Appendix to: Sharygin, Ethan. 2017. Modeling methodology for the 2016 baseline California population projections. Sacramento: California Department of Finance. February 2017.

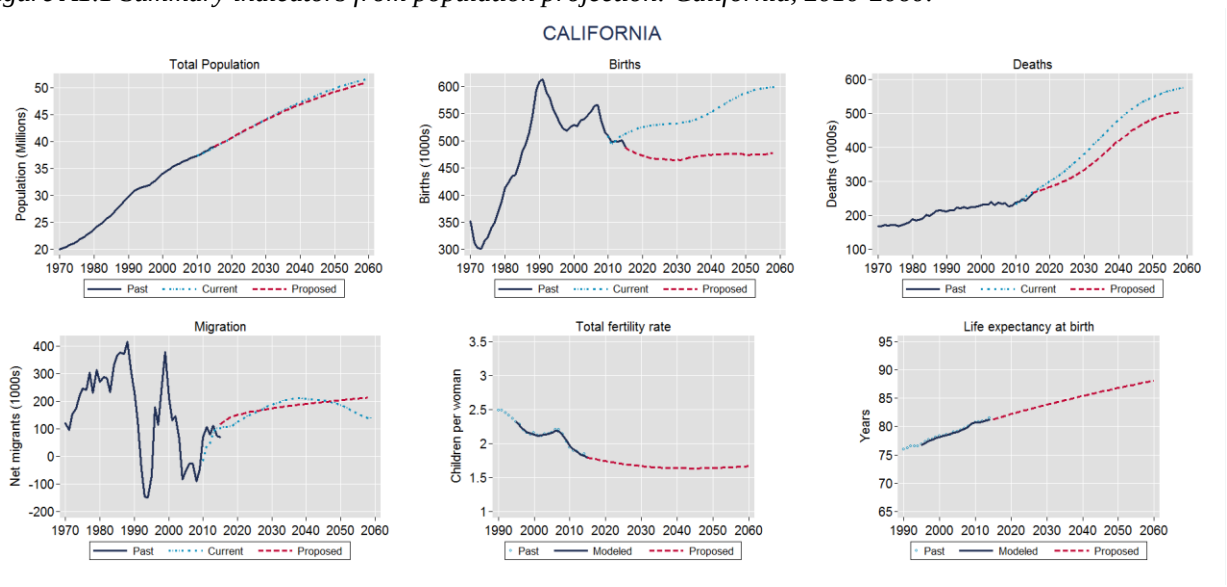
Data and documentation available at: http://www.dof.ca.gov/Forecasting/Demographics/Projections/
Note: This appendix has not been revised to reflect updates to projections made in June 2017 or January 2018.

Appendix

A1. Key projection results

The key demographic rates are modeled at the county level, specified by age and sex. They are applied to the entire resident population of the county each year (special populations are handled differently and not subject to the same mortality or migration hazards, in order to preserve a stable population size). Figure A1.1 shows the total fertility rate and the life expectancy at birth, weighted by each county's share of the population as of the 2010 Census, as well as the sum of annual county components (births, deaths, and net migrants).

Figure A1.1 Summary indicators from population projection: California, 2010-2060.



Historical (intercensal) and current estimates (postcensal) are shown by a solid blue line. The light blue dashed line indicates the trajectory projected in the prior DOF 2014 projection series. The dashed red line indicates the projected trajectory from the current projections. Total fertility rate (TFR) refers to the number of children born to a woman who was subject at each age during her life to the prevailing age-specific fertility rates (ASFR) estimated for women of all ages during one year. Life expectancy at birth is the mean age at death to a hypothetical cohort of people subject at each age during their lives to the prevailing age-specific death rates (ASDR) estimated for people of all ages during one year.[1]

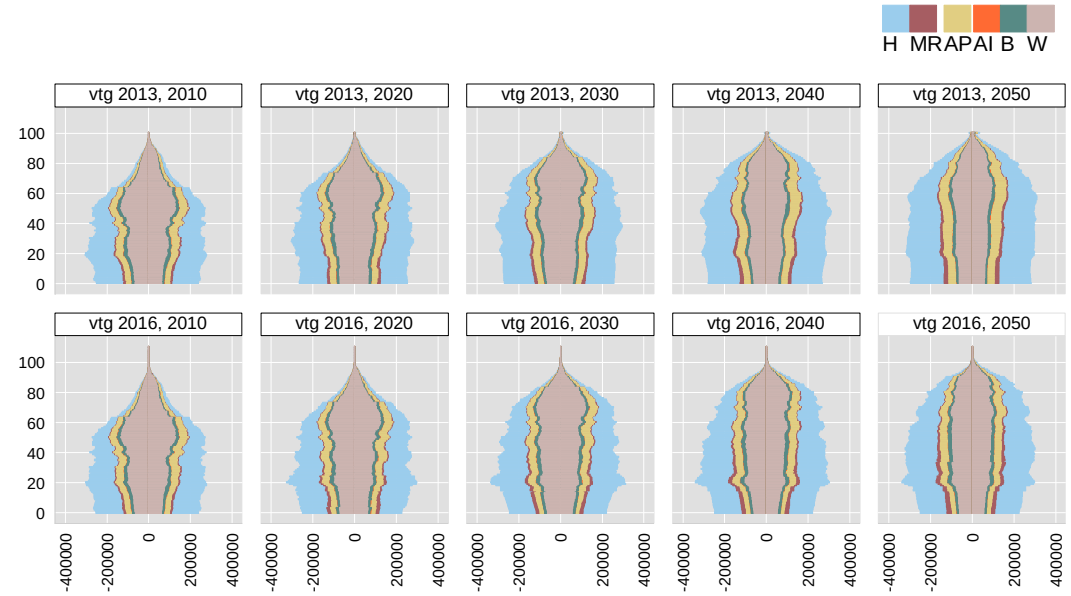
The prior projection series reflected far more births than the current series: growing from approximately 500,000 per year to 600,000 per year by 2060. In contrast, the current projection series reflects falling fertility, reflected in declines in total births to approximately 460,000 by 2030 and thereafter stabilizing around 475,000 births per year as the total fertility rate stabilizes around 1.6 children per woman. There are fewer deaths

[1] Projected fertility and mortality rates are not directly recoverable from the DOF 2014 projection series. The methodology document from the DOF 2014 projections described growth in life expectancy was approximately 2 years (0.4 years gain per decade), while the TFR was projected to converge to approximately 1.9 statewide.

projected in the current series than the past series, a function of more optimistic projections of life expectancy as well as persistent baseline county-level differences in mortality.

The current projections suggest a very similar statewide trajectory in total population but a significantly different age structure (Figure A1.2). Lower projected mortality and fertility means that there will be fewer deaths and fewer births. These dynamics counteract each other in terms of the projected total population, but result in a higher mean age of the population compared to the DOF 2014 data series. Migration is projected at approximately the same total level of net migrants and with a similar age profile, but is spread out more evenly across years during the projection window, without a cyclical component.

Figure A1.2 Summary and comparison of age structure from population projections: California, 2010-2060.



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The age pyramid figure above displays single years of age along the vertical axis. The horizontal axis of each graph is the population of males (shown on the negative, or left horizontal axis) and females (shown on the positive, or right horizontal axis). The color striations indicate race or ethnicity, from a grouping using six categories: White; Black; American Indian or Alaska Native; Asian, Native Hawaiian or Pacific Islander; Multi-racial (meaning any combination of the preceding groups), or Hispanic (of any race). The state's overall level of racial/ethnic diversity is comparable between the two projections. Compared to the 2014 projections, the new projections are less rectangular and more kite-shaped, with a heavier top and narrower bottom. This shape is typical of states that are undergoing a so-called "second demographic transition" into later marriage, low fertility, and higher longevity, which result in a larger share of the population at older ages. The ridge visible around age 20 in later panels is due to the high population of college students in California relative to young children and teenagers, based on the assumption of stable enrollment despite long run fertility declines.

A2. High and low growth variants.

The central projection results are published through 2060. In addition to the central scenario, high and low growth variants were calculated in order to validate the model and to compare a range of plausible outcomes for population growth for other research purposes. Projection variants are distinct from confidence intervals or scenarios. Confidence intervals can be generated for any projection result or variant if uncertainty from the imputation, modeling, and simulation steps can be accounted for. Scenarios describe a possible social or

economic context (recessions, major policy changes, etc.) that would cause a variety of changes in the demographic dynamics of the population, such as changes in policy or economic conditions. Variants represent the path taken when holding one or another of the simulation inputs at a fixed level, absent of context. A variant might be a no change in fertility or mortality, doubling or halving of net migration, etc. Variants are useful in studying the responsiveness of the projection model to each of its components.

A high growth variant was generated by increasing the projected number of net migrants to California by one-third, and holding fertility constant after 2015 at the last rate that was modeled on empirical data. Mortality rate changes are allowed, since the overall statewide trend is towards lower mortality, which will decrement fewer of the population and thus contribute to a higher rate of natural population increase.

A low growth variant was produced by reducing the projected number of net migrants by one-third, and holding mortality constant after 2015, which will produce relatively more deaths. Fertility rate projections are applied through 2060, since the overall statewide trend is towards a lower fertility rate which will produce fewer births and contribute to a lower rate of natural increase.

Variants were executed through 2100 to test for robustness and to provide for additional research uses where long-term forecasts are required. The results of the high and low variants are presented below (Figure A2.1). The high growth variant has the state reaching 55 million by 2060, while in the low growth variant the state population peaks at 45 million in 2050 and declines thereafter. The number of deaths each year rises rapidly in the low variant due to population aging, despite a lower base population. The number of births declines overall through 2050 for the central and low scenarios, while the high scenario projects significant growth in the number of births due to increased immigration as well as higher fertility assumptions.

Figure A2.1 Total population and components of change under high/low variants: California, 2015-2100.