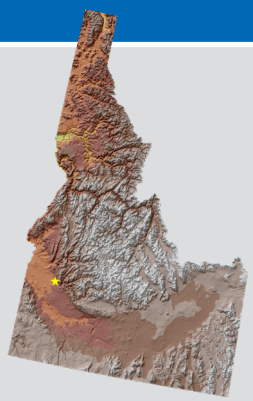
IDAHO



Key Messages

Temperatures in Idaho have risen almost 2°F since the beginning of the 20th century. Under a higher emissions pathway, historically unprecedented warming is projected during this century.

Winter and spring precipitation is projected to increase during this century. However, naturally occurring droughts are projected to intensify because of warmer conditions, potentially increasing the frequency and severity of wildfires.

Higher temperatures are projected to cause more of winter and spring precipitation to fall as rain instead of snow, which may increase flood risks.

Due to Idaho's northerly latitude and location in the interior of North America, its climate has large seasonal temperature differences, with cold winters and pleasantly warm summers. Wide ranges in elevation affect regional precipitation. The low-elevation regions 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. By comparison, the higher elevations of northern and central Idaho receive up to four times the amount of rain and snow. The majority of precipitation falls during the cool season (November–May). Idaho is reliant on mountain snowpack for water storage.

Temperatures in Idaho have risen almost 2°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 46.4°F. As with precipitation, Idaho's temperature climate exhibits regional variation. In the southwestern city of Boise, the average (1991–2020 normals) high temperature in July is 92.7°F, while in the northern town of Coeur D'Alene, it is 82.8°F. In January, average low temperature is colder in Boise (25.5°F) than in Coeur D'Alene (26.2°F). Statewide, the number of very hot days (Figure 2) has been highly variable since 2000 but shows no overall trend. The number of warm nights (Figure 3) has been above average since 2000, exceeding the previous highest values of the late 1920s and 1930s. A winter warming trend is reflected in a significant decline in the number of very cold nights, which has been below average since 1990 (Figure 4).

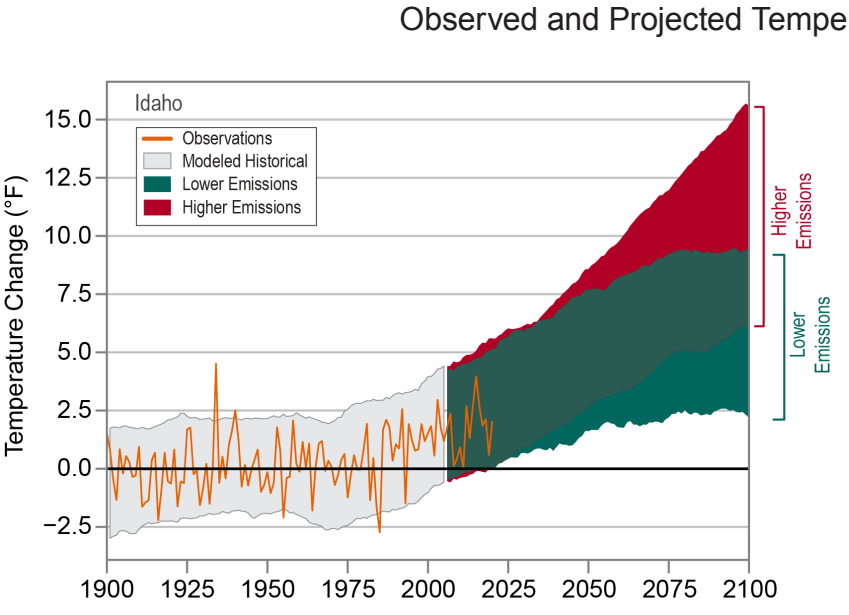


Figure 1: Observed and projected changes (compared to the 1901–1960 average) in near-surface air temperature for Idaho. Observed data are for 1900–2020. Projected changes for 2006–2100 are from global climate models for two possible futures: one in which greenhouse gas emissions continue to increase (higher emissions) and another in which greenhouse gas emissions increase at a slower rate (lower emissions). Temperatures in Idaho (orange line) have risen almost 2°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 this century. Less warming is expected under a lower emissions future (the coldest end-of-century projections being about 2°F warmer than the historical average; green shading) and more warming under a higher emissions future (the hottest end-of-century projections being about 15°F warmer than the historical average; red shading). Sources: CISESS and NOAA NCEI.

Total annual precipitation at long-term monitoring stations ranges from more than 40 inches at some northern mountain sites to less than 10 inches at sites in the southwest. Statewide, there is substantial variability but no overall trend in total annual precipitation for the 126-year period of record (Figure 5). **However, the number of 1-inch extreme precipitation events has been above average for the past 16 years and has been trending upward since 2000** (Figure 6). A record-high number of events (more than 2 per year) occurred during the 1995–1999 period. The driest year on record for Idaho was 1935, with a total of 16.2 inches of precipitation, while the wettest was 1996, with 32.10 inches. The driest consecutive 5-year interval was 1928–1932, with an annual average of 20.1 inches, and the wettest was 1980–1984, with an annual average of 28.8 inches. Annual total snowfall ranges from about 10 to 20 inches in the southern lowlands to more than 100 inches in the higher mountains. Snowpack accumulation in the mountains is the state's major source of water. It is highly variable from year to year and has generally declined since the mid-20th century (Figure 7).

Extreme weather and weather-related events in Idaho include severe winter storms, wildfires, floods, droughts, and heat and cold waves. Flooding occurs frequently in Idaho; an estimated 90% of damages from natural disasters each year is attributable to riverine flooding, flash floods, or floods caused by ice/debris jams. The winter of 1996–97 brought tremendous amounts of snow (80–100 inches) to some parts of the state. 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 after intense thunderstorm events in the spring and summer. In 2012, Idaho experienced one of its most active fire seasons to date, with more than 1.6 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 more than $400 million in property damages in 2012 alone.

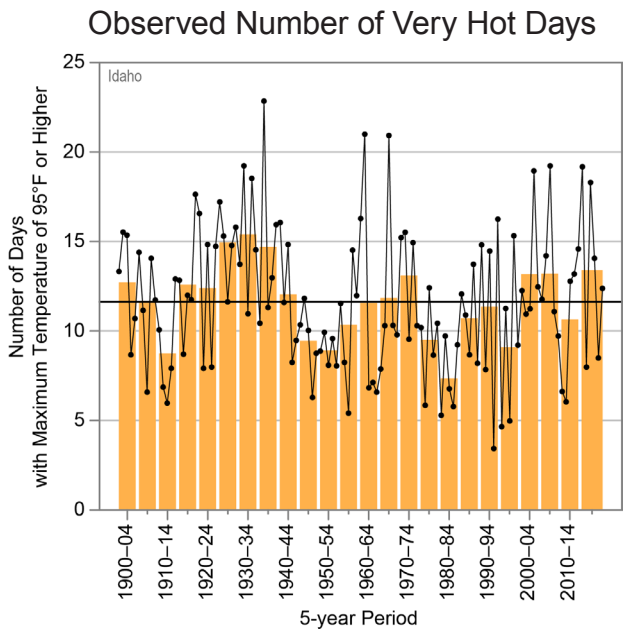


Figure 2: Observed annual number of very hot days (maximum temperature of 95°F or higher) for Idaho from 1900 to 2020. Dots show annual values. Bars show averages over 5-year periods (last bar is a 6-year average). The horizontal black line shows the long-term (entire period) average of 12 days (note that the average for individual reporting stations varies greatly because of the state's large elevation range). The number of very hot days has been highly variable since 2000 but with no overall trend. The highest number of these days occurred during the late 1920s and 1930s. Sources: CISESS and NOAA NCEI. Data: GHCN-Daily from 10 long-term stations.

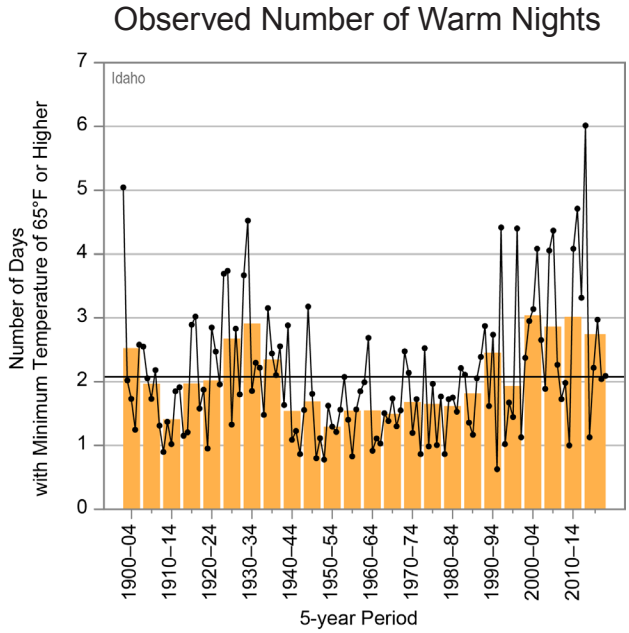


Figure 3: Observed annual number of warm nights (minimum temperature of 65°F or higher) for Idaho from 1900 to 2020. Dots show annual values. Bars show averages over 5-year periods (last bar is a 6-year average). The horizontal black line shows the long-term (entire period) average of 2.1 nights (note that the average for individual reporting stations varies greatly because of the state's large elevation range). The number of warm nights has been above average since 2000, exceeding the previous highest values of the late 1920s and 1930s. Sources: CISESS and NOAA NCEI. Data: GHCN-Daily from 10 long-term stations.

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

Projected rising temperatures will raise the snow line—the average lowest elevation at which the snow falls. This will increase the likelihood that precipitation will fall as rain instead of snow, reducing water storage in the snowpack, particularly at lower mountain elevations that are now on the margins of reliable snowpack accumulation. **Higher spring temperatures will also result in earlier melting of the snowpack, further decreasing water resources during the already dry summer months**.

Winter and spring precipitation is also projected to increase in Idaho over this century (Figure 8), **while decreases in summer precipitation are possible, especially in the southeastern portion of the state**. However, even if overall precipitation increases, naturally occurring droughts will likely be more intense because higher temperatures will increase the rate of soil moisture loss 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 and severity of wildfires are projected to increase.

Extreme precipitation events are projected to become more frequent. The combination of more extreme precipitation events and more winter and spring precipitation falling as rain rather than snow will increase the risk of flooding during the cold season.

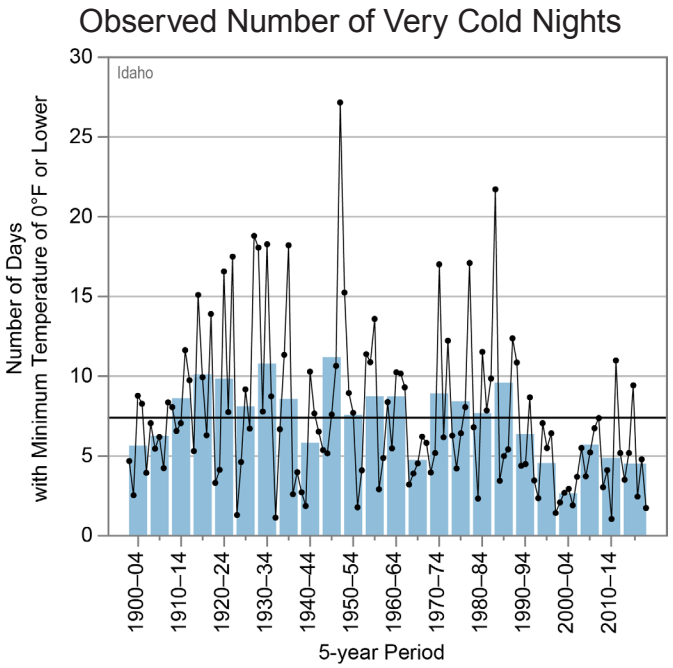


Figure 4: Observed annual number of very cold nights (minimum temperature of 0°F or lower) for Idaho from 1900 to 2020. Dots show annual values. Bars show averages over 5-year periods (last bar is a 6-year average). The horizontal black line shows the long-term (entire period) average of 7.4 nights (note that the average for individual reporting stations varies greatly because of the state's large elevation range). The number of very cold nights has been below average since 1990. The greatest number of these nights occurred during the 1945−1949 period, with a multiyear average of 12 nights. Sources: CISESS and NOAA NCEI. Data: GHCN-Daily from 10 long-term stations.

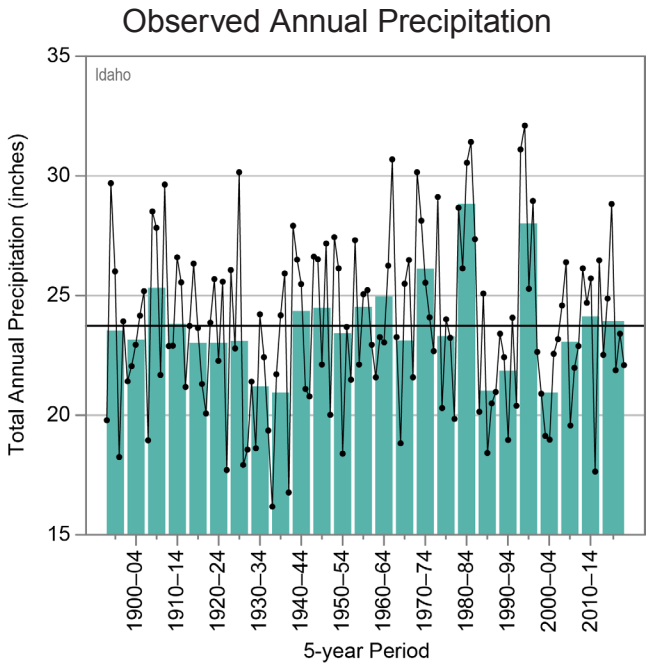


Figure 5: Observed total annual precipitation for Idaho from 1895 to 2020. Dots show annual values. Bars show averages over 5-year periods (last bar is a 6-year average). The horizontal black line shows the long-term (entire period) average of 23.7 inches. Annual precipitation varies widely and shows no overall trend. Sources: CISESS and NOAA NCEI. Data: nClimDiv.

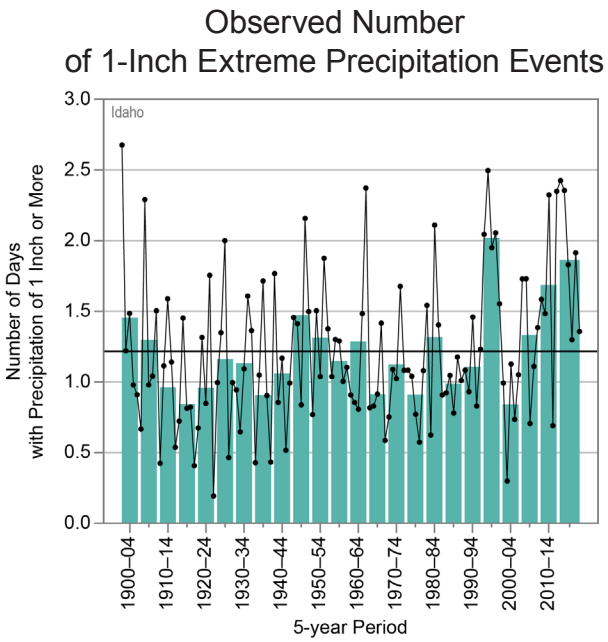


Figure 6: Observed annual number of 1-inch extreme precipitation events (days with precipitation of 1 inch or more) for Idaho from 1900 to 2020. Dots show annual values. Bars show averages over 5-year periods (last bar is a 6-year average). The horizontal black line shows the long-term (entire period) average of 1.2 days (note that the average for individual reporting stations varies greatly because of the state's large elevation range). A typical station experiences 1 event per year. The number of 1-inch extreme precipitation events has been above average since 2005, with an overall upward trend since 1900. Sources: CISESS and NOAA NCEI. Data: GHCN-Daily from 10 long-term stations.

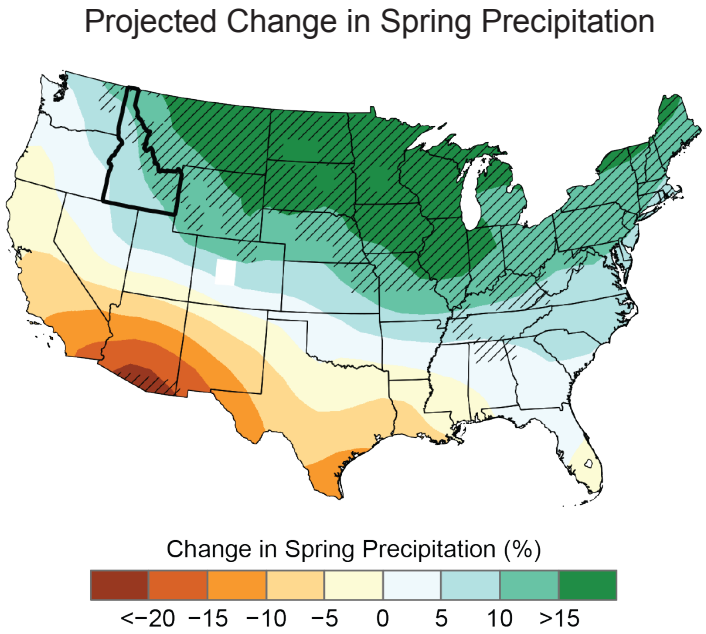


Figure 8: Projected changes in total spring (March–May) precipitation (%) for the middle of the 21st century compared to the late 20th century under a higher emissions pathway. The whited-out area indicates that the climate models are uncertain about the direction of change. Hatching represents areas 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. Sources: CISESS and NEMAC. Data: CMIP5.

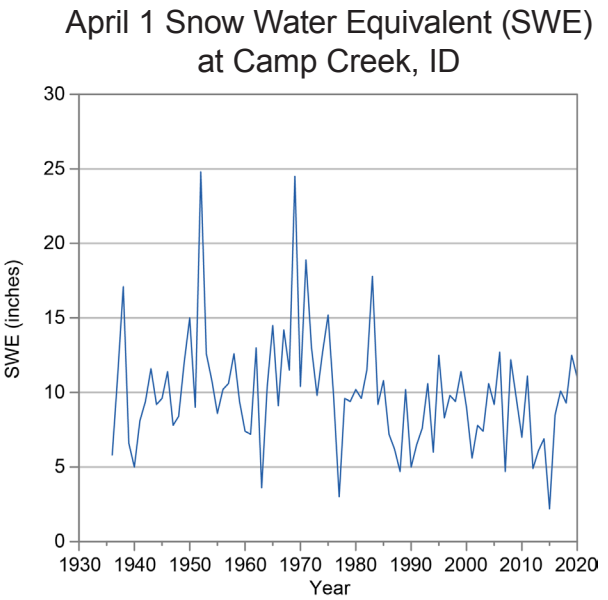


Figure 7: Variations in the April 1 snow water equivalent (SWE) at the Camp Creek, Idaho, snow course site from 1936 to 2020. SWE, the amount of water contained within the snowpack, is highly variable from year to year. There is an overall decline in SWE since high values in 1952 and 1969. The lowest value on record occurred in 2015. Source: NRCS NWCC.

Technical details on observations and projections are available online at https://statesummaries.ncics.org/technicaldetails.