



MAINE POPULATION OUTLOOK 2020 to 2030

JUNE 2023

Office of the State Economist

Maine Department of Administrative and Financial Services

Executive Summary

The Office of the 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.

Demographics are a key element of understanding the functions of an economy. 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. Understanding demographics can tell us about the makeup of the labor force, what the demand for a new product might be, or about where to start a new business. 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 April 2021. Although they cover different years, they replace the previous set of projections, which are now considered outdated and should no longer be used.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 likely to be more accurate than projections of the distant future as trends tend to change more significantly the further out we look.

The new projections were complicated by impacts of the COVID-19 pandemic. The “base year” for the projections is 2020, but in order to best reflect recent trends and exclude one-time impacts from the pandemic, some adjustments were made to the methodology. Specifically, migration rates were calculated using pre-pandemic trends for 2015-2019 and applied to 2021 population estimates. This allowed the projections to incorporate the one-time migration impacts from the pandemic in 2021 without carrying that higher migration rate forward indefinitely.

Results

Maine’s population is projected to increase from 1,362,280 in 2020 to 1,374,728 in 2025, and further increase to 1,397,663 in 2030. Thirteen counties are projected to see population increases from 2020 to 2030.

Statewide

Maine’s total population is projected to increase 0.9% from 2020 to 2025 and a further 1.7% from 2025 to 2030. Over the ten-year period, Maine’s population is projected to increase 2.6%.

Maine Statewide Population				
	2020 (historical)	2025	2030	2020-2030
Total Population	1,362,280	1,374,728	1,397,663	
Five-Year Percent Change				
Percent Change		0.9%	1.7%	2.6%

Maine’s prime working-age population (age 20-64) is projected to decrease by 5.3% from 2020 to 2030, as the Baby Boom generation continues to age out of the cohort. In 2020, this generation was between 56-74 years old. In 2030, the youngest baby boomers will be 66 years old, while the oldest among them will be 84 years old. If just the young working-age population (20-39) is considered, this group will decline by only 2.0% from 2020 to 2030. Meanwhile, the age 65 and older cohort is expected to see growth of 36.2% from 2020 to 2030 as the youngest baby boomers age into this cohort.

Maine Statewide Population by Age			
	2020 (historical)	2025	2030
Age 0-19 years	286,218	264,935	258,901
Age 20-39 years	320,309	325,242	313,804
Age 40-64 years	466,899	444,771	431,560
Age 65+ years	288,854	339,780	393,399

Percent Change in Population			
	2020-2025	2025-2030	2020-2030
Age 0-19 years	-7.4%	-2.3%	-9.5%
Age 20-39 years	1.5%	-3.5%	-2.0%
Age 40-64 years	-4.7%	-3.0%	-7.6%
Age 65+ years	17.6%	15.8%	36.2%

Counties

Thirteen counties are expected to gain population cumulatively from 2020-2030. From 2020-2030, Washington County is projected to see the greatest rate of population growth, 8.0%, ahead of Waldo, 7.0% and York, 6.5%. Three counties are projected to decline from 2020-2030, with the largest percentage losses expected in Piscataquis (-5.0%).

Maine County Total Population				Percent Change in Population			
	2020 (historical)	2025	2030		2020-2025	2025-2030	2020-2030
Androscoggin	111,039	111,250	113,477	Androscoggin	0.2%	2.0%	2.2%
Aroostook	66,994	66,602	66,937	Aroostook	-0.6%	0.5%	-0.1%
Cumberland	303,312	304,451	308,124	Cumberland	0.4%	1.2%	1.6%
Franklin	29,418	29,330	29,603	Franklin	-0.3%	0.9%	0.6%
Hancock	55,460	56,140	56,707	Hancock	1.2%	1.0%	2.2%
Kennebec	123,754	126,211	130,259	Kennebec	2.0%	3.2%	5.3%
Knox	40,609	40,944	41,130	Knox	0.8%	0.5%	1.3%
Lincoln	35,192	35,361	35,364	Lincoln	0.5%	0.0%	0.5%
Oxford	57,849	58,121	58,321	Oxford	0.5%	0.3%	0.8%
Penobscot	152,007	152,059	153,327	Penobscot	0.0%	0.8%	0.9%
Piscataquis	16,768	16,424	15,935	Piscataquis	-2.0%	-3.0%	-5.0%
Sagadahoc	36,688	36,794	36,921	Sagadahoc	0.3%	0.3%	0.6%
Somerset	50,404	49,889	49,781	Somerset	-1.0%	-0.2%	-1.2%
Waldo	39,635	40,843	42,405	Waldo	3.0%	3.8%	7.0%
Washington	31,062	32,099	33,555	Washington	3.3%	4.5%	8.0%
York	212,089	218,208	225,816	York	2.9%	3.5%	6.5%

Background

Population is a crucial component of understanding economic growth. As we witnessed during the pandemic, an economy cannot function without its people. Looking to the future, understanding the process of older generations aging out of and younger generations aging into the workforce provides critical insight into who will be available to fill jobs, start new businesses, and consume the next generation of products and services.

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 their future. These projections incorporate one-time migration effects from the COVID-19 pandemic without carrying the higher rate forward indefinitely by applying pre-pandemic (2015-2019) rates to 2021 population estimates. However, caution should be used in interpreting these projections as the full extent of the demographic impacts from COVID-19 is still being explored.

What are demographics?

Demographics are the characteristics that describe a population – not just the “how many” but also the “who.” This includes more detailed information like how old a population is or what its racial and ethnic distribution is, for example. These descriptive characteristics such as age, sex, race, and ethnicity are all elements of the whole picture.

Maine’s demographics are similar to those of Vermont and New Hampshire, but quite different from the nation. The chart below compares the demographics of Maine to its Northern New England neighbors (Vermont and New Hampshire), its Southern New England neighbors (Massachusetts, Connecticut, and Rhode Island) and the United States. Maine compares closely to the rest of Northern New England in its age structure and levels of diversity. There are more pronounced differences when comparing to Southern New England and the United States, which are home to younger and more diverse populations.

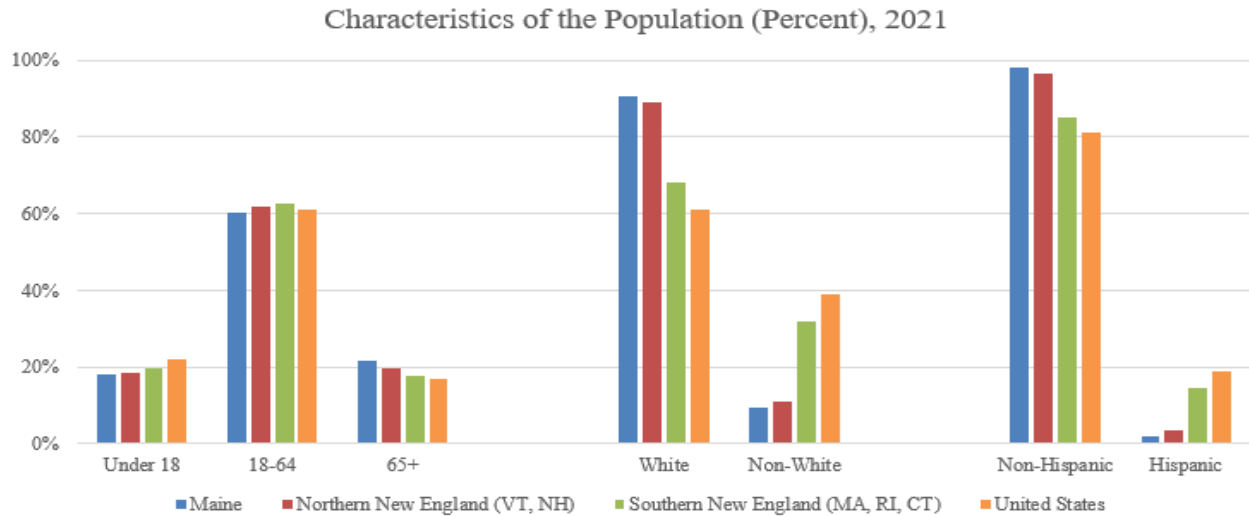


Figure 1. Demographics across regions
 Source: U.S. Census Bureau, American Community Survey 1-Year Estimates

Maine’s generational structure

As a percentage of the population, the Baby Boom generation is by far the largest in Maine, at 27.8 percent. In 2021 this generation ranged from 57 to 75 years old, but by the end of 2030 will be 66 to 84 years old as they fully age out of the traditional definition of the working age population (20-64 years old). Nationally, just 22.5 percent of the population is part of the Baby Boom generation, similar to the share of Millennials and slightly higher than Gen X and Gen Z.

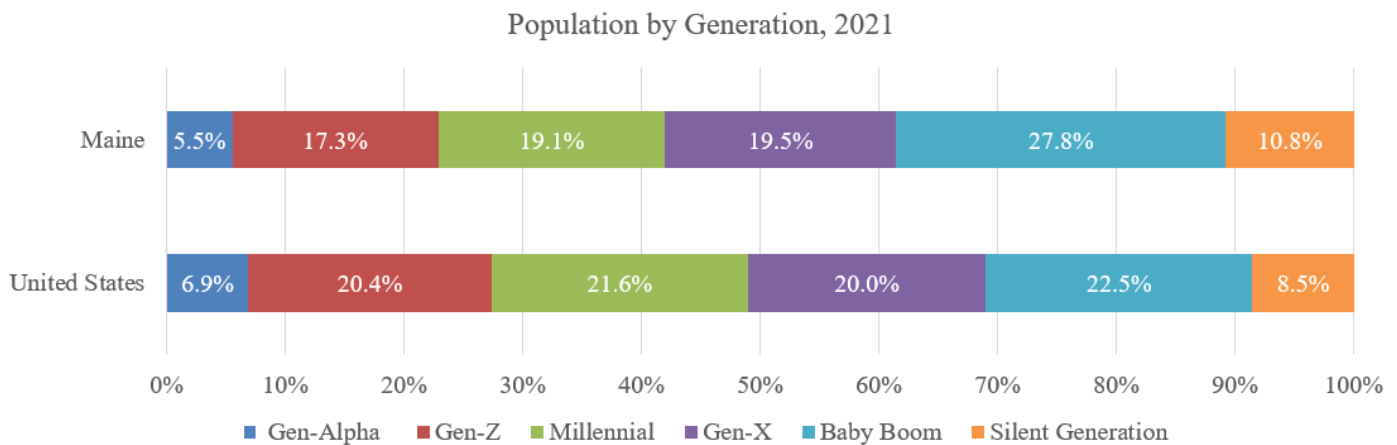


Figure 2. Generational distribution in Maine and the U.S.
 Source: U.S. Census Bureau, Population Estimates Program

The size of the Baby Boom generation has significant implications for Maine’s economy. One of the most prominent impacts is their participation in the labor force, which saw substantial increases from the late 1960s through 1990. During this time, multiple sources contributed to a surge in the

labor force: Baby Boomers entered their prime working age years, and women entered the labor force at higher rates, with labor force participation of women growing from 37.8% in 1960 to 57.5% in 1990¹. However, in the last decade, Baby Boomers have begun to retire from the labor force. With fewer workers in younger generations to fill their shoes, the labor force leveled out starting in 2005 and has declined in more recent years.

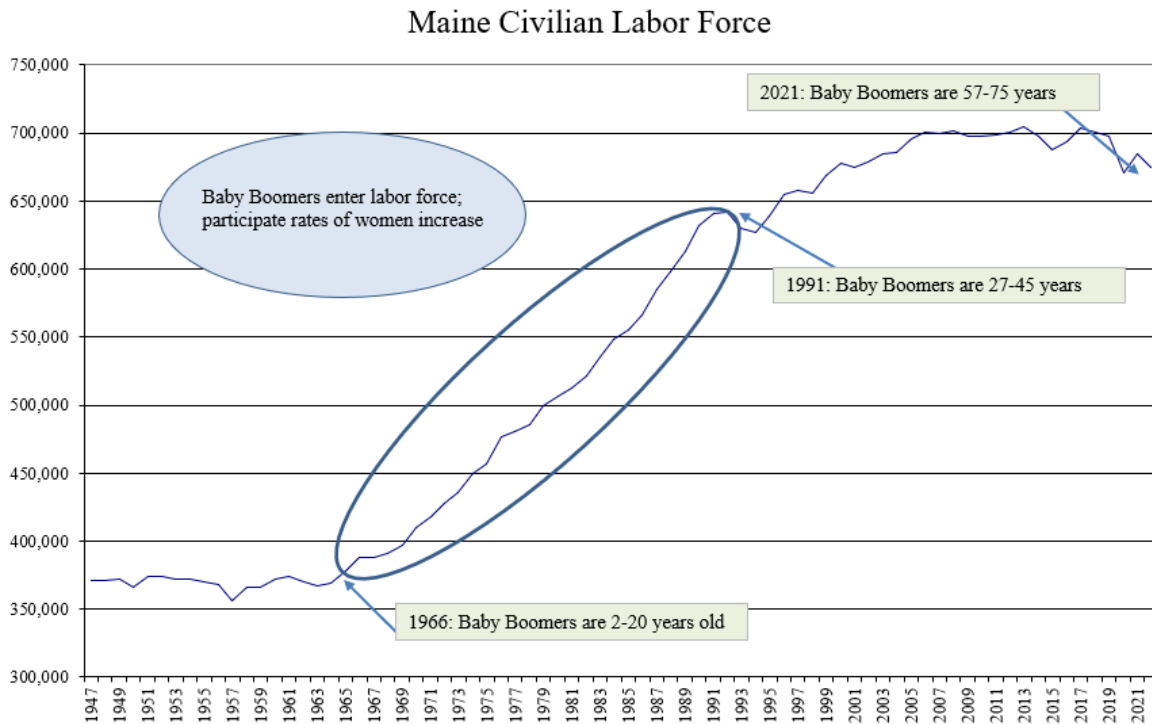


Figure 3. The Baby Boom generation’s impact on Maine’s labor force
 Source: Maine Department of Labor

From 2020-2030, the further aging of this generation will continue to impact Maine’s labor force as many continue to retire. Since their successors make a smaller share of the population, labor constraints are likely to be felt in the coming years.

These dynamics impact future demographic trends within the state in two major ways: first, by increasing Maine’s median age, and second, by leading to natural population decline. Due to the sheer size of the Baby Boom generation, the aging of the cohort will naturally raise Maine’s median age, barring the migration into the state of younger populations. This trend has been happening nationwide. Along with this aging comes the second major impact, which is natural population decline. As Baby Boomers have aged out of their childbearing years, the number of deaths each year exceeds the number of births each year. This is a reversal of what happened when Baby Boomers were in childbearing years, when births far outnumbered deaths.

¹ Source: U.S. Bureau of Labor Statistics, accessed through fred.stlouisfed.org (Series LNS11300002)

In this case, Maine’s population can only grow through in-migration. Since 2016, Maine has seen net domestic migration accelerate, with over 15 thousand people moving in from other states in 2021. Strong in-migration has contributed to improved population projections and will have a positive impact on Maine’s economy in the future.

Components of population change

There are three components of population change: births, deaths, and net migration (domestic and international). Recent population estimates for 2021 and 2022 provide some additional detail, but keep in mind that the projections released with this report do not include any data from 2022. In 2021, Maine had the largest percentage of its population aged 65+ of any state in the nation. As this cohort ages, the rate of total deaths per 1,000 population in Maine will naturally increase. Conversely, the birth rate per 1,000 population both nationally and in Maine has seen consistent decline in recent decades, though Maine’s birth rate has been lower than the nation’s for many years. This might be due to both the state’s older population as well as its relatively homogenous population; the white non-Hispanic birth rate tends to be somewhat lower than other racial and ethnic groups.

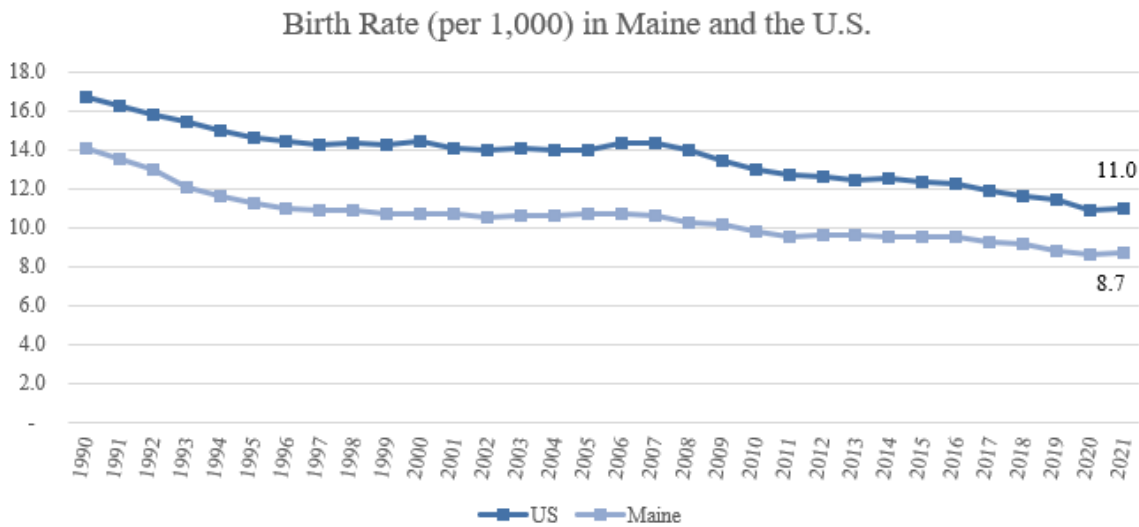


Figure 4. Birth rates in Maine and the U.S.
 Source: Maine CDC, Vital Statistics and Population Estimates Program

As previously mentioned, the combination of increasing deaths and decreasing births has led to natural population decline, meaning the state has had more deaths than births in recent years. Maine is one of twenty-four states that had natural population decline in 2022. In New England, only Connecticut and Massachusetts had positive natural change (more births than deaths).

Despite a natural population decrease of 4,520, Maine’s population managed to increase by over 13,000 people in 2021. Maine’s population growth has accelerated in recent years as the final component of population has improved: net migration. Net migration is defined as the total number

of people who moved to the state, either from other states (domestic in-migration) or other nations (international in-migration) minus the number of people who moved out of the state. Net migration has been ticking up since 2016. Where data for the first half of the last decade showed net negative or neutral migration, the past six years have seen an accelerating influx of new residents to the state.

Overall, net migration has been the driving force of Maine’s population growth in recent years. Its consistent and continued improvement since the previous set of projections has contributed to stronger growth projections in this update.

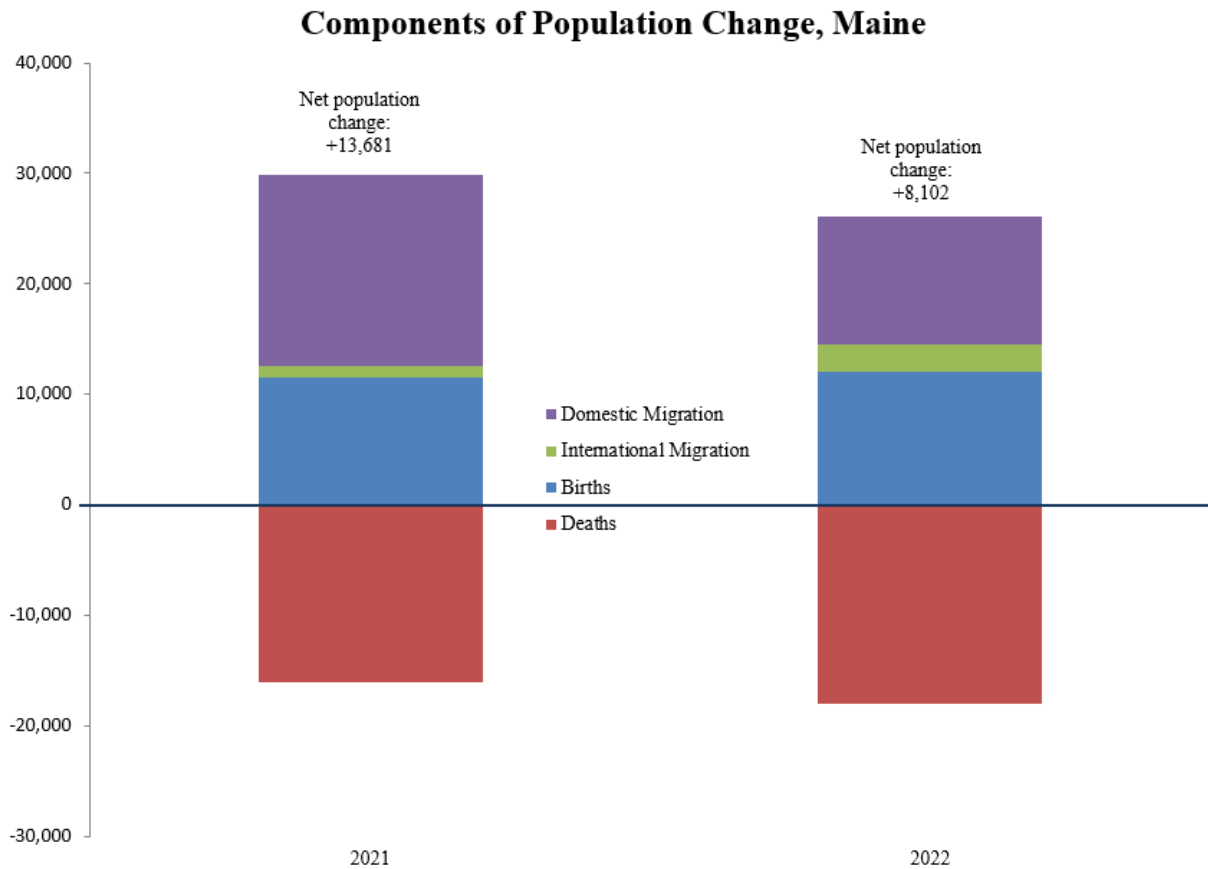


Figure 5. Components of population change in Maine, 2021 – 2022
 Source: U.S. Census Bureau, Population Estimates Program

Implications

Population growth and the demographic composition of a region have myriad impacts on its economy. An influx of working-age population tends to lead to better job growth as businesses have a larger pool of qualified workers to draw from. However, disproportionate population growth can have negative effects on a region. For example, some parts of the state may grow too fast – that is to say, faster than their infrastructure capabilities allow. This may lead to lack of affordable housing, traffic congestion, and reduced quality of public services. At the same time,

some areas may see their populations decline. These dynamics make a careful understanding of a region's population change critical to providing for its residents.

Maine's age structure poses some challenges for the state. As many members of the Baby Boom generation retire from the workforce, there are fewer workers to fill their jobs. This can be problematic for business and job development. Additionally, these dynamics put stress on what is called the "old-age dependency ratio" for Maine: this means that for each person aged 65+, there are increasingly fewer people of working age for them to depend on. We have begun to see the implications of this and will continue to in the future: shortages of nurses and critical healthcare workers, challenges for working-age adults who are caregivers, and stress on pension and Social Security systems. The onset of COVID-19 in early 2020 brought these challenges to the forefront as Maine grappled not only with the public health implications of a large population of older adults, but also with the impact to the labor force as many who were nearing retirement age decided to leave the labor force earlier than expected to protect their health. There are opportunities, too, as older adults can bring a wealth of experiences to the workplace if businesses are able to keep them engaged beyond traditional retirement age.

For Maine to move forward with economic growth, it must continue to attract and embrace immigration, both international and domestic, and welcome diverse populations. Currently, Maine is the least diverse state in the United States, with 92.2% of the population identifying as white alone, not Hispanic. However, from 2021-2022, 61% of the state's 8,000+ population gain came from populations other than white, non-Hispanic. To be successful, Maine must not only welcome racially and ethnically diverse communities to the state, but also work consistently to make its economy more equitable and inclusive for these populations.

COVID-19: impacts and challenges for forecasting

The COVID-19 pandemic added an extra layer of complications to this set of projections. The pandemic resulted in significant short-term changes to migration as well as birth and mortality rates. For example, the way labor markets interact with geographic boundaries changed as the rapid and widespread implementation of remote work made it possible for many workers, particularly those in middle- and high-wage jobs, to work from anywhere. Maine's lower population density may have been attractive to urban dwellers throughout the height of the pandemic, as it posed less risk than crowded city centers, resulting in a substantial increase in migration to Maine in 2021 and, to a lesser extent, in 2022. While migration patterns generally change gradually over time, the COVID-19 pandemic appears to have led to a sudden, drastic change in migration patterns. However, that change may have been more of a one-time impact than a long-term shift. Future projections will incorporate any additional information available at the time about post-COVID-19 migration trends.

The "base year" for the projections is 2020, but in order to best reflect recent trends and exclude one-time impacts from the pandemic, some adjustments were made to the methodology. Specifically, migration rates were calculated using pre-pandemic trends for 2015-2019 and applied to 2021 population estimates. This allowed the projections to incorporate the one-time migration impacts from the pandemic in 2021 without carrying that higher migration rate forward indefinitely.

Projections

Total Population

The Office of the State Economist has prepared population projections for the state, counties, and cities/towns. Populations are projected for 2025 and 2030, with additional projections out to 2040 available, and replace the previous set of projections issued in April 2021. 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 the data inputs, including recent population estimates, will be incorporated into this and future projections. The county-level model assumes that past birth, death, 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 a pandemic 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.

Most importantly, note that some adjustments were made to the methodology to account for migration impacts from the COVID-19 pandemic. Specifically, migration rates were calculated using pre-pandemic trends for 2015-2019 and applied to 2021 population estimates. This allowed the projections to incorporate the one-time migration impacts from the pandemic in 2021 without carrying that higher migration rate forward indefinitely.

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 is provided in the appendix to this report.

Statewide

Maine’s total population is projected to increase 2.6% for the decade between 2020 and 2030, with 0.9% growth in the first half and 1.7% in the second. This projection forecasts Maine’s population to be 1,397,663 in 2030.

Table 1 Maine's total population and projected change

Maine Statewide Population				
	2020 (historical)	2025	2030	2020-2030
Total Population	1,362,280	1,374,728	1,397,663	
Five-Year Percent Change				
Percent Change		0.9%	1.7%	2.6%

Counties

Twelve of Maine’s 16 counties are projected to see population increases from 2020-2025 and fourteen are expected to see increase from 2025-2030. Overall, thirteen counties are expected to see population increases from 2020-2030 cumulatively.

Washington County is expected to see the largest percentage gain over the ten-year period, 8.0%, followed by Waldo County at 7.0% and York County at 6.5%. Conversely, Piscataquis County’s population is projected to decline by 5.0%, the largest percentage decline of any county.

Again, these projections are based on recent historical trends: any major changes to migration rates or birth/mortality rates will be reflected in future revisions to the population projections.

Table 2. Maine population projections by county

Maine County Total Population				Percent Change in Population			
	2020 (historical)	2025	2030		2020-2025	2025-2030	2020-2030
Androscoggin	111,039	111,250	113,477	Androscoggin	0.2%	2.0%	2.2%
Aroostook	66,994	66,602	66,937	Aroostook	-0.6%	0.5%	-0.1%
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Piscataquis	16,768	16,424	15,935	Piscataquis	-2.0%	-3.0%	-5.0%
Sagadahoc	36,688	36,794	36,921	Sagadahoc	0.3%	0.3%	0.6%
Somerset	50,404	49,889	49,781	Somerset	-1.0%	-0.2%	-1.2%
Waldo	39,635	40,843	42,405	Waldo	3.0%	3.8%	7.0%
Washington	31,062	32,099	33,555	Washington	3.3%	4.5%	8.0%
York	212,089	218,208	225,816	York	2.9%	3.5%	6.5%

Population by Age

In the next ten years, the generational makeup of Maine’s workforce will undergo significant change. In 2030, all of the Baby Boom generation will have aged out of the traditionally defined working-age population (20-64 years old). At this point, Millennials and Gen Z will make up the majority of Maine’s working-age population, as workers in Gen X begin to approach retirement age.

As Baby Boomers continue to age, the population pyramid will continue to appear top-heavy as the share of the population 65+ grows while the share of the population under age 18 contracts. Additionally, Maine’s female-to-male ratio will gradually increase over time as women statistically live longer than men.

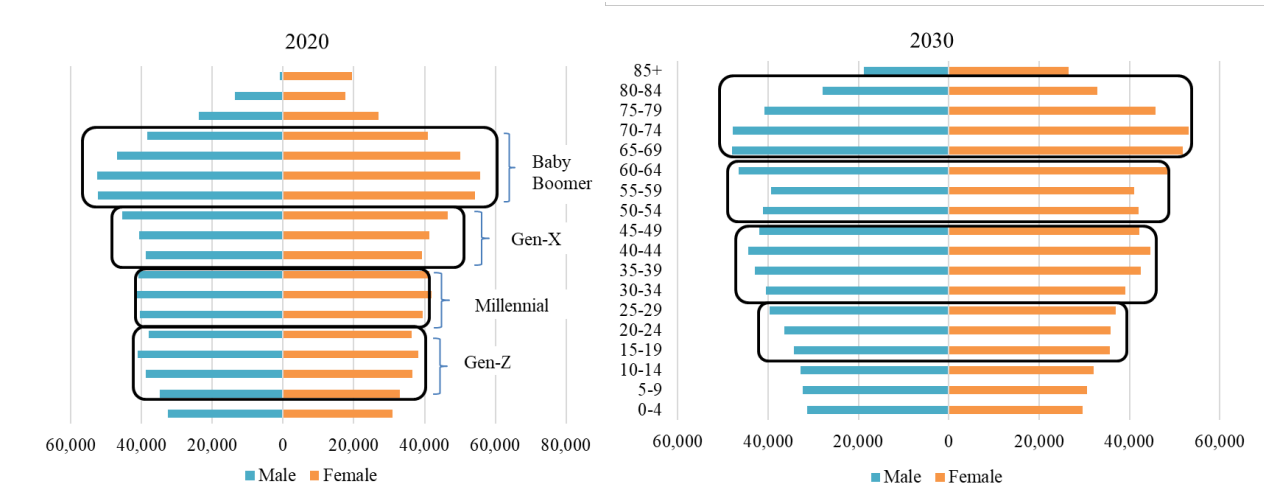


Figure 6. Population pyramids for 2020 and 2030

Note: The years used to define Millennial, Gen Z, and Gen Alpha are not universally agreed upon and are subject to substantial change. The years used in this analysis are based on the best information available at the time of writing, primarily from the Census Bureau and Pew Research Center.

Maine’s working-age population will continue to decline by 5.3% from 2020-2030, including the aging-out of Baby Boomers, who will be 66-84 years old in 2030. Both the young working-age (20-39) and older working-age (40-64) cohorts are also expected to decline during this period, by 2% and 7.6%, respectively. Conversely, Maine’s 65+ population is expected to grow by 36.2% from 2020-2030.

Table 3. Maine population projections by age cohort

Maine Statewide Population by Age				Percent Change in Population			
	2020 (historical)	2025	2030	2020- 2025	2025- 2030	2020- 2030	
Age 0-19 years	286,218	264,935	258,901	-7.4%	-2.3%	-9.5%	
Age 20-39 years	320,309	325,242	313,804	1.5%	-3.5%	-2.0%	
Age 40-64 years	466,899	444,771	431,560	-4.7%	-3.0%	-7.6%	
Age 65+ years	288,854	339,780	393,399	17.6%	15.8%	36.2%	

Over time, the aging of older generations and the birth of new ones will begin to equalize the generational distribution in Maine. While the Baby Boom generation made up about 28% of Maine’s population in 2020, it will drop to just below 25% by 2030. Gen Alpha (in this analysis, defined as being born in the 17-year period from 2013-2030), the generation directly following Gen Z, is projected to grow to around 14% of the population, while Gen Z will fall to about 17% by 2030.

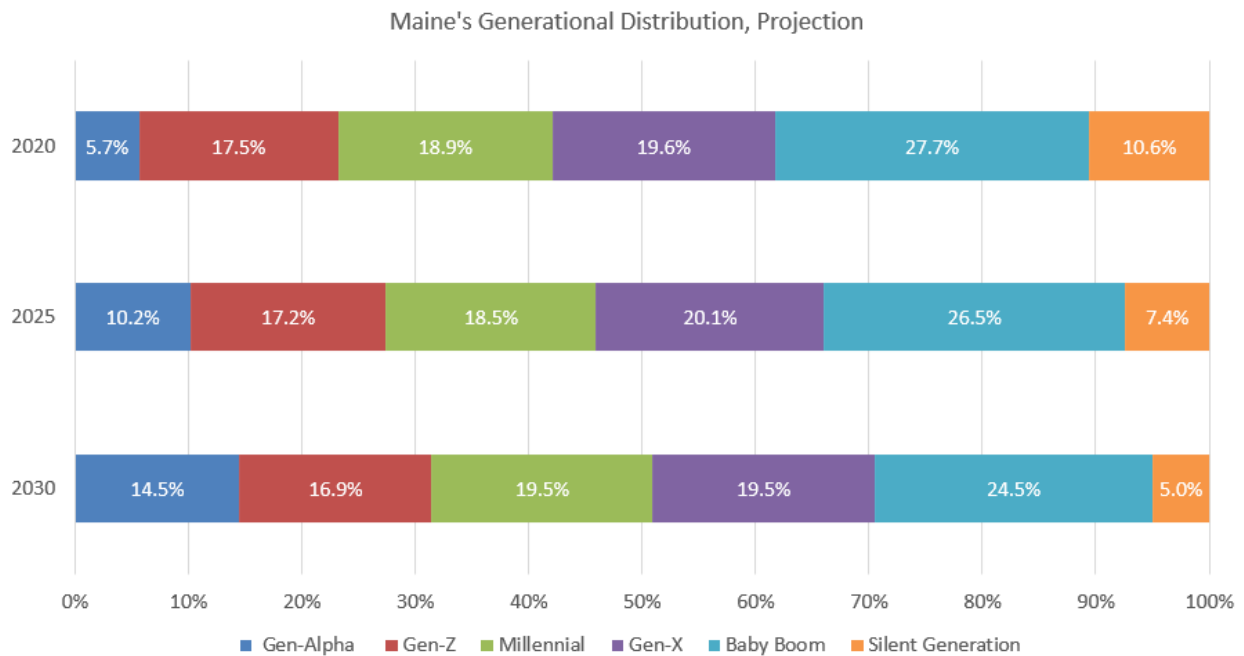


Figure 7. Maine's projected generational distribution, 2020-2030

Note: The years used to define Millennial, Gen Z, and Gen Alpha are not universally agreed upon and are subject to substantial change. The years used in this analysis are based on the best information available at the time of writing, primarily from the Census Bureau and Pew Research Center.

City and Town Population

City/town projections by necessity use a different, less robust methodology due to a lack of detailed source data. Most of the city/town projections were calculated by estimating a constant rate of growth for each town's share of their county population between 2015 and 2019 and then extrapolating this growth into the future. There were a few communities for which projections required off-model adjustments. The off-model adjustments included either: (1) using a linear regression to estimate a constant rate of growth for the town as a share of its county population between 2010 and 2019, (2) using a linear regression to estimate a constant rate of growth for the town as a share of its county population between 2017 and 2019, or (3) applying the town's share of the county population in 2020 to each year of the forecast.

In all methodologies, the emphasis is on a town's growth as a share of its county's total growth. This is necessary to ensure the town totals within a county equal the total county projection, but 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. A minimum size threshold was established for publication and any towns with total population below 10 in any year are excluded.

Fifty-eight percent of the cities and towns in Maine are projected to see population growth between 2020 and 2030. The growth rates in these 301 towns range from 0.1% to 36.7%. Nine towns are projected to see no change from 2020 to 2030. The remaining 209 cities and towns are projected to see declines ranging from -0.1% to -26.6%.

Unlike other years, where towns with projected population growth were heavily concentrated in the counties that were projected to see growth overall, the 2020 to 2030 projected growth across Maine communities is highly dispersed. For example, while Aroostook and Somerset counties are projected to see declines in population between 2020 and 2030, 49% and 24% of their towns, respectively, are expected to grow. York and Kennebec counties, which are projected to see growth overall, are projected to see growth in at least 90% of their towns.

Maine's five largest cities are projected to remain so in 2030. However, only Auburn is expected to see growth over the 10-year period. Even though Portland has seen recent growth and Cumberland County is projected to see growth from 2020 to 2030, Portland's share of Cumberland County 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 the state.

Table 4. Population projections for Maine's largest cities

Population in Maine's Five Largest Cities				
	2020 (historical)	2025	2030	2020-2030
Portland	68,408	66,825	65,536	
Lewiston	37,121	36,574	36,838	
Bangor	31,753	31,354	31,286	
South Portland	26,498	26,236	26,116	
Auburn	24,061	24,636	25,535	
Five-Year Percent Change				
Portland		-2.31%	-1.93%	-4.20%
Lewiston		-1.47%	0.72%	-0.76%
Bangor		-1.26%	-0.22%	-1.47%
South Portland		-0.99%	-0.46%	-1.44%
Auburn		2.39%	3.65%	6.13%

Conclusion

Maine's median age remains the highest in the nation, however, recent acceleration in net migration, especially among working-age individuals and children, results in overall population growth for Maine in this set of projections despite a condition of natural population decline. These projections assume a continuation of the robust in-migration seen in recent pre-pandemic years; for this to be achieved, the state must continue to attract new people and businesses to the state. Over time, Maine will need to attract younger residents to fill the shoes of its Baby Boomer retirees. Just as workers seek out employment opportunities, employers seek out markets that contain a diverse set of available workers. Both sides of this equation are necessary for our economy to thrive. However, simply attracting new people and businesses to the state is not enough to ensure the state's success in the future; Maine must also prioritize equitable access to economic opportunity for all. Maine's future growth will be driven by diversity as migration into the state increases, making demographic projections an even more important part of policy development.

Appendix: Methodology and Caveats

While this report focuses on the 10-year population projections (out to 2030), spreadsheets with projections out to 2040 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 2025 through 2040 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 the data inputs, including recent population estimates, will be incorporated into this and future projections. The county-level model assumes that past birth, death, and migration rates within each cohort will persist into the foreseeable future. The model cannot account for unprecedented future events, such as a pandemic or changes in technologies, personal choices, or environmental conditions, that may change 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. While they provide a forward-looking estimate of the population, they are not a prediction of future population.

Most importantly, note that some adjustments were made to the methodology to account for migration impacts from the COVID-19 pandemic. Specifically, migration rates were calculated using pre-pandemic trends for 2015-2019 and applied to 2021 population estimates. This allowed the projections to incorporate the one-time migration impacts from the pandemic in 2021 without carrying that higher migration rate forward indefinitely.

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 migration 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, and migration rates. The projections do not account for 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 2020 will be 25-29 in 2025. These projections go out to 2040, for four projection data points (2025, 2030, 2035, and 2040).

There were several key inputs to the county projections: the number of births by the age of the mother for each year from 2016 to 2021; the number of deaths by age and sex for each year from 2016 to 2020; the population estimate by age and sex as of July 1 of each year from 2016 to 2021; select college enrollment data for Franklin and Penobscot counties; U.S. population estimates for 2019 and population projections for 2025, 2030, 2035, and 2040. 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 national projections came from the U.S. Census Bureau. Because intercensal estimates were not available from the Census, county-level intercensal estimates were calculated by Angela Hallowell (former Economist Analyst in the Office of the State Economist) and town/city level intercensal estimates were calculated by Megan Bailey (Senior Analyst in the Office of the State Economist). College enrollment data came from the National Center for Education Statistics and the Maine Community College System.

The first step in the process involved calculating the college population for Franklin and Penobscot counties. For these two counties, the in-migration resulting from college-going populations distorts the overall migration rates and would cause unrealistic results if not adjusted for in the projections. Thus, estimates were made of the number of 18- and 19-year-olds entering colleges and universities in these counties from outside of the counties. Adjustments were made to exclude students engaged solely in distance learning. These figures were later used to adjust the in-migration rates for the pertinent age cohorts in Franklin and Penobscot county.

The operational birth rate for females in each age cohort is calculated as the five-year average birth rate from 2016-2020, 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. For 2025, a four-year rate needed to be calculated because of the 2021 base; this four-year average birth rate was averaged across the age cohorts in the same manner.

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 2016 to 2020 divided by the 2018 cohort population and then subtracted from one. To get the five-year rate, the average survival rate is raised to the fifth power (for a four-year rate, raised to the fourth 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 two subsequent age cohorts.

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 power (for four years) or 2.5 power (for five years). For the oldest age cohort, 85 and older, the operational survival rate is the five-year survival rate raised to the 1.5 power.

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 2019 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 (four for 2025) 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 2019 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.

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 (four for 2025) before being divided by the estimated total number currently living in the county. Adjustments are made for the incoming college-bound 18-19 year-olds in Franklin and Penobscot county.

Adjustments are again 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 2019 cohort population and the number of outmigrants is added.

The survived population for 2025 is calculated by multiplying the 2021 population for each cohort 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 2020-2025 from the survived population for 2025.

Next the 2025 survived county population is subtracted from the 2025 cohort population from the U.S. Census Bureau’s national population projections and then multiplied by the in-migration rate to get the number of in-migrants. This number is added to the stayers in county 2020-2025 to get the 2025 population. Keep in mind that this is the population of the next age cohort for 2025. People who were 20-24 in 2020 are 25-29 in 2025.

For the oldest cohort, the calculated 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 population at risk of giving birth is calculated by adding the stayers in county 2020-2025 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 2025 0-4 cohort population. For 2025, the actual number of births for 2021 are added to the four-year estimate of births resulting from the calculations to get the total over the five-year period. 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 are calculated using two pieces of information: (1) the recent historical growth of each town's share of its county's population, and (2) the county population projections.

Historical population growth rates for cities and towns were derived from the population estimates from the U.S. Census Bureau. Intercensal estimates were not available from the U.S. Census Bureau, so Megan Bailey (Senior Economic Analyst in the Office of the State Economist) produced intercensal estimates for towns and cities using a Census-based methodology.

A linear regression analysis was used for most of the projections, estimating a constant rate of growth for each town's share of their county population between 2015 and 2019. This growth rate was then extrapolated into the future, using county population projections to project the population for each town in 2025, 2030, 2035, and 2040. There were some communities whose projections required an off-model adjustment. The three off-model adjustments included either: (1) using a linear regression to estimate a constant rate of growth for the town as a share of its county population between 2010 and 2019, (2) using a linear regression to estimate a constant rate of growth for the town as a share of its county population between 2017 and 2019, or (3) applying the town's share of the county population in 2020 to each year of the forecast.

This method produces some results that may seem counterintuitive. For example, some towns may be projected to shrink between 2020 and 2025, even though they showed historical population growth and the county is expected to grow from 2020 to 2025. 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.