



Alagnak

Aniakchak

Katmai

Kenai Fjords

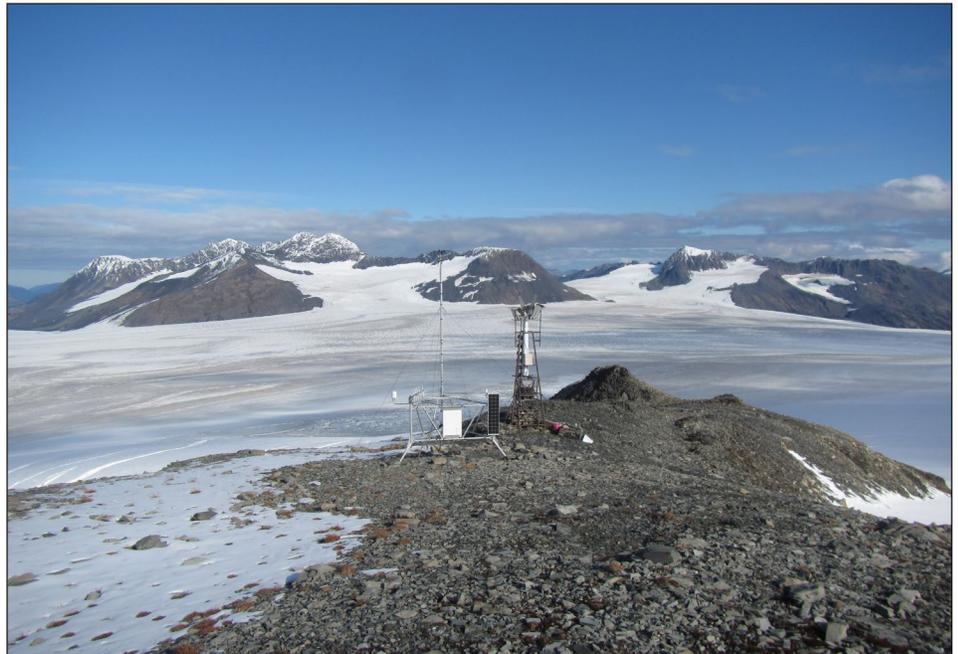
Lake Clark

Climate at Kenai Fjords NP

Kenai Fjords National Park (NP) is geographically located in the northern Gulf of Alaska and exhibits a range of climates, from the moderate and ecologically productive coastal zone to the ice-covered expanse of the Kenai Mountains, where below-freezing temperatures and deep snow packs sustain southwest Alaska's largest icefield. Examples of how elevation and proximity to the ocean affect air temperature can be seen in the monthly mean temperatures recorded at the Southwest Alaska Network climate stations found at three different elevations where temperatures drop and the accumulation of snow, versus rain, increases with altitude (Figure 1).

Patterns of Gulf of Alaska sea-surface temperatures in the northern Pacific are an important influence on climate because they mediate the transfer of heat and water vapor to and from the atmosphere. One measure of cyclic changes in sea-surface temperature, known as the Pacific Decadal Oscillation (PDO), shows multi-decadal patterns of approximately 10 to 30 years, which are characterized by the distribution of warm vs cool water in the central and coastal regions of the northern Pacific (Mantua et al. 1997). When the PDO shifts from cool to warm phases, it often influences the land-surface temperatures of the Kenai Fjords region and Alaska.

Long-term land-surface temperature records in the Kenai Fjords region are rare. Seward weather stations, from several different locations, provide a



NPS/P. Kirchner

Remote Automatic Weather Station (RAWS), Harding Ice Field, Kenai Fjords NP.

Weather Highlights

- Temperatures recorded at the Seward airport indicate 2003 and 2015 were tied as the warmest years on record with a mean annual air temperature of 43°F (6°C), 2.5°F (1.4°C) above the 30-year climate normal of 40.5°F (4.7°C).
- During the winter months of 2003, 2014, and 2015, record-high daily temperatures were recorded 18, 12, and 12 times, respectively.
- 2016 has already broken several temperature records.

How climate and weather are different can be summed up by the phrase: climate is what you expect; weather is what you get.

Weather refers to atmospheric conditions over short periods of time, typically days to weeks. *Climate* refers to the patterns (statistics) of weather over long periods of time, typically 30 years. *Climate change* refers to changes in climate patterns over long periods of time.

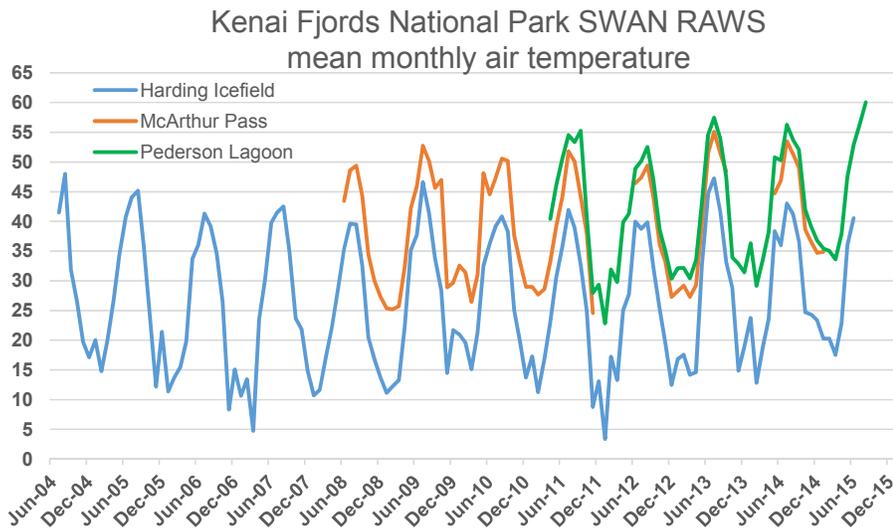


Figure 1. Mean monthly air temperatures from remote automated weather stations (RAWS) in Kenai Fjords show climatic differences due to elevation. Harding Icefield at 4,000 feet is the coldest and Pederson Lagoon at 480 feet is the warmest.

long-term record because they have been intermittently monitored since 1908, but continuous records are only available starting in 1998. When a yearly running mean of these air temperatures are compared to the PDO trends, there is a coherent signal from the PDO in recent years (Figure 2).

Temperatures recorded at the Seward airport indicate 2003 and 2015 were tied as the warmest years on record with a mean annual air temperature

of 43°F (6°C), 2.5°F (1.4°C) above the 30-year climate normal of 40.5°F (4.7°C). During the winter months of 2003, 2014, and 2015, record-high daily temperatures were recorded 18, 12, and 12 times, respectively. The combined effects of these patterns have the greatest impact on whether precipitation falls as rain or snow, as well as when and how frequently snow melts. The current year, 2016, has also broken several temperature records.

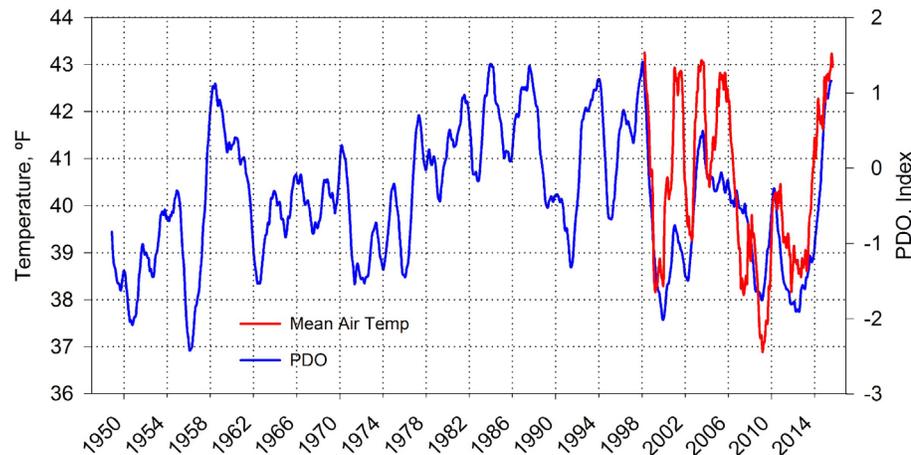


Figure 2. One year running mean of Seward Airport mean monthly air temperature and PDO index, PDO date source National Climate Data Center (Smith et al. 2008).

References

- Mantua, N. J., S. R. Hare, Y. Zhang, J. M. Wallace, and R. C. Francis. 1997. A Pacific interdecadal climate oscillation with impacts on salmon production. *Bulletin of the American Meteorological Society* 78:1069-1079.
- Smith, T. M., R. W. Reynolds, T. C. Peterson, and J. Lawrimore. 2008. Improvements on NOAA's Historical Merged Land-Ocean Temperature Analysis (1880-2006). *Journal of Climate* 21:2283-2296.

More Resources

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Snow and Climate

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