IDAHO

Key Messages

Average annual temperature has increased about 1.5°F since the beginning of the 20th century. Under a higher emissions pathway, historically unprecedented warming is projected by the end of the 21st century.

Winter and spring precipitation is projected to increase over the next century. However, naturally-occurring droughts are projected to be more intense because of warmer conditions, increasing the frequency and severity of wildfire occurrence.

Higher temperatures are projected to cause more of the increased winter and spring precipitation to fall as rain instead of snow. These seasonal changes in precipitation may result in increased flood risks.

Idaho's northerly latitude and location in the interior of North America gives it a climate with large seasonal differences in temperature, from cold winters to pleasantly warm summers. The low elevation areas of southern Idaho are shielded by mountains to the east and west, reducing the amount of moisture that can penetrate the area and resulting in generally low amounts of precipitation. The higher elevations of northern and central Idaho receive up to four times the amount of rain and snow compared to the southern portion of the state. The majority of precipitation occurs during the cool season (November–May), with the state being reliant on mountain snowpack for water storage.

Temperatures in Idaho have increased about 1.5°F since the beginning of the 20th century (Figure 1). The year 2015 was the second hottest (after 1934) since records began in 1895, with a statewide average temperature of 46.9°F. Average high temperatures in Boise on a July day are around 92°F (individual July monthly averages have ranged from 79.6°F in 1993 to 98.6°F in 2007) and much lower in the northern town of Coeur D'Alene, where temperatures on a July day average 83.5°F (76.4°F–94.5°F). In January, average low temperatures are colder in

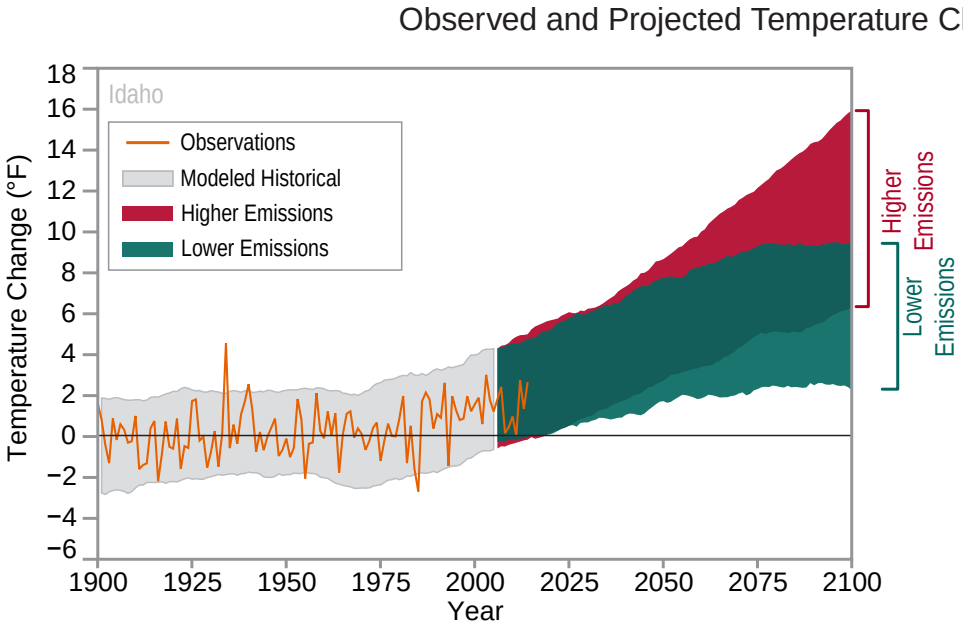

Figure 1: Observed and projected changes (compared to the 1901–1960 average) in near-surface air temperature for Idaho. Observed data are for 1900–2014. Projected changes for 2006–2100 are from global climate models for two possible futures: one in which greenhouse gas emissions continue to increase (higher emissions) and another in which greenhouse gas emissions increase at a slower rate (lower emissions)[1]. Temperatures in Idaho (orange line) have risen by about 1.5°F since the beginning of the 20th century. Shading indicates the range of annual temperatures from the set of models. Observed temperatures are generally within the envelope of model simulations of the historical period (gray shading). Historically unprecedented warming is projected during the 21st century. Less warming is expected under a lower emissions future (the coldest years being about as warm as the hottest year in the historical record; green shading) and more warming under a higher emissions future (the hottest years being about 12°F warmer than the hottest year in the historical record; red shading). Source: CICS-NC and NOAA NCEI.

[1]Technical details on models and projections are provided in an appendix, available online at: https://statesummaries.ncics.org/id.

Boise (23.6°F, range: 11.3°F–32.5°F) than in Coeur D'Alene (25.7°F, range: 20.5°F–31.9°F). Both the number of very hot days (maximum temperature above 95°F, Figure 2) and the number of very warm nights (minimum temperature above 70°F, Figure 3) have been above average in the 2000s. A winter warming trend is reflected in a significant decline in the number of very cold nights (minimum temperature below 0°F), which has been below the long-term average (1900–2014) since the early 1990s (Figure 4).

Average annual total precipitation at long-term monitoring stations ranges from more than 40 inches at some northern mountain sites, to less than 10 inches in the southwest part of the state. There is substantial variability but no overall trend in average annual precipitation for the 118-year period of record (Figure 5). **However, the number of extreme precipitation events (days with precipitation greater than 1 inch) has been above the long-term average over the past decade**. The record number of events (more than two per year) occurred during the period of 1995–1999 (Figure 6). Over the entire historical period (1895–2015), the statewide-average driest year on record was 1935 with an annual average total of 16.18 inches of precipitation, while the wettest year was 1996 with 32.10 inches. The driest multi-year period was in the 1930s, and the wettest periods were in the early 1980s and late 1990s (Figure 5). The driest 5-year period was 1928–1932 with an average of 20 inches per year and the wettest was 1980–1984 with an average of nearly 29 inches per year. Mean annual snowfall ranges from about 10 to 20 inches in the southern lowlands to more than 100 inches in the higher mountain locations. Snowpack accumulation in the mountains is the major source of water. This is highly variable from year to year and has generally declined since the middle of the 20th century (Figure 7).

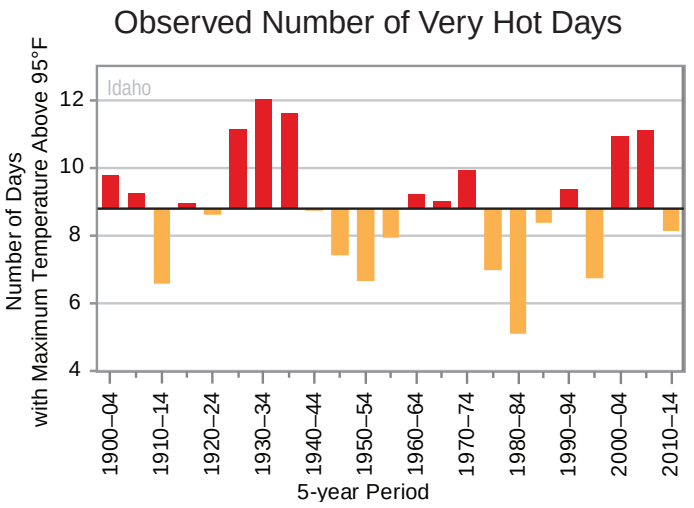

Figure 2: The observed number of very hot days (annual number of days with maximum temperature above 95°F) for 1900–2014, averaged over 5-year periods; these values are averages from eight long-term reporting stations. The number of hot days was mostly above average during the 2000s. The highest number of such days occurred during the late 1920s and 1930s. The dark horizontal line is the long-term average of 8.8 days per year. Source: CICS-NC and NOAA NCEI.

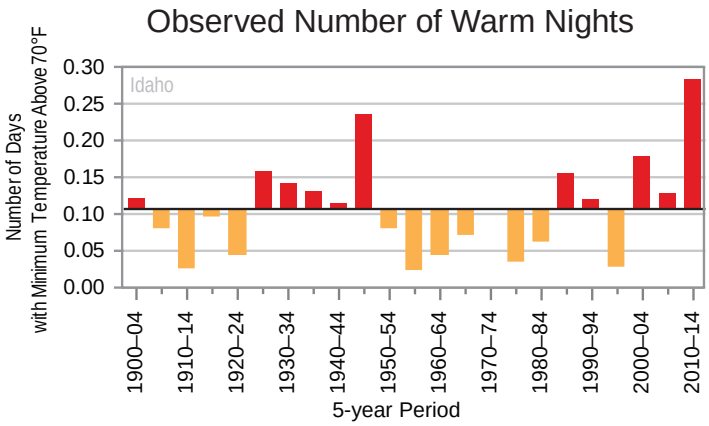

Figure 3: The observed number of very warm nights (annual number of days with minimum temperature above 70°F) for 1900–2014, averaged over 5-year periods; these values are averages from eight long-term reporting stations. Warm nights are infrequent in Idaho because of the high elevation and dry atmosphere. The number of warm nights has been above average during the 2000s, although remaining a rare event. The dark horizontal line is the long-term average of 0.12 days per year. Source: CICS-NC and NOAA NCEI.

Extreme weather and weather-related events that commonly occur in Idaho include severe winter storms, wildfires, floods, droughts, and heat and cold waves. Flooding frequently occurs in Idaho, with an estimated 90% of damage from natural disasters each year attributable to riverine flooding, flash floods, or ice/debris jam flooding. The winter of 1996–1997 brought tremendous amounts of snow in some parts of the state (80–100 inches). The snow in combination with heavy rains and unusually warm temperatures produced significant amounts of snowmelt, resulting in disaster declarations for one-third of the state's counties due to severe flooding and mudslides. Flash flooding typically occurs following intense thunderstorm events in the spring and summer. In 2012, Idaho experienced one of its most active fire seasons to date, with over 1.5 million acres burned. Additionally, 11 of the state's 44 counties were designated as primary natural disaster areas due to damages and losses caused by drought, excessive heat, and high winds. Extreme weather cost the state an estimated $480 million in property damages in 2012 alone.

Under a higher emissions pathway, historically unprecedented warming is projected by the end of the 21st century (Figure 1). Even under a pathway of lower greenhouse gas emissions, average annual temperatures are projected to most likely exceed historical record levels by the middle of the 21st century. However, there is a large range of temperature increases under both pathways, and under the lower pathway, a few projections are only slightly warmer than historical records. In addition, the intensity of heat waves is projected to increase while cold wave intensity is projected to decrease.

Projected rising temperatures will increase the average lowest elevation at which the snow pack reliably accumulates throughout the winter. This will increase the likelihood that precipitation will fall as rain instead of snow, reducing water storage in the snowpack, particularly at lower elevations. **Warmer spring temperatures will also result in earlier melting of the snowpack, further decreasing water availability during the already dry summer months**.

Winter and spring precipitation are projected to increase in Idaho over the 21st century (Figure 8), **while summer decreases are possible, especially in the southeastern portion of the state.** However, even if overall precipitation increases, future naturally-occurring droughts will likely be more intense because higher temepratures will increase the rate of loss of soil moisture during dry spells. The earlier melting of mountain snowpack may also lead to a reduction in soil moisture during the summer months. As a result, the frequency of wildfire occurrence and severity is projected to increase in Idaho.

Heavy precipitation events are projected to become more frequent. As temperatures increase, the proportion of winter and spring precipitation falling as rain rather than snow are also projected to increase. The combination of more heavy events and more precipitation falling as rain will increase the risk of flooding during the cold season.

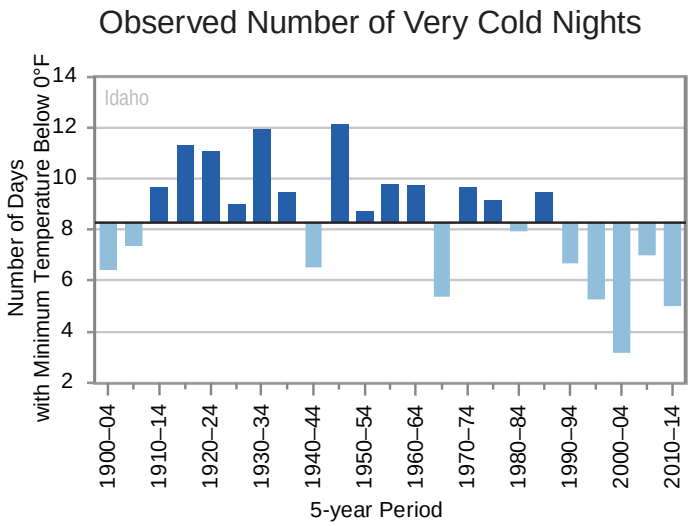

Figure 4: The observed number of very cold nights (annual number of days with minimum temperature below 0°F) for 1900–2014, averaged over 5-year periods; these values are averages from eight long-term reporting stations. The number of very cold nights has been below average since the early 1990s. In the period of record, the greatest number occurred during 1945–1949, when the state averaged 12.1 such days annually. The dark horizontal line is the long-term average of 8.3 days per year. Source: CICS-NC and NOAA NCEI.

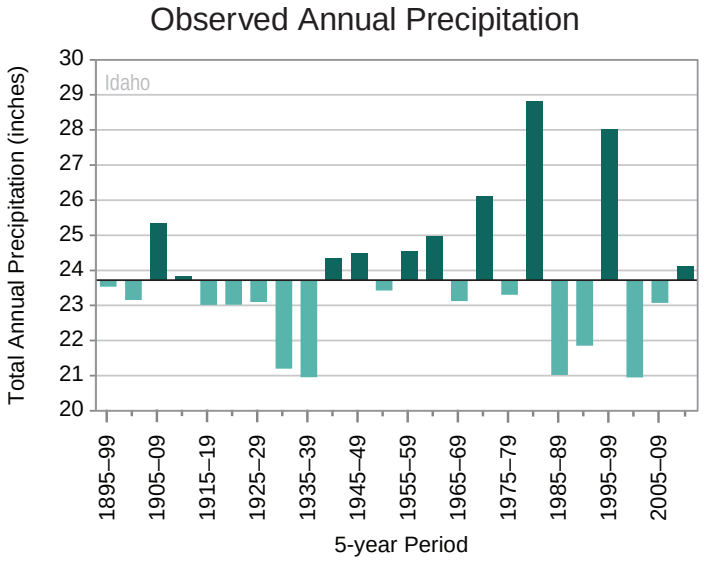

Figure 5: The observed annual precipitation across Idaho for 1895–2014, averaged over 5-year periods; these values are averages from NCEI's version 2 climate division dataset. Annual precipitation varies widely. The dark horizontal line is the long-term average of 23.7 inches annually. Source: CICS-NC and NOAA NCEI.

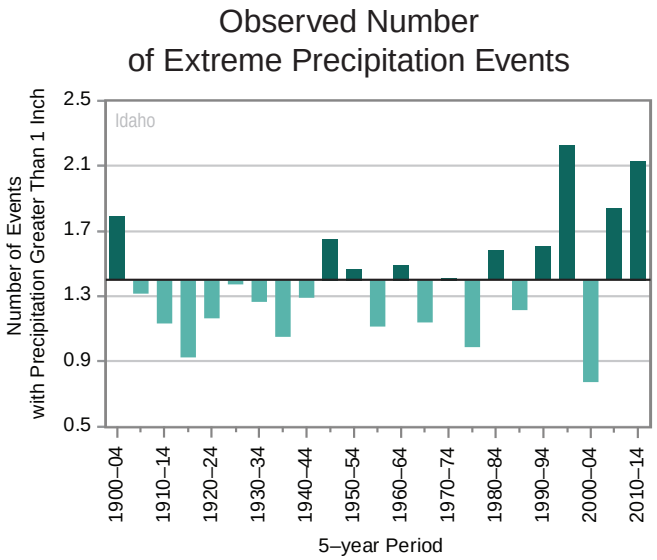

Figure 6: The observed number of days with extreme precipitation events (annual number of days with precipitation greater than 1 inch) for 1900−2014, averaged over 5-year periods; these values are averages from eight long-term reporting stations. Idaho has experienced an above normal number of extreme precipitation events during most of the late 1990s and 2000s, except for 2000−2004. The dark horizontal line is the long-term average of 1.4 days per year. Source: CICS-NC and NOAA NCEI.

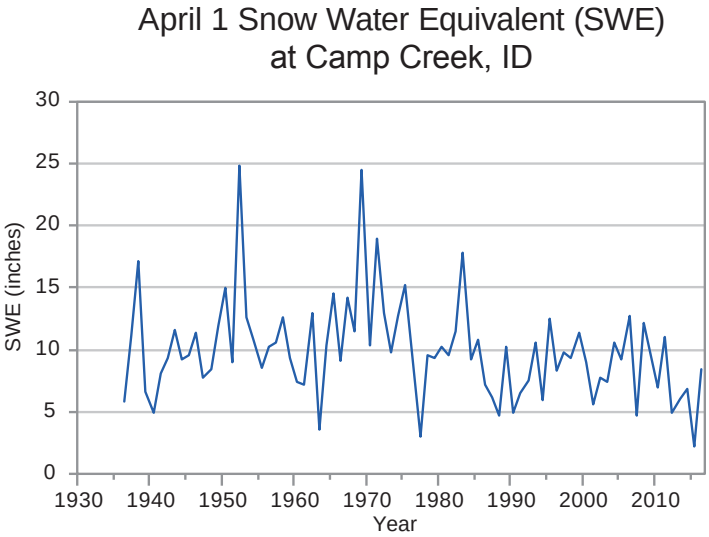

Figure 7: Variations in the annual end-of-season (April 1) snow water equivalent at the Camp Creek, Idaho Snow Survey site. Snow water equivalent (SWE) is the amount of water contained within the snowpack, and is highly variable from year to year. There is an overall decline in SWE since high values in the 1960s and early 1970s. The lowest value on record occurred in 2015. Source: USDA Natural Resources and Conservation Service.

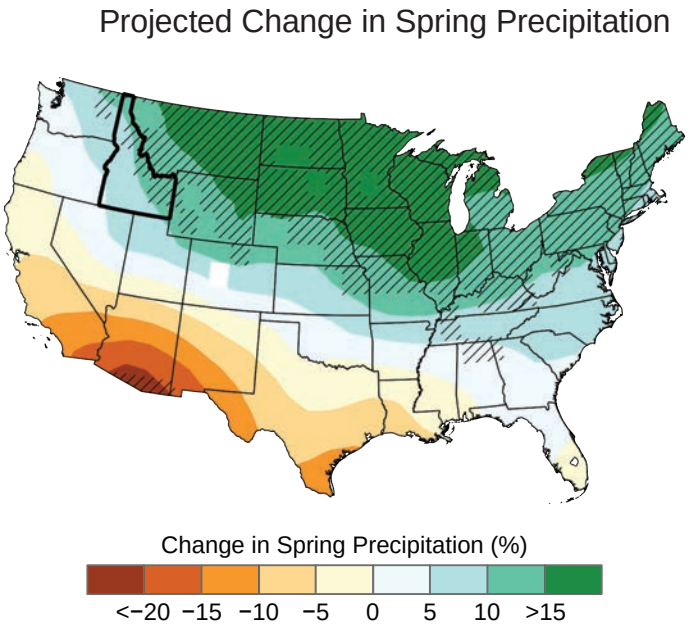

Figure 8: Projected changes in spring precipitation (%) by the middle of the 21st century compared to the late 20th century under a higher emissions pathway. Hatching represents areas where the majority of climate models indicate a statistically significant change. Idaho is part of a large area of projected increases across the northern United States. Source: CICS-NC, NOAA NCEI, and NEMAC.