

Dr. Edward Hopkins, Assistant Wisconsin State Climatologist, was a guest speaker at the 2018 Agronomy Day at the Five Pillars Restaurant in Random Lake. In the article below, Ed summarizes the Wisconsin weather data presented during the meeting. I found the Wisconsin weather data intriguing and somewhat consistent with common perceptions.

Has the Weather Really Changed? A look Back 50 years.

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People who are involved with agriculture across Wisconsin suspect that weather patterns across the Badger State have been changing over the last 50 years, possibly resulting in milder winters, warmer summers and longer growing seasons. They wonder if weather records, such as those maintained in the Wisconsin State Climatology Office bear out their suspicions.

The State Climatology Office maintains copies of weather records for several hundred stations around Wisconsin, with some records of temperature and precipitation extending back to the late 19th century. While examining the temperature records for individual stations would be a daunting task and are prone to local effects and data gaps, one can obtain valuable information by inspecting the statewide average temperature records that represent a spatial average of the monthly data for all the reporting stations around the state for each month since 1895.

These statewide average temperature records show increases in the monthly maximum (or afternoon) temperatures and the minimum (early morning) temperatures for all seasons over the last 50 years.

Of note, the afternoon maximum temperatures around the state during summer (June, July and August) have increased by 0.6 Fahrenheit degrees, while the nighttime minimum temperatures in summer have increased since 1971 by three times as much (1.6 degrees), leading to an average statewide summer temperature increase of 1.3 degrees.

The temperature increases have been much larger in winter, with the maximum temperature increasing by 3.6 degrees and the minimum winter temperatures climbing by 6.2 degrees, resulting in statewide average winter temperatures increasing by 5.0 degrees.

Furthermore, if one ranked the 20 warmest years (or highest annual average statewide temperatures) that Wisconsin residents have experienced since 1895, then more than half of the warmest 20 years (11) have occurred since 2001. Interestingly, the first 16 years of the 21st century had the 10th coldest year on record (2014), the result of the polar vortex that remained entrenched across the Great Lakes for the first part of that year.

In addition to the temperature records, several other records can reveal interesting results that tend to go along with the idea of warmer winters and summers. The State Climatology Office has been maintaining a lake ice record of dates of ice-over and ice-out for the Madison area lakes (Mendota, Monona and Wingra) that extends back to the 1850s. ***Plots of the duration of ice cover for the lakes reveals a general decrease in the ice duration by roughly three weeks over the last five decades. This recent decline in ice cover appears to correspond to the long term increases in the winter temperatures over that time span.***

Keeping track of the last occurrence of a 32° Fahrenheit temperature reading in spring and the first occurrence of a 32°F temperature in autumn is important for agricultural interests as these dates define the length of the frost-free period, or for practical purposes, the length of the growing season. For instance, ***inspection of the record of the dates of first and last occurrence of 32°F temperatures and the length of the frost-free season for the weather station at Plymouth (Sheboygan County) shows that since 1971, the length of the season has increased by approximately 16 days (or more than two weeks).*** Some other stations in southern Wisconsin have seen a bigger increase in the length of the frost-free season, while others have had smaller increases. Now, relatively late autumn frosts or exceptionally late spring frosts can mean disaster for farmers and reduce the length of the growing season.

The number of accumulated growing degree days for corn (with a threshold temperature of 50°F and an upper ceiling of 86°F) is available at the State Climatology Office for each year in each of the nine climate divisions and the entire state, commencing in 1895. These modified

growing degree days are meant to show the response of corn to summer heat. Interestingly, no significant long-term trends in the seasonal accumulated modified growing degree days over the last 50 years could be seen, although several cool summers could be seen in the early 1990s.