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## TEMPERATURE TRENDS IN IOWA

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With all the discussion about possible global warming, many people have wondered: What is the historical trend in Iowa's temperatures? This can be answered reasonably well for the past century. Temperature records since 1873 have been compiled by the State Climatological Office and its predecessors (National Climatic Center, 1990). For many years the State Climatologist published the average annual temperatures for the state as a whole, but that practice ceased in the early 1950s. Consequently, I have gone back over the records of the last 11 decades (from 1880 to 1989) and computed an average annual temperature for each year and then averaged them for each decade. I suspect the more recent temperatures are more reliable than those of the late nineteenth century, but I have used the records all the way back to 1880.

The monthly reports titled *Climatological Data--Iowa Section* (National Climatic Data Center, 1990) contain a great wealth of climatological data concerning temperatures, precipitation, wind and so forth. These reports (and their predecessors) list daily high and low temperatures and monthly averages for many stations throughout the state. They also contain monthly average temperatures for Iowa's nine climatological regions, each of which consists of 10 to 12 counties. These regional averages are currently computed by weighting each station by the area closer to it than to any other station, although this area-weighting appears not to have been the practice in the early decades of the Iowa weather records.

For my analysis, I began with the nine regional monthly averages in *Climatological Data--Iowa Section*, using them to produce a monthly average for the whole state by weighting each region according to its area. Next, I determined an average annual temperature for Iowa by averaging the monthly averages for the state, weighting each month by its number of days. In the early years, monthly averages for the state were published in the State Climatologist's reports, and I have used them when available. Until about 35 years ago the State Climatologist also published an annual average temperature for the state of Iowa, but it usually differed by a few tenths of a degree from the annual average temperatures I calculated. The main reason for this seems to be that the published annual average was simply the mean of the 12 monthly averages, not weighted by the number of days, which has the effect of giving some months (particularly February) too great a weight.

Table 1 shows the lowest and the highest annual average in each decade from the 1880s (1880-1889) to the 1980s, together with the average for each decade, which is also plotted in Figure 1. The most surprising result, considering the year-to-year fluctuations, is that there have been only two reversals of trends. The data exhibit an upward trend from the 1880s to the 1930s, followed by a downward trend from the 1940s through the 1970s, then an increase in the 1980s. The 1980s are tied with the 1920s for third and fourth warmest decades in Iowa, the hottest two being the 1930s followed by the 1940s.

**Table 1**  
**Average Temperatures in Iowa**

<b>Decade</b>	<b>Lowest</b>	<b>Average</b>	<b>Highest</b>
1880s	44.9	46.7	48.5
1890s	45.8	47.6	49.7
1900s	46.3	48.0	49.4
1910s	44.9	48.2	49.8
1920s	46.3	48.8	52.3
1930s	47.5	50.2	53.2
1940s	47.7	49.1	51.1
1950s	45.7	48.6	50.6
1960s	47.3	48.2	49.7
1970s	46.2	48.1	49.9
1980s	46.9	48.8	51.9

Note: For each decade the lowest and highest annual average temperatures are given, along with the average of the annual averages for each decade. Decades extend from the year ending in 0 to the year ending in 9.

Considerable disagreement prevails among scientists as to whether or not a definite warming trend can be detected in the global temperature records, but it is generally admitted that the trends in any small geographical area (such as Iowa) are not significant because they may differ substantially from the global trend. Global temperatures exhibited a warming trend until about 1940, then a cooling trend until about 1970, followed by a warming since then (Jones, 1990). Iowa's trends are similar to the global trends, except that the latest warming trend appears to have begun a decade later in Iowa and has not yet returned to the level of the 1930s.

### References

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