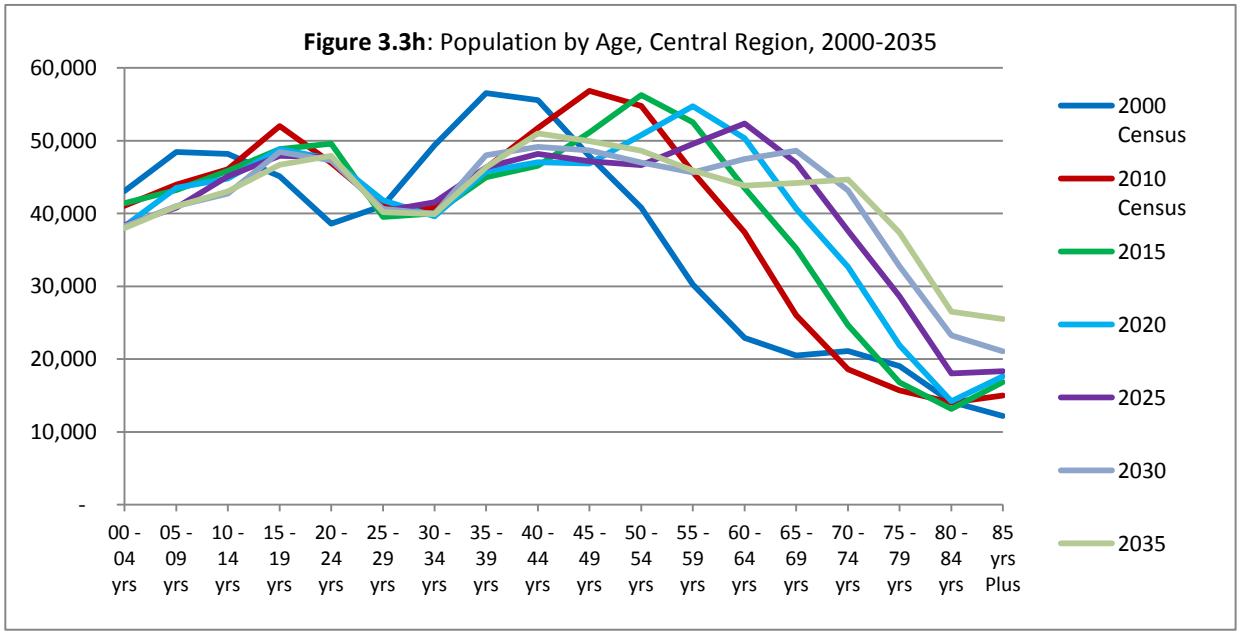


Figure 3.3h below shows the Central region population by age at 2000, 2010 and then projected at five-year intervals through 2035, demonstrating how the population ages forward through the time-series. Because it is a college region, the number of 15-19 and 20-24 year olds is more or less maintained as other population peaks age forward over time.



4. Greater Boston Region

Summary

The Greater Boston region is the major employment and population center of the Commonwealth of Massachusetts. It covers the entirety of Suffolk County, and extends into portions of Middlesex, Norfolk, and Essex counties. There are 36 municipalities in the Greater Boston region, including the cities of Boston, Cambridge, Quincy and Newton (Figure 3.4a).

Our long-term projections predict strong growth in the Greater Boston population over the next 25 years, increasing by roughly 100,000 residents every five years through 2025, 75,000 from 2025 to 2030, and 57,000 from 2030 to 2035 (Figure 3.4b). We project growth during the 2010 to2015 period to be particularly strong, as we align our model with the level of growth estimated by the U.S. Census Bureau for the state through 2014.[15] The Bureau estimates that the Greater Boston region has been growing by about 20,000 persons per year since the 2010 Census,[16] and our model assumes that this level of growth is sustained through 2020 and beyond. By 2035, the region is expected to have a population of 2,418,770; this is 443,615 more than the 1,975,155 counted in Census 2010.

The Sources of Population Change

Population change in the Greater Boston region is driven by natural increase—the number of births over deaths—and

Figure 3.4a
The Greater Boston Region

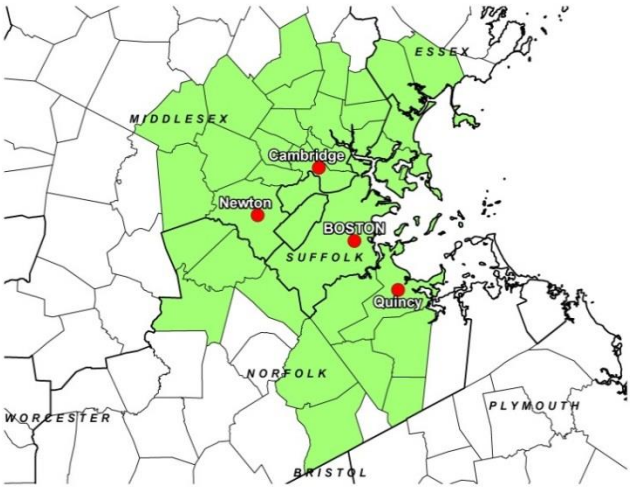


Figure 3.4b
Projected Population, Greater Boston

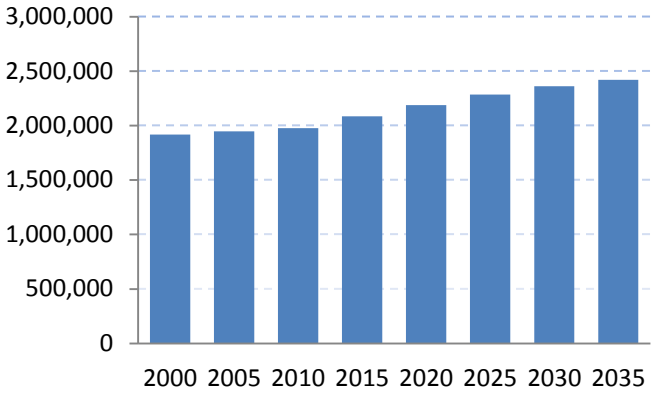
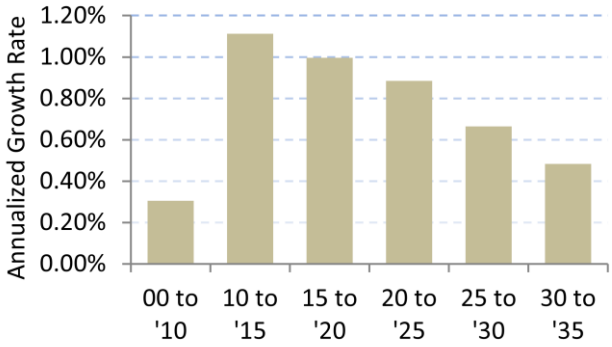


Figure 3.4c
Annualized rates of population change, Greater Boston



[15] See Methods section of this report for details on how 2015 population for each region is aligned to U.S. Census Bureau population estimates through 2013 and 2014.
[16] Source: Sub-EST 2013: Subcounty Resident Population Estimates April 1, 2010 to July 1, 2013. U.S. Census Bureau, Population Division. May 2014.

international immigration (Table 3.4). While the region tends to lose more by out-migration than it gains by domestic in-migration, a steady stream of international immigrants more than off-sets the loss. The relatively young population of the region, including international immigrants who tend to be younger than the state on average, ensures a steady level of births over the 2010 to 2035 time period. As seen in other regions of the state, the number of deaths increases over time as a large percentage of the population ages into the elderly cohorts. In the Greater Boston region this reduces the level of natural increase over time. However, the steady number of births continues to counter this loss, and overall we continue to see positive natural increase in the region all the way through 2035.

Table 3.4
Summary Results: Estimated Components of Population Change, Greater Boston

	2010-2015	2015-2020	2020-2025	2025-2030	2030-2035
Starting Population	1,975,155	2,085,048	2,188,890	2,285,779	2,361,771
Births	124,292	124,144	126,140	126,269	125,902
Deaths	79,063	86,933	94,904	104,605	116,069
Natural Increase	*45,229*	*37,210*	*31,236*	*21,664*	*9,833*
Domestic In-migration, MA & Border	294,330	302,018	303,394	303,350	305,272
Domestic In-migration, Rest of U.S.	215,430	217,512	222,119	225,951	229,345
Domestic Out-migration	555,938	561,694	568,820	584,110	596,612
Net Domestic Migration	*-45,013*	*-42,285*	*-43,460*	*-54,651*	*-61,666*
Net International Migration	*110,842*	*108,796*	*108,959*	*109,137*	*109,161*
Ending Population	2,085,048	2,188,890	2,285,779	2,361,771	2,418,770

Figure 3.4d
Projected levels of domestic in and out-migration, Greater Boston, 2010-2035

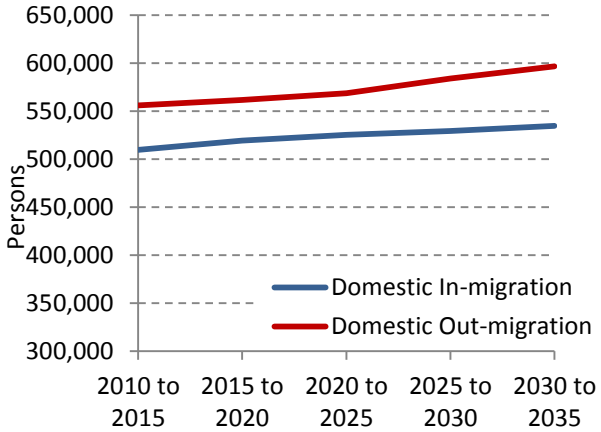
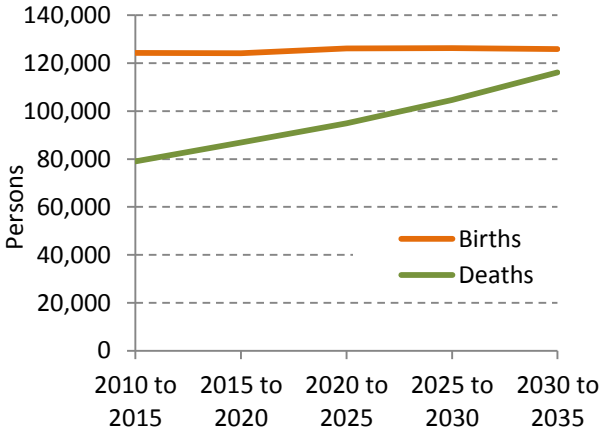
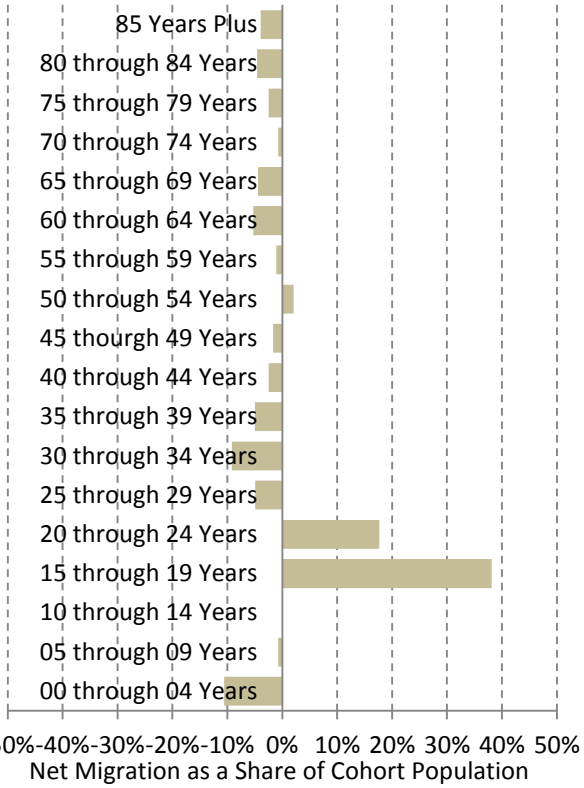


Figure 3.4e
Projected levels of births and deaths, Greater Boston, 2010-2035



Domestic migration patterns in the Boston region are highly age-specific, driven by the massive in-migration of young adults followed by steady out-migration of residents as they age and taking their children with them. Figure 3.4f shows the migration-by-age patterns observed in the American Community Survey 2007 to 2011 dataset for the region. People come to Boston in their late teens and early twenties for education, economic opportunities, or the cultural amenities of urban life. There is no mass exodus immediately after graduation, but rather a steady outflow through the upper age-cohorts. A good number of young adults stay through their twenties (thus contributing to a steady number of births), but as they age into their thirties they are increasingly more likely to move out of the region. The rates of net out-migration are particularly high among those in their thirties and early forties (young families) as well as among those nearing or in retirement age.

Figure 3.4f: Age profile of net domestic migrants, Greater Boston, 2007-2011 American Community Survey



The Boston region is also more of a national (and international) draw compared to other areas of the state. While the majority (58%) of in-migrants do come from Massachusetts or neighboring states, in most other regions this "local" share typically represents between 65 to 75 percent of all domestic migrants. For this reason, the effect of migration on the region's population change depends on generational shifts in the age profile of the U.S. as a whole to a much larger extent than do the other Massachusetts regions. International migration is also a major factor in understanding population change in the Greater Boston region. Using data from the 2007-2011 American Community Survey, we estimate that immigration contributes over 150,000 new area residents every five years. While approximately one-third of these represent college students who leave the country when their studies conclude, over 100,000 new immigrants per five-year period are expected to remain in the region.

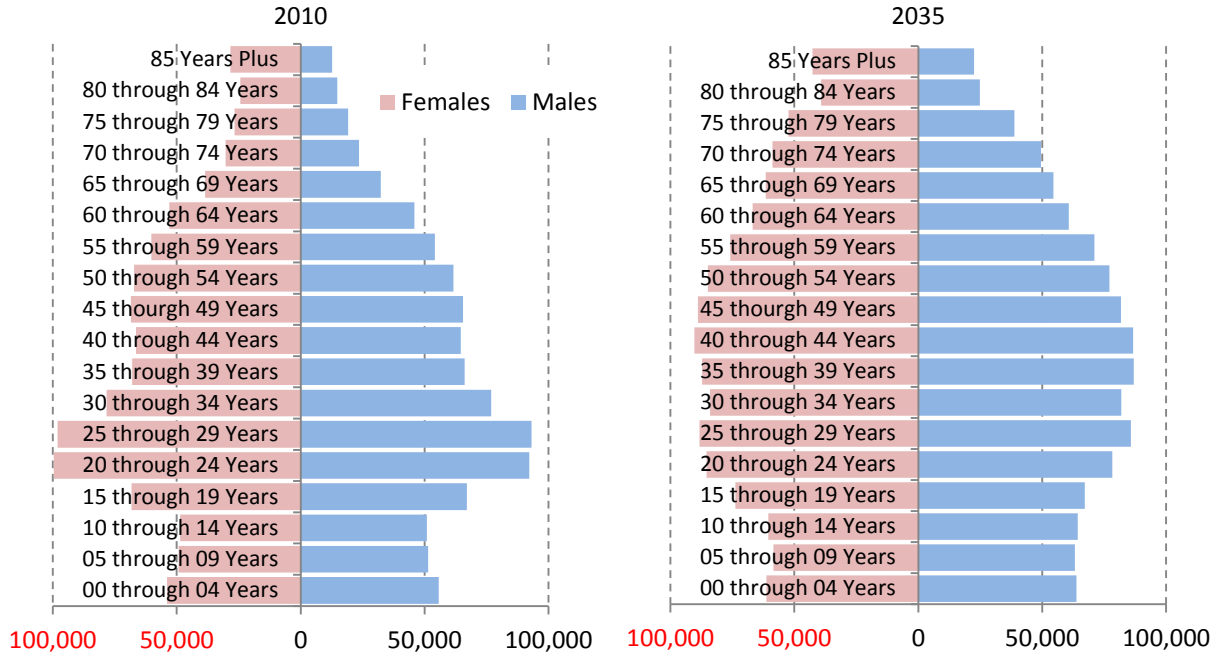
Population growth will be fastest in the next few years as the swell of millennials (the children of the baby boom generation) ages through their twenties. Because the region tends to lose residents to out-migration as they move through the family-building and retirement phases of life, we expect population growth to slow in the 2020s as the millennials age into their thirties and early forties and more baby boomers enter their sixties and seventies. However, the region's population will continue to grow during this time as international immigration and a steady number of births will

more than offset population loss associated with domestic out-migration and the gradual rise in the number of resident deaths.

Age Profile

Due to its rather unique age-specific migration patterns, the Greater Boston region is exceptionally young relative to other regions in Massachusetts. Greater Boston lacks the typical hourglass shape of the national age profile with the sizable baby boom generation (people in their fifties and early sixties as of the 2010 census) barely showing as a bubble in the region's age profile (Figure 3.4g). Instead, Greater Boston has a rather unimodal age distribution peaking among residents in their early twenties and declining in a near linear fashion thereafter.

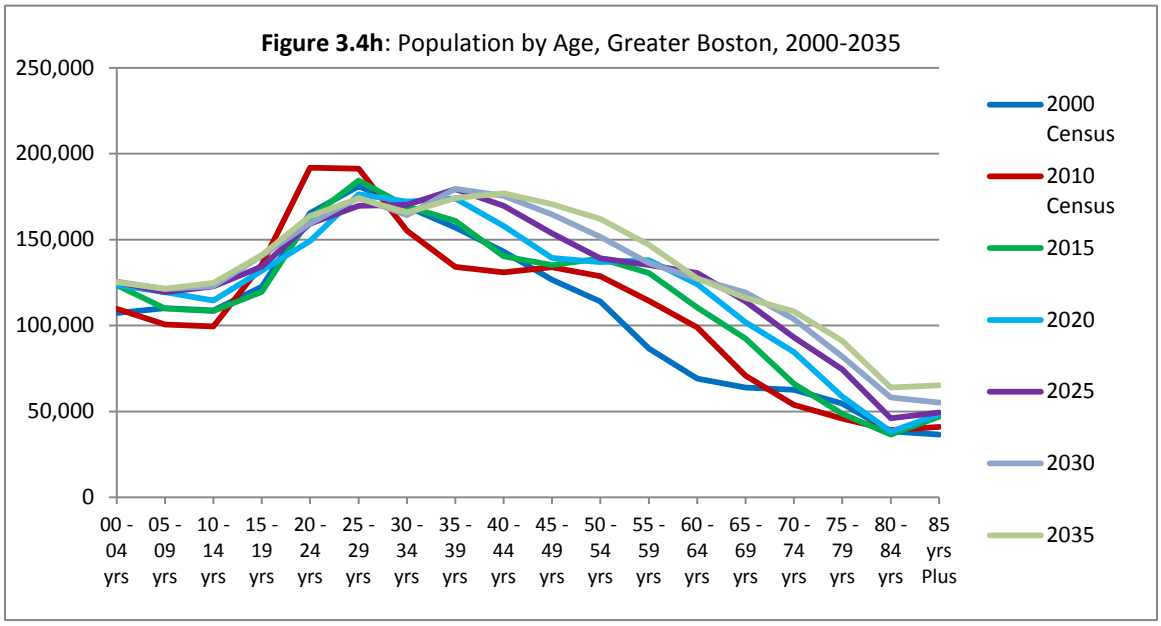
Figure 3.4g
The age and gender composition of the Greater Boston region, 2010 (actual) vs. 2035 (forecasted)



Greater Boston's population distribution remains fairly steady within age cohorts over time. Whereas changes in the profile of most regions are dominated by the aging in place, in Greater Boston education and opportunity draw a consistent number of young adults. Many leave as they age, only to be replaced by a new cohort of young coming in. While this makes Boston's demographic profile rather unique among New England regions, it does not divorce them from the influence of broader national demographic trends, such as the aging of the baby boomers and their children. As the millenials pass through their twenties into their thirties, we expect a slight upward shift in the overall age distribution of the Greater Boston Region (Figure 3.4g). Over the near term there will be relatively more infants and pre-schoolers under the age of five, growing from 5.6% of the population in 2010 to 5.9% percent in 2015 before returning to 2010 levels again in 2020. There will also be a relatively higher share of elders aged 65 and over, coinciding with the aging in

place of the baby boomer generation, increasing from 12.7% of the population in 2010 to 18.4% in 2035. While this does represent a significant increase, it is not nearly as pronounced as in other regions of the state where the 65-and-over population of 2035 will range from 23% in younger regions like Central to 35% in older regions such as the Cape and Islands region. The relative increase in the elderly cohorts will be countered by a slight loss in the younger adult cohorts, aged 15-34, however, these losses as percentages are very small. Other cohorts are represented at roughly the same distribution in 2035 as they were in 2010 in terms of their percent of the total population.

Figure 3.4h below shows the Greater Boston region population by age at 2000, 2010 and then projected at five-year intervals through 2035, demonstrating how the population ages forward through the time-series. Because it is a college region that includes large numbers of older graduate students, Boston's number of 20-29 year olds is more or less maintained as other population groups age forward over time.



5. Lower Pioneer Valley Region

Summary

The Lower Pioneer Valley region is located in the west-central portion of the Commonwealth. It follows the Interstate 91 corridor from the Connecticut state line, northward through Hampden and Hampshire County, terminating in the lower portion of Franklin County. The region includes 29 municipalities, with primary employment and population centers in Springfield, Chicopee and Holyoke (Figure 3.5a).

The Lower Pioneer Valley experienced slow growth in population over the last decade, increasing by 12,372 over the ten year period, from 591,932 to 604,304 persons (Figure 3.5b). Our model anticipates that this growth will continue at a slightly increased level through 2030, with the region adding about 8,000 to 9,000 in each five-year period before falling off to about 5,000 in the 2030 to2035 period. During the 2000s, the annualized population growth rate was 0.21%. This rate will increase through 2025 to as much as to 0.31%, and then start to decline again. Our model predicts that by 2035 the region will be home to 644,975 residents, about 32,000 more than counted in the 2010 Census.

The Sources of Population Change

Population gain in the 2000 to2010 period was due primarily to natural increase—the number of births exceeding the number of deaths in the region. Natural increase is expected to contribute to population gain in the region through 2020, though at diminishing levels, after which an increase in the number of deaths in the regions will overtake births, leading to net natural

Figure 3.5a
The Lower Pioneer Valley Region

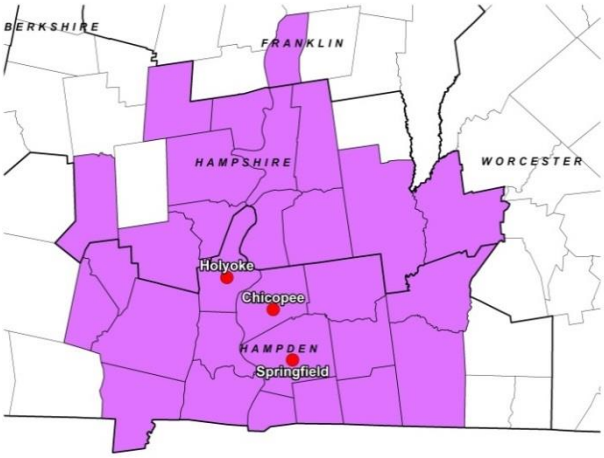


Figure 3.5b
Projected Population, Lower Pioneer Valley

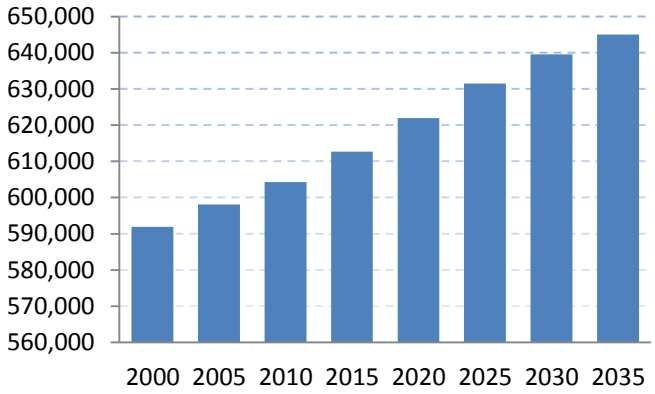
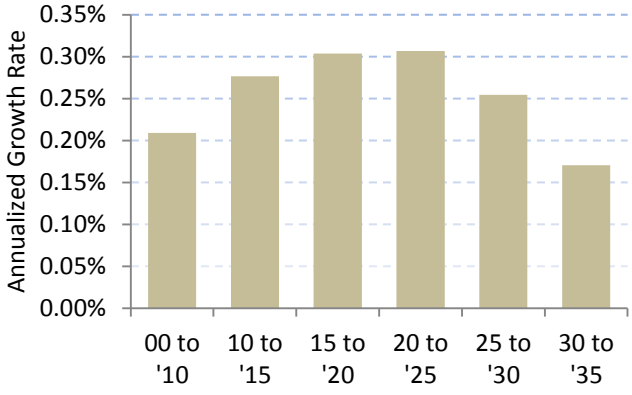


Figure 3.5c
Annualized rates of population change, Lower Pioneer Valley



decrease (Table 3.5, Figure 3.5e). On the positive side, net negative migration in the region will eventually reverse to net positive migration by the end of the time series with the number of out-migrants gradually decreasing as the number of in-migrants gradually increases over the course of the time series (Figure 3.5e).

Table 3.5
Summary Results: Estimated Components of Population Change, Lower Pioneer Valley

	2010-2015	2015-2020	2020-2025	2025-2030	2030-2035
Starting Population	604,304	612,664	621,962	631,497	639,525
Births	35,017	32,173	32,257	32,214	32,166
Deaths	29,742	31,413	33,666	36,923	40,939
Natural Increase	*5,275*	*759*	*-1,408*	*-4,709*	*-8,773*
Domestic In-migration, MA & Border	76,438	77,815	78,094	78,698	79,684
Domestic In-migration, Rest of U.S.	46,427	47,396	48,310	49,261	50,250
Domestic Out-migration	133,338	129,906	128,771	128,538	129,047
Net Domestic Migration	*-10,328*	*-4,782*	*-2,364*	*-554*	*949*
Net International Migration	*13,558*	*13,234*	*13,311*	*13,316*	*13,336*
Ending Population	612,664	621,962	631,497	639,525	644,975

Figure 3.5d
Projected levels of domestic in and out-migration, Lower Pioneer Valley, 2010-2035

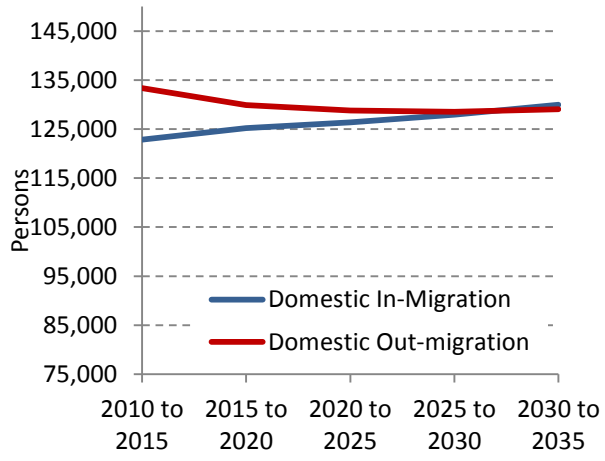
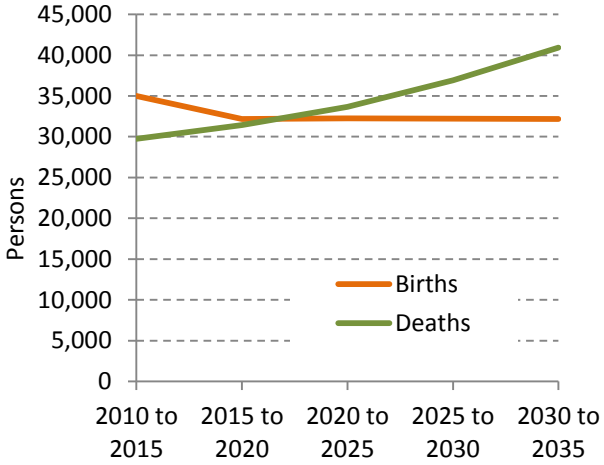


Figure 3.5e
Projected levels of births and deaths, Lower Pioneer Valley, 2010-2035



Period to period changes in each of the components are small, but together they add up to a change in relative direction. This change over time relates to the changing age structure of the region and the greater U.S. While we assume that migration-by-age rates calculated from recent ACS data will persist into the future, the migrant "pools" will vary over time as these populations age. Contributing to this dynamic is the sizable student population in the region which results in a higher portion of domestic in-migrants coming from outside the Northeast. Between 2005 and 2010, 36% of all domestic in-migrants came from outside of Massachusetts and its neighboring states. Although a minority, this share is among the lowest of all regions in the state. Thus, the future size of the region is heavily influenced not only by regional demographic trends, but also national and international ones.

Domestic migration in the Pioneer Valley is heavily concentrated among college age students. According to ACS 2007-2011 data, 15-19 year olds account for 86% of all domestic in-migrants, and these recent in-migrants represent over 40% of the resident cohort population (Figure 3.5f). However, a large number also leave the region after completing their studies, with 25-29 year olds comprising 32% of all domestic out-migrants and 58% of all domestic out-migrants falling into the 25-39 age cohorts. Looking at the non-college population only, including those that graduated college and moved out of the region, the 20-24 age group dominates the out-migrant pool, comprising 50% of all domestic out-migrants for that group. Out-migrants accounted for 30% of the region's total population of 20-24 year olds (Figure 3.5g).

In the 2010 to 2015 period, the millennials are

Figure 3.5f: Age profile of net domestic migrants, Lower Pioneer Valley, 2007-2011 American Community Survey

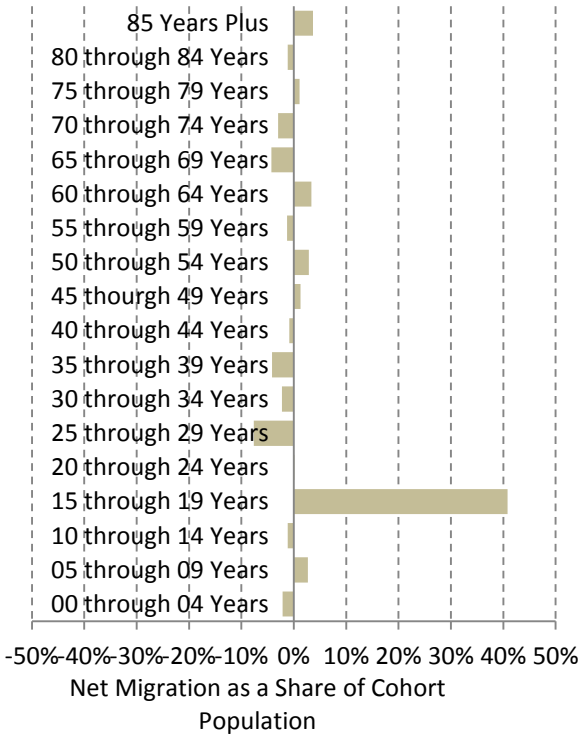
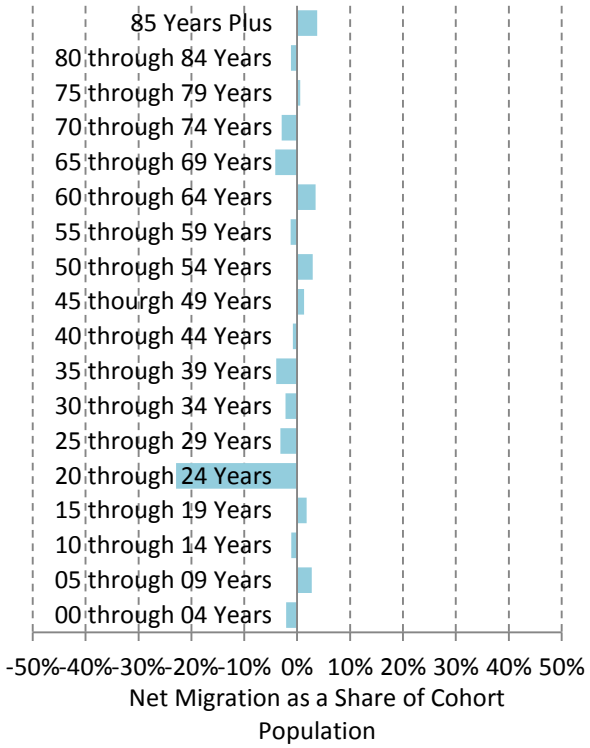


Figure 3.5g: Age profile of net domestic migrants in the **NON-COLLEGE** population, Lower Pionner Valley, 2007-2011 American Community Survey



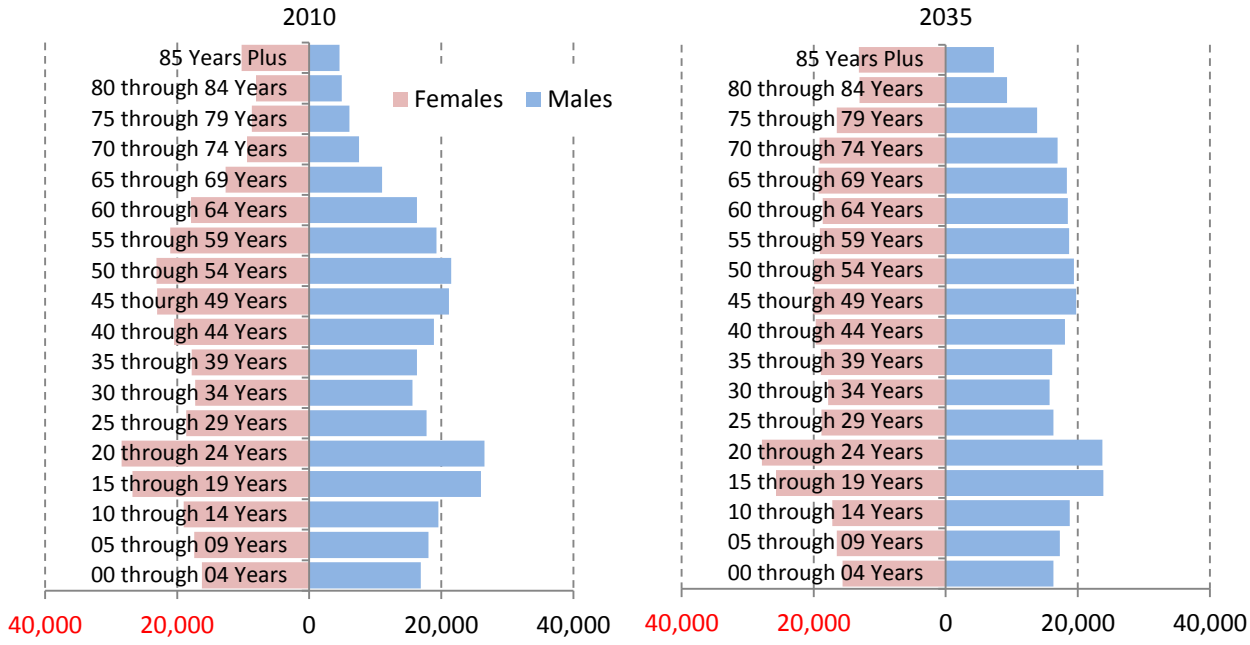
aging up out of the 15-24 and into the 20-29 age cohorts, and so we expect that out-migration in this period will be fairly high. As the group later ages through and out of the groups most prone to out-migration, the number of people leaving the region may be expected to diminish. For age groups over the age of 39, migration tends to change direction fairly frequently from one cohort to the next; making it difficult to identify other largely influential age-related migration patterns aside from those of the college and post-college cohorts.

Even though anticipated decreasing out-migration in the region supports population growth throughout the 2010 to 2035 time-series, the level of growth diminishes after 2025. While births remain nearly level from 2015 forward, an increasing number of deaths in the region due to an aging population—both in the region and statewide—will start to erode population gains. After 2020 the number of deaths is expected to overtake births, and by 2025 the region will experience a population loss of about 1,400 due to natural decline (Figure 3.5e).

Age Profile

Figure 3.5h below shows the age profile of the region in 2010 and projected to 2035, where a much larger proportion of the population reaches the elderly age-groups. In 2010, 14% of the region's population was aged 65 and over and by 2035 that percentage is expected to grow to 23%.

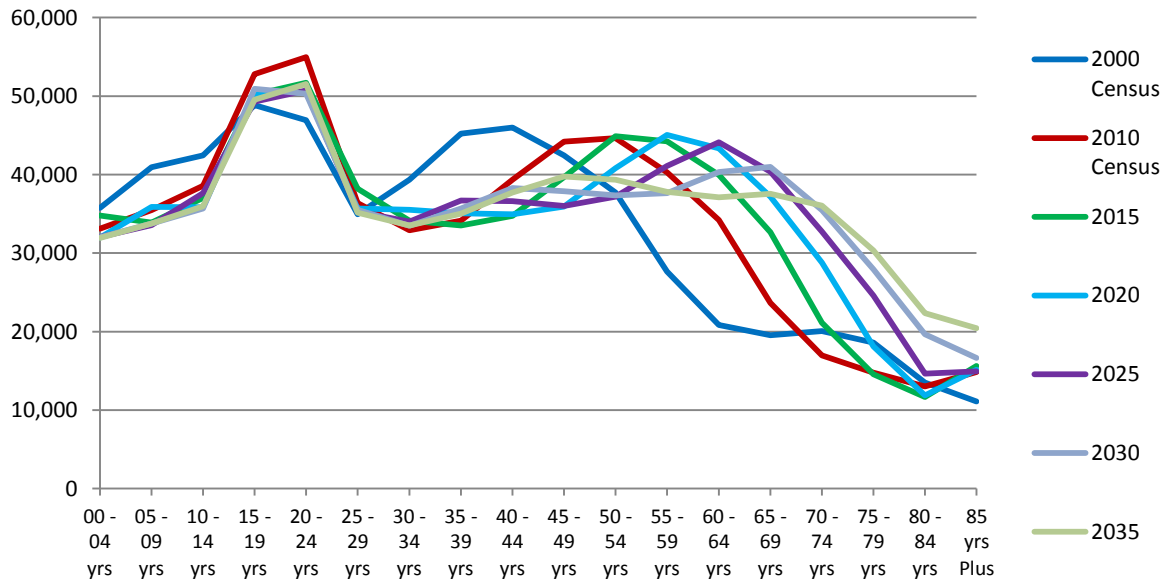
Figure 3.5h
The age and gender composition of the Lower Pioneer Valley, 2010 (actual) vs. 2035 (forecasted)



The dominance of the college population in the region is also apparent in the overall age distribution of the population. In most regions, the population age distribution is dominated by the baby boom generation (roughly 45-64 years old in 2010). This is not true for the Lower Pioneer Valley. Although there are still many boomers, they are eclipsed by an even larger concentration of

15-24-year olds. While some of these will be children of resident baby boomers, most are students from other regions. Also, unlike other age cohorts that tend to stay in place and progress into older cohorts with the passage of time, the size of the post-college age population in the Lower Pioneer Valley remains fairly constant over time; persons aged 25-39 represented 17% of the population in 2010 and are expected to comprise 16% of the population in 2035, at just over 103,000 persons in both 2010 and 2035. Likewise, the population aged 15-19 hovers around 50,000 for the entire time series, and the population aged 20-24 remains in the 50,000 to 54,000 range even when the millennials largely pass out of those age groups after 2010. Figure 3.5i below shows the Lower Pioneer Valley region population by age at 2000, 2010 and then projected at five-year intervals through 2035, demonstrating how the population ages forward through the time-series.

Figure 3.5i: Population by Age, Lower Pioneer Valley, 2000-2035



6. MetroWest Region

Summary

The MetroWest region lies at the western fringe of the Boston metro area, occupying much of the area between the outer and inner loop highways (Interstates 495 and 95/Route 128, respectively). There are 45 communities in the MetroWest region, including its most heavy populated centers of Framingham, Marlborough, and Natick (Figure 3.6a).

The steady growth of the MetroWest region over the past decade is expected to continue into the foreseeable future, at increased levels through 2015, and more moderately through 2035 (Figures 3.6b and 3.6c). The MetroWest region added nearly 30,000 residents between 2000 and 2010, for an annualized growth rate of just below 0.5% per year. By 2015, the region is expected to increase by approximately 36,000, or 1.1% per year, according to our model, which aligns the 2015 region population to U.S. Census Bureau estimates through 2014.[17] According to these Census estimates, the MetroWest region grew by about 1% per year from July 1, 2010 to July 1, 2013, increasing by 19,542 in the three-year period, or 6,514 residents per year. Our model extends this level of annual growth out to 2015, adding a total of 35,901 persons over the five-year period.

After 2015, growth is expected to slow again to between 0.25% and 0.35% annualized, increasing by an average of 11,000 persons per five-year period through 2035. By 2035, the region will have grown by 79,749 persons over the Census 2010 count of 655,126 to a new total of 734,875 persons.

Figure 3.6a
The MetroWest Region

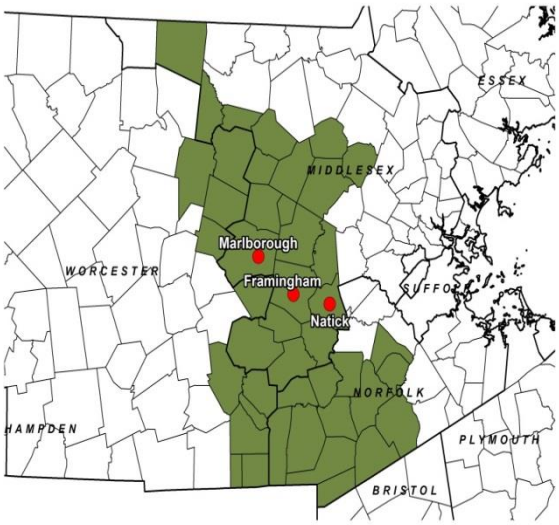


Figure 3.6b
Projected Population, MetroWest

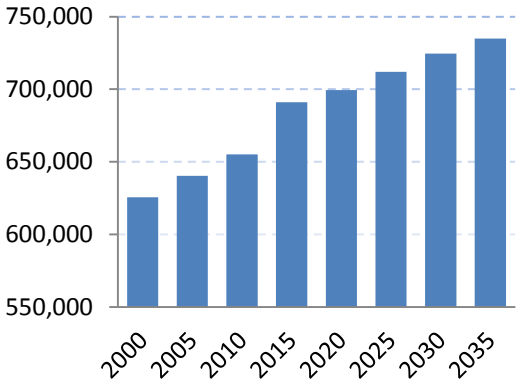
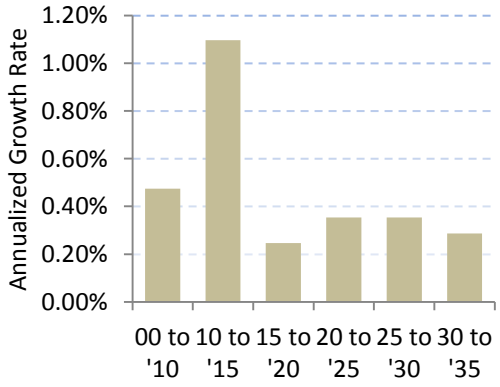


Figure 3.6c
Annualized rates of population change, MetroWest

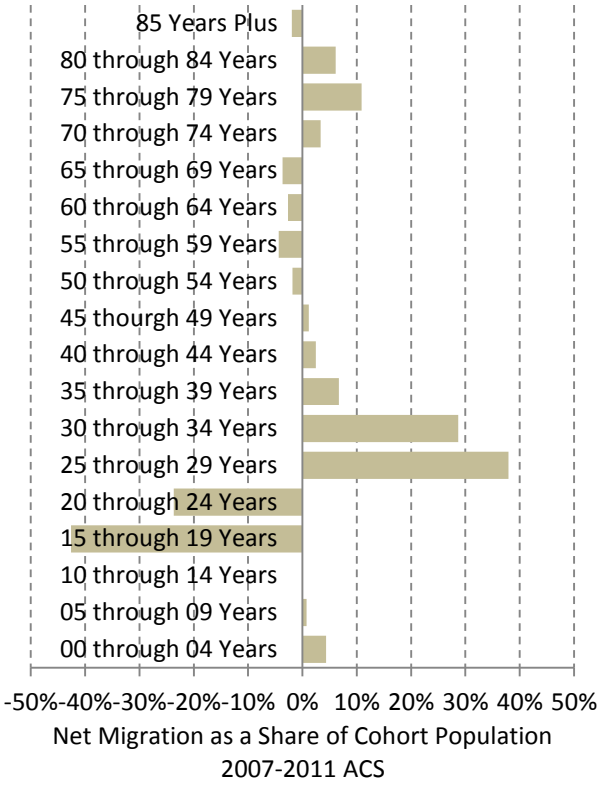


[17] See Methods section of this report for details on how 2015 population for each region is aligned to U.S. Census Bureau population estimates through 2013 and 2014.

The Sources of Population Change

Figure 3.6d
Age profile of net domestic migrants, MetroWest, 2007-2011 American Community Survey

The continuing growth of the MetroWest region will be the result of a combination of factors: increasing domestic in-migration coupled with slight decline in domestic out-migration from 2015 forward; continued positive net international immigration; and a slight increase in new births in the near term—with steady levels continuing throughout the period. This growth will be partly offset by a steady rise in the number of deaths, coinciding with the region's aging population.



MetroWest is a dynamic region with a significant flow of migrants moving in and out. As shown in Figure 3.6d, net domestic out-migration is heavily concentrated among college-age youth and young adults in their early twenties. However, the region gains many new residents in their later twenties and thirties, the age at which many settle into a home and start a family. The vast majority (77%) of these in-migrants come from elsewhere in Massachusetts or from neighboring states.

Because the MetroWest region has a history of attracting residents in their late twenties and thirties, the aging of the millennial generation will lead to a steady increase in domestic in-migration, helping to narrow the gap between domestic in-migration and domestic out-migration (Figure 3.6e). However, the region is still expected to lose more domestic migrants than it gains between 2015 and 2035. Most of this out-migration will be among college students and retiring baby boomers, although there will be far fewer residents approaching college age (15-19 years old) in the next two decades than in the recent past. We also expect international migration to remain positive during this time, which will more than offset any losses from domestic out-migration.

Figure 3.6e
Projected levels of domestic in and out-migration, MetroWest, 2010-2035

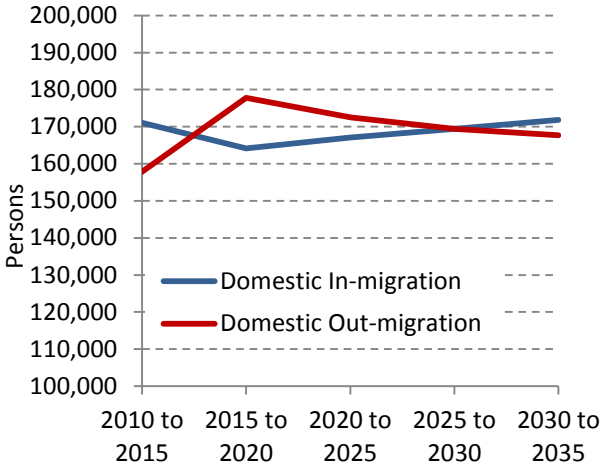
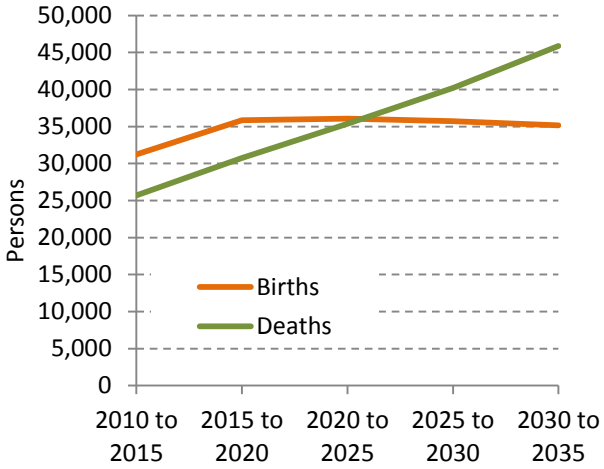


Figure 3.6f
Projected levels of births and deaths, MetroWest, 2010-2035



In-migration in the region during 2010 to 2015 is increased in our model to catch up to 2014 Census Bureau estimates[18] before returning to historic 2005 to 2011 rates-by-age for the 2015 to 2020 period and beyond. Out-migration peaks in the 2015 to 2020 period, most of this driven by large number of persons in their late teens and early twenties leaving the region. The 15-19 year old population is peaking in in 2010 and 2015, while the 20-24 and 25-29 year old groups in the region peak in 2015. This means that the pool of persons in the groups most prone to out-migration is at a maximized level and thus the number of out-migrants increases.

The age groups contributing the largest number of domestic in-migrants, persons in their late twenties and early thirties, have the largest effect on in-migration levels during the 2015 to 2035 time period. The number of in-migrants from the largest contributing age group, the 25-29 year olds, peaks in the 2020 to 2025 period, corresponding to the swell of millennials passing through this cohort starting around 2015. Many of the older cohorts also contribute to modest increases in the number of in-migrants as the region moves towards 2035, so that net domestic migration gradually increases to a positive over the 2015 to 2035 period. By the 2030 to 2035 period, there will be an estimated 4,088 more people coming into the region than leaving it.

The numbers of births and deaths largely follow changes in the age composition of the population, with a considerably larger share of the population moving through their twenties and thirties and relatively few elderly residents (see Figure 3.6g). While large numbers of in-migrants in their late twenties enter the area after 2015, and the 30-34 age cohort peaks from 2015 through 2025, the number of births in the region also increases after 2015 and remains strong throughout the 2015 to 2035 time period (Figure 3.6g). However, an aging population at the top end of the distribution suggests that the number of deaths in the region also increases after 2015 and at a stronger pace. The number of deaths increases as the population ages, particularly so when residents age into

[18] See Methods section of this report for details on how 2015 population for each region is aligned to U.S. Census Bureau population estimates through 2013 and 2014.

cohorts of 70 years and older when mortality rates begin to show a marked increase. The baby boom population will only begin to move into these higher-mortality cohorts by 2030. Over time, the number of deaths starts to catch up to and then exceed the number of births, slowing population growth in the region. By 2035, the region is expected to experience 10,734 more deaths than births (Table 3.6).

Table 3.6
Summary Results: Estimated Components of Population Change, MetroWest

	2010 -2015	2015-2020	2020-2025	2025-2030	2030-2035
Starting Population	655,126	691,027	699,520	711,909	724,504
Births	31,231	35,854	36,077	35,703	35,158
Deaths	25,674	30,753	35,385	40,202	45,892
Natural Increase	*5,557*	*5,101*	*692*	*-4,499*	*-10,734*
Domestic In-migration, MA & Border	132,324	126,483	128,041	129,127	130,502
Domestic In-migration, Rest of U.S.	38,735	37,683	39,078	40,314	41,305
Domestic Out-migration	157,848	177,788	172,483	169,386	167,719
Net Domestic Migration	*13,210*	*-13,622*	*-5,363*	*54*	*4,088*
Net International Migration	*17,133*	*17,014*	*17,060*	*17,039*	*17,016*
Ending Population	691,027	699,520	711,909	724,504	734,875

Age Profile

Overall, the MetroWest region of the future will be older than it is today, with a notable increase in elderly residents (Figure 3.6g). By 2035, the population aged 65 and over will have doubled its share of the regional total, comprising 26% of the region's population compared to just 13% in 2010. At the same time, however, the population profile will also become more evenly distributed among retirees, middle-aged households, and young families with school-aged children. The massive concentration of the baby boomer generation found in 2010 is far less evident in 2035. This is, in part, because MetroWest residents are somewhat prone to leaving the region as they approach retirement, diminishing the impact of the age progression of the baby boom generation within the region. MetroWest also tends to gain residents in their thirties and forties through migration, resulting in a more even distribution in the middle-aged cohorts than found in other regions.

Figure 3.6g
The age and gender composition of the MetroWest region, 2010 (actual) vs. 2035 (forecasted)

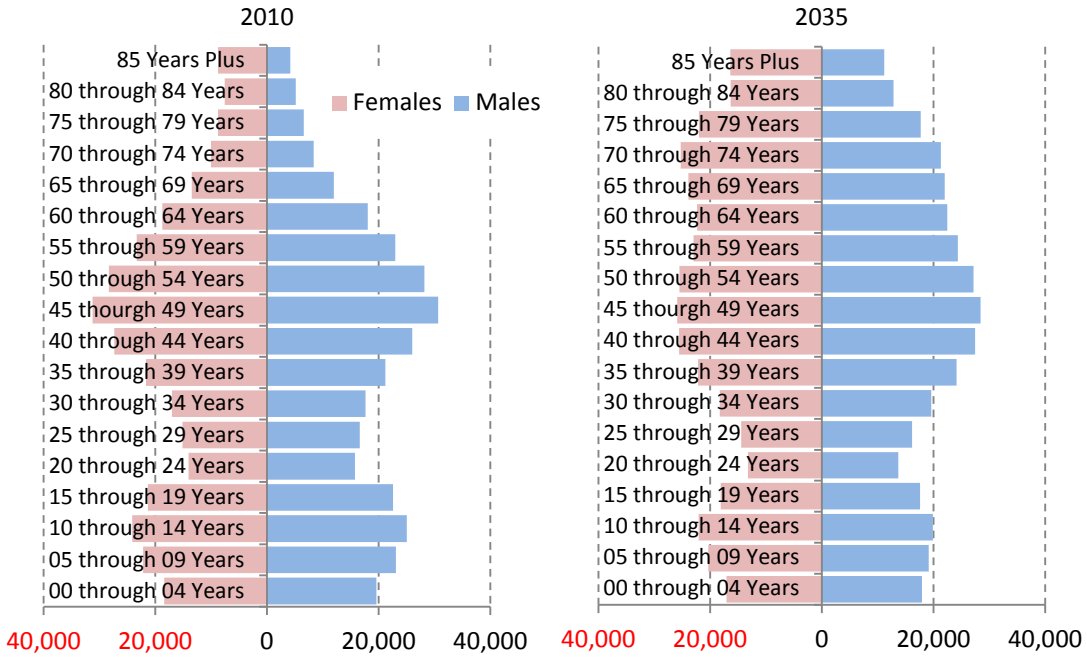
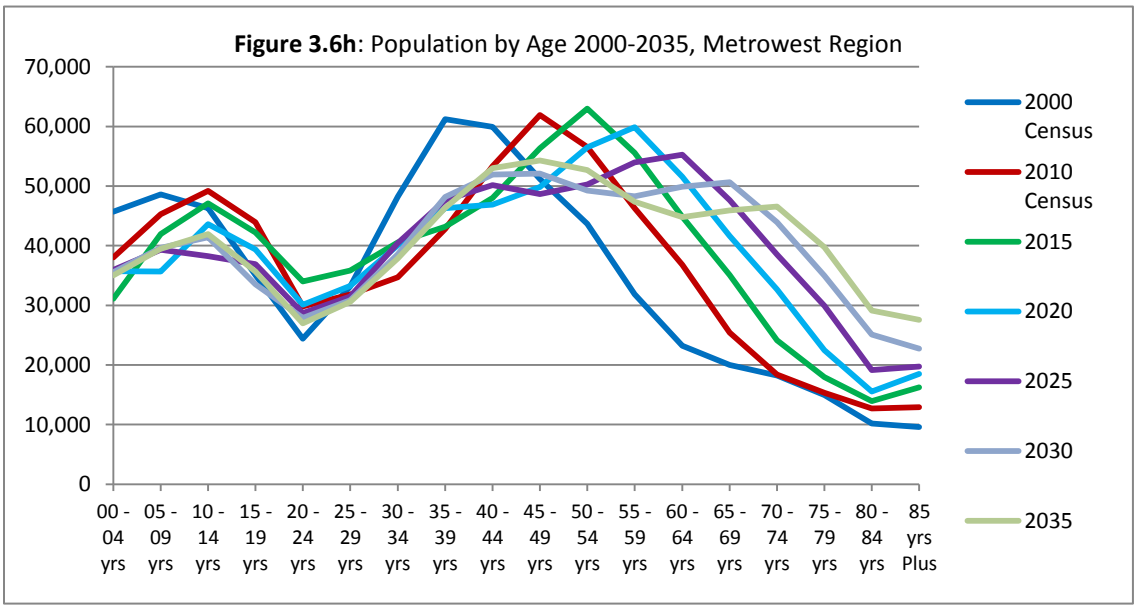


Figure 3.6h below shows the MetroWest region population by age at 2000, 2010 and then projected at five-year intervals through 2035, demonstrating how the population ages forward through the time-series.



7. Northeast Region

Summary

The Northeast region borders New Hampshire to the north and the Atlantic Ocean to the east. The region includes 46 communities encompassing all of Essex County as well as the northern portion of Middlesex County (Figure 3.7a). Its primary cities are Lowell, Lawrence and Haverhill, all located along the Interstate 495 corridor.

The Northeast region added nearly 30,000 residents between 2000 and 2010 for an annualized growth rate of roughly 0.3% per year over the decade (Figures 3.7b and 3.7c). Since that time, the U.S. Census Bureau estimates that the region has been growing at an even faster pace.[19] According to Census estimates, the Northeast region grew by an average of 0.9% per year from July 1, 2010 to July 1, 2013, increasing by 29,096 persons in the three year period, or 9,365 per year. In aligning future projections to these recent estimates,[20] our model anticipates a 52,423 person increase in the region from 2010 to 2015. The annualized growth rate is accelerated to 1.02% in the near-term to 2015 before slowing down to levels more consistent with the 2000 to 2010 period. After 2015, our model predicts that annualized growth will slow to about 0.2% per year through 2025, gradually diminishing to just under 0.1% in the 2030 to 2035 period. (Figure 3.7c).

Figure 3.7a
The Northeast Region

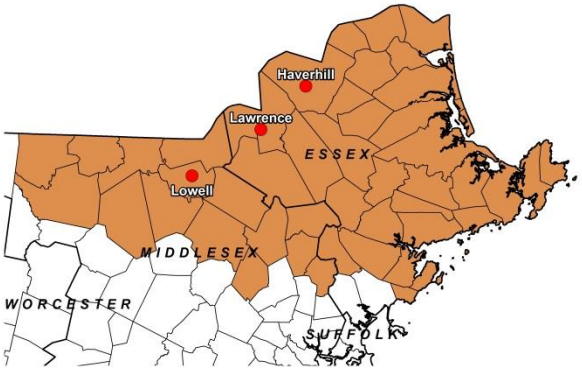


Figure 3.7b
Projected Population, Northeast

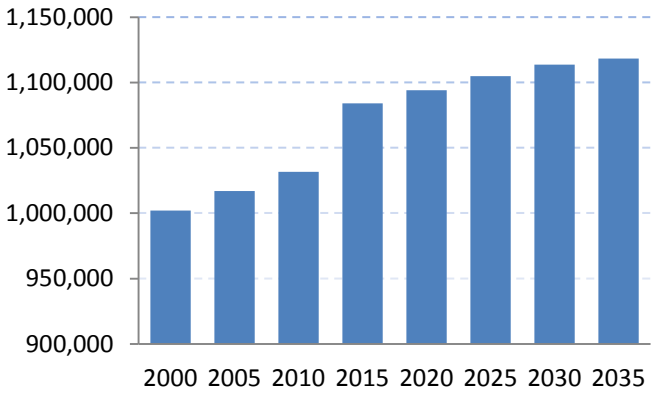
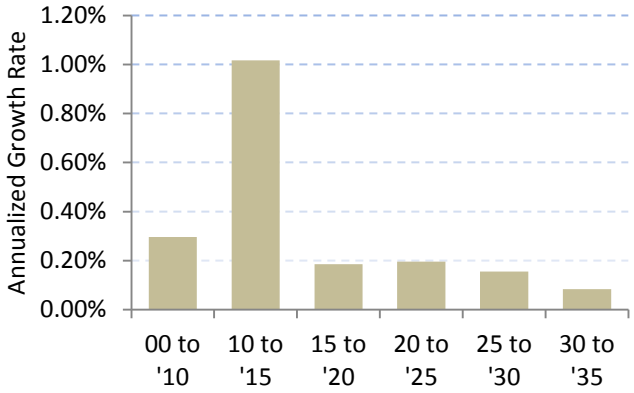


Figure 3.7c
Annualized rates of population change, Northeast



[19] Source: Sub-EST 2013: Subcounty Resident Population Estimates April 1, 2010 to July 1, 2013. U.S. Census Bureau, Population Division. May 2014.
[20] See Methods section of this report for details on how 2015 population for each region is aligned to U.S. Census Bureau population estimates through 2013 and 2014.

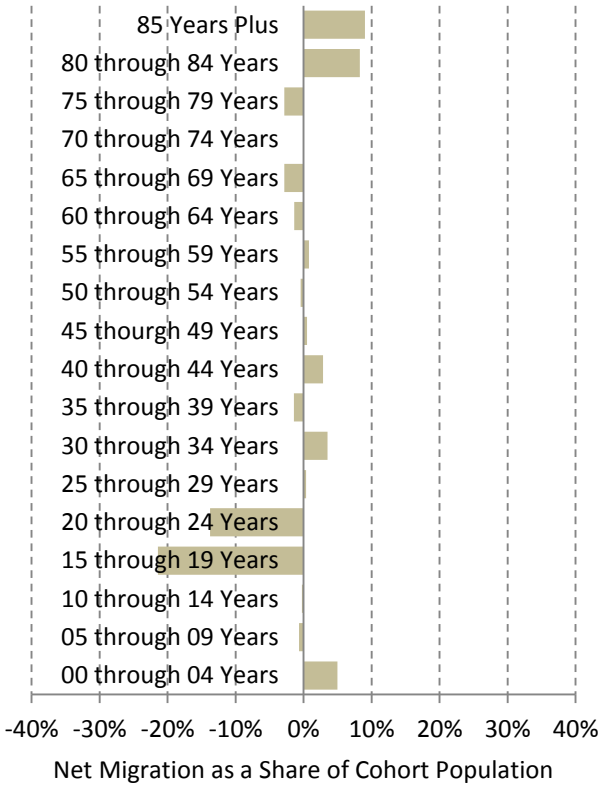
Table 3.7
Summary Results: Estimated Components of Population Change, Northeast Region

	2010 to 2015	2015 to 2020	2020 to 2025	2025 to 2030	2030 to 2035
Starting Population	1,031,733	1,084,156	1,094,196	1,104,923	1,113,554
Births	57,389	60,988	60,272	58,691	57,246
Deaths	46,396	54,147	60,213	67,344	75,790
Natural Increase	*10,993*	*6,840*	*59*	*-8,653*	*-18,543*
Domestic In-migration, MA & Border	132,930	130,673	131,306	132,228	133,653
Domestic In-migration, Rest of U.S.	54,844	50,060	52,033	53,833	55,668
Domestic Out-migration	165,818	196,874	192,144	188,226	185,501
Net Domestic Migration	*21,956*	*-16,141*	*-8,805*	*-2,165*	*3,821*
Net International Migration	*19,475*	*19,341*	*19,472*	*19,449*	*19,423*
Ending Population	1,084,156	1,094,196	1,104,923	1,113,554	1,118,254

In recent years, the Northeast region has lost more residents to domestic migration than it has gained. In our model, we adjust migration rates in the 2010 to 2015 period so that population totals catch up to Census Bureau estimates through 2013, resulting in net domestic in-migration during that period. After 2015, our model reverts to migration patterns observed in the 2005 to 2011 American Community Survey, and the region once again shows more outflow than inflow from other parts of the U.S. (Table 3.7).

The largest cohorts of out-migrants are the 15- to 24-year olds, many of who head off to college or to look for work opportunities elsewhere (Figure 3.7d). Those approaching retirement age are also somewhat prone to move elsewhere in the U.S., although the region tends to be a net importer of the elderly. However, similar to other regions on the fringe of the Boston Metropolitan area, the Northeast is also a net attractor of young families and others in their early thirties,

Figure 3.7d: Age profile of net domestic migrants, Northeast, 2007-2011, American Community Survey



some of which bring their young children with them.

Over the next two decades, the aging of the large millennial generation into its thirties will lead to a slight increase in domestic in-migration—helping narrow the gap between domestic in- and out-migration (Figure 3.7e). Out-migration is also expected to decline, the consequence of relatively smaller resident population of college-aged and young adults (15-24 years old) in the next several decades.

Figure 3.7e
Projected levels of domestic in and out-migration, Northeast, 2010-2035

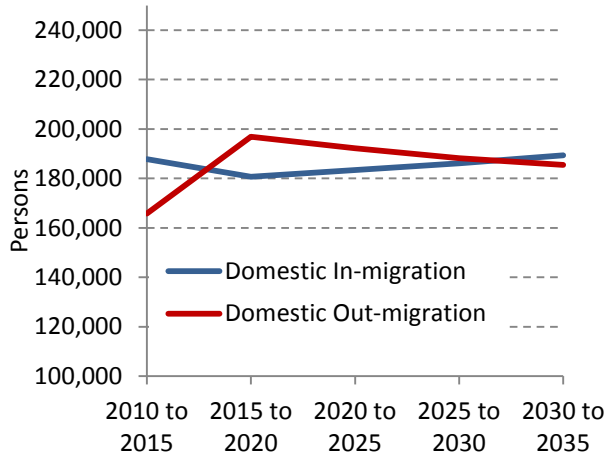
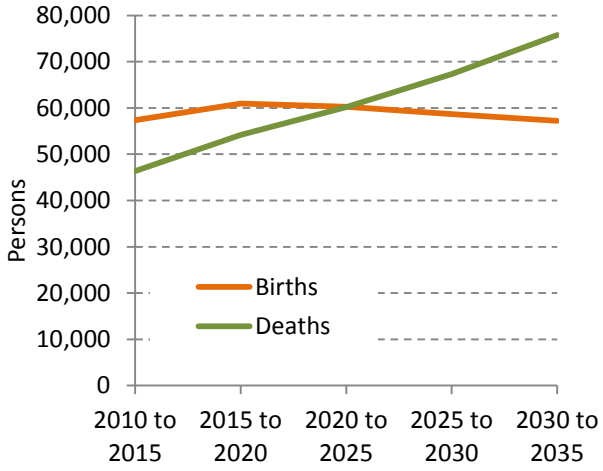


Figure 3.7f
Projected levels of births and deaths, Northeast, 2010-2035



While the region lost more residents than it gained from domestic migration, international migration has been a steady force behind the region's growth. Between 2010 and 2015, we estimate that the region will add 19,000 new residents due to net international immigration—a level that is expected to carry forward for the next several decades. This international immigration more than offsets the domestic loss experienced in 2015 through 2030.

With domestic and international migration in near balance, natural increase (births minus deaths) sets the pace for overall population growth in the coming years. According to vital statistics data, there were 60,178 births and 40,098 deaths between 2005 and 2010—resulting in a natural increase of just over 20,000 persons. The numbers of births and deaths is largely dictated by changes in the region's age profile over the past decade, with a larger share of the population moving through their twenties and thirties and relatively few elderly residents (see Figure 3.7g). This will begin to shift in the coming decades, with increasing numbers of baby boomers moving into their seventies by the end of our study period. The result will be a steady increase in the number of deaths between 2010 and 2035, from about 46,000 every five years to almost 76,000 in the 2030 to 2035 period. The number of births is expected to remain relatively constant during this time, hovering around 60,000 births during each five year period from 2010 to 2035, but by 2025 the number of deaths catches up to the number of births. By 2030 the number of deaths in the region is expected to outnumber births by over 8,000, significantly slowing growth in the region.

Age Profile

Overall, the Northeast of the future will be notably older, although with a population age distribution much more evenly spread across age groups than it is today (Figure 3.7g). The two population bulges associated with the baby boomers and the millennial children are less pronounced in 2035 than they were in 2010. Commensurate with the aging of the U.S. population, there will be a notable increase in the share of older and elderly residents, with 25% of the region's residents age 65-and older by 2035—compared to the 14% reported in the 2010 census. There will also be a secondary mass of relatively young families providing some balance to the regional age profile. The millennial generation will be moving into their forties by 2035, many with school age children. Children aged 0 through 14 will make up 16% of the regions population in 2035 compared to 19% in 2010.

Figure 3.7g
The age and gender composition of the Northeast Region, 2010 (actual) vs. 2035 (forecasted)

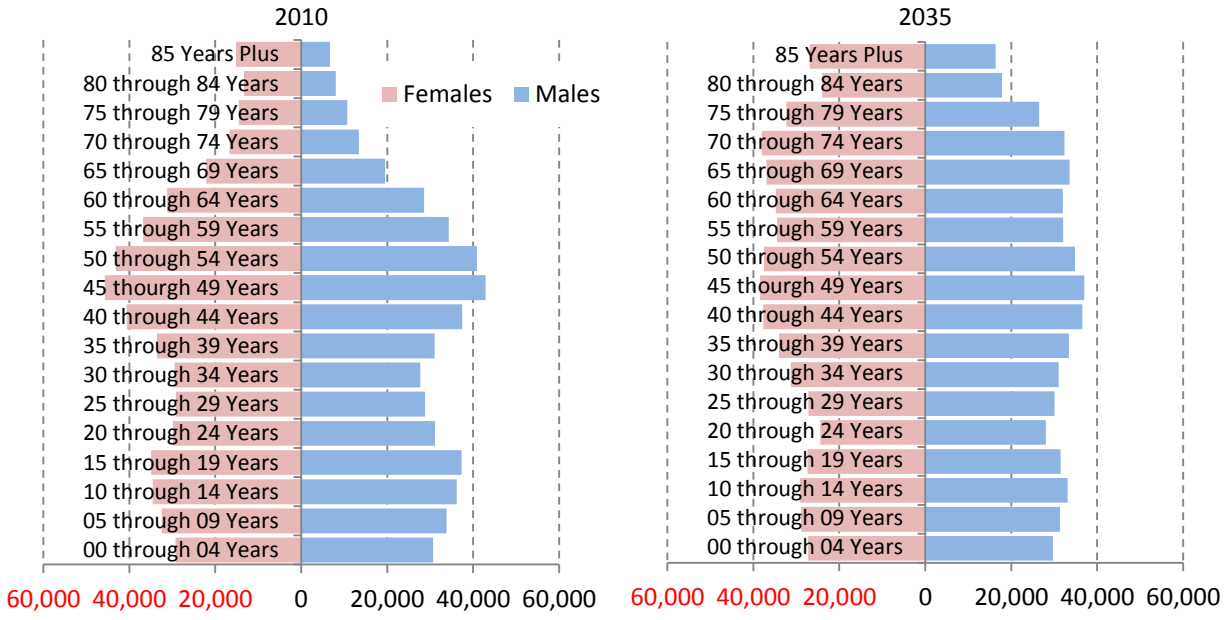


Figure 3.7h below shows the Northeast region population by age at 2000, 2010 and then projected at five-year intervals through 2035, demonstrating how the population ages forward through the time-series.

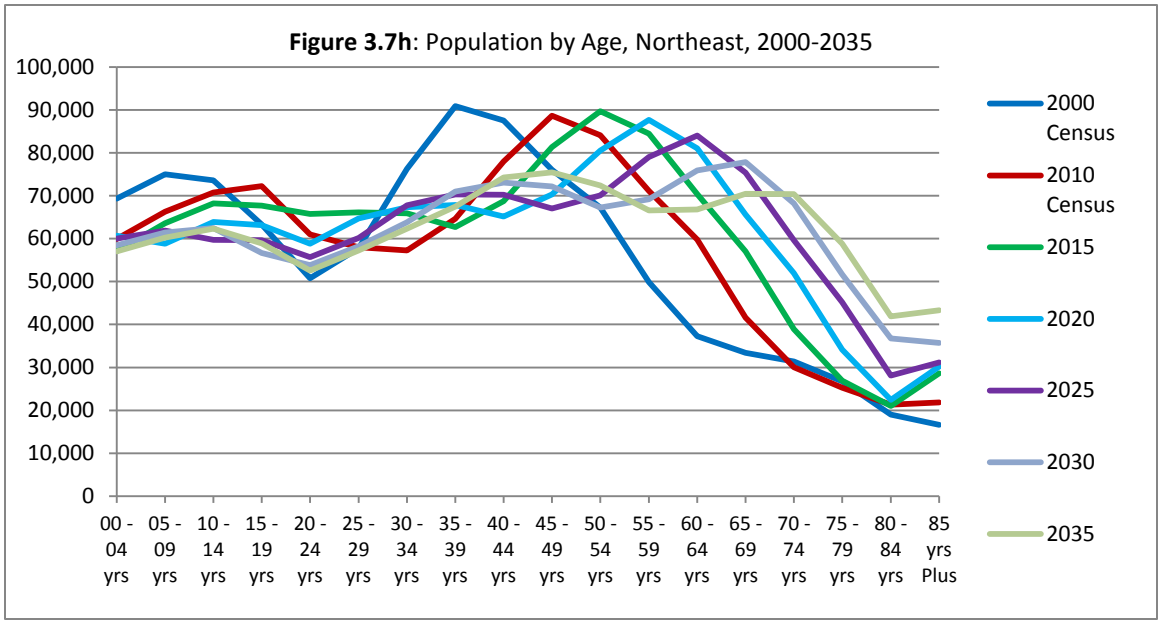


Figure 3.7h: Population by Age, Northeast, 2000-2035
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
00 - 04 yrs
05 - 09 yrs
10 - 14 yrs
15 - 19 yrs
20 - 24 yrs
25 - 29 yrs
30 - 34 yrs
35 - 39 yrs
40 - 44 yrs
45 - 49 yrs
50 - 54 yrs
55 - 59 yrs
60 - 64 yrs
65 - 69 yrs
70 - 74 yrs
75 - 79 yrs
80 - 84 yrs
85 yrs Plus
2000 Census
2010 Census
2015
2020
2025
2030
2035

8. Southeast Region

Summary

The Southeast region includes 50 municipalities, covering the entirety of Plymouth and Bristol counties and extending into the southeastern reaches of Norfolk County. Its largest cities are New Bedford and Fall River, on the region's Southern coast, and Brockton to the north (Figure 3.8a).

The Southeast region experienced modest population growth in the past decade, adding 37,633 persons and with an annualized population growth rate of 0.35% between 2000 and 2010. The region should expect to see continued population growth over the next twenty five years, although at an increasingly slower rate as time moves on (Figures 3.8b and 3.8c). Our model anticipates that the region will add another 39,490 residents between 2010 and 2020, after which levels of growth start to diminish, with fewer than 28,000 residents gained from 2020 to 2030. By 2035, the population of the Southeast region will approach 1.19 million persons, a gain of almost 75,000 residents over the 2010 Decennial Census.

The Sources of Population Change

Population growth in the region will be driven largely by the in-migration of persons in their thirties, and with these young families, a fairly steady number of births. However, increasing deaths with the aging in place of the sizable baby boom population will slowly chip away at the rate of population growth, eventually exceeding new births by 2025.

Figure 3.8a
The Southeast Region

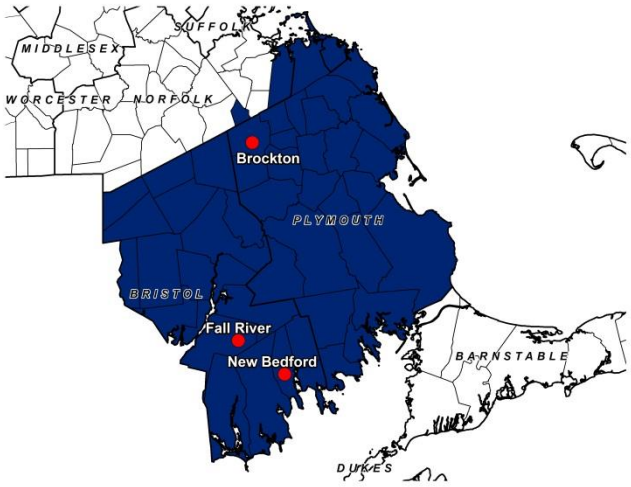


Figure 3.8b
Projected Population, Southeast

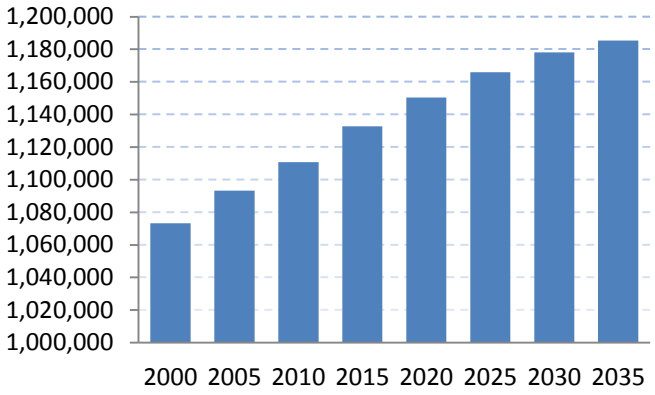


Figure 3.8c
Annualized rates of population change, Southeast

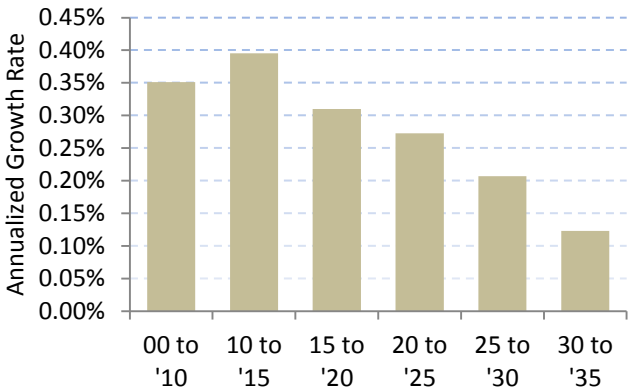


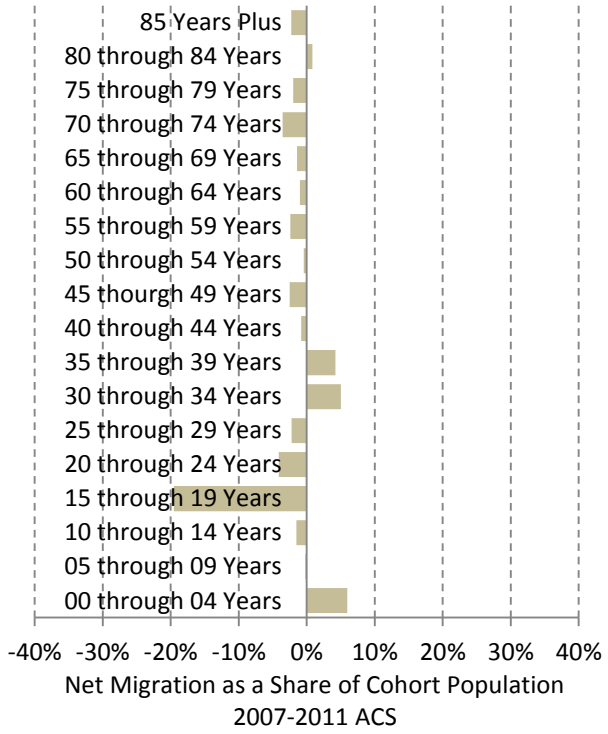
Table 3.8 Summary Results: Estimated Components of Population Change, Southeast

	2010-2015	2015-2020	2020-2025	2025-2030	2030-2035
Starting Population	1,108,845	1,132,805	1,150,345	1,166,038	1,178,095
Births	58,476	60,541	61,219	60,694	59,810
Deaths	52,082	57,177	62,674	69,403	76,810
Natural Increase	*6,394*	*3,364*	*-1,455*	*-8,709*	*-17,000*
Domestic In-Migration, MA & Border	125,472	133,625	134,316	135,015	136,109
Domestic In-Migration, Rest of U.S.	43,962	45,425	46,925	48,369	49,645
Domestic Out-migration	171,223	184,097	183,331	181,833	180,706
Net Domestic Migration	*-1,789*	*-5,048*	*-2,089*	*1,552*	*5,048*
Net International Migration	*19,356*	*19,223*	*19,238*	*19,214*	*19,188*
Ending Population	1,132,805	1,150,345	1,166,038	1,178,095	1,185,331

In recent years, the Southeast region has tended to lose residents due to domestic out-migration, and this trend is expected to continue through 2025 (Table 3.8). At the same time, international migration offsets this net domestic loss, with gains of over 19,000 each five years expected to continue through the time-series such that the region continues to increase in population size.

Domestic out-migration is heavily concentrated among the college-age population and, to a lesser extent, older residents in the 55-and older cohorts (Figure 3.8d). However, the region tends to import residents in their thirties, as well as their school-age children. In the near future, the large population of millennials move out of their teens and twenties (age-groups prone to leaving the region) and into their thirties (the groups that tend to move in). This, together with only modest levels of out-migration among boomers, will result in decreasing

Figure 3.8d
Age profile of net domestic migrants, Southeast, 2007-2011 American Community Survey



levels of out-migration and increasing levels of domestic in-migration. Domestic in-migration will catch up to out-migration by 2025 to 2030 and start contributing to population gain in the region (Figure 3.8e).

Figure 3.8e
Projected levels of domestic in and out-migration, Southeast, 2010-2035

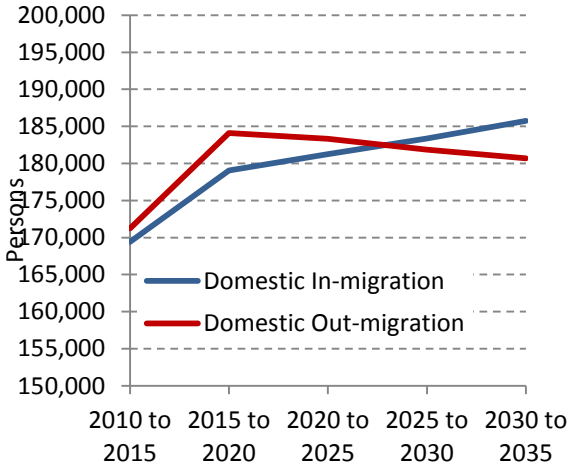
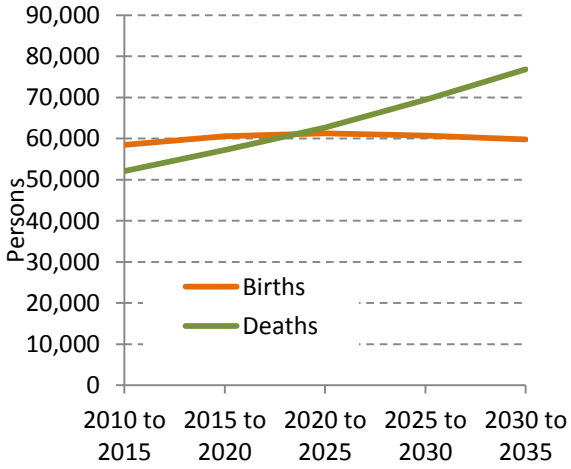


Figure 3.8f
Projected levels of births and deaths, Southeast, 2010-2035



Growth in the Southeast region will be partially constrained, however, by a steady increase in deaths in the coming years, coupled with a small decline in births (Figure 3.8f). Natural increase was a major contributor factor to the region's growth over the past decade, with 15,371 more births than deaths between 2005 and 2010. This reflects the region's status as a favored residence among young families. During the 2000s, the Southeast region had a particularly high concentration of residents progressing through their thirties, forties and early fifties (Figure 3.8g). Likewise, the region also had a high concentration of children with relatively few elderly residents. However, we expect the number of deaths to increase with the aging of the baby boomers. Mortality rates show a marked increase as people approach their seventies and eighties. The baby boom population will begin to move into these high-mortality cohorts by 2025, and by that time the number of deaths in the region will start to exceed the number of births, subtracting from the population gained by migration.

Age Profile

By 2030, baby boomers will have moved into the retirement phase of their life cycles. Although some older residents will retire outside the region, they will be eclipsed by those deciding to age in place, shifting the entire population distribution upward (Figure 3.8g). By 2035, 24% of the region's population will be over the age of 65, compared to 14% in 2010. Yet the Southeast will continue to attract young families, including many from the millennial generation, who will be moving into

their forties by 2035. The result will be a regional age profile that, while older, will be more evenly distributed among the different age groups (Figure 3.8g.)

Figure 3.8g: The age and gender composition of the Southeast Region, 2010 (actual) vs. 2035 (forecasted)

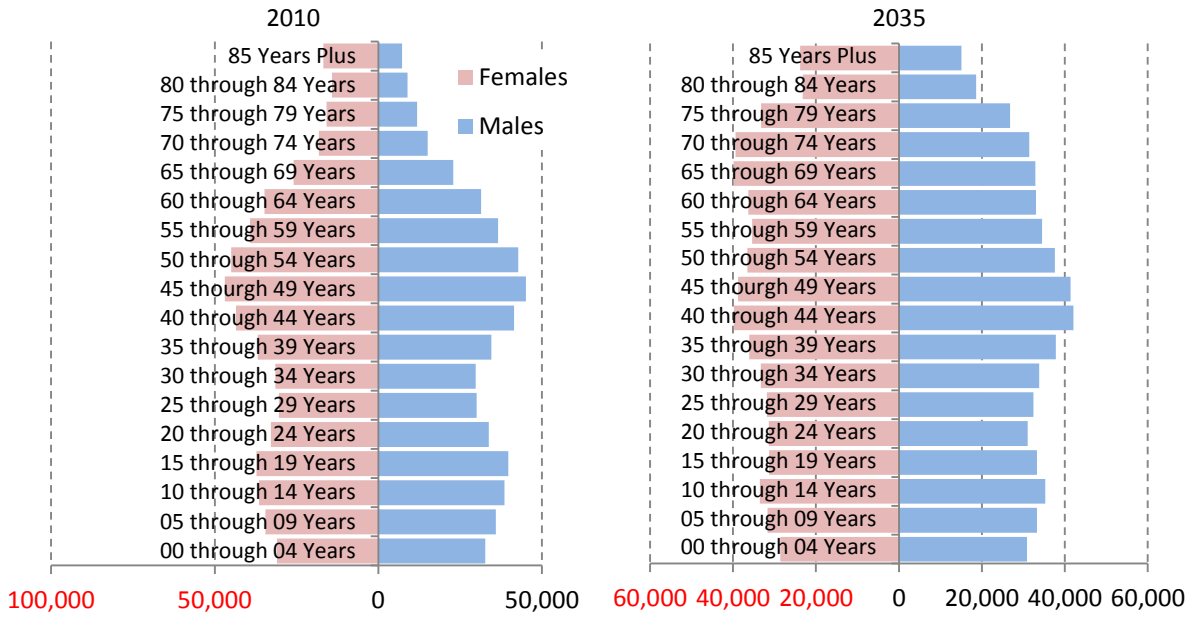


Figure 3.8h below shows the Southeast region population by age at 2000, 2010 and then projected at five-year intervals through 2035, demonstrating how the population ages forward through the time-series.