



**K-STATE**  
Research and Extension

## Extension Agronomy

# eUpdate

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*02/15/2021*

These e-Updates are a regular weekly item from K-State Extension Agronomy and Kathy Gehl, Agronomy eUpdate Editor. All of the Research and Extension faculty in Agronomy will be involved as sources from time to time. If you have any questions or suggestions for topics you'd like to have us address in this weekly update, contact Kathy Gehl, 785-532-3354 [kgehl@ksu.edu](mailto:kgehl@ksu.edu), or Dalas Peterson, Extension Agronomy State Leader and Weed Management Specialist 785-532-0405 [dpeterso@ksu.edu](mailto:dpeterso@ksu.edu).

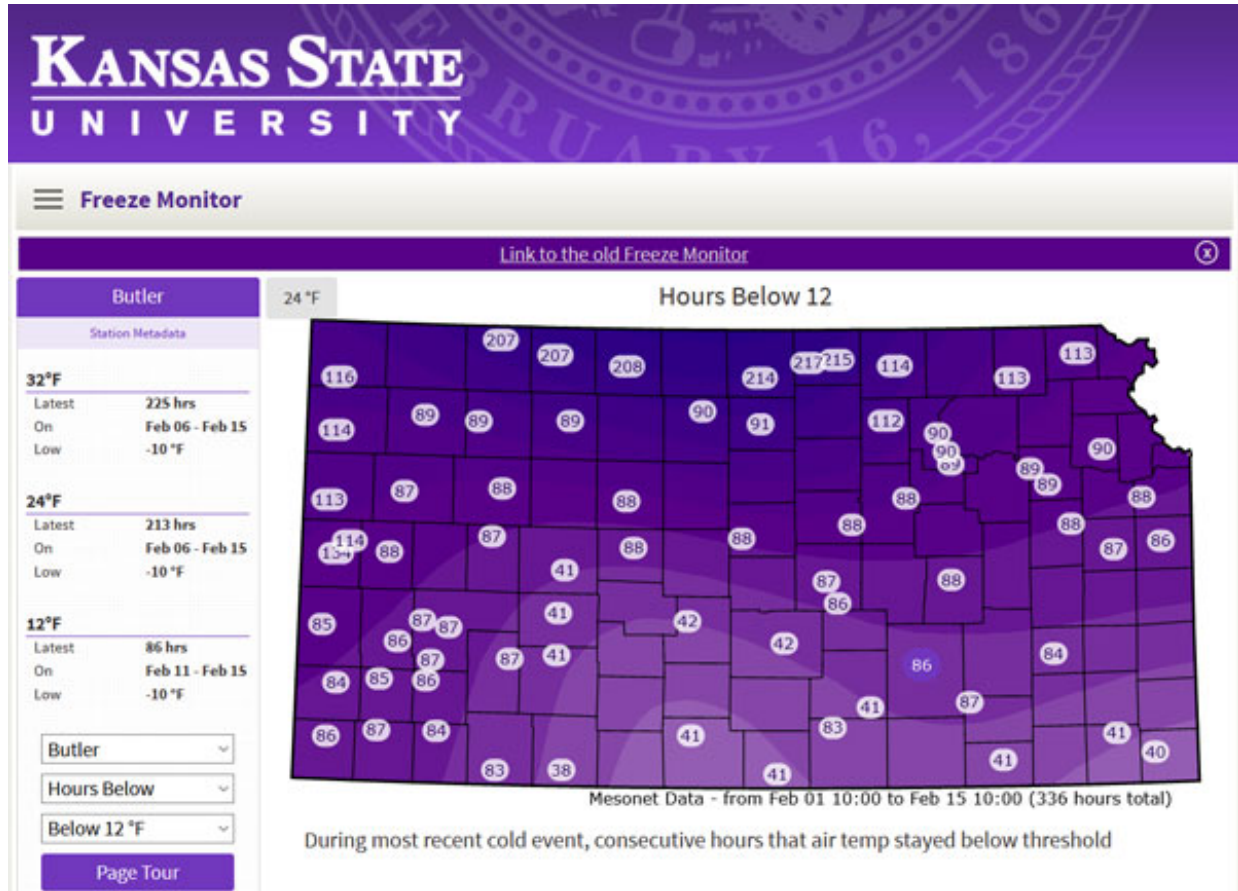
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## 1. Measuring the Arctic outbreak on the Mesonet

In light of the recent cold weather, the Kansas Mesonet has enhanced and expanded its Freeze Monitor tool, providing new resources for both producers and agents dealing with extended cold temperatures. The page can be found at <https://mesonet.k-state.edu/airtemp/min/hoursbelow/> or by navigating through the Mesonet menu (☰ > Weather > Freeze Monitor).



**Figure 1. Screenshot of the updated Freeze Monitor on the Kansas Mesonet.**

### Background

While the original Freeze Monitor focused on how many of the past 24 hours were spent in freezing conditions, our new tool expands its scope to the past 14 days. This allows us to track a lengthy cold spell, not just the overnight lows. The tool is focused on the most recent freeze event, or the continuous time below 32°F. It also handles continuous time below 24° and 12°.

We built this tool to answer the following questions:

How many hours have we spent below freezing?

The default map and table display the length (in hours) of the most recent freeze event. The bottom dropdown "Change Threshold" selector allows for the selection of 24° (for wheat) and 12° (for canola)

as well. As a new feature, desktop users will find navigation buttons above the map to switch between temperatures and mobile users will find that all maps are accessible by swiping right and left on the map.

When was the last cold spell?

Once things warm up, selecting the “Days Since” map from the middle dropdown “Change Map Type” selector will display the number of days (up to a year) since the temperature last dipped below 32°F (or 24° or 12°). It also changes the table to include freeze climatology: the normal and record dates of first or last freeze.

How cold did it get?

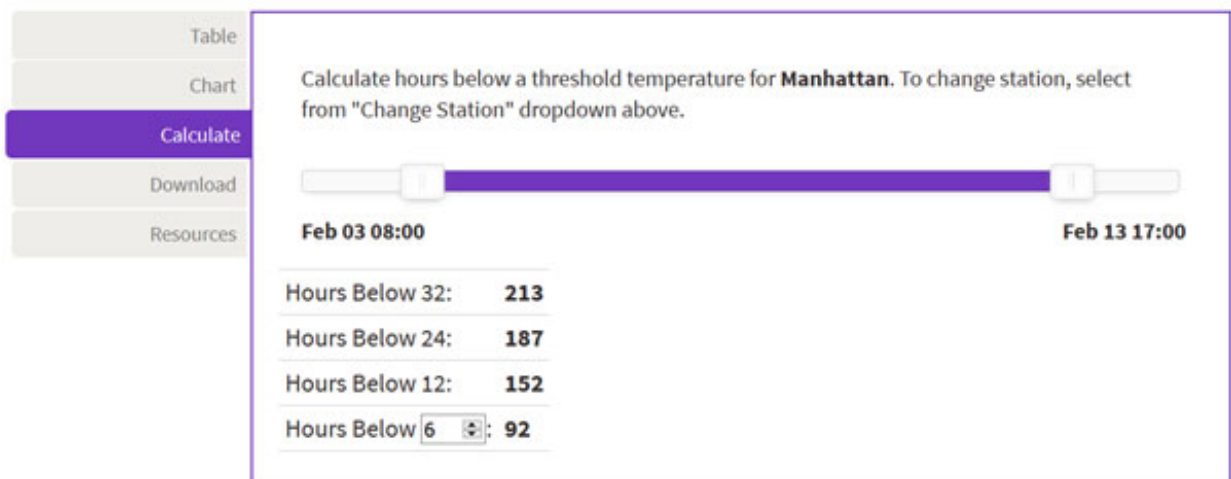
Select “Low Temperature” from the middle dropdown “Change Map Type” selector (mobile users can also swipe left until they reach the Low Temperature maps). The displayed map and table show the coldest temperature during the latest freeze event in the past two weeks. Note that as each threshold may have a different time period, the lowest temperature for each may vary.

Did we break a record?

Please refer to our daily max and min temperature page at <https://mesonet.k-state.edu/weather/maxmin/> (also found under the Mesonet homepage menu at ☰ > Weather > Wind Gust and High/Low)

What if I’m interested in a different threshold?

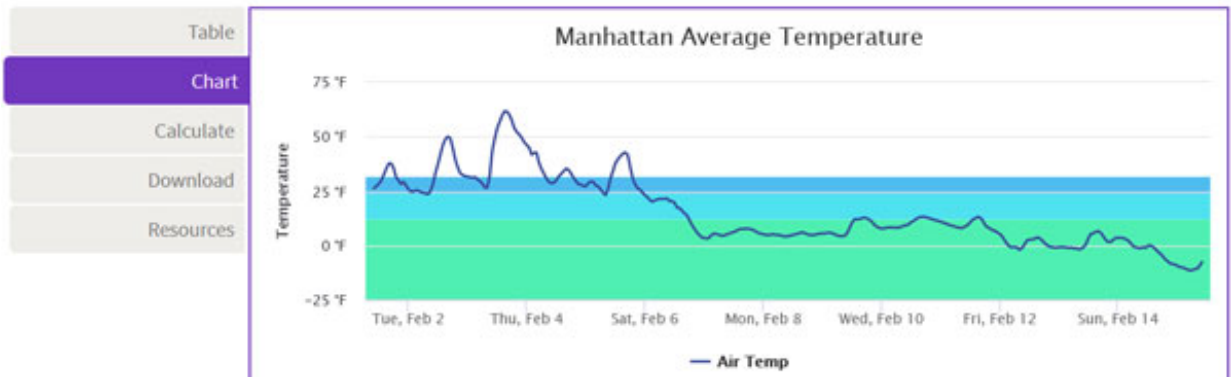
This page introduces a new tool under the “Calculate” tab for those who want a different threshold. Users can select both the threshold and the time period, and the number of hours below will automatically update. Note that this calculation sums all hours below the threshold levels, not continuous hours.



**Figure 2. The Calculate Tab allows users to set a custom threshold and time range.**

What about the freeze before last?

When temperatures regularly dip below freezing, the Freeze Monitor will only report the most recent freeze event. The Chart tab gives a graphical representation of temperatures, and the Calculate tab provides the number of hours for any time period in the past two weeks.



**Figure 3. Chart displaying past two weeks' temperature data for a single station.**

What happened to the old Freeze Monitor?

For the sake of continuity, we will continue to serve our original Freeze Monitor page through spring. Both new and old pages include a link at the top to reach the other. We will retire the old Freeze Monitor over the summer. If you have concerns, please contact one of the authors at the end of the article.

### **About the Data**

Temperatures are air temperature data measured at Kansas Mesonet stations at 2 meters (6'5") above the ground. Data displayed are the hourly average temperature. Timestamps refer to the hour ending on the timestamp. The page is updated hourly as new data become available. The "Download" tab has links to comma separated (.csv) data for the entire network and individual stations. It also includes image files (.png format) of all maps on the page. For more information on the impacts of cold temperatures on wheat and canola, see the "Resources" tab.

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## 2. Safety guidelines for frozen ponds

With the recent extremely cold weather, ponds across Kansas have begun to freeze over. Invariably, questions arise such as, “How quickly does the ice thicken?” and “How thick does ice need to be to support a person? A car?”. The answers to these questions vary greatly.

Ice accumulation rates can be determined by a number of complex formulas that include temperature, snow cover, wind, and radiational cooling. A simpler method looks at Frost Degree Days (FDDs). This is calculated similar to growing degree days. Take the average temperature and subtract it from the freezing point of water (32 degrees F). Each degree that the average is below freezing is one FDD. After the first ice layer forms, studies have shown that the ice will accumulate at about 1 inch per 15 FDDs.

For the questions regarding depth to support various objects, there are tables that indicate 2-4 inches of ice would support a single individual (Figure 1), while 8 to 12 inches of ice would support a car (<http://www.dnr.state.mn.us/safety/ice/thickness.html>). However, all of those guides mention that this is for “clear, solid ice”, and are based on regions with consistent, long-term cold weather, such as Canada, Alaska, the northern United States, and Russia. It should also be noted that these calculations are for still water. Rate of accumulation will be much slower in moving water, and the strength of the ice will be less.



**Figure 1. Ice safety graphic from the National Weather Service Weather-Ready Nation program.**

The Michigan Department of Natural Resources (DNR) has this advice, "The DNR does not recommend the standard "inch-thickness" guide used by many anglers and snowmobilers to determine ice safety. A minimum of four inches of clear ice is required to support an average person's weight on the ice, but since ice seldom forms at a uniform rate it is important to check ice thickness with a spud and ruler every few steps." They also note, "Be especially cautious in areas where air temperatures have fluctuated. A warm spell may take several days to weaken the ice; however, when temperatures vary widely, causing the ice to thaw during the day and refreeze at night, the result is a weak, "spongy" or honeycombed ice that is unsafe. Check out this additional online resource: [Ice Safety Tips](#) from the Michigan Department of Natural Resources.

So despite the recent cold weather, don't trust that ice on the ponds here in Kansas.



**Figure 2. Newly formed ice on pond. Photo is public domain.**

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