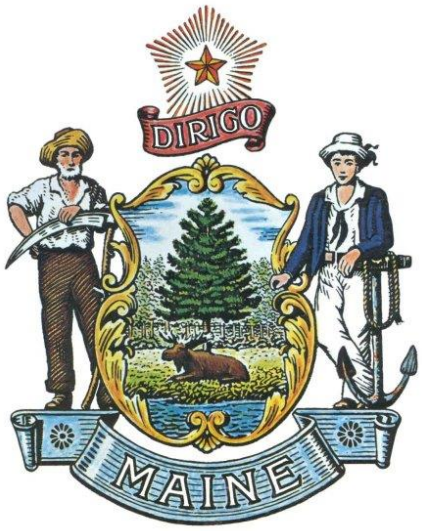


MAINE POPULATION OUTLOOK
2016 to 2026

DECEMBER 2018

Maine State Economist

Department of Administrative and Financial Services

EXECUTIVE SUMMARY

The Maine State Economist has prepared updated population projections covering the state, counties, and cities and towns. For cities and towns, projections cover total population only; for the state and counties, projections include five-year age and sex cohorts.

Understanding trends in demographics is key to understanding the economy at large. The economy is made up of people making decisions: decisions about how much to work, what to buy, whether to hire more workers, where to live, and so on. Looking ahead to what the population might be like in the future can help us develop plans and policies now.

These projections are an update to those issued in November 2016. While these new projections include different years, they replace the previous set of projections, which are now considered outdated and should no longer be used. Projections are based on a continuation of recent historical trends. As new and revised data are released, these trends can change, making it important to update projections on a regular basis. Near-term projections are more likely to be accurate than projections of the distant future as trends will change more the further out we look.

The new projections show an improvement in Maine's population growth compared to the previous set of projections. This is a result of recent improvements in Maine's net migration as well as revisions made to the methodology regarding college populations. The base year for these projections is 2016: while some data for 2017 was available during the development of these projections, other data sets had not yet been updated for 2017, requiring the use of 2016 as the base year.

Results

Maine's population is projected to increase from 1,330,232 in 2016 to 1,335,260 in 2021 and further increase to 1,340,462 in 2026. Seven counties are projected to see population increases from 2016 to 2026.

Statewide

- Maine's total population is projected to increase 0.4% from 2016 to 2021 and another 0.4% from 2021 to 2026. Over the ten-year period, Maine's population is projected to increase 0.8%.

Maine Statewide Population				
	2016 (historical)	**2021**	**2026**	**2016-2026**
Total Population	1,330,232	1,335,260	1,340,462	
Five-Year Percent Change				
Percent Change		0.4%	0.4%	0.8%

- Maine's working-age population (20-64 years) is projected to decrease 6% from 2016 to 2026, but this includes the aging-out of the Baby Boomers, who were 52-70 years old in 2016 and will be 62-80 years old in 2026. If just the young working-age population (20-39 years) is considered, this population is projected to increase 2% from 2016-2026. The 65 and older age cohort is expected to see growth of 37% from 2016 to 2026 as the Baby Boomers age into this cohort.

Maine Statewide Population by Age				
	2016 (historical)	**2021**	**2026**	**2016-2026**
Age 0-19 years	287,581	265,943	253,938	
Age 20-39 years	308,280	315,515	314,612	
Age 40-64 years	476,872	446,545	420,032	
Age 65+ years	257,499	307,257	351,880	
Five-Year Percent Change				
Percent Change 0-19		-8%	-5%	-12%
Percent Change 20-39		2%	0%	2%
Percent Change 40-64		-6%	-6%	-12%
Percent Change 65+		19%	15%	37%

Counties

- Seven of Maine's 16 counties are projected to see population increases from 2016-2021, while eight are projected to increase from 2021-2026. Seven counties are projected to see cumulative increases over the ten-year period from 2016-2026.

- York County is projected to see an increase of 6% from 2016-2026: the largest gain of any county. Cumberland County is projected to gain 3%. Piscataquis, which has the smallest population and the oldest median age of counties in Maine, is projected to lose 11% of its population from 2016-2026.

Maine County Total Population			
	2016 (historical)	2021	2026
Androscoggin	107,269	107,968	108,579
Aroostook	68,116	67,929	67,736
Cumberland	290,905	294,711	298,632
Franklin	30,071	29,964	30,030
Hancock	54,398	54,588	54,679
Kennebec	121,328	120,469	120,095
Knox	39,655	39,430	39,103
Lincoln	33,993	32,801	31,725
Oxford	57,096	56,108	55,241
Penobscot	151,515	151,927	152,294
Piscataquis	16,876	15,908	14,989
Sagadahoc	35,133	35,233	35,283
Somerset	50,663	49,192	47,923
Waldo	39,425	39,797	39,994
Washington	31,566	31,172	30,723
York	202,223	208,062	213,437

Maine County Total Population – Five-Year Percent Change			
	2016-2021	2021-2026	2016-2026
Androscoggin	1%	1%	1%
Aroostook	0%	0%	-1%
Cumberland	1%	1%	3%
Franklin	0%	0%	0%
Hancock	0%	0%	1%
Kennebec	-1%	0%	-1%
Knox	-1%	-1%	-1%
Lincoln	-4%	-3%	-7%
Oxford	-2%	-2%	-3%
Penobscot	0%	0%	1%
Piscataquis	-6%	-6%	-11%
Sagadahoc	0%	0%	0%
Somerset	-3%	-3%	-5%
Waldo	1%	1%	1%
Washington	-1%	-1%	-3%
York	3%	3%	6%

BACKGROUND

Population growth is an important element of economic growth. As the existing population ages out of the workforce, younger workers are needed to fill the job openings created through retirements. Business owners seeking to retire look for the next generation of business owners. Employers looking to expand need more workers to fill those positions. Although Maine has seen improvements in population growth the past two years, the rate of growth must increase if we are to sustain economic growth in the state.

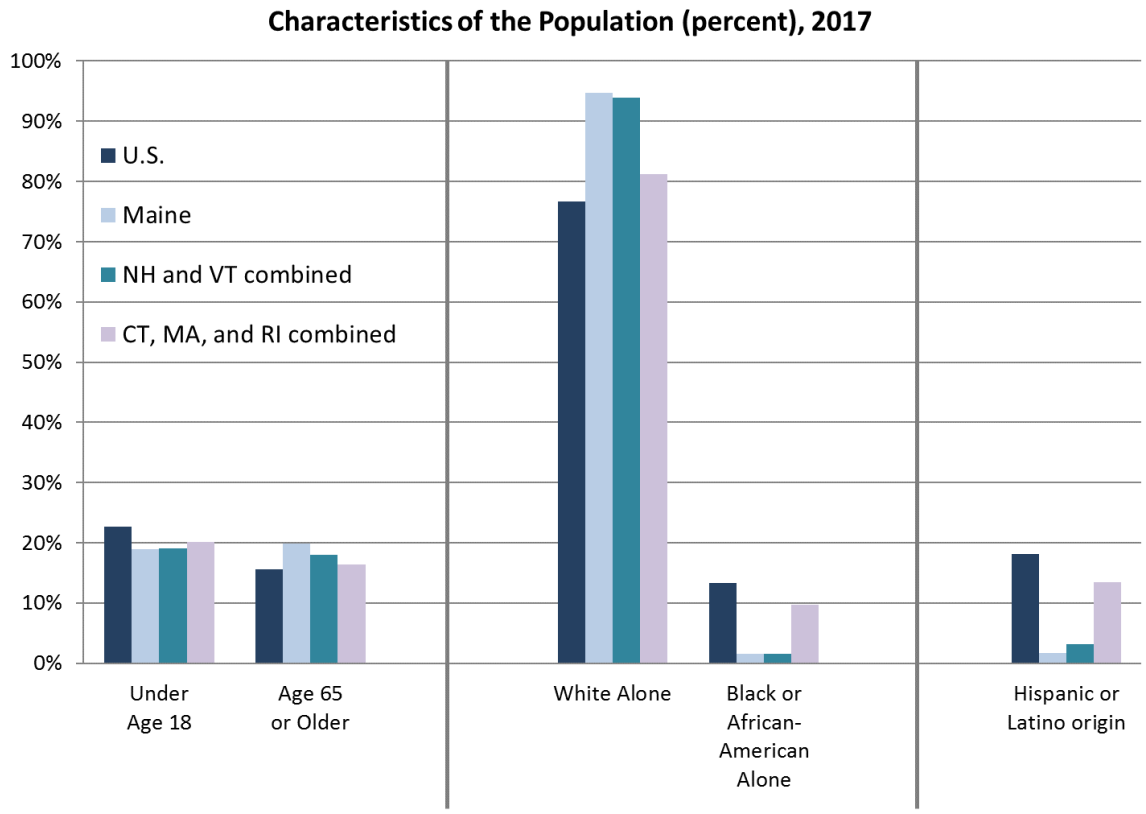
Population projections provide an important gauge of the current outlook based on recent trends. They are updated periodically as new data are released. Trends change over time, and each new set of population projections replaces the previous set. These projections should be considered as just one piece of information to be used by policymakers, businesspeople, and residents making decisions about the future.

What are demographics?

Demographics are the characteristics that describe the population, including not just the total count of people living in an area but how old they are, what the racial and ethnic mix of the population is, and other characteristics. These descriptive characteristics paint a picture of our population. Age, sex, race, and ethnicity are all elements of this picture.

Maine's demographics are, in many ways, similar to those of our neighboring states, but quite different from the nation as a whole. The chart below shows a few key demographic comparisons between Maine, the U.S., and the other New England states divided into two groups: New Hampshire and Vermont (the rest of northern New England) and Connecticut, Massachusetts, and Rhode Island (southern New England). Maine and the rest of northern New England share many similarities, while southern New England bears more resemblance to the U.S. as a whole.

While there is a larger share of the population under the age of 18 than age 65 or older in the U.S. and in New England, Maine has a larger share of people age 65 or older. Maine, Vermont, and New Hampshire have the three highest percentages, respectively, of the total population who are white alone. Maine, New Hampshire, and Vermont also have considerably smaller percentages of the total population who are of Hispanic or Latino origin than southern New England or the U.S. as a whole.

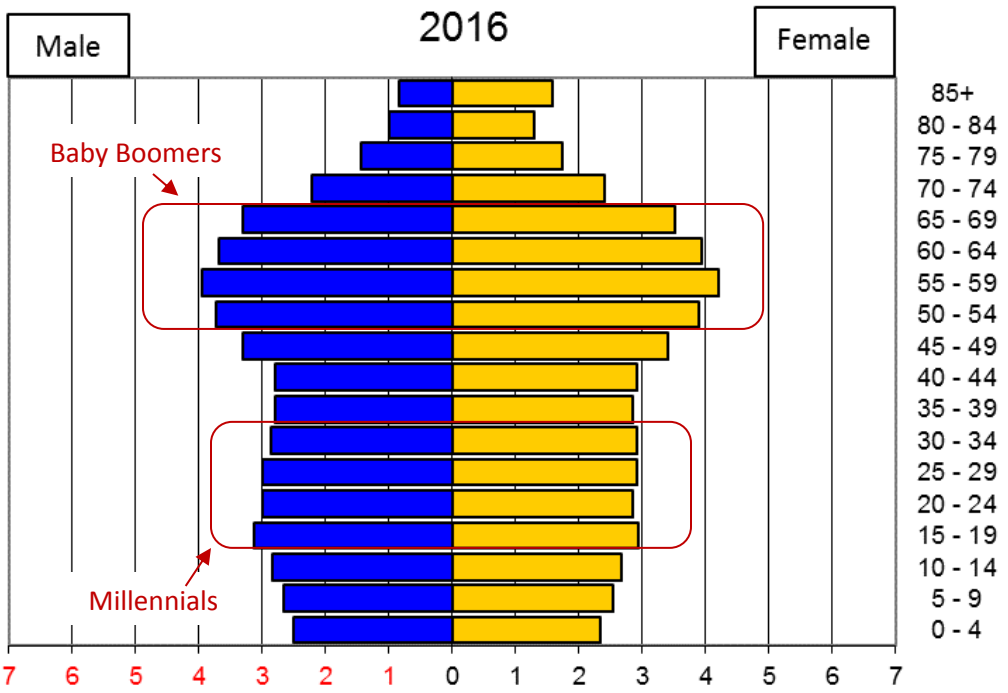


The Baby Boomers

One of the driving factors in Maine's demographic situation is the large share of Baby Boomers in the population. This generation, born between 1946 and 1964, made up 28.0% of Maine's population in 2017, when its members were between the ages of 53 and 71. Vermont and New Hampshire fall just behind Maine, with 27.2% and 27.0%, respectively. Nationally, just 22.6% of the population are Baby Boomers, while Millennials, who are largely the children of the Baby Boomers and were born between 1982 and 2000 (according to the U.S. Census Bureau's definition), make up 26.0% of the national population. In Maine, this generation is just 22.4% of the population.

The size of the Baby Boom generation in Maine means that as a cohort, they have a large influence on demographic and economic trends in the state. When this generation was growing up, school enrollments increased; when they entered the workforce, employment and the labor force increased. However, with this generation now poised to exit the workforce and with smaller generations following, labor constraints are starting to be felt around the state. Maine will need to see continued increases in migration to the state to offset the retirements of the Baby Boomers.

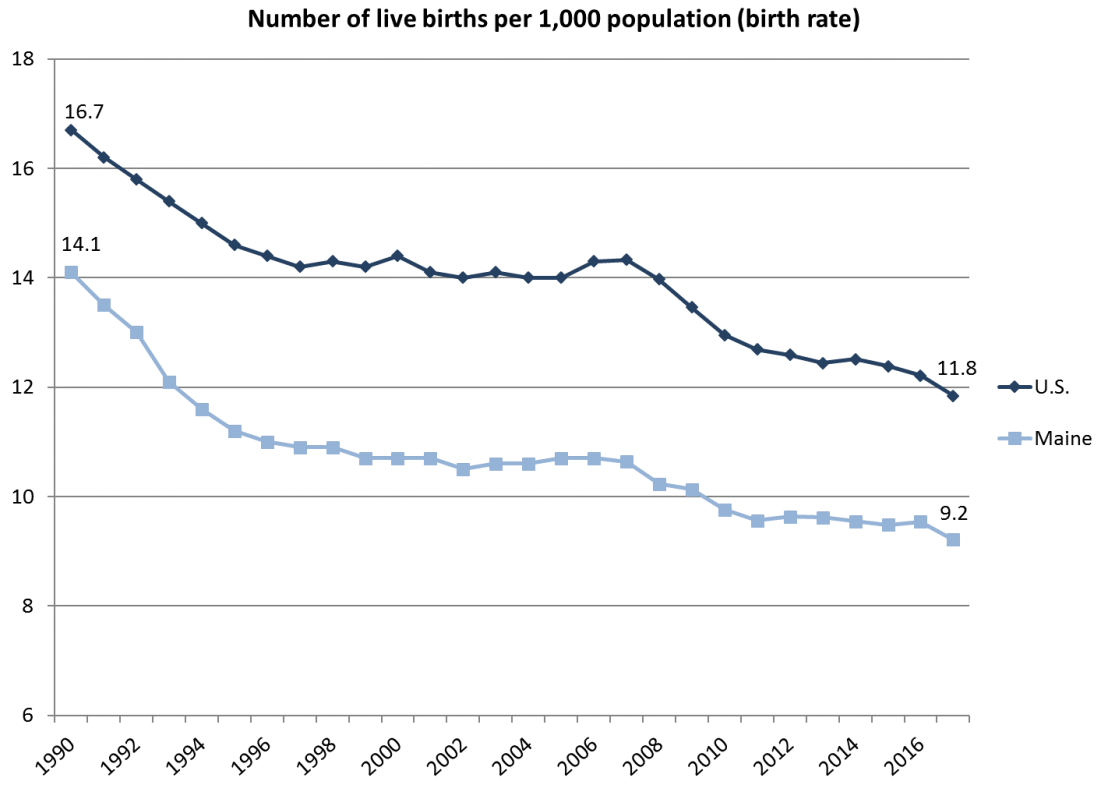
One of the industries that will be most affected by the aging of the Baby Boomers is the health care industry. As people age, their need for health services tends to increase. Thus, as Maine's largest generational cohort ages, the need for a broad spectrum of health care related services will also increase. Health care and social assistance is one of the largest industries in the state and will likely continue to be an economic driver in the years to come. At the same time that demand for health services is increasing, though, the workforce in this field is also aging. Demand for new workers will come not only from expansions in the industry but from retirements as well.



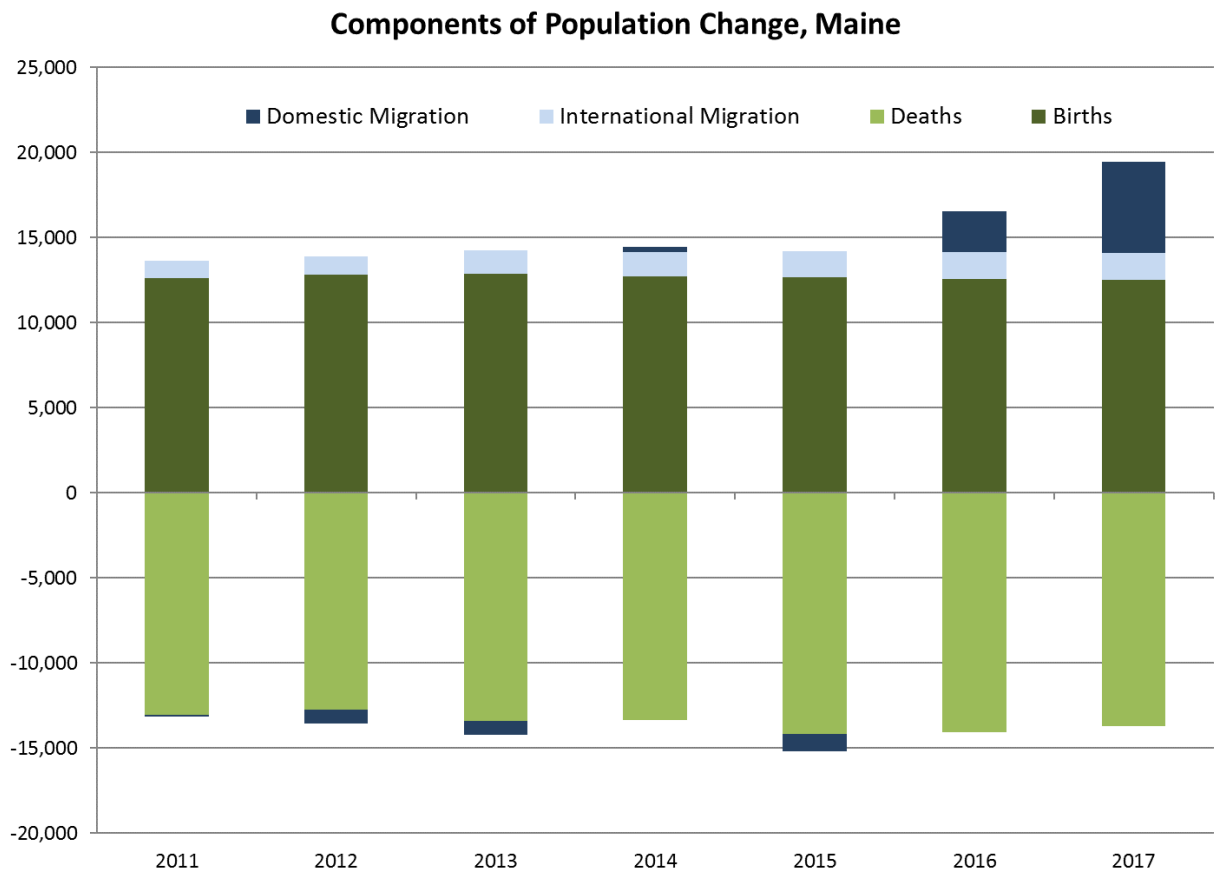
The large share of Baby Boomers in Maine's population has several different effects on Maine's overall demographic picture. First, as the Baby Boomers age, the sheer size of this cohort drags the median age upward. This is happening around the country: Maine just happens to have the largest relative share of Baby Boomers, meaning that the increase in median age is happening faster here than in other states. Second, when the Baby Boomers were in their child-bearing years, the number of births each year increased. As the Baby Boomers have aged, the number of births has decreased while the number of deaths has increased. Maine reached the point earlier this decade where the number of deaths each year is greater than the number of births. In this situation, the only way Maine's population grows is through migration. In fact, Maine has seen an acceleration in in-migration recently, with net domestic migration of +5,376 in 2017. Even more encouraging, the two age groups with the most in-migration to Maine in 2017 were 25-29 and 30-34 year olds. A continuation of this migration trend could offset the impacts from the aging Baby Boom generation and provide more robust population growth the next time projections are revised.

Components of population change

Births and deaths are two of the components of population change: migration, commonly divided into international and domestic migration, is the third. As the Baby Boomers continue to age, the number of deaths each year in Maine will continue to grow. The birth rate has declined both in Maine and in the nation as a whole with the aging of the Baby Boomers, but Maine's birth rate (the number of births per 1,000 people) is lower than the U.S. birth rate and has been for decades. Birth rates for non-Hispanic whites have tended to be lower than birth rates for other races and ethnicities, so Maine's lack of racial and ethnic diversity contributes to a relatively low overall birth rate.



The number of births minus the number of deaths in a year combine to generate the "natural change" in a population. For Maine, the natural change has been negative for several years. Maine relies on migration, the third component of change, for population growth. Both international migration (people moving to Maine from other parts of the world) and domestic migration (people moving to Maine from other parts of the U.S.) play a part in overall migration. Net migration is the difference between the number of people moving into a region and the number of people moving out of that region. More people moving in leads to positive net migration; more people moving out leads to negative net migration. Maine has seen an increase in net migration the past two years, with modest positive net migration in 2016 and more robust positive net migration in 2017, led by a surge in domestic in-migration as described earlier. This led to stronger population growth in 2016 and 2017 and improvements in the population projections. If this trend continues, the migration and population growth will be reflected in the next round of population projection updates.



Implications

The demographic composition of an area has many implications for the economy of that area. An area with a slow-growing population will see slower employment and GDP growth and may find business development challenging. Population growth generally goes hand-in-hand with economic growth. Businesses want to know that they will be able to find the workers they need and so look for areas with more rapid population growth. However, areas that experience population booms often struggle to keep up with the infrastructure demands that accompany this expansion. Housing becomes unaffordable and unavailable, schools exceed capacity, roads experience congestion, and transportation becomes problematic.

Areas with an aging population struggle to find workers to replace the retirements that happen each year. Businesses either raise wages to attract more workers (in turn raising prices) or are forced to relocate or close up shop. Demand for health care services surges, just as doctors and nurses are reaching retirement age as well. The number of children in the population declines, leaving school enrollments lower and per student costs higher. There are benefits, though: retirees are often more engaged in their communities and have time for volunteer projects or engage in part-time work.

Maine's current demographic composition poses some challenges. Competition for workers is fierce, especially with a strong economy. Unemployment rates in Maine and the nation are near record lows. Companies in all industries across the state are facing shortages of workers and are

experimenting with creative ways to attract new hires. Maine's continued employment growth and renewed net in-migration are an indication that workers are getting the message and moving to the state. There are regional variations, though: much of the economic activity and population growth in recent years has been in southern Maine, although 12 of the state's 16 counties did see population growth in 2017 according to the U.S. Census Bureau population estimates.

For Maine to continue seeing economic growth, population growth and in-migration of workers must accelerate. Population projections, updated regularly, help policymakers and others to gauge the potential outlook based on recent trends, providing one way to evaluate the effectiveness of current policies and public and private efforts to improve demographic conditions.

PROJECTIONS

Total population

The Maine State Economist has prepared population projections for the state, counties, and cities/towns. Populations are projected for 2021 and 2026 and replace the previous set of projections issued in November 2016. County- and state-level projections are given for five-year age cohorts by sex. City- and town-level projections are only available for the total population.

It is important to note that the projections presented here are not exact. Any estimation errors in recent population estimates will be incorporated into future projections. The county-level model assumes that past birth, death, college enrollment, and migration rates within each cohort will persist into the foreseeable future. The model cannot account for unprecedented future events that may dramatically alter a county's demographic composition, such as large business openings and closures or changes in technologies, personal choices, or environmental conditions in the coming years that may alter migration behavior or birth and death rates. As such, population projections are more accurate for the near future than distant years and should be updated regularly.

The county projections are the basis for the state and town projections and thus are the first piece completed. The methodology used for the county projections is the cohort-component method. This widely-used methodology utilizes births, deaths, and migrations to advance each age-sex cohort through the projection period. It allows for specific survival and migration rates to be calculated for each age-sex cohort. Using this methodology provides a detailed projection of the county population. A more detailed description of the methodology used is provided in the appendix to this report.

Statewide

Maine's total population is projected to increase 0.4% from 2016 to 2021 and another 0.4% from 2021 to 2026 for a total increase of 0.8% from 2016 to 2026. This is an improvement over the previous set of projections, which had Maine's population unchanged from 2014 to 2024. Recent increases in population growth and net migration as well as an improved methodology for the college-age population are reflected in the new, higher population projections.

Maine Statewide Population				
	2016 (historical)	**2021**	**2026**	**2016-2026**
Total Population	1,330,232	1,335,260	1,340,462	
Five-Year Percent Change				
Percent Change		0.4%	0.4%	0.8%

Counties

Seven of Maine's 16 counties are projected to see population increases from 2016-2021, while eight are projected to increase from 2021-2026. Five counties are projected to see cumulative increases over the ten-year period from 2016-2026. As with the statewide projections, this is an improvement over the previous set of projections, which had only five counties showing increases from 2014 to 2024.

York County is projected to see an increase of 6% from 2016 to 2026: the largest gain of any county. Cumberland County is projected to gain 3%. Piscataquis, which has the smallest population, is projected to lose 11% of its population from 2016 to 2026.

Maine County Total Population			
	2016 (historical)	2021	2026
Androscoggin	107,269	107,968	108,579
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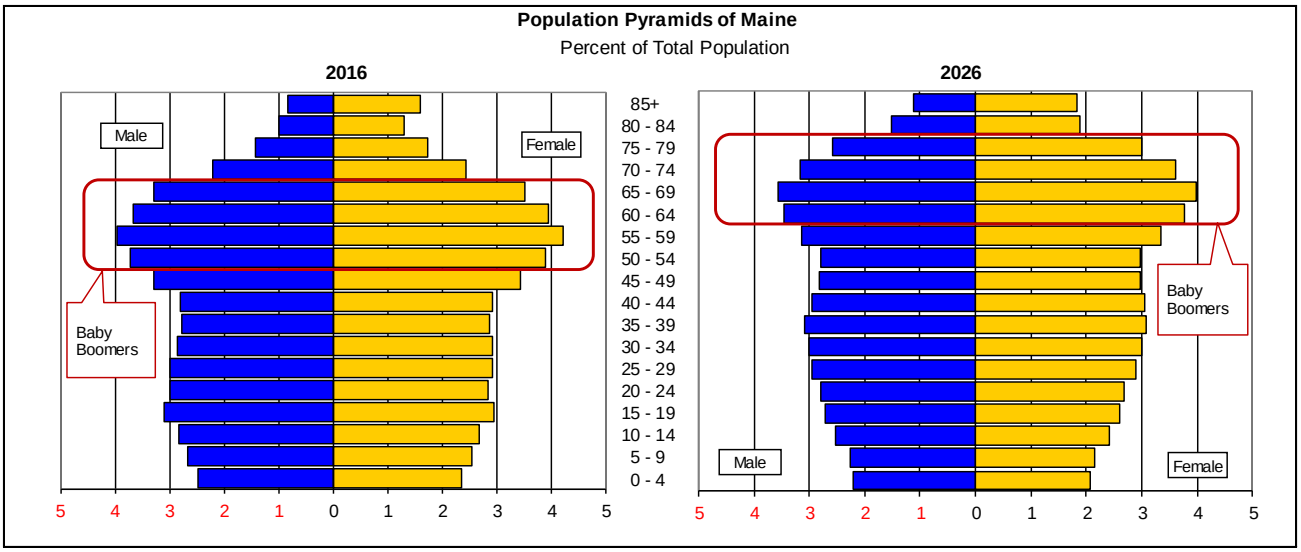
Waldo	39,425	39,797	39,994
Washington	31,566	31,172	30,723
York	202,223	208,062	213,437

Maine County Total Population – Five-Year Percent Change			
	2016-2021	2021-2026	2016-2026
Androscoggin	1%	1%	1%
Aroostook	0%	0%	-1%
Cumberland	1%	1%	3%
Franklin	0%	0%	0%
Hancock	0%	0%	1%
Kennebec	-1%	0%	-1%
Knox	-1%	-1%	-1%
Lincoln	-4%	-3%	-7%
Oxford	-2%	-2%	-3%
Penobscot	0%	0%	1%
Piscataquis	-6%	-6%	-11%
Sagadahoc	0%	0%	0%
Somerset	-3%	-3%	-5%
Waldo	1%	1%	1%
Washington	-1%	-1%	-3%
York	3%	3%	6%

Again, these projections are based on recent trends: should migration rates or birth rates improve, population growth would also improve, and revised projections would reflect these improvements.

Population by age

By 2026, the Baby Boomers will be between 62 and 80 years old and will comprise around 24% of Maine's population. The population pyramids below compare the 2016 population with the 2026 population projection. As the Baby Boomers continue to age, the population pyramid will become increasingly top-heavy, with a larger share of the population over the age of 65 and a smaller share of the population under the age of 18. In addition, because women statistically live longer than men, Maine's female-to-male ratio will gradually increase over time.



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Maine Statewide Population by Age				
	2016 (historical)	**2021**	**2026**	**2016-2026**
Age 0-19 years	287,581	265,943	253,938	
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Age 65+ years	257,499	307,257	351,880	
Five-Year Percent Change				
Percent Change 0-19		-8%	-5%	-12%
Percent Change 20-39		2%	0%	2%
Percent Change 40-64		-6%	-6%	-12%
Percent Change 65+		19%	15%	37%

City and town population

City/town projections by necessity use a different, less robust methodology due to a lack of detailed source data. They are calculated by estimating a constant rate of growth for each town's share of their county population between 2010 and 2016 and then extrapolating this growth into the future. This can create some counterintuitive results. Towns with historical population growth in counties that are projected to grow may have projected population declines if that town's share of the county population has been declining (that is, if the other towns in the county have been growing faster than the town in question). City/town projections should be used with caution, particularly in situations where the results seem unlikely.

One-third of the cities and towns in Maine are projected to see population increase between 2016 and 2026. 173 of the 522 cities/towns are projected to see positive population change, ranging from 0.1 percent to 24 percent growth. Three towns are projected to see no change from 2016 to 2026. The remaining 346 cities/towns are projected to see population declines, ranging from -0.1 percent to -14 percent.

Most of the cities/towns projected to grow in the coming years are in the counties projected to see population growth. In York County, all of the constituent cities/towns are projected to increase. On the other end, two counties are projected to have no cities/towns with population increases from 2016 to 2026: Lincoln and Piscataquis. This is a reflection of the underlying demographics of these counties – these are the two counties with the oldest median ages in the state.

Maine's five largest cities (Portland, Lewiston, Bangor, South Portland, and Auburn) are projected to remain the five largest cities in 2026. Only South Portland and Auburn are projected to see population growth over the 2016 to 2026 time period. Keep in mind that the projections are based on the changing share of the county population, so even though Portland has been growing recently and Cumberland County is projected to see growth from 2016 to 2026, Portland's share of Cumberland County population has been shrinking, leading to the projected decline. However, as described earlier, city/town projections should be viewed with caution and used in conjunction with local knowledge, as the methodology used here is not as refined as that for the counties and state.

Population in Maine's Five Largest Cities				
	2016 (historical)	2021	2026	2016-2026
Portland	66,892	66,588	66,252	
Lewiston	36,136	36,088	36,016	
Bangor	31,908	31,563	31,138	
South Portland	25,513	25,699	25,825	
Auburn	22,969	23,105	23,248	
Five-Year Percent Change				
Portland		0%	-1%	-1%
Lewiston		0%	0%	0%
Bangor		-1%	-1%	-2%
South Portland		1%	0%	1%
Auburn		1%	1%	1%

CONCLUSION

While Maine's population continues to age more rapidly than the U.S. as a whole, recent gains in net domestic migration have led to improvements in the overall population projections. However, we must not become complacent; we need to continue to pursue policies and opportunities that will continue to attract young people and businesses to the state. Population growth is key to economic growth, and Maine will need to continue attracting residents and businesses to the state in the coming years as the Baby Boom generation retires. Just as workers seek out employment opportunities, employers seek out markets with available workforce. Both sides of the equation are needed for an economy to thrive. Continued improvements in migration rates and population growth will lead to improvements in demographic projections and the economy at large.

APPENDIX: METHODOLOGY AND CAVEATS

While this report focuses on the near-term population projections (out to 2026), spreadsheets with projections out to 2036 are available for those needing longer projection periods. Use these out-year projections with caution as the further out the projections look, the less accurate they become.

Populations are projected for 2021 through 2036 in five-year intervals and are given for five-year age cohorts by sex for counties and the state while city and town projections are for total population only.

It is important to note that the projections presented here are not exact. Any estimation errors in recent population estimates will be incorporated into future projections. The county-level model assumes that past birth, death, college enrollment, and migration rates within each cohort will persist into the foreseeable future. The model cannot account for unprecedented future events that may dramatically alter a county's demographic composition, such as large factory openings and closures, or changes in technologies, personal choices, or environmental conditions in the next 20 years that may alter migration behavior or birth and death rates. As such, population projections are more accurate for the near future than distant years.

Population projections rely on the continuation of recent trends. While they provide a forward-looking estimate of the population, they are not a prediction of future population. Projections must be updated regularly to reflect changing historical trends and new data points.

Methodology

The county projections are the basis for the state projections. The methodology used for the county projections is the cohort-component method. This widely-used methodology utilizes births, deaths, and migrations to advance each age-sex cohort through the projection period. It allows for specific survival and migration rates to be calculated for each age-sex cohort. Using this methodology provides a detailed projection of the county population.

As with any projections, these are only an estimate of one possible scenario. While the best data and methodology available at the time are used, there are many factors that could change the projections. These projections are based on past trends of birth, survival, college enrollment, and migration rates. The projections do not take into account any future changes in these rates. In addition, life expectancy is held constant during the projection time period.

The population is divided into 18 age cohorts: 17 five-year cohorts, beginning with 0-4 and continuing through 80-84, and one open-ended cohort, 85+. When divided among males and females, this gives a total of 36 age-sex cohorts. Because the cohorts are in five-year intervals, it is necessary to advance the projections five years at a time. The population of 20-24 year olds in 2016 will be 25-29 in 2021. These projections go out to 2036, for four projection data points (2021, 2026, 2031, and 2036).

There were several key inputs to the county projections: the number of births by the age of the mother for each year from 2006 to 2016; the number of deaths by age and sex for each year from

2006 to 2016; the population estimate by age and sex as of July 1 of each year from 2006 to 2016; college enrollment by age and sex for 2016; U.S. population projections for 2021, 2026, 2031, and 2036; and graduate degrees awarded for 2016. The births and deaths data came from the Office of Data, Research, and Vital Statistics in the Maine Department of Health and Human Services while the population estimates and projections came from the U.S. Census Bureau. College enrollment and graduate degrees awarded came from the National Center for Education Statistics.

The first step in the process involved calculating the college population. This population remains relatively static from year to year and is not subject to the same aging and migration patterns as the non-college population. As such, this population is essentially removed at the beginning of the process and then added back in after migration and aging has been completed for each cohort. Note that six counties (Knox, Lincoln, Oxford, Piscataquis, Sagadahoc, and Somerset) do not have any significant secondary education presence and so the college population for these counties is zero. Three counties have graduate student populations (Cumberland, Penobscot, and York).

The institution-based college enrollment figures from the National Center for Education Statistics are used to estimate the county-based college population in 2016. For the 2021, 2026, 2031, and 2036 college populations, shares of the 2016 U.S. population are calculated and then applied to the U.S. projections by age/sex cohort for 2021, 2026, 2031, and 2036.

The operational birth rate for females in each age cohort is calculated as the five-year average birth rate from 2012-2016, multiplied by five and averaged between the current and the next age cohort. This averaging is done because the average female can expect to spend half of the next five years in her current age cohort and half of the next five years in the next age cohort. For example, the operational birth rate for 25-29 year olds is the average of the 25-29 five-year rate and the 30-34 five-year rate.

Operational survival rates are calculated for each age-sex cohort. The average survival rate for each cohort is calculated as the average number of deaths from 2012 to 2016 divided by the 2014 cohort population and then subtracted from one. To get the five-year rate, the average survival rate is raised to the fifth power: mortality being a permanent condition, the probability of surviving more than one year compounds exponentially. As with the birth rates, survival rates are averaged across the current and the subsequent age cohorts. For example, the operational survival rate for 65-69 year olds is the 65-69 five-year rate raised to the 0.5 power multiplied by the 70-74 five-year rate raised to the 0.5 power.

The oldest and youngest age cohorts are treated somewhat differently. For the youngest age cohort, 0-4 year olds, the operational survival rate is simply the one-year survival rate raised to the 2.5 power. For the oldest age cohort, 85 and older, the operational survival rate is simply the five-year survival rate because there is no further age cohort for them to age into.

Migration is the most complicated element of the projections. Out-migration and in-migration are calculated separately and applied to different populations to obtain the migration rates.

The out-migration and in-migration rates use the 2016 5-year estimates of movers to and from counties produced by the U.S. Census Bureau as part of the American Community Survey. For each

cohort, the total preliminary number of out-migrants is multiplied by five to get the number for five years, multiplied by the percentage of total outmigrants that were male/female, and divided by the estimated total number living in the county one year ago. This is the preliminary out-migration rate. The 2016 total population of each age cohort is multiplied by the preliminary out-migration rate to get the estimated number of out-migrants for each cohort.

For the outgoing college-age cohorts (20-24, 25-29, 30-34), a separate non-college outmigration rate is calculated. An estimate of first-year college students from outside of each county is calculated using enrollment data from the National Center for Education Statistics. This is multiplied by 75% for 20-24 year olds and 25% for 25-29 year olds, and then multiplied by the percent of male/female out-migrants before being subtracted from the original (total) out-migration. For the three counties with significant graduate student populations (Cumberland, Penobscot, and York), 5% of the graduate degrees awarded in 2016 were also subtracted out from the 25-29 and 30-34 age cohorts. These non-college outmigration numbers are then multiplied by five and divided by the estimated total number living in the county one year ago.

Adjustments are made to the 15-19, 75-79, 80-84, and 85+ age cohorts to account for the fact that the ages in the geographic mobility tables are not an exact match for the age cohorts used throughout the projections.

In-migration is calculated in a similar manner. For each age cohort, the number currently living in the county who were living abroad, moved from a different state, or moved from a different county from one year ago were summed to obtain the total preliminary number of in-migrants. This was then multiplied by the percent of female/male in-migrants and multiplied by five (for a five-year period) before being divided by the estimated total number currently living in the county. For the incoming college-age populations (18-19, 20-24, 25-29), a separate non-college in-migration rate was calculated. For 18-19 year olds, 75% (85% for Penobscot County) of the out-of-county first-year college population was subtracted from the original in-migration number and then multiplied by the percent of female/male in-migrants. For 20-24 year olds, 25% (50% for Penobscot County) of the out-of-county first-year college students were subtracted from the original in-migration, then multiplied by the percent of female/male in-migrants. For the three counties with significant graduate student populations, 5% of the female/male graduate degrees awarded in 2016 were also subtracted out from the 20-24 year olds. For 25-29 year olds in those three counties, 5% of the female/male graduate degrees awarded in 2016 were subtracted from the original in-migration. These non-college in-migration figures are then multiplied by five and divided by the estimated total number currently living in the county.

Similar adjustments are made to the 15-19, 75-79, 80-84, and 85+ age cohorts to account for differences in age groupings between data sets.

The migration rates operate on the concept of "at risk" populations. In each case, the population at risk of migrating is identified and used as the basis for migration rates. To calculate the population at-risk of migration, the number of in-migrants is subtracted from the 2016 cohort population and the number of outmigrants is added. For counties with college populations, half of the current age cohort college population and half of the subsequent age cohort population are subtracted. The outmigration

rate is calculated by dividing the number of outmigrants by the survived population at-risk for both the current and the subsequent cohorts and averaging the two.

Since the entire U.S. population is at-risk of in-migration, the 2016 cohort population for the U.S. is used to calculate in-migration. From this the population at-risk of migration for the county is subtracted (since they were already living in the county, they cannot be at-risk of moving into the county). The number of in-migrants is divided by the rest-of-nation population at-risk for both the current and the subsequent cohorts and the two are averaged to get the in-migration rate.

The survived population for 2021 is calculated by multiplying the 2016 population for each cohort (in counties with colleges, half the college population in the current cohort and half the college population in the subsequent cohort are subtracted from the 2016 population) by the corresponding operational survival rate. The number of stayers in the county is calculated by multiplying the survived population by one minus the outmigration rate. The number of outmigrants is calculated by subtracting the stayers in the county for 2016-2021 from the survived population for 2021.

Next the 2021 survived county population is subtracted from the 2021 cohort population from the U.S. Census Bureau's national population projections (for counties with college populations, half of the current cohort of the 2021 national college population and half of the subsequent cohort are also subtracted). The result is multiplied by the in-migration rate to get the number of in-migrants. This number is added to the stayers in county 2016-2021 to get the 2021 population. Keep in mind that this is the population of the next age cohort for 2021. People who were 20-24 in 2016 are 25-29 in 2021. For the counties with college-age populations, half of the current cohort college population and half of the previous cohort college population are added back in, except in Penobscot County where the addition is half of the current cohort population and half of the subsequent cohort college population.

For the oldest cohort, the calculated 2021 population for the oldest and next-oldest age cohorts are added together. The 85+ cohort contains those who were 85+ in the previous period as well as those who were 80-84 and have aged into the 85+ cohort.

The youngest cohort, those born during the 5-year period, is more complicated to project. The 2021 survived non-college population is subtracted from the 2016 non-college population to get the number of deaths in each cohort. The population at risk of giving birth is calculated by adding the stayers in county 2016-2021 to the in-migrants and half of the deaths during the period. This figure is then multiplied by the operational birth rate to get the number of births to each age cohort of mothers. The births across all cohorts are summed and multiplied by the ten-year average percentage of the 0-4 population that is female/male to get the number of female/male births. Each of these are multiplied by the respective operational survival rates to get the 2021 0-4 cohort population. Note that migration is addressed through the mothers' movements.

State-level projections were obtained by adding together the county projections.

City and town population projections were calculated using two pieces of information: the recent historical growth of each town's share of its county's population and county population projections.

The projections use linear regression analysis to estimate a constant rate of growth for each town's share of their county population between 2010 and 2016. This growth rate is then extrapolated into the future, using county population projections to project the population for each town in 2021, 2026, 2031, and 2036.

This method produces some results that may seem counterintuitive. For example, some towns may be projected to shrink between 2016 and 2021, even though they showed historical population growth and the county is expected to grow from 2016 to 2021. Keep in mind that the population projections for the town are based on changes in its share of the county's population. The town's share of the county population may be declining even though the town and the county have both been growing in population. The town population projections thus rest on the assumption (among many others, including those upon which the county population projections are based) that relative growth rates of towns in a given county will continue into the future.