

Annual air temperature

Air temperatures have increased over the past century, with nighttime temperatures increasing to a greater extent.



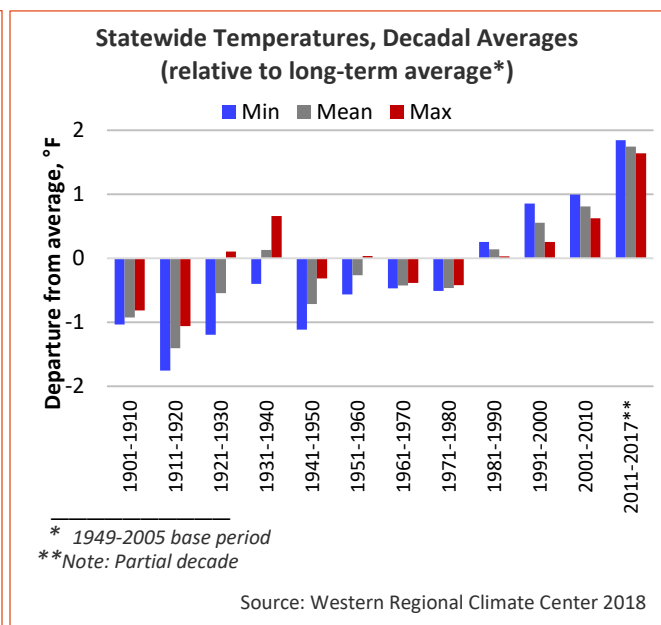
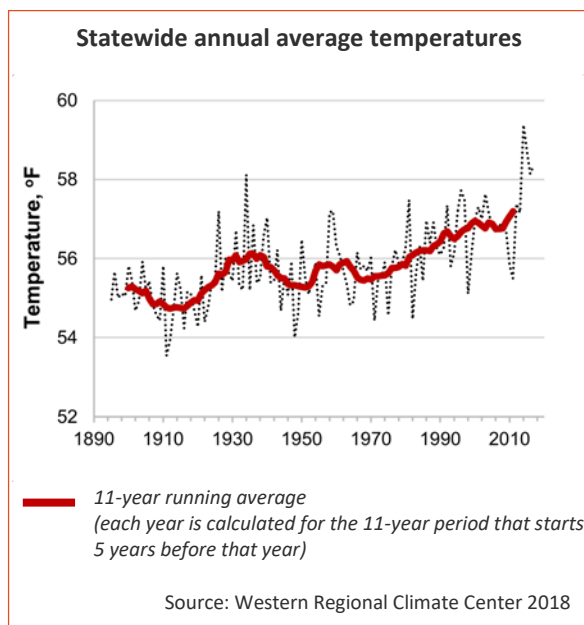
California has been warming since the early 20th century, especially at night. The increasing temperatures in the state reflect warming observed globally. One of the most cited and telling indicators of climate change is average global temperatures. There is clear evidence that both the atmosphere and the oceans have warmed. This warming is linked to increased concentrations of carbon dioxide and other greenhouse gases in the Earth's atmosphere from human activities. Warming air temperatures have wide-reaching impacts on the weather, the water cycle, human health and well-being, and ecosystems.

What does the indicator show?

The graph below on the left shows that annual mean temperatures averaged over the state have increased by about 1.8 degrees Fahrenheit (°F) since 1895, when measurements were first recorded. The last four years were notably warm, with 2014 being the warmest on record, followed by 2015, 2017 and 2016. Eleven of the 20 warmest years in California have occurred since 2000.

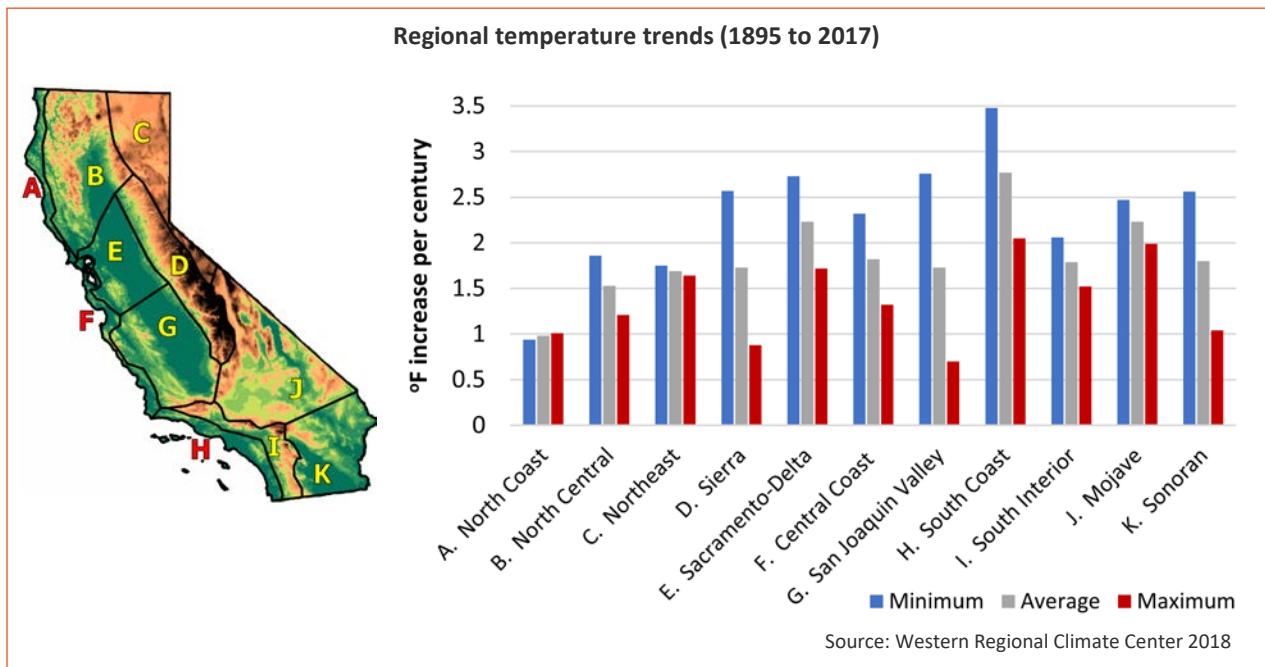
The graph below on the right shows how temperature averages for each decade have deviated from the long-term average. Minimum, mean and maximum temperatures are all increasing. Minimum temperatures — which correspond to nighttime temperatures — have increased the fastest, at 2.3°F per century. Higher nighttime temperatures impede the ability of people, plants and animals to recover from daytime heat. Maximum temperatures have increased at a slower rate of 1.3°F per century.

Air temperatures are influenced by local topography, proximity to the ocean, and global and regional atmospheric patterns such as the *jet stream* and large ocean currents or *gyres*. Human influences, such as urbanization, irrigation, and other land use changes can also affect temperature.





California has a diversity of landscapes, ranging from the Sierra Nevada to the Central Valley, the Mojave-Sonoran Desert and the coastal areas. The state's 11 climate regions are all warming, but by varying extents. The graph below shows the rate of change per century in maximum, average, and minimum temperatures. As was observed statewide, minimum temperatures increased more than maximum or average temperatures in all the regions. The greatest overall increase is observed in the South Coast region; rapid urbanization may have contributed to this overall warming trend.



Why is this indicator important?

Temperature plays a key role in physical and biological processes that have far-reaching effects on the environment. Warmer air temperatures alter precipitation and runoff patterns, affecting the availability of freshwater supplies. Temperature changes can increase the likelihood of severe weather events, such as heat waves and intense storms. Warming also leads to a wide range of impacts on ecosystems. Even seemingly small temperature changes can cause shifts in species' geographic distribution, the timing of their life cycle events and population abundance.

Temperature affects human health and day-to-day activities. Warmer temperatures increase the risk of heat-related illnesses and deaths, worsen air quality, and make conditions more favorable for certain disease-carrying insect vectors and agricultural pests. As temperatures warm, more energy is needed to cool living spaces and more water is required to meet agricultural and urban needs. This will require the state to make policy decisions about the types of energy generation and infrastructure needed to meet these demands. Understanding observed and projected temperature trends is critical for decision-making and taking action in a broad range of areas, including public health, energy and water management, agriculture, forest management and wildlife protection.

For more information about this and other climate change indicators, visit:

<https://oehha.ca.gov/climate-change/report/2018-report-indicators-climate-change-california>

