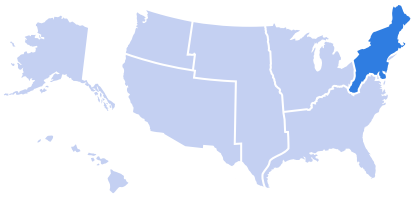
Regional Trends and Projections

The following pages summarize global climate changes that are expected to affect different regions of the United States. Review the predications for your region and the ecozone you studied. Use this information to complete Part 2 of the Forests and Climate student page.

United States Regions

Source: Reprinted with permission from "Regional Climate Change Information." U.S. Global Change Research Program. 2009. http://www.globalchange.gov/.

Northeast



- Northeast annual average temperature has increased by 2°F since 1970, with winter temperatures rising twice this much.
- Warming has resulted in many other climate-related changes, including more frequent very hot days, a longer growing season, an increase in heavy downpours, less winter precipitation falling as snow and more as rain, reduced snowpack, earlier break-up of winter ice on lakes and rivers, earlier spring snowmelt resulting in earlier peak river flows, rising sea surface temperatures, and rising sea level.
- These trends are projected to continue, with more dramatic changes under higher emissions scenarios compared with lower emissions scenarios.
- Some of the extensive climate-related changes projected for the region could significantly alter the region's economy, landscape, character, and quality of life.

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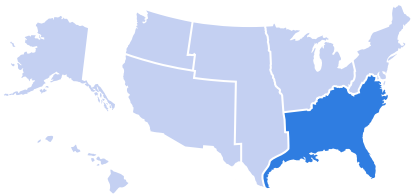
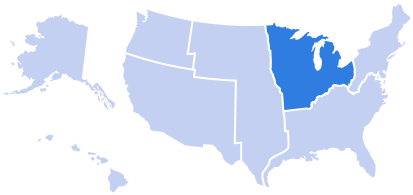
Southeast



- Southeast annual average temperature has risen 2°F since 1970, with the greatest seasonal increase in the winter months.
- There has been a 30 percent increase in fall precipitation over most of the region but a decrease in fall precipitation in South Florida. Summer precipitation has decreased over almost the entire region.
- The percentage of the Southeast experiencing moderate to severe drought increased over the past three decades.
- There has been an increase in heavy downpours.
- The power of Atlantic hurricanes has increased since 1970, due to an increase in sea surface temperature.

Midwest



- Average temperatures in the Midwest have risen in recent decades, with the largest increases in winter.
- The length of the frost-free or growing season has been extended by one week, mainly due to earlier dates for the last spring frost.
- Heavy downpours are now twice as frequent as they were a century ago. Both summer and winter precipitation were above average for the last three decades, the wettest period in a century.
- The Midwest has experienced two record-breaking floods in the past 15 years. There has also been a decrease in lake ice, including on the Great Lakes.
- Since the 1980s, large heat waves have become more frequent than any time in the last century, other than the Dust Bowl years of the 1930s.
- The observed patterns of temperature increases and precipitation changes are projected to continue, with larger changes expected under higher emissions scenarios.

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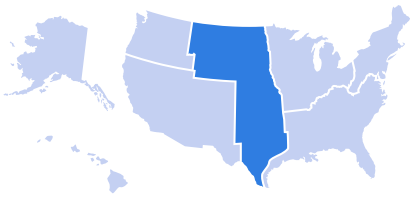
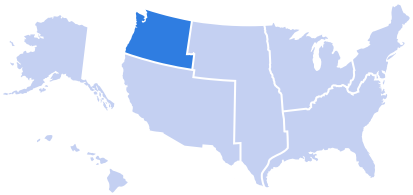
Great Plains



- Over the last few decades, average temperatures have risen throughout the Great Plains, with the largest increases occurring in the winter months and over the northern states. Relatively cold days are becoming less frequent and relatively hot days more frequent.
- In the future, temperatures are projected to continue to increase, with larger changes under scenarios of higher heat-trapping emissions. Summer increases are projected to be larger than those in winter in the southern and central Great Plains.
- Precipitation is also expected to change, particularly in winter and spring. Conditions are expected to become wetter in the north and drier in the south.
- Projected changes include more frequent extreme events, such as heat waves, droughts, and heavy rainfall.

Northwest



- Annual average temperature over the Northwest region as a whole rose about 1.5°F over the past century, with some areas experiencing increases up to 4°F.
- The region's average temperature is projected to rise another 3 to 10°F in this century, with higher emissions scenarios resulting in warming in the upper end of this range.
- Increases in winter precipitation and decreases in summer precipitation are projected by many climate models, though these projections are less certain than those for temperature.
- Impacts related to changes in snow-pack, stream flows, sea level, forests, and other important aspects of life in the Northwest are already underway, with more severe impacts expected over the coming decades in response to continued and more rapid warming.

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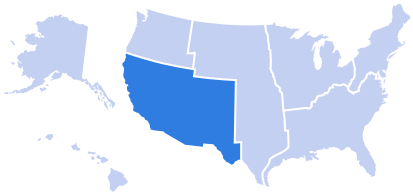
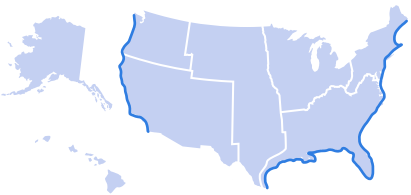
Southwest



- Recent warming in the Southwest has been among the most rapid in the nation. This is driving declines in spring snowpack and Colorado River flow.
- Projections of future climate change indicate continued strong warming in the region, with much larger increases under higher emissions scenarios than under lower emissions scenarios. Projected summertime temperature increases are greater than the annual average increases in parts of the region and are likely to be exacerbated by expanding urban heat island effects.
- Further water cycle changes are projected, which, combined with increasing temperatures, signal a serious water supply challenge in the decades and centuries ahead.
- The prospect of future droughts becoming more severe due to warming is a significant concern, especially because the Southwest continues to lead the nation in population growth.

Coasts



- Global sea level has already risen due to the warming-induced expansion of the oceans, accelerated melting of most of the world's glaciers, and loss of ice on the Greenland and Antarctic ice sheets. Sea level is currently rising at an increased rate. A warming climate will cause further sea-level rise.
- Rising sea level is already eroding shorelines, drowning wetlands, and threatening homes, businesses, and infrastructure.
- The destructive potential of Atlantic hurricanes has increased in recent decades, in association due to increasing sea surface temperatures. In future decades, it is likely that hurricane rainfall and wind speeds will increase in response to global warming.
- Coastal water temperatures have risen and the distributions of marine species have shifted. Ocean acidification resulting from the uptake of carbon dioxide by ocean waters threatens corals, shellfish, and other living things that form their shells and skeletons from calcium carbonate.
- These and other forces converge and interact at the coasts, making these areas particularly sensitive to the impacts of climate change.

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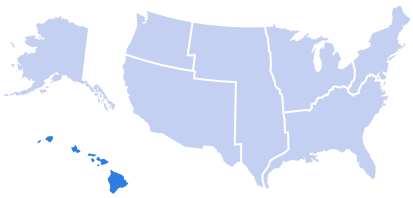
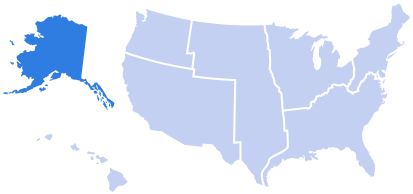
Hawaii (and other islands)



- Climate change presents U.S.-affiliated islands with unique challenges. Small islands are vulnerable to sea-level rise, coastal erosion, extreme weather events, coral reef bleaching, ocean acidification, and contamination of freshwater resources with saltwater.
- The islands have experienced rising temperatures and sea level in recent decades.
- Projections for the rest of this century suggest continued increases in air and ocean surface temperatures in both the Pacific and Caribbean, an overall decrease in rainfall in the Caribbean, an increased frequency of heavy downpours nearly everywhere, and increased rainfall during the summer months (rather than the normal rainy season in the winter months) for the Pacific islands.
- Hurricane wind speeds and rainfall rates are likely to increase with continued warming. Island coasts will be at increased risk of inundation due to sea-level rise and storm surge, with major implications for coastal communities, infrastructure, natural habitats, and resources.

Alaska



- Over the past 50 years, Alaska has warmed at more than twice the rate of the rest of the United States. Its annual average temperature has increased 3.4°F, while winters have warmed by 6.3°F. The higher temperatures are already causing earlier spring snowmelt, reduced sea ice, widespread glacier retreat, and permafrost warming.
- The observed changes are consistent with climate model projections of greater warming over Alaska, especially in winter, compared with the rest of the country.
- Climate models also project increases in precipitation over Alaska.
- Simultaneous increases in evaporation due to higher air temperatures, however, are expected to lead to drier conditions overall, with reduced soil moisture.
- Average annual temperatures are projected to rise between 5 and 13°F by late this century, with lower emissions scenarios yielding increases at the lower end of this range and higher emissions yielding increases near the high end of the range.