

2. Climatic Characteristics of the Taiga in Interior Alaska

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The studies described in this volume were conducted in the boreal forest zone of central Alaska. This high-latitude setting has a continental climate characterized by low annual precipitation (285 mm at Fairbanks), low humidity, low cloudiness, and large diurnal and annual temperature ranges (Haugen et al. 1982). The coldest month is January, with a mean daily temperature of -24.4°C , while July has a mean daily temperature of $+17.1^{\circ}\text{C}$. In winter, strong, stable temperature inversions are common due to intense long-wave radiation cooling during long periods of low sun angle, darkness, and typically cloud-free conditions. Snow commonly covers the entire landscape from October through mid-April (average, 214 days in Fairbanks); the frost-free summer at Fairbanks averages 97 days (Haugen et al. 1982).

The annual range in air temperature in the taiga is exemplified in Figure 2.1, which charts normal and extreme air temperatures for Fairbanks. On any given date, the extremes of record can vary by as much as 35°C (in June) to 65°C (in January); the extreme annual temperature range is about 90°C . Mean daily temperatures are more moderate, but still vary from a normal low of -30°C to a normal high of $+23^{\circ}\text{C}$.

Bowling (1979) points out that the distribution of climatic zones in Alaska is largely controlled by topography; interior Alaska is bounded by the Brooks Range to the north and the Alaska Range to the south, and so it is open to direct intrusions of maritime air masses only from the west.

Alaska's interior lies in the zone of discontinuous permafrost (Hartman and

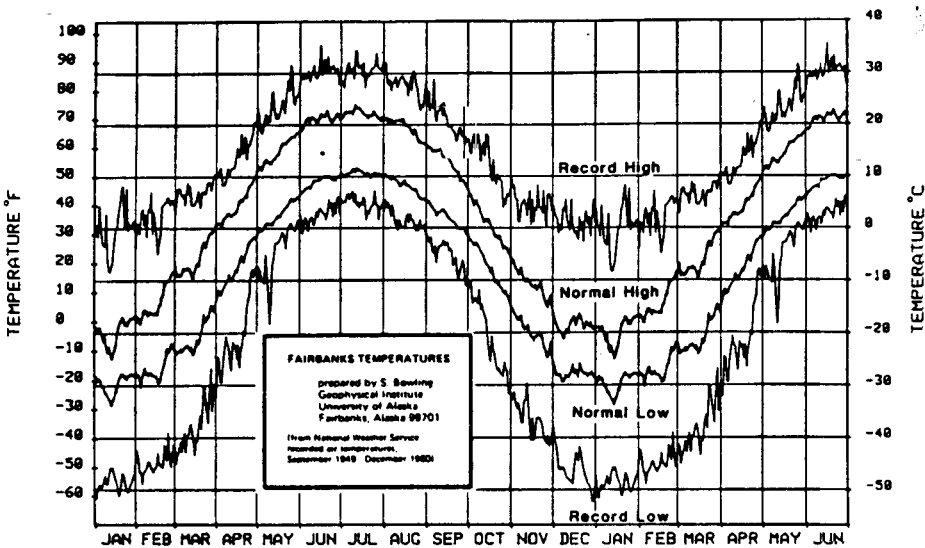


Figure 2.1. Average daily temperature for 39 years of records from the National Weather Service station at Fairbanks, Alaska (compiled by S. Bowling, 1980, Geophysical Institute, University of Alaska).

Johnson 1984). Permafrost (earth material remaining continuously below 0°C) is generally found on north-facing slopes and in valleys and poorly drained settings, but is commonly absent from south-facing slopes and beneath major water bodies. At higher elevations and more northerly latitudes, permafrost becomes more prevalent and is virtually continuous north of the Brooks Range (Ferrians 1965).

The taiga ecosystem study encompassed 25 field locations in interior Alaska. Climatic data were acquired at 12 sites over varying time periods. Much of these environmental data for the intensive site of Washington Creek have been summarized in a series of annual reports.¹ Environmental data for several of the other sites are summarized in a report by Williams (1980).² The sites for which concurrent data are available provide a reasonably wide range of local environment. Site elevations range from 122–747 m m.s.l. (mean sea level);

¹Hoch, David. 1977–1979. Selected climatic characteristics, Washington Creek Experimental Area. Intensive Study Site. Cooperative Black Spruce Ecosystem Study. Reports on file at the Institute of Northern Forestry, USDA Forest Service and the Forest Soils Laboratory, University of Alaska, Fairbanks, AK.

²Williams, Carolyn. 1980. Selected climatic characteristics of semi-intensive sites in Bonanza Creek Experimental Forest, Washington Creek Experimental area, and the Tanana River experimental sites. Report on file at the Institute of Northern Forestry, USDA Forest Service, Fairbanks, AK.

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aspects include north, south, east, southeast, and level, while vegetation includes the major forest types of the taiga.