The fifth chapter of the *Assessment of Climate Change in the Southwest United States* assesses weather and climate variability and trends in the Southwest, using observed climate and paleoclimate records. “Present Weather and Climate: Evolving Conditions” analyzes the last one hundred years of climate variability in comparison to the last one thousand years and links the important features of evolving climate conditions to river flow variability in four of the region’s major drainage basins.

As the twenty-first century unfolds, a key concern is that the annual demand for water in the Southwest—especially from the Colorado River, which supplies water to each of the region’s states—has risen to an amount that nearly matches the natural annual flow in the Colorado River. There is a small margin between supply and demand—both of which are sensitive to climate variability and change.

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For more information about *Assessment of Climate Change in the Southwest United States*, see: www.swcarr.arizona.edu, www.cakex.org, www.islandpress.org/NCAreports. This fact sheet developed by Institute of the Environment, University of Arizona.
Temperature
Annual temperatures for 2001–2010 were warmer than during any decade of the twentieth century, both for the Southwest as a whole and for each state in the region, with greater warming occurring during the spring and summer seasons. The recent rapid increase in late winter and early spring minimum temperatures are very unlikely due to natural variability alone, but are consistent with a regional sensitivity to increased greenhouse gases and aerosols. Annual average surface temperatures during 1901–2010 increased by around 1.6°F over the Southwest region. Long-term weather stations across the region show warming trends in both daytime high temperatures and nighttime low temperatures. Cold waves have been especially rare since about 1990, while the frequency of heat waves has increased.

Precipitation
For 2001–2010, annual precipitation, averaged across the entire Southwest, ranked the fourth driest of all decades since 1901. It is likely that most of the recent dryness over the Southwest is associated with a natural, decadal coolness in tropical Pacific sea-surface temperatures and is mostly unrelated to influences of increased greenhouse gases and aerosols. The strongest percentage declines occurred during spring and summer, which were 11 percent and 8 percent below average, respectively. The winter season experienced a small increase relative to twentieth-century averages. Although the decade 2001–2010 was relatively dry for the Southwest, regional annual precipitation computed for the entire 1901–2010 period reveals little change in trend.

Snow
Observed regional snow-related changes include trends toward earlier snowmelt runoff in California and across the West, earlier onset of spring snowmelt-runoff pulses, declines in mountain snowpack, general shifts in hydroclimatic seasons, trends toward more late winter precipitation falling as rain instead of snow, and declines in late-winter snowpack in the northern Sierra Nevada. During 1950–1999 as much as 60 percent of the climate-related trends in wintertime minimum temperatures, snowpack water content as a fraction of total precipitation, and snow-fed streamflow timing were human-induced. These changes reflect temperature influences more than precipitation effects.

Drought
In the decade 2001–2010, the Sacramento-San Joaquin, Humboldt, Colorado, and Rio Grande river systems all showed lower-than-average measured flows in response to warm, dry conditions. Observed flows for 2001–2010 in the Rio Grande at El Paso were about 23 percent lower than the period from 1941 to 2000, even though overall precipitation in the basin was 3 percent above average. The Southwest was the only region in the continental United States to experience a widespread declining trend in annual peak streamflow rates from 1901 to 2008.