CLIMATE CHANGE IMPACTS IN ANCHORAGE

C2ES SOLUTIONS FORUM

Located in Southcentral Alaska, Anchorage is the most populated area of the state and its economic hub, home to about 300,000 people, or about half of the state's residents.[1] Energy production is the main driver of the state's economy, although minerals, seafood, tourism, and agriculture also contribute. Many oil and gas companies are headquartered in Anchorage.[2] Anchorage is the state's primary transportation, communications, trade, service, and finance center. The local economy is driven mostly by oil and gas, the military, transportation, and the tourism industry. The Port of Anchorage serves as the state's shipping hub.

Anchorage is a diverse community, with minority groups representing 34 percent of its population and showing significant growth in these groups (including Asian, Hawaiian, Pacific Islander, Native groups, African American, and other races). Ten percent of the area's population are reported to be below the poverty level, with the highest concentration of poverty in the northern part of the city.[1,3]

The changing of broader weather patterns has brought increasingly warmer air towards the Earth's poles, accelerating the melting of ice in these areas. As ice is melted, more energy from the sun is absorbed, further warming these areas. Because of this rapid warming in northern latitudes, climate change impacts on Alaska are already being observed, including earlier spring snowmelt, reduced sea ice, widespread glacier retreat, warmer permafrost, drier landscapes, and more extensive insect outbreaks and wildfire across the state.[4]

Climate changes will impact the entire Anchorage community. Businesses of all sizes are an important part of the community, and will experience many different risks, such as disruptions to their supply chain, financial losses from extreme events, and threats to the health and safety of their employees. The business community in Anchorage can work together with city and state agencies, along with other stakeholders to evaluate potential risks and take steps toward enhancing the community's resilience.

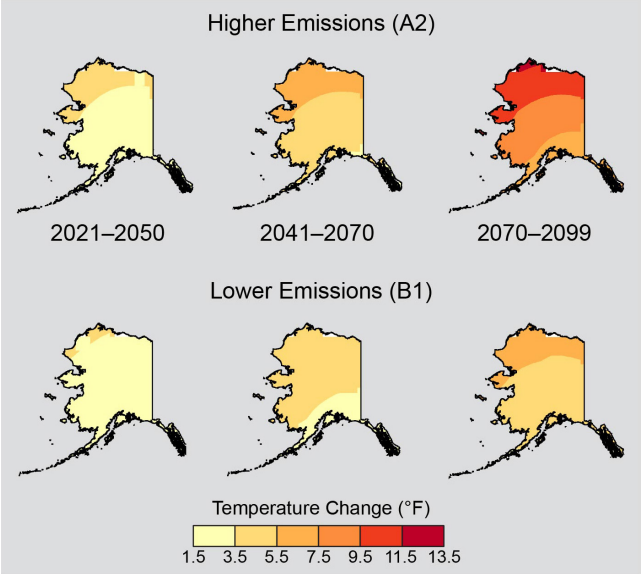
TEMPERATURE

As a state, Alaska has warmed at more than twice the rate of the rest of the United States, with state-wide average annual temperature increasing by 3°F and average winter temperature increasing by 6°F over the past 60 years.[4]

Temperature changes in Anchorage have been similar to the statewide average, with average annual temperature increasing by 3.2°F and winter temperatures increasing by 6°F since 1949. Globally, the year 2015 was the warmest year on record. Anchorage saw its second warmest year on record in 2015, with an annual temperature 2.6°F above average.[5] While one single year or particular event does not necessarily indicate climate change, the overall trend of warming and associated changes show that the climate in Anchorage is changing.

Over the next century, average monthly temperatures are expected to increase in Anchorage during all months, but particularly during winter months. This follows the trend of the state at-large. Average annual temperatures in Alaska are projected to rise by an additional 2°F to 4°F by 2050. If global emissions continue to increase during this century, temperatures can be expected to rise 10°F to 12°F in the north, 8°F to 10°F in the interior, and 6°F to 8°F in the rest of the state. Even with substantial emissions reductions, Alaska is projected to warm by 6°F to 8°F in the north and 4°F to 6°F in the rest of the state by the end of the century.[4]

FIGURE 1: Potential Temperature Changes in Alaska



Projected changes in temperature for Alaska, relative to 1971–1999, for the early, middle, and late parts of this century, if greenhouse gas emissions continue to increase (higher emissions, A2), or are substantially reduced (lower emissions, B1).

Source: National Climate Assessment[4]

PRECIPITATION

In 2015, while Anchorage saw higher than average precipitation (13 percent above average), most of this precipitation was rain rather than snow, and snowfall totals in Anchorage were 54 percent below average.[6]

Annual precipitation in Alaska is projected to increase by about 15 percent to 30 percent by the end of this century if global emissions continue to increase. All models project increases in all four seasons. However, increases in evaporation due to higher air temperatures and longer growing seasons could reduce water availability in most of the state. Reduced water availability can lead to more extensive wildfire and insect outbreaks.[4] Average monthly precipitation is projected to increase during all months in Anchorage, with some variability from decade to decade. Reduced snowpack and earlier thawing could lead to shortened ski seasons in Anchorage and elsewhere.[2]

THAWING OF GLACIERS

Southcentral Alaska is home to some of the largest glaciers that are rapidly losing ice because of rising temperatures. This loss of glacial volume contributes to freshwater input to oceans, leading to rising sea levels globally. The largest loss of glacier volume has occurred at the Columbia Glacier in Prince William Sound, which has been in rapid retreat since the mid-1980s. The Kenai Peninsula has also experienced glacial thinning.[2] While in the short term, glacier retreat could increase river discharge and hydropower potential in Southcentral and Southeast Alaska, over the longer term, this loss of ice might reduce water input to reservoirs and alter the productivity of nearshore fisheries.[1]

WILDFIRE

Warmer springs have lead to conditions that increase the drying of the fuels that contribute to wildfire risks. Outside Anchorage, Interior Alaska has experienced four large fire years, in which 17 percent of the landscape was burned since 2000. By the end of this century, area burned is projected to triple in Alaska for a moderate emissions scenario and quadruple under a high emissions scenario.[2] Wildfires threaten buildings and other infrastructure at the forest-city interface, and can put people's safety at risk. Smoke may also affect health of people miles away from the fire.

HEALTH

Since 1950, Alaska experienced its most heat wave events in the 2000s, and also saw fewer cold waves during this decade.[3] The spring months have seen the greatest increase in the frequency of warm events and the greatest decrease in the frequency of cold events.[2]

While extreme heat is not as prevalent in Alaska, warmer spring and summer months will still impact people across the state. For the most part, air conditioning is not available, so warmer temperatures could put vulnerable populations at risk (young, elderly, those with health issues). Warmer temperatures and changing precipitation patterns may also increase the spread of vector-borne diseases (from fleas, ticks, mosquitoes, etc.).[4]

FIGURE 2: Average Monthly Temperature for Anchorage, Alaska

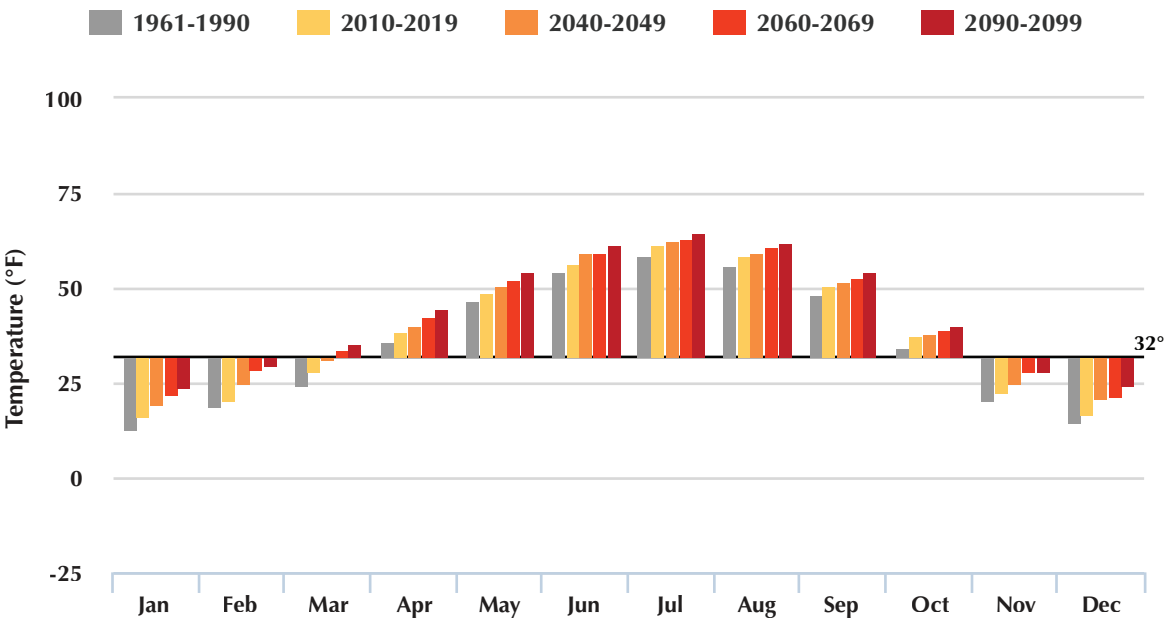
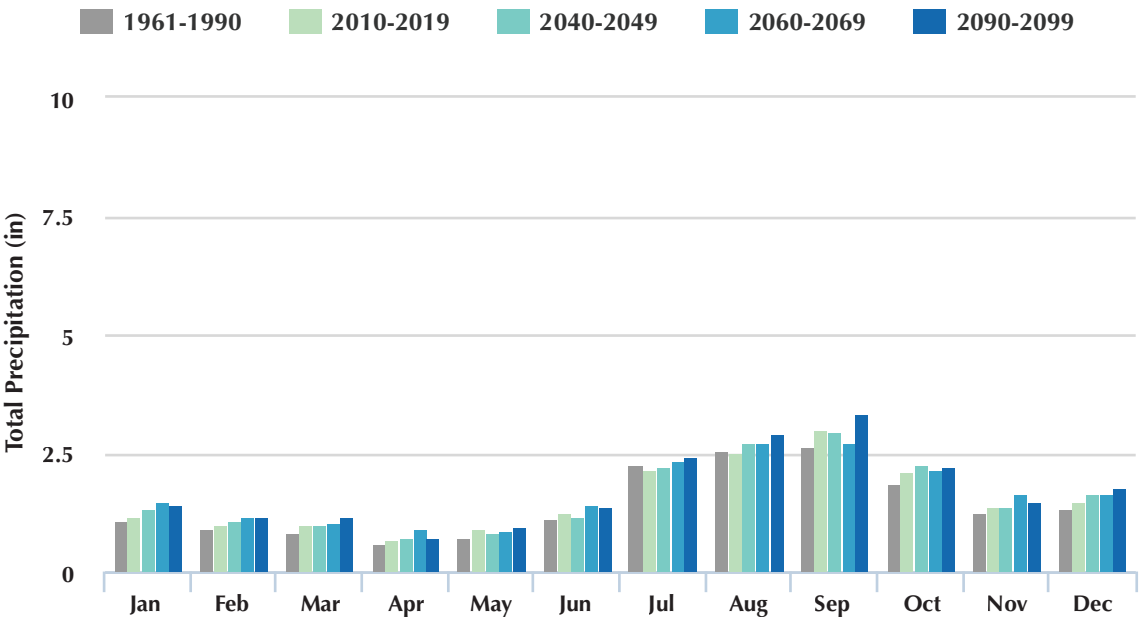


FIGURE 3: Average Monthly Precipitation for Anchorage, Alaska



Historical CRU 3.2 and 5-Model Projected Average at 10min resolution, Mid-Range Emissions (RCP 6.0). aDue to variability among climate models and among years in a natural climate system, these graphs are useful for examining trends over time, rather than for precisely predicting monthly or yearly values.

Source: "SNAP Community Charts," Scenarios Network for Alaska + Arctic Planning (SNAP), last accessed March 25, 2016, https://www.snap.uaf.edu/sites/all/modules/snap_community_charts/charts.php#baseline=cru32&community=86&dataset=1&scenario=rcp60&units=standard&variability=0.

ENDNOTES

1 "Anchorage Municipality Alaska (County) QuickFacts from the US Census Bureau," United States Census Bureau, last accessed March 25, 2016, http://www.census.gov/quickfacts/table/VET605214/02020.

2 C.J. Markon, S.F. Trainor, and F.S. Chapin III, eds., *The United States National Climate Assessment— Alaska Technical Regional Report: U.S. Geological Survey*, Circular 1379 (Washington, DC: U.S. Geological Survey, 2012), http://pubs.usgs.gov/circ/1379/pdf/circ1379.pdf.

3 Anchorage Economic Development Corporation, *2012 Anchorage Indicators* (Anchorage, AK: Municipality of Anchorage, 2012), http://www.muni.org/Departments/OCPD/Planning/Publications/Documents/Full%20Indicators%20Report.pdf.

4 F.S. Chapin III, S. F. Trainor, P. Cochran, H. Huntington, C. Markon, M. McCammon, A. D. McGuire, and M. Serreze, "Chapter 22: Alaska. Climate Change Impacts in the United States" in *The Third National Climate Assessment*, ed. J. M. Melillo, T.C. Richmond, and G. W. Yohe (Washington, DC: U.S. Global Change Research Program, 2014), http://nca2014.globalchange.gov/report/regions/alaska.

5 "Temperature Changes in Alaska," The Alaska Climate Research Center, last accessed March 25, 2016, http://climate.gi.alaska.edu/ClimTrends/Change/TempChange.html.

6 "The Climate of Alaska for 2015," The Alaska Climate Research Center, last accessed March 25, 2016, http://akclimate.org/Summary/Annual/2015.

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