Seasonal Weather Patterns of the Northern Plains

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Precipitation Pattern

The current climate of the Northern Plains has existed for the past 5,000 years (Bluemle 1977, Bluemle 1991, Manske 1994, Bluemle 2000). The seasonal distribution of precipitation (figure) is classified as the Plains Precipitation Pattern (Humphrey 1962), in which most of the precipitation occurs during the growing season (85%) and the smallest amount occurs in winter (10%). Total precipitation for the 5-month nongrowing season of November through March averages less than 2.5 inches (63.5 mm) (15%) of precipitation. The greatest amount of precipitation occurs in spring and early summer (60%). The precipitation received in the 3-month period of May, June, and July accounts for over 50% of the annual precipitation, and June has the greatest monthly precipitation (22%).

Weather Air Mass Pattern

The weather of the Northern Plains is controlled by three major air masses that dominate at different times of the year (Redmann 1968). The Pacific air mass dominates the region from September through January, a period that is generally dry because the orographic effect of the Rocky Mountains causes a rain shadow as the air mass moves east. The mean monthly precipitation during this dry period is less than 1.0 inch (25.4 mm). The Polar air mass dominates the region from February through May, a period with mean monthly precipitation between 1.0 and 2.0 inches (25.4 mm and 50.8 mm). Throughout June, combinations of Gulf, Polar, and Pacific air masses mix and produce a relatively rainy period with a monthly precipitation average around 3.5 inches (88.9 mm). The summer months of July and August are dominated by the Gulf air mass, with little mixing of other air masses and a reduction of monthly precipitation to about 2.0 inches (50.8 mm), which comes generally in intermittent thunderstorms. The change from the dominance of one air mass to the next results in transition periods, which can vary annually. Differences in the transition periods contribute to the variation in conditions from year to year.

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Seasonal Precipitation Distribution of the Plains Precipitation Pattern