



Climate in Kenai Fjords

Weather and climate are key physical drivers of ecosystem structure and function. Because global climate models indicate that climate change and variability will be greatest at high latitudes, climate monitoring is critical to understanding the changing conditions of park ecosystems. Some potential effects in Southwest Alaska parklands include a reduced snowpack, earlier lake-ice breakup, warmer winters, and wetter summers. These changes will likely affect the distribution, abundance, growth, and productivity of plants and animals.

Kenai Fjords National Park, located in the northern Gulf of Alaska, straddles two climate divisions: the Cook Inlet and the Northwest Gulf (Bieniak et al. 2012). In this part of Alaska, sea surface temperatures of the northern Pacific moderate the transfer of energy and water to and from the atmosphere. So far this year, the Northern Pacific is only slightly warmer than normal, with a positive *Pacific Decadal Oscillation*, a long-term index of seas surface temperature (Namias 1959, Mantua and Hare 2002).

Additional climate dynamics and patterns in sea surface temperatures and other climate dynamics will affect Southwest Alaska's weather this spring and summer. Typically the northern seas that surround Alaska (the Bering, Chukchi, and Beaufort) are mostly ice-covered in winter (Figure 1). However, this year saw the lowest ice cover since satellite observations began in 1979. The Bering Sea, which is much warmer than normal, has had areas of open water that are historically unprecedented. Due to these and other climate influences, Southwest

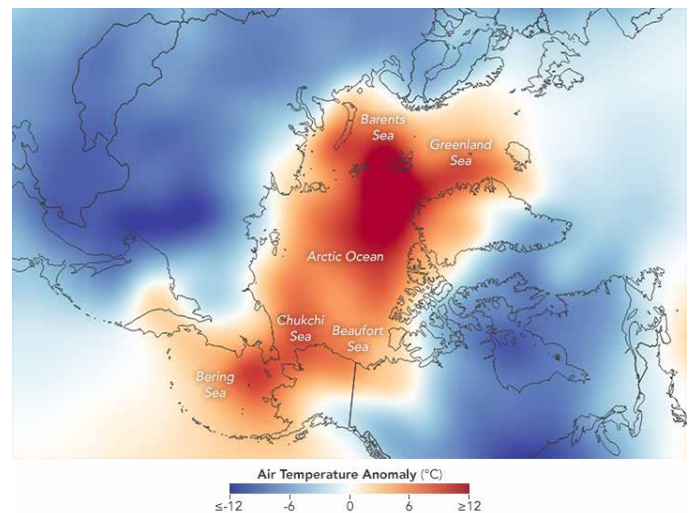
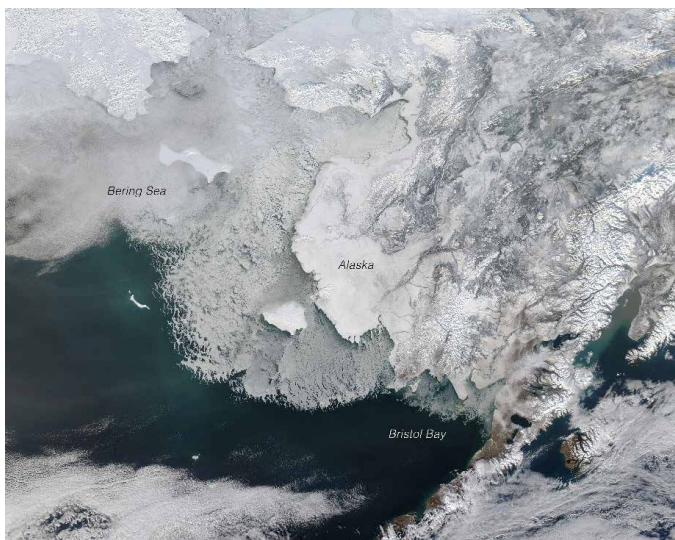


Figure 1. Ice covers much of the Bering Sea into Bristol Bay throughout the winter and spring in normal years (April 2015; above, left). Ice cover in 2018 has been the lowest since observations began in 1979 due to warmer-than-normal air temperatures over the Arctic (February 2018; above, right). The warmer sea surface temperatures are expected to affect Southwest Alaska's climate throughout the spring. Image sources: Johnson Space Center and NASA Earth Observatory.

Alaska's 2018 temperatures are predicted to be above normal this spring and early summer with slight increases in precipitation, although precipitation is more difficult to predict and thus has higher uncertainty. These and other regularly updated regional climate forecasts from multiple models can be found at: cpc.ncep.noaa.gov/products/predictions.

The cumulative effects of these large-scale patterns of climate can be seen in the mean annual air temperatures

where the years of 2003, 2015, and 2016 were the hottest on record at the Seward airport (Figure 2). Consequently, the number of days that were below freezing in these years were least, 60 to 100 days fewer than in normal-to-cooler years (Figure 2). The difference in the number of freezing days has a profound influence on whether precipitation falls as rain instead of snow and how rapidly that snow melts, in turn affecting hydrologic and ecologic processes in the park.

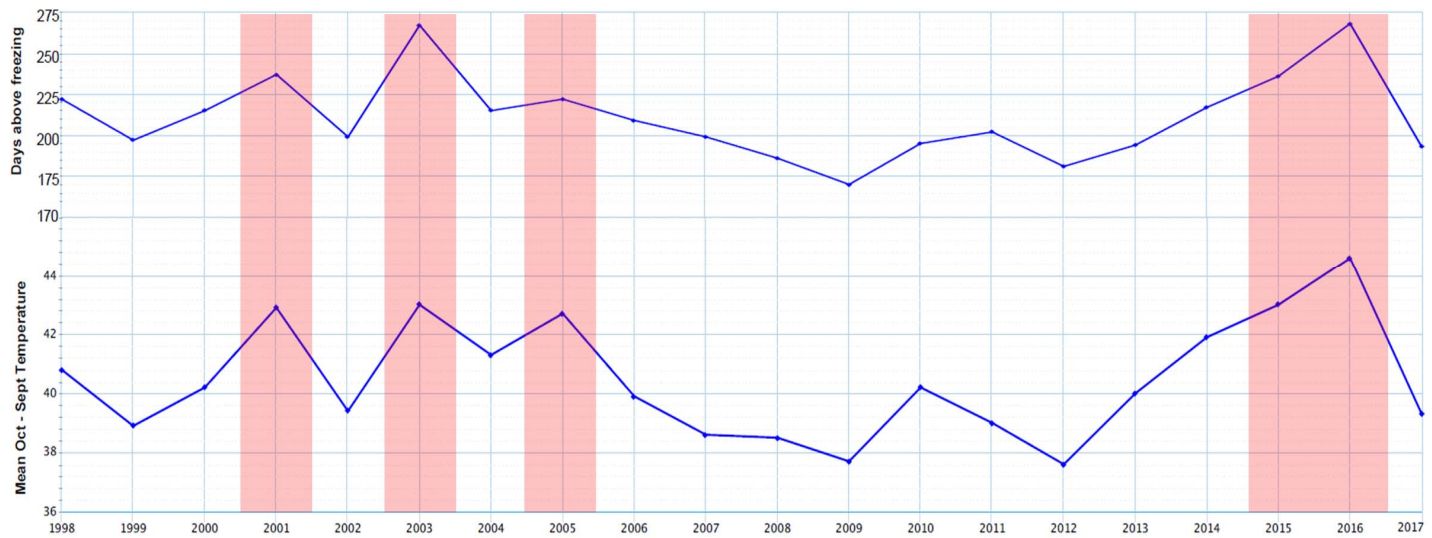


Figure 2. Temperature data (°F) from Seward, Alaska for the period of record, show the 5 warmest years of 2001, 2003, 2005, 2015, and 2016 highlighted in red. The years of 2003 and 2016 also had the highest number of days above freezing, nearly 100 more than the coldest year of 2009.

References

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