



Minnesota WeatherTalk Newsletter for Friday, January 4, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, January 4, 2013

HEADLINES

- Comments on 2012 climate summaries
- January thaws
- Retirement of Byron Paulson
- Weekly Weather potpourri
- MPR listener questions
- Almanac for January 4th
- Past weather
- Outlook

Topic: Comments on 2012 Climate Summaries

As many people already know, 2012 was one of the warmest years in history for Minnesota and much of the USA. It tied 1931 for warmest year in the Twin Cities record, and it was clearly the warmest year in history for Rochester. Also, Winnipeg, Canada reported its 5th warmest year since 1873. The signal of warmth was evident in the monthly climate statistics through October as the first 10 months of 2012 were the warmest ever statewide in Minnesota.

You can read more about the temperature rankings for 2012 at our web site.....

<http://www.climate.umn.edu/doc/journal/warm2012.htm>

About 80 percent of all climate observers in the state reported below normal precipitation for 2012. The dominant pattern in the state was one of drought. For many areas 70 percent of the total precipitation for the year fell in the first 6 months, as drought gripped much of the state by late summer and carried on into fall and winter. In the late fall and early winter there were some reports of shallow wells going dry in some northern counties, another consequence of the drought. Thanks to severe thunderstorms and flash flooding over June 19-20, some northeastern communities reported record-setting rainfall values for the month of June: 13.93 inches at Floodwood, 13.86 inches at Two Harbors, 13.03 inches at Wright, 12.64 inches at Cloquet, and 10.03 inches at Duluth. This produced above normal annual precipitation for some climate stations in the northeast, including Cloquet (40.33 inches), Floodwood (38.31 inches), Duluth (33.18 inches), and Two Harbors (36.11 inches).

Many citizens have asked me about the wind patterns for 2012. For example was it a windier than average year? Looking at both the mean daily values of wind speed, along with the maximum gusts I find that only in January and March of 2012 did the average wind speed exceed the historical average. All the remaining months show average wind speeds that are less than the long term values. These statistics hide the fact that there were some extremely windy days. In the Twin Cities for example there were 25 days in 2012 when the maximum wind gusts exceeded 40 mph. In fact during the stormy month of May, this happened on six days, with a maximum gust of 58 mph on the 19th.

Topic: The January Thaw - A common feature of southern Minnesota

Most residents of the Twin Cities area consider the January thaw to be a given each year. They know it will come, just not precisely when. This time around it looks like next Monday through Thursday (Jan 7-10) may bring a thaw period.

Indeed for many central and southern Minnesota locations a January thaw is quite common. The definition of a January thaw is variable. Some consider it to be any single day with a temperature above 32 degrees F. But consequences associated with a January thaw, like loss of snow cover, melting and drying of street surfaces and sidewalks, softening of lake ice, etc are generally not realized unless temperatures rise above the freezing mark for two or more days. Using this as a sorting criteria we can look at the historical frequency of such temperatures for various locations in Minnesota. These frequencies of January thaws (listed below) indeed show great reliability in most of southern Minnesota, and even parts of central Minnesota, but more like a 50/50 probability in the northern sections of the state.

Historical frequency of January thaws at various locations since 1948
(here defined as two or more days with daytime temperatures greater than 32 F)

Twin Cities 92 percent Rochester 95 percent Pipestone 92 percent
Fairmont 93 percent St Cloud 87 percent Morris 80 percent
Crookston 62 percent Duluth 60 percent International Falls 50 percent

It is interesting to note that the three consecutive years of 1977, 1978, and 1979 brought no January thaw to most of Minnesota. All three were dominated by abundant January snow cover and are ranked among the top 15 coldest in state history. The most recent years without a January thaw in most places were 2009 and 2011.

Topic: Retirement of Byron Paulson

Congratulations and best wishes to Byron Paulson, who retired this week. He was a long-time forecaster with the National Weather Service in the Twin Cities (35 years). A dedicated public servant, expert on fire weather, and a good friend, Byron will be missed by many of us. He was especially valued as an "incident meteorologist" deployed to serve fire fighters with specialized forecasts during major outbreaks in our region, including the Cavity Lake fire (2006), Ham Lake fire (2007) and Pagami Creek fire (2011). I consider myself lucky to have known and worked with him. You can see a picture and read more about him at....

http://www.crh.noaa.gov/news/display_cmsstory.php?wfo=mpx&storyid=91233&source=0

Topic: Weekly Weather potpourri

Tropical Cyclone Dumile was spinning in the Southern Indian Ocean east of Madagascar this week. It was slowly moving to the south with winds of 85-95 mph that were producing sea waves of 30 to 35 feet. Heavy rains and high winds were forecast for La Reunion Island. Earlier in the week Tropical Cyclone Freda had brought heavy rains (10-12 inches) to parts of the Solomon Islands and New Caledonia in the Southern Pacific Ocean. But it had died off by mid-week.

The United Kingdom Meteorological Office reported this week that based on preliminary data 2012 was the 2nd wettest in history for that country (trailing only 2000). Their annual nationwide summaries date back to 1910. Many areas of the country reported over 50 inches of precipitation during 2012. You can read more about this at....

<http://www.metoffice.gov.uk/news/releases/archive/2013/2012-weather-statistics>

For those interested in the climatology of college football bowl games, the Southeast Regional Climate Center has published the climate records for most of the bowl games. You can read more about this at.....

<http://www.sercc.com/Bowl%20Climate.pdf>

NOAA announced a correlation in independent paleoclimatic data (corals, lake sediments, and ice cores) with observer network measurements of climate change over the period from 1880-1995. Further both sources of data confirm an acceleration in temperature trends since 1980. You can read more in the NOAA press release at....

<http://www.ncdc.noaa.gov/news/independent-evidence-confirms-global-warming-instrument-record>

MPR listener question: Has there ever been a January without snowfall in the Twin Cities?

Answer: No. The closest we came to no snow in January was a long time ago, 1892 and 1898. In January 1892 it snowed measurably only twice, 0.4" on the 7th and 0.2" on the 16th. In 1898, it only snowed measurably on three dates, 0.1" on the 11th, 0.4" on the 18th, and 0.1" on the 24th.

Twin Cities Almanac for January 4th:

The average MSP high temperature for this date is 25 degrees F (plus or minus 13 degrees F standard deviation), while the average low is 11 degrees F (plus or minus 15 degrees F standard deviation).

MSP Local Records for January 4th:

MSP weather records for this date include: highest daily maximum temperature of 41 degrees F in 1898 and 2007; lowest daily maximum temperature of -14 degrees F in 1884; lowest daily minimum temperature of -32 F in 1884; highest daily minimum temperature of 33 F in 2007; and record precipitation of 0.57 inches in 1997; Record snowfall is 3.2 inches in 1910.

Average dew point for January 4th is 5 degrees F, with a maximum of 37 degrees F in 1946 and a minimum of -39 degrees F in 1924.

All-time state records for January 4th:

The state record high temperature for this date is 50 degrees F at Worthington (Nobles County) in 1930. The state record low temperature for this date is -48 degrees F at Breese (Marshall County) and Leech Lake (Cass County) in 1896 and at Red Lake (Beltrami County) in 1968. State record precipitation for this date is 2.90 inches at Coleraine (Itasca County) in 1949; and the state record snowfall for this date is 24.0 inches at Wheaton (Traverse County) in 1997.

Past Weather Features:

1884 brought perhaps the coldest first week of January in history for the Twin Cities. Here are the readings from the Signal Corps Office in downtown St Paul for the first full week of the month:

DATE PRECIP MAX MIN

Jan 1, .01 12 -14

Jan 2, 0 -1 -22

Jan 3, 0 -15 -33

Jan 4, 0 -26 -33

Jan 5, 0 -11 -30

Jan 6, 0 -9 -30

Jan 7, 0 -3 -28

The -26 F maximum temperature on January 4th was the coldest ever measured on that date. St Vincent (Kittson County) reported consecutive nights of -41 degrees F. Interestingly enough by January 12th daytime temperatures were in the 40s F in 1884.

January of 1886 was the wettest in history for the community of Winona with 5.60 inches of precipitation. During the first week 2.85 inches fell as a mixture of snow and rain. This record was broken in 1998 when Winona recorded 6.73 inches of precipitation in January, one of the largest amounts for the month in state history.

Arctic air dominated the state over January 3-5 of 1896 bringing extreme and record-setting cold temperatures to many communities. At least a dozen cities reported temperatures of -30 degrees F or colder and for some the daytime high temperature remained -20 degrees F or colder.

January 4-5, 1949 brought a strong winter storm to Minnesota with a mixture of rain, sleet, and snow. Many communities reported 1-2 inches of precipitation. Coleraine in Itasca County reported 4.30 inches of precipitation over the two days, a phenomenal amount for the month of January. Most of it was rain as they only received 3.5 inches of snow with temperatures in the mid 30s F.

January 4, 1971 brought a winter storm to southern Minnesota where snowfall amounts ranged from 9 to 16 inches. Some roads were closed in southern counties.

January 3-4, 1981 brought arctic cold to northern counties as six communities reported lows of -40 degrees F or colder. Tower reported a low of -44 degrees F and a high of -9 degrees F on the 4th.

January 4-5, 1997 brought a strong winter storm to central and northern Minnesota, with 10 to 20 inches of snow and strong winds. Wheaton in west central Minnesota reported 2 feet of snow with winds gusting to over 40 mph. Snow drifts of 5-7 feet blocked many roads. I94 was closed down from Sauk Center to the North Dakota border. Many rural buildings were damaged by the high winds and heavy snow loads on roofs.

Outlook:

Near normal temperatures over the weekend with a chance for scattered flurries, then warmer next week and mostly dry until Thursday and Friday which will bring a chance for snow.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

<http://www.climate.umn.edu/weathertalk/>

For access to other information resources go to

<http://www.climate.umn.edu/Seeley/>

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Minnesota WeatherTalk Newsletter for Friday, January 11, 2013

o: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, January 11, 2013

HEADLINES

- 2012 warmest year on record
- Record warm January 10th in northern communities
- Weekly Weather potpourri
- Two MPR listener questions
- Almanac for January 11th
- Past weather
- Outlook

Topic: 2012 Warmest year on record

The National Oceanic and Atmospheric Administration (NOAA) announced this week that 2012 was the warmest year on record (back to 1895) for the contiguous 48 states. Not only that, but it broke the previous record warmest year (1998) by a full degree F. You can read more at....

<http://www.noaa.gov/>

In addition according to the state by state reports Minnesota recorded the 3rd warmest year in history, Wisconsin and Iowa 2nd warmest, and Nebraska and South Dakota warmest ever. According to NOAA 443 climate states in the 48 contiguous states saw

their warmest year in history during 2012. With respect to moisture Minnesota was nowhere near record-setting even though much of the state was in drought to end the year. To the west Nebraska and Wyoming reported their driest year in history, while Iowa reported its 11th driest year. In contrast the state of Washington reported its 5th wettest year in history.

Topic: Record warm January 10th for northern communities

A relatively strong warm front past over the region on Thursday, January 10th bringing a strong surge of mild air. Clouds associated with the warm front held temperatures in check for many southern areas of Minnesota, but northern communities enjoyed plenty of sunshine and saw afternoon temperature values soar to new record levels for the date. Among those setting records were:
52 degrees F at Waskish 50 degrees F at Kelliher and Littlefork
48 degrees F at International Falls, Crane Lake, Cass Lake, Baudette, and Itasca State Park (tied record from 1928)
46 degrees F at Bemidji and Fosston
45 degrees F at Warroad, Ely and Orr

Some of these communities had just set new record highs last year (2012) on January 10th. The warm front brought an unusual mid-January rainfall with amounts ranging from a few hundredths to a quarter of an inch.

Topic: Weekly Weather potpourri

Earlier this week NOAA released a technical report outlining historical climate trends and future climate scenarios by region around the USA. The future climate scenarios take two paths depending on future emission scenarios. The goal is to provide plausible future environmental conditions for policy makers to consider in planning for climate adaptation and looking at mitigation strategies by region and stated. You can read more about this report at....

<http://www.ncdc.noaa.gov/news/us-regional-climate-trends-and-scenarios>

The National Weather Service reported that some areas of east-central Texas received 2 to 4 inches of much needed rainfall on Wednesday of this week. Further some areas have received up to six inches for the month so far, helping to alleviate the drought there. Forecasts favor continued above normal rainfall across areas of Texas through the third week of the month.

Portions of central Australia have been suffering through a terrible heat wave this week. Sydney reported daytime highs up to 108 degrees F, while in Leonora in

Western Australia the thermometer hit 120 degrees F on the 9th. Fortunately temperatures in the Melbourne area are supposed to cool off into the 70s and 80s F next week as the Australian Open Tennis Tournament gets underway.

Tropical Cyclone Narelle was spinning off the northwest coast of Australia this week. Winds were gusting to over 110 mph producing sea waves of 35-40 feet. It was expected to strengthen even further and bring heavy rain and high seas to the west coast of Australia over the weekend before dissipating.

Brad Rippey from the USDA World Outlook Board provided a drought update this week that included the following statements:

- Overall U.S. drought coverage decreased to 60.26% of the contiguous U.S., down more than three-quarters (0.83%) of a percentage point from last week. The decreased drought coverage came on the strength of additional rain across the South.
- The portion of the contiguous U.S. in the worst category – D4, or exceptional drought – fell very slightly to 6.70%.
- The percent of hay in drought (63%) and cattle in drought (72%) fell one percentage point from a week ago.
- Winter wheat in drought (62%) remained unchanged from New Year's Day.
- For the 27th consecutive week (July 10, 2012 – January 8, 2013), drought encompassed more than two-thirds of the domestic cattle inventory and at least 60% of the domestic hay acreage.

MPR listener question: It seems quite unusual to get rain in January. How often does this happen in the Twin Cities?

Answer: Perhaps more often than you think. In the past 20 years there have been eight Januarys that have produced at least one day with only liquid precipitation (rain) and no sleet, snow, or freezing rain. In 1997 and 2006 there were two rain events in January. So an estimate is that about 40 percent of the time we see a rain event in January for the Twin Cities.

MPR listener question: How are temperature averages calculated by the National Weather Service?

Answer: Daily temperature averages are computed by adding the high (max) and low (min), then dividing by two. Monthly averages are computed by summing all of the daily maximum temperatures, dividing by the number of days in the month; doing similar to the daily minimum temperatures; then adding together those monthly average values of maximum and minimum temperature and dividing by two. State average monthly and annual temperatures are computed by averaging all of the mean values from the observing stations within a Climate Division (a multi-county area),

then taking a weighted average (based on landscape area) of the climate division mean values.

Twin Cities Almanac for January 11th:

The average MSP high temperature for this date is 25 degrees F (plus or minus 13 degrees F standard deviation), while the average low is 11 degrees F (plus or minus 15 degrees F standard deviation).

MSP Local Records for January 11th:

MSP weather records for this date include: highest daily maximum temperature of 44 degrees F in 1986; lowest daily maximum temperature of -19 degrees F in 1912; lowest daily minimum temperature of -31 F in 1977; highest daily minimum temperature of 32 F in 1928; and record precipitation of 0.47 inches in 1930; Record snowfall is 6.0 inches in 1905.

Average dew point for January 11th is 5 degrees F, with a maximum of 36 degrees F in 1980 and a minimum of -38 degrees F in 1977.

All-time state records for January 11th:

The state record high temperature for this date is 56 degrees F at Madison (Lac Qui Parle County) in 1958 and at Canby (Yellow Medicine County) in 1990. The state record low temperature for this date is an arctic-like -53 degrees F at St Vincent (Kittson County) in 1888. State record precipitation for this date is 2.70 inches at Beaver Bay (Lake County) in 1866; and the state record snowfall for this date is 24.0 inches at Riverton (Crow Wing County) in 1975.

Past Weather Features:

Arctic cold gripped the state on January 11, 1888 as St Vincent reported -53 degrees F, Moorhead reported -44 degrees F, and Morris reported -31 degrees F. St Paul Signal Corps Office reported -28 degrees F that morning and in Rochester it was -26 degrees F.

Another arctic cold wave engulfed Minnesota over January 10-12 with over 20 communities reporting temperatures of -40 degrees F or colder. There was little moderation in temperature until the last week of the month as January of 1912 proved to be the coldest in state history.

January 8-11, 1958 brought a prolonged thaw period to western portions of the state as at least ten Minnesota communities reported record high temperatures in the 50s F. It was one of Minnesota's warmest Januarys.

January 10-12, 1975 brought one of the state's worst ever blizzards, called the "Storm of the Century" by the National Weather Service. Winds of 30-50 mph blew snow into huge drifts, with damaging wind gusts up to 80 mph. Snow drifts over 20 feet blocked roads and highways. Passengers (168 people) were trapped for hours on a stalled train near Willmar and there were 35 storm-related deaths. Many areas reported over a foot of snow, while Alexandria, Riverton, Melrose, Kettle Falls, Remer, Hibbing, and Springfield reported over 20 inches.

Another mild spell of January weather prevailed over the 8th through the 11th in 1990 as a dozen western and central Minnesota communities saw daytime highs reach the 50s F. Mild temperature prevailed most of the month, which was the 3rd warmest January in state history.

Outlook:

Much colder over the weekend, and windier too. There will be a chance for scattered snow with generally cooler than normal temperatures through the middle of next week.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

<http://www.climate.umn.edu/weathertalk/>

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Minnesota WeatherTalk Newsletter for Friday, January 18, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, January 18, 2013

HEADLINES

- Absence of below zero F high temperatures
- Measures of January persistent warmth
- New seasonal climate outlooks
- Weekly Weather potpourri
- MPR listener questions
- Almanac for January 18th
- Past weather
- Outlook

Topic: Absence of Below Zero F High Temperatures

For Twin Cities residents we may be seeing a remarkable record weather streak come to an end by Martin Luther King Day (Monday, Jan 21st). The Twin Cities have not reported a daytime high temperature below 0 F since January 15, 2009 (high of -6 F). By Monday, this streak will be 1466 days long, the longest such streak in the Twin Cities climate record back to 1873. In addition the National Weather Service reports a remarkable absence of below 0 F minimum temperatures for the Twin Cities in recent winters as well, with only 3 such days last winter, and 1 so far this winter. This trend, but to a lesser extent is obvious in the recent data for International Falls as well. There the average number of days when the high temperature remains below 0 F is about 10 per winter. Over the past three winters it has just been 3 days. In addition, overnight minimum temperatures at International Falls fall below 0 F slightly 60-61 days per winter on average. Last winter brought only 35 such days, and there have been only 26 such days so far this winter, well below average.

You can read more about these temperature streaks and trends at the National Weather Service web site.....

http://www.crh.noaa.gov/news/display_cmsstory.php?wfo=mpx&storyid=91607&source=0

Topic: A measure of persistence in recent January warmth

In addition to the absence of below 0 F January cold, it is noteworthy to examine the signals of persistent warmth in the recent climate data for the month. Over the past 15 winters the mean value of January temperature on a statewide basis has been below normal in only three years (2004, 2009, and 2011). The other twelve have all been warmer than normal, and four have ranked among the 12 warmest months of January in state history (2001, 2002, 2006, 2012). In

addition over 62 percent of all daily measures of temperature in January have been above normal values. These are measures of persistence. Some individual days have been 25 F or more above normal, such as last January 10 (2012) when the Twin Cities reported a high of 52 degrees F and a low of 27 degrees F. As Paul Huttner has shared on his Updraft blog, the signal of warmth in the winter months has been very pronounced in recent years.

Topic: New Seasonal Climate Outlooks

The NOAA Climate Prediction Center (CPC) released new seasonal climate outlooks this week. For the period from February through April the outlook calls for cooler than normal temperatures across parts of northwestern MN and North Dakota, equal chances for temperatures to be above or below normal elsewhere in the state. For precipitation the outlook favors above normal moisture for the Great Lakes region. Given the extent and magnitude of drought that is still gripping the state, the precipitation outlook is certainly heartening. In fact the CPC Drought Outlook favors improvement over the entire state by April 30th, and suggests a wetter than normal precipitation pattern may be in play across the western Great Lakes through May. You can read more of their analysis on the web site.....

<http://www.cpc.ncep.noaa.gov/>

Topic: Weekly Weather potpourri

This week the U.S. Global Change Research Program released a draft of the comprehensive National Climate Assessment Report describing analysis of regional climate trends, impacts on infrastructure and possible future climate scenarios. This report makes for some interesting reading with contributions from over 60 people. You can find out more about it at.....

<http://ncadac.globalchange.gov/>

It is over 1100 pages in length, so it might be wise to read it on line.

The USGS released a report this week on the devastating floods in northeastern Minnesota last June (2012). The report states that 13 USGS streamgages recorded the all-time peak gage heights following this storm. In some cases these peak flows were estimated to be 1 in 500 year floods, while in others they were estimated to be 1 in 100 year floods. Flood maps and profiles of damage and inundation were created for this report. You can view the report at the USGS web site:

<http://pubs.usgs.gov/sir/2012/5283/>

The USDA World Agricultural Outlook Board briefing this week on drought (offered by Brad Rippey) reported the following highlights:

- Overall U.S. drought coverage decreased to 58.87% of the contiguous U.S., down 1.39% from last week. The decreased drought coverage came on the strength of heavy rain from the southern Plains the Mid-South and Southeast excluding the southern Atlantic region.
- The portion of the contiguous U.S. in the worst category (D4), or exceptional drought, fell more than one-third of a percentage point to 6.31%.

- The percent of hay in drought (61%), cattle in drought (70%), and winter wheat in drought (60%) fell two percentage points from a week ago.
- For the 28th consecutive week (July 10, 2012 January 15, 2013), drought encompassed more than two-thirds of the domestic cattle inventory and at least 60% of the domestic hay acreage.

NASA is conducting a "Let It Snow" photo contest. They are soliciting digit photos of winter scenes from around the country. NASA's Precipitation Measurement Mission is sponsoring the contest and it is open for submissions through February 4, 2013. You can read more about it at....

http://www.nasa.gov/mission_pages/GPM/news/let-it-snow-photo-contest.html

Persistent smog and foul air continues to plague large parts of China this week. In Beijing hospitals reported up to a 30 percent increase in patients with respiratory problems. Low visibility and foul air has been persistent day after day due to inversion layers associated with high pressure across that country. It has been called one of the worst cases of air pollution in recent years. You can read more about it at....

<http://www.guardian.co.uk/world/2013/jan/14/beijing-smog-continues-media-action>

On Friday parts of Western England and South Wales were being hit by a strong winter storm, depositing 4 to 8 inches of snow in many places. The UK Met Office was issuing many weather warnings and even a blizzard warning for parts of Wales. Bitterly cold weather is expected to prevail there through the weekend.

A paper published recently in the Proceedings of the National Academy of Sciences documents a sharp decline in the health of much of the Amazon Forest of South America where a mega-drought has persisted since 2005. NASA scientists and others have analyzed QuikScat satellite data and other data sets to determine the deficiencies in rainfall there, along with soil moisture declines. The imagery clearly shows impacts on forest canopy densities and health. You can read more about this study at...

<http://www.sciencedaily.com/releases/2013/01/130118111705.htm>

MPR listener question: Has Minnesota ever seen 70 degrees F in the month of January?

Answer: No, but it has come close to that. On January 24, 1981 Montevideo on the upper reaches of the Minnesota River valley reported a high of 69 degrees F, truly remarkable for what is historically the coldest week of the year. This temperature is approximately 45 degrees F above normal!

Twin Cities Almanac for January 18th:

The average MSP high temperature for this date is 25 degrees F (plus or minus 13 degrees F standard deviation), while the average low is 11 degrees F (plus or minus 15 degrees F standard deviation).

MSP Local Records for January 18th:

MSP weather records for this date include: highest daily maximum temperature of 48 degrees F in 1880 and 1891; lowest daily maximum temperature of -16 degrees F in 1994; lowest daily minimum temperature of -36 F in 1887; highest daily minimum temperature of 33 F in 1880 and 1944; and record precipitation of 0.31 inches in 1895; Record snowfall is 3.1 inches in 1895.

Average dew point for January 18th is 7 degrees F, with a maximum of 39 degrees F in 1973 and a minimum of -40 degrees F in 1967.

All-time state records for January 18th:

The state record high temperature for this date is 57 degrees F at Caledonia (Houston County) in 1996. The state record low temperature for this date is -48 degrees F at Cotton (St Louis County) in 1967. State record precipitation for this date is 3.10 inches at Stewart (McLeod County) in 1996; and the state record snowfall for this date is 18.0 inches at Sibley (Sibley County) in 1866.

Past Weather Features:

January 18-19, 1919 brought unusual mid-winter warmth to the southern counties of Minnesota. Many communities reported consecutive days in the 40s F. Both Luverne and Fairmont reported temperatures in the 50s F. There was little snow that month and lots of January sunshine.

January 18, 1944 also brought unusual warmth. Many communities reported temperatures in the 40s F under sunny skies. Zumbrota, Windome, Elk River, and Madison all saw afternoon temperatures in the 50s F with moderate southerly winds. January of 1944 was the 2nd warmest in state history.

With abundant snow cover, January 18, 1950 brought arctic cold to many areas as temperatures plunged to -30 F or colder in many areas. At least 7 Minnesota communities started the day at -40 degrees F or colder.

The coldest January 18th in state history occurred in 1967 as an Arctic high pressure system settled over the state bringing a temperature drop of over 50 degrees F in 24 hours. Temperatures fell to -40 degrees F or colder in 20 communities, and as far south as Theilman (Wabasha County) the temperature plummeted to -44 degrees F.

Perhaps the worst winter storm on January 18th occurred in 1996. It started late in the day on the 17th with strong winds up to 45 mph and mixed precipitation (rain, sleet, and snow). Freezing rain and severe icing occurred in some southwestern counties. Snowfall amounts ranged from 5 to 15 inches across western counties and large drifts were reported. Many roads were closed and the Governor order most schools closed as well. Dangerous windchills ranging from -30 to -60 degrees F followed the storm. Approximately 200 cars were abandoned on Interstate 90 and a water main broke in Marshall causing some local flooding.

Outlook:

Weather transition day on Saturday. Starting relatively mild in most places then getting windy, with falling temperatures and some flurries. Chance for dangerous windchill values later in the day and Saturday night, ranging from -25 to -35 F. Much colder on Sunday with highs ranging from below 0 F to the single digits above 0 F. Colder yet on Monday (MLK Day) with highs mostly below 0 F and lows from the minus teens to -30 F. Warming trend starts on Tuesday and continues through next week with temperatures slowly climbing back towards normal and mostly dry weather.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, January 25, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, January 25, 2013

HEADLINES

- Cold week with some records broken
- Absence of snow cover, deeper frost
- Weekly Weather potpourri
- MPR listener questions
- Almanac for January 25th
- Past weather
- Outlook

Topic: Cold week with some records broken

This week's weather pattern brought the coldest temperatures in years to many parts of Minnesota, and coldest in the 48 contiguous states on some dates. There were many reports of lows ranging from -30 degrees F to -40 degrees F across the northern counties, with windchills ranging from -35 to -50 degrees F at times. The coldest temperature was -42 degrees F at Embarrass on January 24th (Thu) and the coldest windchill was -54 degrees F at Grand Marais Airport on January 21st (Monday).

Some new station record lows were set on selected dates, including:

January 22 (Tuesday): Record low of -34 degrees F at Brimson, Gunflint Lake, Isabella; Record low of -38 degrees F tied at Babbitt (with 1922)

In addition the high temperature of -18 degrees F at Gunflint Lake on Tuesday was the 2nd coldest for the date of all-time, and 3rd coldest high temperature ever measured at that station.

January 24 (Thursday): Record low of -35 degrees F at Gunflint Lake, Isabella, and Kabetogama; Record low of -34 degrees F at Kettle Falls; Record low of -37 degrees F at Orr; Record low of -40 degrees F at Babbitt; and record low of -42 degrees F at Embarrass. Many other observers came close to record lows for the date on Thursday as well, but no reports were anywhere close to the state record of -57 degrees F at Pokegama Dam in 1904.

Topic: Absence of snow, frost goes deeper

A relative absence of snowfall has been prevalent in most Minnesota counties this month. Many observers are reporting just 1 to 3 inches for the month so far. In many parts of the state snow cover is non-existent or less than 1 inch. Only a few observers like Roseau, Crookston, Warroad, Kettle Falls, Wolfe Ridge, and International Falls have received 8-15 inches of snowfall for the month so far.

The absence of deep snow cover exposed the soil to the Arctic-like cold blast this week. As a result frost depths increased significantly, in some cases going from 4-6 inch depth down to 16 to 20 inches in depth. Actual soil temperatures plummeted as well, dropping into the low to mid 20s F at the 4 inch depth, and into the single digits and low teens F at the shallower 2 inch depth. These low soil temperatures can damage plants, and is one of the reasons so many gardeners use mulch or straw (insulation) to cover the soil in the winter. In agricultural pasture lands and alfalfa fields such low temperatures pose a risk of winter injury.

Topic: Weekly Weather potpourri

Cyclone Garry was spinning in the Southern Pacific Ocean just east of Pago Pago and west of Bora Bora. It generated wind gusts over 105 mph and sea wave heights greater than 20 feet. Garry was expected to move southeast and not present a threat to any islands over the weekend, dissipating by early next week near 30 degrees south latitude in the open ocean.

More snow and rain visited the United Kingdom this week, as January continued to be a cool and stormy winter month. More precipitation is expected over the weekend and may pose the threat of flooding in some areas. In Scotland and northern England up to 4 more inches of snowfall was forecast. It is also expected to be windy, but temperatures will warm closer to seasonal averages.

Reuters reported this week that federal crop insurance payments to farmers in the USA will likely establish a new record in 2012, perhaps topping \$20 billion. This was not entirely unexpected with over 63 percent of the country in drought during the growing season. Illinois and Iowa topped the list for federal crop insurance payments, mostly based on corn. You can read more about this report at...

<http://www.reuters.com/article/2013/01/22/usa-agriculture-insure-idUSL1N0ARG2E20130122>

Weekly highlights on USA drought from Brad Rippey in the USDA World Agricultural Outlook Board Office include:

- Overall U.S. drought coverage decreased to 57.64% of the contiguous U.S., down 1.23% from last week and down 5.01% in the last eight weeks. Last week's decrease came on the strength of additional heavy precipitation (rain and snow) in the lower Midwest and the Southeast excluding the southern Atlantic region.
- The portion of the contiguous U.S. in the worst category – D4, or exceptional drought – was nearly steady at 6.36%. D4 coverage has ranged from 5 to 7% for 24 consecutive weeks (August 14 – January 22).
- The percent of hay in drought (59%) and cattle in drought (68%) fell two percentage points from a week ago. Winter wheat in drought (59%) was down a point. The last time “hay in drought” was less than 60% was July 3, 2012.
- For the 29th consecutive week (July 10, 2012 – January 22, 2013), drought encompassed more than two-thirds of the domestic cattle inventory.

MPR listener question: Our friend Paul Douglas asked if records showed that extreme cold (-40 F or colder) was visiting the state with less frequency in recent years. This is his perception and that of many others, but what do the data show?

Answer: I examined the climate records of 8 northern Minnesota climate stations that showed some frequency in their history of reporting -40 degrees F or colder. I then compared the relative frequency of such temperature measurements over the period from 1951 to 1980 against the more recent period of 1981-2010. The results showed the following shift in frequency:

Location 1951-1980 1981-2010 (percent change)

Baudette 31 days 12 days (-61 percent)

Roseau 24 days 15 days (-38 percent)

International Falls 21 days 16 days (-24 percent)

Big Falls 34 days 22 days (-35 percent)

Itasca State Park 17 days 11 days (-35 percent) No reading of -40 F since 1997

Warroad 16 days 10 days (-63 percent)

Thorhult 31 days 23 days (-26 percent)

Waskish 12 days 15 days (+25 percent)

Thus 7 of the 8 climate stations show a significant drop in the frequency of -40 F or colder. Concerning this change in frequency of such temperatures and its potential impact on Minnesota, Dr. Lee Frelich, University of Minnesota Forest Ecologist comments: "An invasive species from Asia, the emerald ash borer, has killed tens of millions of ash trees in Michigan, Ohio, and southern Ontario, and is also likely to be killed by -40 temperatures (or perhaps even -30). It arrived a few years ago in the Twin Cities, where its probably not cold enough in winter these days to kill the insect. Whether it will be able to kill millions of ash trees in the ash swamps of northern Minnesota could depend on winter minimum temperatures and a warmer climate in the future."

Twin Cities Almanac for January 25th:

The average MSP high temperature for this date is 20 degrees F (plus or minus 15 degrees F standard deviation), while the average low is 4 degrees F (plus or minus 15 degrees F standard deviation).

MSP Local Records for January 25th:

MSP weather records for this date include: highest daily maximum temperature of 58 degrees F in 1944; lowest daily maximum temperature of -16 degrees F in 1904; lowest daily minimum temperature of -31 F in 1904; highest daily minimum temperature of 42 F in 1944; and record precipitation of 0.50 inches in 1950; Record snowfall is 7.5 inches in 1950.

Average dew point for January 25th is 5 degrees F, with a maximum of 48 degrees F in 1944 and a minimum of -35 degrees F in 1972.

All-time state records for January 25th:

The state record high temperature for this date is 67 degrees F at Springfield (Brown County) in 1981. The state record low temperature for this date is -55 degrees F at Pokegama Dam (Itasca County) in 1904. State record precipitation for this date is 2.65 inches at Theilman (Wabasha

County) in 1967; and the state record snowfall for this date is 16.5 inches at Isabella (Lake County) in 1982.

Past Weather Features:

Nearly 241 years ago on January 27, 1772, the famous "Washington and Jefferson Snowstorm" occurred. So named because an account of this appears in both gentlemen's diaries, a total snowfall ranging from 30 to 36 inches was reported at both Washington's home in Mt Vernon and at Jefferson's home at Monticello. Colonists were unable to travel around Virginia for two weeks because of the depth of snow and the colonial postal service did not resume for five weeks. To this day these figures, though unofficial, remain the highest snowfall amounts reported in those areas from a single storm. An interesting footnote to this storm concerning Jefferson's life: Jefferson and his 22 year-old bride Martha had just been married at her family plantation (The Forest) near Williamsburg on New Year's Day. It was a cold and snowy January throughout the colonies and they travelled the 130 miles to Monticello (near Charlottesville) very slowly, arriving just ahead of this famous storm which caused them to be homebound for two weeks. Nine months later, their first child, daughter Martha, was born in September.

January 23-27, 1897 brought an Arctic Cold Outbreak to northern Minnesota. Temperatures plummeted to into the -30s and -40s F across northern counties. Morning lows ranged from -38 F to -49 F at Pokegama Dam, while on January 25th the mercury rose no higher than -28 degrees F at Ada (Norman County).

January 24-25, 1967 brought a strong winter storm to many parts of Minnesota with a mixture of rain sleet and snow. Many areas received over an inch of precipitation and some reported over 2 inches. Where precipitation froze, roads became icy as well.

January 25, 1981 was the warmest in state history, with most observers reporting record-setting high temperatures. Even the Red River Valley reported highs in the 50s F. At least a dozen communities saw an afternoon temperature reach into the 60s F. There was little or no snow cover under bright, sunny skies.

January 23-27, 1996 brought another Arctic Cold Outbreak to Minnesota, in some cases breaking cold temperature records that had been set back in 1897. Many communities reported lows of -40 degrees F or colder, and some were colder than -50 degrees F. Abundant snow cover, high pressure, and clear skies contributed to the extreme cold.

Outlook:

Warming trend begins over the weekend, bringing with it a chance for mixed precipitation, perhaps snow, freezing rain and drizzle. Temperatures will moderate into the 20s to lower 30s F by Sunday. There will be a continued chance for snow and rain on Monday and Tuesday, and some areas may see more freezing rain. The weather pattern will get colder and drier by the middle of next week.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

<http://www.climate.umn.edu/weathertalk/>

For access to other information resources go to

<http://www.climate.umn.edu/Seeley/>

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Minnesota WeatherTalk Newsletter for Friday, February 1, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, February 1, 2013

HEADLINES

- Mixed precipitation this week with some records set
- Preliminary climate summary for January
- Weekly Weather potpourri
- MPR listener questions
- Almanac for February 1st
- Past weather
- PING
- Outlook

Topic: Mixed precipitation this week with some records

The last week of January brought a good deal of moisture to the state in the form of rain, freezing rain, drizzle, sleet, and snow, along with some dense fog as well. Starting Sunday, January 27th dewpoints climbed into the 20s and 30s F, and sleet and freezing rain began in southern parts of the state about midday. By Monday hundreds of accidents had been reported on slick roads. The Twin Cities reported a new record amount of precipitation for the date with 0.49 inches. In Monday (January 28) reports there were also several record setting amounts of precipitation received, including 0.53 inches at Fargo (ND), Moorhead, St Peter, and Jordan, along with 0.65 inches at Worthington. Moorhead also reported a record snowfall on the 28th with 5.8 inches. As the colder air moved over the state on Tuesday, another round of precipitation brought mostly snow, and some record-setting amounts. New snowfall records for January 29th were set at the following locations:

12.0 inches at Detroit Lakes

10.5 inches at Breckenridge and Cass Lake

10.0 inches at Rothsay, Itasca State Park, and Bigfork

9.5 inches at Pelican Rapids (with a new precipitation record of 0.70 inches)

8.5 inches at Littlefork

8.0 inches at Kettle Falls, Kabetogama, and Bemidji

6.8 inches at Hawley

Yet another round of snow on January 30th came to southeastern Minnesota, where Rushford and LaCrescent reported a record 4.0 inches. For many these last days of the month rescued what was an otherwise dry January, bringing monthly precipitation amounts closer to normal or even a little above normal in many areas, especially in the north. The month ended (Jan 31) with dry air and another round of dangerous windchill values ranging from -20 to -40 degrees F. By Friday morning, February 1st Park Rapids and Fosston reported morning lows of -35 degrees F.

Topic: Preliminary Climate Summary for January 2013

Despite some cold temperature outbreaks the average January temperature reported by most Minnesota observers ranged from 1 to 2 degrees F warmer than normal. Extremes for the month ranged from 52 degrees F at the Waskish Airport on January 10th to -42 degrees F at Embarrass on the 24th. Grand Marais reported a windchill reading of -54 degrees F on the 21st.

Total precipitation for the month of January was mixed, with some significantly above normal values reported, and a few below normal values reported. Most of the above normal amounts of precipitation occurred in northern counties where many reported over 1 inch for the month. Grand Rapids, International Falls, Backus, Cook, and Kabetogama all reported over 2 inches. Snowfall was scarce in many western and southern counties with less than 3 inches reported in a number of places. In the north snowfall was abundant, with many areas reporting over a foot. International Falls, Kettle Falls, Kabetogama, and Orr reported over 20 inches. End of the month snow depths in northern counties ranged from 15 to 20 inches, while bare ground was still visible in parts of the Red River Valley. Frost depths ranged from 15 to 30 inches in the soil.

Freezing rain and ice visited the state on two or three occasions during the month leading to a number of accidents. Winds peaked on the 19th of the month with many observers reporting 40-50 mph gusts.

Topic: Weekly Weather potpourri

The NOAA Storm Prediction Center was busy this week. On January 30th severe thunderstorms in the southeast and mid-Atlantic states brought damaging winds, with hundreds of reports filed from TN, KY, AL, GA, NC, FL, SC, and VA among other states. There were also seven tornado reports filed from Georgia, some with significant structural damage to buildings and several injuries (among them in Adairsville, GA). SPC documented 37 tornado reports nationwide during January, a below average number for the month. SPC expects a quiet period through the weekend in terms of severe weather threats as we start the month of February.

Strong Tropical Cyclone Felling formed in the Southern Indian Ocean this week and was threatening Madagascar with strong winds, high seas and heavy rainfall. There were reports of 8-10 inches of rainfall in eastern parts of Madagascar. Winds were gusting to 110 mph on Thursday (Jan 31) producing sea wave heights of 30 to 35 feet. The cyclone was expected to head south between Madagascar and La Reunion Island, then weaken considerably over the weekend.

The European Wind Energy Association (EWEA) hosts its annual meeting in Vienna, Austria next week. It is a showcase for developments in wind energy technologies and services with participation by over 700 members from 60 countries. This year's conference will present a focus on economic opportunities associated with wind energy. You can read more about this organization and conference at...

<http://www.ewea.org/annual2013/>

News reports this week highlighted more intense air pollution in parts of China, especially in Beijing where residents were more frequently wearing masks. Smog was making the air quality hazardous in a variety of ways, cancelling airline flights and closing highways due to poor visibility and causing respiratory ailments among citizens. Snow and rain were expected to help clean the air by the weekend. You can read more about this at...

<http://news.blogs.cnn.com/2013/01/29/beijing-choking-on-hazardous-smog-again/>

A new paper published by the University of New Hampshire documents that independent voters views on climate change are highly governed by recent weather conditions. Ten surveys were conducted of independent voters and all showed that their positions on climate change were swayed if recent days were unseasonably warm or unseasonably cold. Conversely, Democrats and Republicans held firmer positions on climate change, that were not dramatically influenced recent weather trends. You can read more about this study at...

<http://www.unh.edu/news/releases/2013/jan/lw24climate.cfm>

A new paper in the journal Nature documents how precipitation patterns vary during warming periods provoked by increased solar radiation versus the current warming provoked by greenhouse gases. The research highlights that differences in sea surface temperature patterns have major effects on precipitation, especially convective storms. You can read more about this study at...

<http://www.sciencedaily.com/releases/2013/01/130130132405.htm>

The NOAA Southeast Regional Climate Center has documented the climatology for all Super Bowls from 1967-2012. It is interesting reading to see how the weather has varied for this significant event despite the fact that most of the time it is played in the southern USA where the weather is relatively mild. Interestingly enough, next year's Super Bowl is scheduled for East Rutherford, NJ outdoors, so it could be played in snow and cold. You can read more at....

<http://www.sercc.com/SuperBowlClimate.pdf>

MPR listener question: I am still hoping this will turn out to be a snowy winter, so I can do more cross country skiing. What is the state record for snowfall in the month of February?

Answer: Several observers have reported as much as 40 inches of snowfall during the month of February, notably in 1922 and 1939. The statewide record is from Pigeon River Bridge (Cook County) where they reported 51 inches for the month in 1939. That is close to a year's worth in 28 days!

Twin Cities Almanac for February 1st:

The average MSP high temperature for this date is 21 degrees F (plus or minus 14 degrees F standard deviation), while the average low is 3 degrees F (plus or minus 15 degrees F standard deviation).

MSP Local Records for February 1st:

MSP weather records for this date include: highest daily maximum temperature of 54 degrees F in 1931; lowest daily maximum temperature of -12 degrees F in 1996; lowest daily minimum temperature of -28 F in 1951; highest daily minimum temperature of 33 F in 1892; and record precipitation of 0.89 inches in 1922; Record snowfall is 6.7 inches in 2004.

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Average dew point for February 1st is 3 degrees F, with a maximum of 35 degrees F in 1931 and a minimum of -35 degrees F in 1951.

All-time state records for February 1st:

The state record high temperature for this date is 60 degrees F at St Peter (Nicollet County) in 1931. The state record low temperature for this date is -58 degrees F at Tower (St Louis County) in 1996. State record precipitation for this date is 1.85 inches at Fairmont (Martin County) in 1915; and the state record snowfall for this date is 18.5 inches also at Fairmont (Martin County) in 1915.

Past Weather Features:

A strong winter storm brought blizzard like conditions to southern Minnesota over January 31 to February 1, 1915. Snowfall amounts over 10 inches were reported by many observers, topped by Fairmont which measured 18.5 inches. It was the start of a very snowy February for many in Minnesota.

Another winter storm brought mixed precipitation and large amounts of snowfall to the state over January 30 to February 1, 1922. In western Minnesota many observers reported over 10 inches of snowfall, with huge drifts. A number of rural schools were closed for days until the snow melted.

February 1, 1931 was the warmest in state history. Over 35 Minnesota communities saw afternoon temperatures climb above 50 degrees F, while overnight lows remained in the 20s and 30s F. It was a precursor of things to come, as day after day was above normal. February of 1931 was the warmest in history at that time. It is still ranked as the 4th warmest in state history even today, surpassed only by 1998, 1987, and 1954.

February 1, 1996 was the coldest in state history. Arctic high pressure brought record-setting cold to most communities. Over 50 observers reported overnight lows of -40 degrees F or colder, and at least 10 observers were -50 degrees F or colder. It was -42 degrees F as far south as Rushford, MN.

Word of the Week: PING

A relatively new acronym, PING stands for Precipitation Identification Near the Ground, a program of NOAA's National Severe Storms Lab. As research attempt to calibrate NWS radar systems to estimate precipitation from radar return signals, they need ground truth, real observations of precipitation at ground level. In this context they are looking for more weather

observers in our area to report when precipitation is falling, what type it is (frozen or liquid), and how much has fallen. If you become an observer for them it is easy to report your data via website access or over your mobile device (cell phone). You can read more about PING at...

<http://www.nssl.noaa.gov/projects/ping/?cwa=mpx>

Outlook:

Moderating temperatures with chances for snow on Saturday and Sunday. Continued chance for snow Monday and Tuesday, especially southern and eastern sections. More of a warming trend on Wednesday and Thursday with chances for snow by the end of the week.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, February 8, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, February 8, 2013

HEADLINES

- Snowy start to February
- Correction from last week
- Weekly Weather potpourri
- MPR listener questions
- Almanac for February 8th
- Past weather
- Outlook

Topic: Snowy start to February

Many observers (including MSP and St Cloud) reported six consecutive days with measurable snowfall to start out the month. In the Twin Cities it was only the 3rd time historically (back to 1871) that 6 consecutive days in February have brought measurable snowfall, and the only time this occurred during the first 6 days. At St Cloud it was only the 2nd time in history that it has snowed measurably on six or more consecutive days in February, and the only time this has happened over the first six days as well. In some areas significant amounts (6 or more inches) have fallen, more than the total snowfall from last month (January 2013) for many. The increasing snow depth may help stabilize frost depths in the soil. Current frost depths around the state range from 18 to 30 inches.

Thursday night (Feb 7) brought freezing drizzle and freezing rain to southeastern Minnesota (from Rochester over to Winona), coating sidewalks and roads with a thin sheet of ice. There were scores of accidents reported for a time, with a number of spin outs on I90.

Topic: Correction to last week's listener question

Last week I was asked about the snowiest February in state history and I said I thought it was 1936 at Winona when February brought them 36 inches of snowfall. I was mistaken. Both 1922 and 1939 brought heavy February snows to central and northern Minnesota communities. In 1922 three observers reported over 40 inches for the month: Milaca (41"), Detroit Lakes (43"), and Two Harbors (47"). In 1939 three locations also reported over 40 inches in February: Two Harbors (45.5"), Grand Marais (49.2"), and Pigeon River Bridge (51"). The 51 inches at Pigeon River Bridge in 1939 is the state record for February.

Topic: Weekly Weather potpourri

A massive and intense winter storm was affecting many northeastern states on Friday of this week. Heavy snowfalls, high winds, and blizzard conditions were expected in several areas. A wide swath of snowfall amounts from 18-24 inches was expected, with some of the higher elevations forecasted to get up to 3 feet of new snow. Obviously many communities will be socked in over the weekend. The National Weather Service Office in Boston was posting frequent updates which you can see at....

<http://www.erh.noaa.gov/box/>

Earlier this week the Detroit News ran a story about Lake Huron and Lake Michigan being at all-time low lake levels. The low water marks broke a record set back in 1964. Obviously drought has played a role in this, and perhaps also higher lake evaporation rates. Each of the Great Lakes currently sits at a water level well below the long term mean. You can read more about this at...

<http://www.detroitnews.com/article/20130201/METRO/302010421/1361/Lakes-Michigan--Huron-break-low-water-records>

Brad Rippey of the USDA, World Agricultural Outlook Board offered the following highlights in his drought briefing this week:

- Overall U.S. drought coverage decreased to 56.84% of the contiguous U.S., down 0.84% from last week and down 5.81% in the last ten weeks. (Mostly on the strength of widespread precipitation across the eastern half of the U.S. and parts of the Southwest.
- However, the portion of the contiguous U.S. in the worst category – D4, or exceptional drought – rose nearly one-half percentage point to 6.85%. D4 coverage has ranged from 5 to 7% for 26 consecutive weeks (August 14, 2012 – February 5, 2013).
- The percent of hay in drought (59%) and winter wheat in drought (59%) were unchanged from a week ago. Cattle in drought (68%) fell one percentage point. For the 31st consecutive week (July 10, 2012 – February 5, 2013), drought encompassed more than two-thirds of the domestic cattle inventory.

Some roads out of Kabul, Afghanistan were closed for four days this week as heavy snow fell over parts of the country. Up to 10 feet of snow was reported in some of the mountain areas and 37 deaths were associated with this storm. The storm moved on to dump more snow over northern India on areas above 2000 feet in elevation.

NOAA scientists have not detected an El Nino or La Nina episode in the equatorial Pacific Ocean for some period of time now, calling the present condition "neutral state." This week NASA scientists suggested naming the "neutral" ENSO state La Nada. The present La Nada state may last for an unusually long period of time. You can read more about this at....

<http://www.sciencedaily.com/releases/2013/02/130206155825.htm>

MPR listener question: Last week you answered a question about snowy Februarys. I wondered what is the heaviest daily snowfall that has occurred in February?

Answer: The Twin Cities daily record snowfall in February is 11.8 inches on February 20, 2011. On a statewide basis Detroit Lakes received 25 inches on February 23, 1922, the most ever.

Twin Cities Almanac for February 8th:

The average MSP high temperature for this date is 22 degrees F (plus or minus 14 degrees F standard deviation), while the average low is 5 degrees F (plus or minus 14 degrees F standard deviation).

MSP Local Records for February 8th:

MSP weather records for this date include: highest daily maximum temperature of 50 degrees F in 1991 and 2002; lowest daily maximum temperature of -19 degrees F in 1899; lowest daily minimum temperature of -29 F in 1899; highest daily minimum temperature of 36 F in 1966; and record precipitation of 1.08 inches in 1966; Record snowfall is 5.0 inches in 1905.

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Average dew point for February 8th is 3 degrees F, with a maximum of 39 degrees F in 1966 and a minimum of -32 degrees F in 1971.

All-time state records for February 8th:

The state record high temperature for this date is 66 degrees F at Madison (Lac Qui Parle County) in 1991. The state record low temperature for this date is -55 degrees F at Warroad (Roseau County) in 1933. State record precipitation for this date is 1.35 inches at St James (Watonwan County) in 1947; and the state record snowfall for this date is 15.0 inches at Grand Marais (Cook County) in 1937.

Past Weather Features:

An Arctic air mass invaded the state over February 7-11, 1899 bringing record-setting temperatures. Many areas of the state reported low temperatures of -40 degrees F or colder. On February 8th Leech Lake reported a high temperature of -33 degrees F, and the temperature fell to -59 degrees F by the next morning. A warmer air mass arrived by mid month pushing daytime temperatures into the 40s F. Still 1899 brought the 5th coldest February in state history.

February 7-8, 1933 brought another Arctic outbreak to Minnesota. Temperatures plummeted to record lows for many observers. Six observers reported a low temperature of -50 degrees F or colder. It was -32 degrees F in New Ulm and a number of places remained colder than -20 F all day.

Over February 7-8, 1937 a strong winter storm brought a foot or more of snow to many parts of central and northern Minnesota. Some schools were closed, along with some roads which were blocked by five foot drifts of snow. The snow was welcome following the 1936 drought.

A strong storm brought mixed precipitation to central and southern Minnesota counties over February 8-9, 1966. The storm produced a good deal of ice in central counties where there were

a number of traffic accidents reported. In southeastern Minnesota heavy rains fell on frozen ground and produced some local flooding.

February 6-8, 1987 brought unusual warmth to western and southern Minnesota as daytime temperatures soared into the 50s and 60s at several locations. The warm string of days took the frost out of the soil across southern and western Minnesota. Temperatures continued warm and February 1987 was one of the warmest in state history.

Outlook:

Cloudy but somewhat mild day on Saturday with temperatures in the 30s and 40s F. Major winter storm potential starting on late Saturday night and into Sunday, with mixed precipitation, heavy at times crossing the state SW to NE. Winds will also increase on Sunday evening into Monday morning, with blizzard conditions expected in some areas. Many communities will receive significant amounts of precipitation, and freezing rain is a possibility in southern locations. Lingering chance of snow on Monday, then drier and cooler on Tuesday. Another chance for snow later in the week on Thursday and Friday.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, February 15, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, February 15, 2013

HEADLINES

- February snow and moisture
- Weekly Weather potpourri
- MPR listener questions
- Almanac for February 15th
- Past weather
- Outlook

Topic: February snow and moisture

Mother Nature continued to bring precipitation to the state this month, with an exclamation mark on Sunday and Monday (Feb 10-11). A slow moving weather system from the southwest moved across the state bringing a mixture of rain, freezing rain, sleet, and snow to many areas. At times the winds were strong enough to produce blizzard conditions in some western and southern counties. Dewpoints soared into the low to mid 30s F with this system helping to fuel some record-setting snowfall and precipitation amounts for many observers. The maximum snowfall amount from this storm was 21 inches at Rothsay (Wilkin County) with a melted liquid precipitation of 2.21 inches. Many observers around the state reported 10 or more inches of snowfall with a liquid content of over 1 inch, a very large amount for February. The snowfall reported from Rothsay of 19 inches on Monday, February 11th broke the previous all-time state record amount for the date of 14 inches at Mahnommen in 1939, while the liquid precipitation amount of 2.02 inches at Rothsay also shattered the previous state record for February 11th of 1.36 inches set at Fort Ripley back in 1861 (a 153 year old record). You can read a summary of the storm on our web site at....

http://www.climate.umn.edu/doc/journal/snow130209_11.htm

Some observers who reported record-setting amounts of snow and/or precipitation for the dates included:

For February 10:

Georgetown 8" snowfall, 0.80" precipitation

Artichoke Lake 10" snowfall, 1.11" precipitation

International Falls 4.4" snowfall, 0.54" precipitation

Moorhead 9.3: snowfall, 0.89" precipitation

Grand Rapids 8.4" snowfall, 0.79" precipitation

St Cloud 6.7" snowfall, 0.70" precipitation

Browns Valley, 6.5" snowfall, 0.62" precipitation

Milan 8.2" snowfall, 0.68" precipitation
Park Rapids 0.67" precipitation
MSP 0.62" precipitation
For February 11:
Rothsay 19" snowfall, 2.02" precipitation
Itasca State Park 15" snowfall, 1.30" precipitation
Bemidji 14" snowfall, 1.16" precipitation
Ottertail 13.5" snowfall, 0.82" precipitation
Pelican Rapids 12" snowfall, 0.81" precipitation
Kettle Falls 12" snowfall, 0.77" precipitation
Wadena 11.5" snowfall, 1.42" precipitation
Brainerd 12" snowfall, 0.97" precipitation
Faribault 4.4" snowfall, 0.83" precipitation
Morris 8" snowfall, 0.63" precipitation

At least 40 other Minnesota locations reported new snowfall or precipitation records for February 11th as well. Yet, another Alberta Clipper storm brought more snow to the state over Wednesday night (Feb 13) and early Thursday morning (Feb 14). Many observers reported another 2-4 inches of snowfall, while Long Prairie reported a record amount for Valentine's Day of 4.7 inches. These storms added to the snowfall from earlier this month producing monthly snowfall totals that exceed 20 inches at Bemidji, Battle Lake, Itasca State Park, Breckenridge, Ottertail, Pelican Rapids, Rothsay, and Wheaton. Rothsay (Wilkin County) has totaled 26 inches of snow so far this month, the most ever in February for that location.

As a result of the frequent snows the U.S. Drought Monitor changed some western and northern Minnesota counties from severe drought to moderate drought this week, the first substantial change in drought status in several weeks. The snow pack on the landscape is estimated to have as much as 2-4 inches of liquid water equivalent stored in it. The accumulated moisture surplus this month should help with surface hydrology (runoff flowing into lakes and streams), but will likely provide little help for soil moisture recharge as long as the ground is frozen.

Topic: Weekly Weather potpourri

NOAA administrator, Dr. Jane Lubchenco named Dr. Louis Uccellini the new Director of the National Weather Service this week. Dr. Uccellini brings a wealth of experience having worked for NOAA since 1989. He holds all of his degrees from UW- Madison. You can read more about him at...

http://www.noaanews.noaa.gov/stories2013/20130207_nws_newaa.html

Tropical Cyclone Gino was spinning away in the Southern Indian Ocean this week southwest of Diego Garcia. It packed wind gusts up to 110 mph and was creating sea wave heights of 25-30 feet. Gino was headed southwest toward cooler waters and was expected to dissipate by the weekend.

Perth in Western Australia reported its 2nd Heat Wave of the summer this week. For five consecutive days the daytime highs reached 100 degrees F or higher, peaking at 106 degrees F on Tuesday this week. This is the longest Heat Wave in the area in the past 27 years and has helped provoke high fire danger, with some wildfires burning. The weekend was expected to bring cooler temperatures there.

A deep low pressure system brought snow, rain, and thunderstorms to parts of Italy earlier this week. By Tuesday heavy rains had flooded much of Venice, submerging even the popular St Mark's square. It was said to be the highest water mark in the city since Christmas of 2010. In the Italian Alps heavy snow was falling this week.

An analysis of European Satellite Data this week revealed that the loss of Arctic sea ice during the Northern Hemisphere summer is very significant. It is estimated that the summer minimum in Arctic sea ice in recent years is only one-fifth the volume it was in 1980. This analysis suggests that earlier estimates of Arctic sea ice may have been too conservative. You can read more at....

<http://www.sciencedaily.com/releases/2013/02/130213105009.htm>

Highlights for the drought-monitoring period ending on February 12 from Brad Rippey at the USDA World Agricultural Outlook Board include:

- Overall U.S. drought coverage decreased to 55.73% of the contiguous U.S., down 1.11% from last week and down 5.36% since the beginning of the year. The decrease came on the strength of heavy rain across the South and some snow in the upper Midwest.
- The portion of the contiguous U.S. in the worst category D4, or exceptional drought dipped nearly one-quarter of a percentage point (0.24%) to 6.61%. D4 coverage has ranged from 5 to 7% for 27 consecutive weeks (August 14, 2012 February 12, 2013).
- The percent of hay in drought (57%) fell two percentage points, while winter wheat in drought was unchanged at 59%. Cattle in drought (67%) fell one percentage point.

NOAA's ClimateWatch Magazine has an interesting article this week about climate change and monitoring ENSO in the equatorial Pacific Ocean. The Climate Prediction Center describes their definitions of El Nino and La Nina events in the context of a changing climate, including the oceans. This makes for interesting reading and can be found online at....

<http://www.climatewatch.noaa.gov/article/2013/in-watching-for-el-nino-and-la-nina-noaa-adapts-to-global-warming>

MPR listener question: I have already had 9 days with measurable snowfall at my house in Shoreview this month, and I am getting tired of shoveling and scrapping ice. What is the most number of days that it has snowed in February here in the Twin Cities area?

Answer: In the Leap Year of 1884 it snowed on 19 of the 29 days in February according to the Army Signal Corps Office in St Paul. The snowfall total for the month was near 23 inches.

Twin Cities Almanac for February 15th:

The average MSP high temperature for this date is 24 degrees F (plus or minus 13 degrees F standard deviation), while the average low is 7 degrees F (plus or minus 15 degrees F standard deviation).

MSP Local Records for February 15th:

MSP weather records for this date include: highest daily maximum temperature of 63 degrees F in 1921; lowest daily maximum temperature of -11 degrees F in 1936; lowest daily minimum temperature of -25 F in 1875; highest daily minimum temperature of 37 F in 1984; and record precipitation of 0.87 inches in 1967; Record snowfall is 12.5 inches at Fergus Falls (Otter Tail County) in 1945.

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Average dew point for February 15th is 11 degrees F, with a maximum of 44 degrees F in 1921 and a minimum of -25 degrees F in 1946.

All-time state records for February 15th:

The state record high temperature for this date is 67 degrees F at Winona (Winona County) in 1921. The state record low temperature for this date is -53 degrees F at Ada (Norman County) in 1936. State record precipitation for this date is 1.84 inches at Winsted (McLeod County) in 1967; and the state record snowfall for this date is 15.0 inches at Grand Marais (Cook County) in 1937.

Past Weather Features:

The warmest February 15th in state history occurred in 1921. Over a dozen Minnesota communities saw afternoon temperatures rise above 60 degrees F. The warm air also brought higher humidity, clouds, and some thunderstorms. The warm spell ended on the 17th when a cold front swept through and dropped temperatures into the the single digits and teens F.

Arctic cold gripped the state on February 15, 1936. Nine communities reported lows of -40 degrees F or colder. All observers in the state except Winona remained below 0 F all day. The high temperature at Crookston was -22 degrees F, while the high at Fergus Falls was -21 degrees F. February of 1936 was the coldest in state history.

February 12-15, 1945 brought a large winter storm to Minnesota. Temperatures were not extreme, but snowfall was persistent and abundant. Many areas reported over a foot of snow, including Grand Marais and Fergus Falls with over 15 inches, and Pigeon River with over 18 inches.

Word of the Week: AVOID

AVOID is a research program conducted by multiple government agencies and universities to examine the potential consequences of climate change and advise the government of the United Kingdom on methods to avoid or mitigate some of the most detrimental effects. They recently

produced a report that suggested climate change could be limited to a rise in temperature of 2 degrees C or less if efforts to limit emissions of greenhouse gases are undertaken soon and practiced along with conservation efforts. You can read more about their report at....

<http://www.avoid.uk.net/>

Outlook:

The weekend will start out a bit colder than normal, then slowly warm up on Sunday. Chance of snow again by Monday and Tuesday, followed by another more significant chance of snow next Thursday.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

<http://www.climate.umn.edu/weathertalk/>

For access to other information resources go to

<http://www.climate.umn.edu/Seeley/>

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Minnesota WeatherTalk Newsletter for Friday, February 22, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, February 22, 2013

HEADLINES

- New climate outlook
- Blizzard on February 18-19
- Big Midwest snow on February 21-22
- An Invitation
- Weekly Weather potpourri
- MPR listener questions
- Almanac for February 22nd
- Past weather
- nib-nebs
- Outlook

Topic: New Climate Outlook

NOAA's Climate Prediction Center issued new seasonal climate outlooks this week. For the period from March through May they favor somewhat above normal temperatures, especially in eastern MN, and above normal precipitation across the Great Lakes area, including Minnesota. You can read more about these outlooks and see image products at....

<http://www.cpc.ncep.noaa.gov/>

The CPC also sees good chances for some continued alleviation of drought across our state through the end of May. The hydrologic features (lake levels and stream flows) will benefit from above normal precipitation whether it comes as rain or snow. The soil will not benefit much until it thaws out later in the spring. Right now soil frost depths still range from 20-40 inches deep in many areas and will take some time to thaw out. On the NWS-Grand Forks Office web site there is a good discussion of the implications of the spring climate outlook for flood threats on the Red River between North Dakota and Minnesota.....

<http://www.crh.noaa.gov/fgf/>

Portions of the Red River have a higher level of spring snow melt flood risk as a result of the high water content of the snow pack and the deep soil frost.

Topic: Blizzard on February 18-19

Yet another strong winter storm crossed the state earlier this week on February 18-19 (Mon-Tue) bring strong winds, snow, and reduced visibility. A number of blizzard warnings were issued for western and southern regions of the state and some highways were closed for a time due to reduced visibility. Windchill advisories were also issued as WC index values ranged from -25 to -35 degrees F in many areas of the state. By early Tuesday winds peaked over 40 mph in several places and in the northeast there were reports of 50 and 60 mph wind gusts. Some observers reported new record snowfall amounts, including 4.0 inches at Thief River Falls, 6.0 inches at Waroad, 6.4 inches at International Falls, 7.5 inches at Littlefork, and 9.5 inches at Baudette. For many this is the snowiest February since 2001 and proving to be the snowiest month of winter.

You can read more about this storm on our web site at...

http://www.climate.umn.edu/doc/journal/blizzard130218_19.htm

Topic: Big Midwest snow on February 21-22

A massive storm crossed the Midwest on Thursday and Friday (Feb 21-22) bringing rain, sleet, snow, and thundersnow to many states. Parts of Nebraska reported 6-9 inches of snow and poor visibility, while some roads in Kansas were shut down with 8 to 14 inches of snowfall. Parts of Iowa received 5 to 8 inches of new snow with a high water content. The area of Minnesota most affected by this storm was the southeast, where 4 to 6 inch amounts of snowfall were common. Some southern Minnesota observers reported record-setting amounts for February 22nd including over 5 inches at Worthington and Spring Valley, 6 inches at Wells and St James (tied record), 6.5 inches at Amboy, 6.6 inches at Lanesboro, 7 inches at Albert Lea, and 7.5 inches at Fairmont.

Topic: An Invitation

Minnpost, the online newspaper will be hosting a public discussion "Climate Change: Right Here, Right Now!" at Hell's Kitchen (80 S. 9th St) in downtown Minneapolis next Monday (Feb 25) evening from 5:30 to 7:30 pm. Discussing the topic will be Mark Seeley from the University of Minnesota, J. Drake Hamilton from Fresh Energy, and Lee Frelich from the University of Minnesota. The conversation will be moderated by Ron Meadow, Earth Journal writer for Minnpost. If you are interested in getting tickets and attending, please go to their web site:

<http://www.minnpost.com/events/climate-change>

Topic: Weekly Weather potpourri

Very heavy rains brought flooding to many parts of Greece on Friday (Feb 22), including areas in and around Athens. Some roads were closed and vehicles abandoned on flooded roads. It was reported that 2 to 3 inches of rainfall came in just a few hours, shutting down the Athens Tram System, and flooding many basements. Some news reports said it was the worst storm to hit Athens since 1961.

Tropical Cyclone Haruna was churning in the Mozambique Channel between Madagascar and

Africa this week. It was producing wind gusts up to 110 mph and sea waves up to 25 feet. Over the weekend it is expected to track across the southern part of Madagascar bringing very heavy rains and strong winds. It will continue to track southeast in the Southern Indian Ocean and weaken by Sunday and Monday.

A paper published in the current International Journal of Biometeorology documents the effects of climate change on wheat phenology in northern China. The data show that warmer seasonal temperatures have produced more rapid growth in the wheat crop and earlier maturation. This has some implications for variety selection.

NOAA's National Hydrologic Remote Sensing Center reports that over western portions of Minnesota the snow pack water content varies from 2 to 5 inches as of February 20, 2013. These water contents are relatively high as the moisture content of January and February snows has been more than normal. The higher water contents in the southern end of the Red River Valley are of concern for spring flood forecasting. You can follow the week to week assessments of snow cover and snow water content using their web site at...

<http://www.nohrsc.nws.gov/>

MPR listener question: I heard you tell Cathy last week that my hometown of Rothsay (Wilkin County) was reporting its snowiest February in history this year (26 inches). Surely other places must also be reporting near record February snowfall. Are there any others? My wife thinks her hometown of Wheaton must be close.

Answer: Indeed there are several observers that are close to breaking their record for snowiest February. Your wife's hometown of Wheaton as already tied the record set in 1952 with 22.2 inches. Elsewhere it appears that Breckenridge has set a new record for February with 23.4 inches, and Pelican Rapids as well with 22.4 inches. Many other western communities are close to their records but need a few more inches, including Browns Valley, Ottertail, and Benson.

Twin Cities Almanac for February 22nd:

The average MSP high temperature for this date is 29 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 11 degrees F (plus or minus 13 degrees F standard deviation).

MSP Local Records for February 22nd:

MSP weather records for this date include: highest daily maximum temperature of 57 degrees F in 1930; lowest daily maximum temperature of -2 degrees F in 1889; lowest daily minimum temperature of -22 F in 1873; highest daily minimum temperature of 38 F in 1930; and record precipitation of 1.13 inches in 1922; Record snowfall is 8.8 inches in 1913.

Average dew point for February 22nd is 14 degrees F, with a maximum of 39 degrees F in 2000 and a minimum of -21 degrees F in 1965.

All-time state records for February 22nd:

The state record high temperature for this date is 64 degrees F at Luverne (Rock County) and Windom (Cottonwood County) in 2000. The state record low temperature for this date is -46 degrees F at Bemidji (Beltrami County) in 1939. State record precipitation for this date is 3.00 inches at Willmar (Kandiyohi County) in 1922; and the state record snowfall for this date is 13.1 inches at Chatfield (Fillmore County) in 1940.

Past Weather Features:

February 20-23, 1873 brought a Cold Wave to Minnesota with many areas reporting continuous readings below 0 F. In St Paul, three consecutive mornings were -20 degrees F or colder, and it was considerably colder up north. Previous months had brought 40-50 inches of snowfall, and little of it had melted.

February 21-23, 1914 brought another strong Cold Wave to the state plummeted temperatures to -30 degrees F or colder at over 20 locations. Hallock (Kittson County) could warm no higher than -18 degrees F on February 22nd. However, by the 27th many communities saw temperatures climb into the 40s and 50s F.

By far the wettest February in state history occurred in 1922. A strong winter storm over February 22-23 brought a mixture of rain, sleet, ice, snow, and even thunderstorms to the state. Over a month's worth of precipitation fell in many areas of the state including 3.23 inches at Willmar, 2.12 inches at Winona, 2.00 inches at Chatfield, and 1.70 inches at Milaca. Many areas received over a foot of snow. Milaca reported 22 inches and Detroit Lakes received 25 inches. The storm knocked our power, closed roads, and damaged a number of trees.

February 22, 1982 brought a hint of spring to southern Minnesota as at least a dozen cities reported afternoon high temperatures of 50 degrees F or greater. The warm-up was short-lived as two days later a winter storm brought snowfall to the state.

The warmest February 22nd in state history occurred in 2000 when over 50 Minnesota communities saw the thermometer soar to 50 degrees F or higher on a bright and sunny afternoon. Many citizens took afternoon lunch outside that day.

Word of the Week: nib-nebs

This is a Scottish term for Jack Frost, or cold personified. It derives from nib meaning to poke or point, and neb meaning kiss. One possible connotation is that when kissed by Jack Frost you are poked by his cold nose. Nib-nebs has certainly been present this winter, and especially this month (Feb) which is averaging colder than normal across the state.

Outlook:

Near seasonal normal temperatures over the weekend with lingering snow in the northeast. Increasing cloudiness Sunday night with a chance for snow, especially in southern and central counties on Monday and Tuesday, then a bit warmer towards the end of next week.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, March 1, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, March 1, 2013

HEADLINES

- Preliminary February Climate Summary
- Spring flood outlook update
- Extreme Minnesota
- An Invitation
- Lamb/Lion climatology
- Weekly Weather potpourri
- MPR listener questions
- Almanac for March 1st
- Past weather
- Outlook

Topic: Preliminary February Climate Summary

Most observers in Minnesota reported a mean monthly temperature for February that was 2 to 4 degrees cooler than normal. Since June of 2011 (a 21 month period), February 2013 is only the 2nd month with a statewide average temperature that is cooler than normal (the other was October 2012). Extremes for the month were 45 degrees F at Grand Rapids on the 27th and -39 degrees F at International Falls on the 2nd.

Precipitation was generally abundant during the month of February, except for small portions of southwestern Minnesota. It was the wettest February statewide since 2007. Many observers reported over 2 inches of precipitation, most of which came as snowfall. For some the moisture was record-setting for the month, including 2.45 inches at Breckenridge, 2.49 inches at Benson, and 2.57 inches at Rothsay. For most areas of the state February brought the most snowfall for the winter season as well. Itasca State Park, Breckenridge, Bemidji, Pelican Rapids, Wheaton, and Hermantown reported over 20 inches for the month, while Ottertail, Rothsay, and Battle Lake reported over 25 inches. Some of these values were record-setting snow totals for the month.

For the most part the moisture was welcome. As we concluded the month the US Drought Monitor reduced the total area of the state designated to be in severe to extreme drought from 84 percent to less than 70 percent of the state landscape.

Topic: Spring flood outlook update

This week the National Weather Service updated the spring flood outlook for Minnesota rivers. The new outlook call for a near normal risk of spring snow melt flooding on portions of the Upper Minnesota River, as well as the Upper Mississippi River. More abundant snowfalls during February, along with deeper ground frost combined to elevate the risk of spring flooding from a below normal level to a near normal level according to NWS hydrologists. You can read more about the spring flooding outlook and keep up to date at.....

http://www.crh.noaa.gov/news/display_cmsstory.php?wfo=mpx&storyid=92930&source=0

Spring flood outlook probabilities for the Red River are also available from the Grand Forks NWS Office. These show a relatively higher risk of flooding on the lower end of the Red River Valley between Wapehton and Fargo, ND. You can get more detail at....

<http://www.crh.noaa.gov/fgf/scripts/localdata.php?loc=appahps&data=lpofar>

Topic: Extreme Minnesota

Next Monday (March 4th) Paul Douglas and I will be discussing our favorite topic (WEATHER) on Twin Cities Public Television (TPT) from 7:00 to 8:00 pm as we show clips from the four documentaries on historical Minnesota weather events produced by Mary Lahammer in recent years. We'll cover historic blizzards, tornadoes, floods, and fires. Please tune for a dose of our interesting weather history.

Topic: An Invitation

Dr. Phil Pardey, Professor of Science and Technology Policy in the University of Minnesota Department of Applied Economics and I will present a session on "Climate Change and Global Food Security" at the 2013 Nobel Peace Prize Forum on March 9th hosted by Augsburg College and the University of Minnesota. The Forum promotes peacemaking through presentations and dialogues about projects which have been successful in various parts of the world, and strategies used to bring good science and business ethics into practice. You can view the entire Forum program, including a list of speakers, and register to participate at the following web site:

<http://nobelpeaceprizeforum.org/>

Topic: The Lion and the Lamb Climatology of March for MSP

March months which have come in "like a lion and out like a lamb" or in "like a lamb and out like a lion" are remembered for both their storminess and temperature deviation. Standard deviations in daily maximum and daily minimum temperature are generally in the 10 to 11 degree F range during March for the Twin Cities. Occasionally daily temperature deviations exceed one standard deviation during the first and last weeks of the month. Using temperature records for the first and last week of March from the Twin Cities (1900-2012) and looking for opposite temperature patterns based on approximately one standard deviation statistically (plus or minus 11 degrees F from normal), the following characteristic years fell out.....

"In like a lamb/out like a lion" (March starts mild, finishes cold): 1921, 1923, 1924, 1934, 1937, 1964, and 1966.

"In like a lion/out like a lamb" (March starts cold, finishes mild): 1920, 1925, 1943, 1945, 1955, 1978, 1989, 1995, and 2005.

Temperature records confirm these years, 16 in all, fell into one category or the other. But 16 out of 113 years is only 14 percent of the time when this old saying has been true, at least based on MSP daily temperature standard deviations for March. Looks like this March will begin with near normal temperatures.

Topic: Weekly Weather potpourri

A winter storm brought some heavy rains and snow to parts of eastern Spain late this week. Rainfall amounts of 2-4 inches were being reported, along with several inches of snowfall in higher elevations. Strong coastal winds were also observed, with some flood warnings issued through Saturday.

The weekly drought assessment from Brad Rippey of the USDA World Agricultural Outlook Board offered the following highlights:

-Overall U.S. drought coverage decreased to 54.17% of the contiguous U.S., down 1.65% from last week. This is down 6.92% from the beginning of the year and down 11.28% from the record-high coverage of 65.45% on September 25, 2012. A pair of late-winter storms produced substantial precipitation, including heavy snow, across the central and southern Plains and the Midwest, and sparked heavy rain in the Southeast.

-The portion of the contiguous U.S. in the worst category – D4, or exceptional drought – also decreased substantially (1.21%) to 5.45%. Nevertheless, D4 coverage has ranged from 5 to 7% for 29 consecutive weeks (August 14, 2012 – February 26, 2013).

-Hay in drought (56%), winter wheat in drought (58%), and cattle in drought (66%) all fell one percentage point from a week ago. For the first time since early-July 2012, drought encompassed less than two-thirds of the domestic cattle inventory.

The Climate Adaptation Knowledge Exchange (CAKE) web site featured the Climate Adaptation Plans for the State of Minnesota this week. For those interested in reading about the work of CAKE as well as finding examples or cases of climate adaptation I recommend a visit to this web site.

<http://www.cakex.org/case-studies>

Northern Japan reported an exceptionally snowy February, adding significantly to what was already a record-setting winter. At least 13 communities have reported record-setting snowfall amounts for the winter so far, including the resort community of Sukayu where 16 feet of snow has been measured, creating roadways that are the equivalent of snow canyons. You can read more at...

<http://www.bbc.co.uk/news/world-asia-21626040>

MPR listener question: We need a lot of precipitation to alleviate our drought. I know that both March of 1951 and 1965 were extremely snowy in Minnesota. But what was the overall wettest March in history from the standpoint of precipitation?

Answer: Indeed both 1951 and 1965 were memorable for heavy snowfalls (many areas received over 40 inches) and in both years precipitation amounts averaged nearly 2.50 inches statewide. But the wettest March in state history was 1977 when the statewide average precipitation was nearly 3 inches, and many places reported over 5 inches (7.25 inches at Madison). That year most of the March precipitation came in the form of rainfalls, even some thunderstorms. A similar situation occurred in 2009 when most of the March precipitation came in the form of rainfalls, and some in thunderstorms. Many observers reported 2.50 to 3.00 inches that month, though not quite as wet as 1977.

Twin Cities Almanac for March 1st:

The average MSP high temperature for this date is 32 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 15 degrees F (plus or minus 13 degrees F standard deviation).

MSP Local Records for March 1st:

MSP weather records for this date include: highest daily maximum temperature of 59 degrees F in 1990; lowest daily maximum temperature of 0 degrees F in 1962; lowest daily minimum temperature of -32 F in 1962; highest daily minimum temperature of 38 F in 1878 and 2004; and record precipitation of 1.62 inches in 1965; Record snowfall is 9.0 inches in 2007.

Average dew point for March 1st is 14 degrees F, with a maximum of 43 degrees F in 2004 and a minimum of -34 degrees F in 1962.

All-time state records for March 1st:

The state record high temperature for this date is 76 degrees F at Ashby (Grant County) in 1907. The state record low temperature for this date is -47 degrees F at Bigfork (Itasca County) in 1962. State record precipitation for this date is 1.97 inches at Faribault (Rice County) in 1965; and the state record snowfall for this date is 18.8 inches at Collegeville (Stearns County) in 1965.

Past Weather Features:

A fast moving winter storm brought heavy snowfall to many parts of the state on March 1, 1951. Snowfall amounts from 6 to 12 inches were reported across central counties and some schools were closed. It was the start of a very snowy March which delivered 40 or more inches of snowfall to many Minnesota communities, including 40 inches in the Twin Cities.

Far and away the coldest March 1st in state history occurred in 1962. A slow moving Arctic cold front invaded the state overnight on February 27th and dropped temperatures dramatically. Deep snow cover was widespread and overnight lows plummeted to record cold for most observers.

Minimum temperatures of -30 degrees F were common, and over a dozen communities reported -40 degrees F or colder. Temperatures rebounded into the 20s and 30s F by March 3rd.

The first four days of March 1965 brought heavy rains in the south, along with ice and sleet, while central and northern counties had heavy snowfalls. Bird Island, Collegeville, Winsted, St Cloud, and Aitkin all reported over 20 inches. In southeastern Minnesota rains caused flooding along the Root and Zumbro Rivers. In central counties hundreds of schools were closed and many cars were abandoned in snow drifts on Highway 10. It was the start of the snowiest March in state history, when Collegeville reported over 66 inches of March snowfall.

Perhaps the warmest March 1st in state history was in 1992 when over two dozen Minnesota communities saw the thermometer climb into the 60s F under bright sunny skies. The warmth did not last as the month brought cold and snow to many areas, including a snow storm on the last day of the month.

Outlook:

A cool start to the weekend under mostly sunny skies, then more clouds and warmer on Sunday with a chance for snow later in the day. Widespread snow by Monday with somewhat cooler temperatures. Some snow lingering into Tuesday, then warmer and drier on Wednesday and Thursday.

Further Information:

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<http://www.climate.umn.edu/weathertalk/>

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Minnesota WeatherTalk Newsletter for Friday, March 8, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, March 8, 2013

HEADLINES

- Snowy start to March
- USA climate score card for the past 12 months
- An Invitation-MN Environmental Congress
- Weekly Weather potpourri
- MPR listener questions
- Almanac for March 8th
- Past weather
- Outlook

Topic: Snowy start to March

It appears that March will continue a wetter than normal pattern for the year across much of the state. A slow moving low pressure system brought considerable snowfall to many areas of the state over March 4-5 this week. Many observers reported a storm total of 5-10 inches. Orr reported 10.1 inches and Faribault reported 11 inches. In addition a number of observers reported water contents of the new snow to be over half an inch, including 0.68 inches at St Cloud, 0.73 inches at MSP, and 0.94 inches at Waseca.

Those reporting new record daily snowfall amounts for March 4th included: 6.0 inches at Crookston and 4.0 inches at Redwood Falls.

Among those reporting new record daily snowfalls for March 5th were: 9 inches at Cambridge and Hastings, 8.5 inches at Mora and Milaca, 8 inches at Thorhult, 7.6 inches at Duluth, 7.1 inches at Theilman, and 7 inches at Bemidji and Harmony. Among those reporting new record daily precipitation amounts for March 5th (liquid water content of the snow) were: Pokegama Dam with 0.56 inches, Jordan with 0.48 inches, and Dodge Center with 0.46 inches. The area of the state covered by a snow depth of 2 feet or more expanded with this storm, as did the overall water content of the snow pack. Some locations are well ahead of normal on their winter season snowfall totals to date, including Forest Lake, Crookston, Kimball, Itasca, and Breckenridge with 50-55 inches; Bemidji, Hibbing, Cass Lake, and Grand Rapids with 55-60 inches; and International Falls, Isabella, and Chisholm with 70-77 inches.

You can read more about this March snow storm on our web site at....

http://www.climate.umn.edu/doc/journal/snow130304_05.htm

Topic: Score card for USA climate records in the past 12 months

The NOAA National Climatic Data Center reported the following new daily record values in the USA for the past 12 months (March 6, 2012 to March 5, 2013), an extraordinary year for record setting:

32,398 new daily maximum temperature records
32,753 new daily warm minimum temperature records
10,525 new daily cold maximum temperature records
6,757 new daily minimum temperature records
28,398 new daily precipitation records
5,979 new daily snowfall records

Obviously the warm signal of climate is dominant in these statistics, with over 65,000 new daily warm temperature records (both max and min) set across the USA in the past 12 months.

Topic: An Invitation

The 2013 Minnesota Environmental Congress hosted by the Environmental Quality Board will take place Friday, March 15 from 8:00 am to 5:00 pm at the Ramada Inn in Bloomington, MN. Its purpose is to engage citizens to discuss and prioritize the state's environmental challenges in the context of meeting our energy and water needs, while preserving and improving environmental quality. I will be participating in a panel discussion during the morning session. If you are interested in this you can read more and register at....

<http://mn.gov/EnvironmentalCongress/>

Topic: Weekly Weather potpourri

On Thursday (March 7) this week the National Weather Service Office in Grand Forks issued an updated spring flood outlook for the Red River Basin. The risk of spring snow melt flooding has increased in the basin with the addition of snow and water in the snow pack. There is an increased risk of moderate to major flooding beyond the simple historical risk, especially in the upper reaches of the Red River Basin, Breckenridge to Moorhead. You can read more detail about this on their web site at....

<http://www.crh.noaa.gov/fgf/>

The Community, Collaborative Rain, Hail and Snow Network (CoCoRaHS) is sponsoring a March Madness Contest to see which state can recruit the most new daily weather observer volunteers this month to join the network. Currently North Carolina leads among all the states. If you would like to keep track of the contest, or more importantly if you would like to become a weather observer volunteer you can go to either of the following web sites:

<http://www.cocorahs.org/Content.aspx?page=marchmadness>

http://www.cocorahs.org/Content.aspx?page=coord_mn

A Tropical Cyclone Sandra formed off the northwest coast of Australia this week east of Willis Island. It was expected to strengthen but remain primarily out to seas producing winds up to 120

mph and sea waves over 20 feet. The cyclone is expected to persist into next week. Another Tropical Cyclone was expected to form over the weekend in the Southern Indian Ocean south of Diego Garcia.

Brad Rippey of the USDA World Agricultural Outlook Board offered the following synopsis of highlights from the US Drought situation report this week:

- Overall U.S. drought coverage decreased to 53.34% of the contiguous U.S., down 0.83% from last week. This is down 7.75% from the beginning of the year and down 12.11% from the record-high coverage of 65.45% on September 25, 2012. Most of the nation's remaining drought areas did not receive appreciable precipitation during the most recent drought-monitoring period. However, some additional improvement was noted in the Southeast (e.g. Georgia), while late-season snow provided some drought relief in the central Corn Belt.
- The portion of the contiguous U.S. in the worst category – D4, or exceptional drought – was unchanged at 5.45%. D4 coverage has ranged from 5 to 7% for 30 consecutive weeks.
- Hay in drought (55%) was down a percentage point from a week ago. Cattle in drought (66%) and winter wheat in drought (58%) were unchanged from last week.

A paper by researchers at Oregon State University and Harvard University appears this week in the journal *Science* and sheds some light on the temporal context for the remarkable warming of planet Earth that has occurred over the past 100 years. It appears that at the present pace of change the planet will soon be warmer than at anytime in the past 11,300 years, known as the Holocene. This is the first paper to set such a historical context for the degree of warming we are measuring. You can read more about the results at...

<http://www.sciencedaily.com/releases/2013/03/130307145303.htm>

MPR listener question: I am writing to ask you to settle a family bet. My wife, son, and I have been talking about this winter in the Twin Cities and how unusual it is to see February be the snowiest month. My son's view is that December is nearly always the snowiest month, my wife thinks January is more often the snowiest, while I remember March typically delivering the most snow. Based on the Twin Cities records can you tell us who is correct?

Answer: We have a 129 years of snowfall measurements in the Twin Cities, back to 1884. Here is the break down of the snowiest month for each winter:

November 13 times
December 29 times
January 34 times
February 18 times
March 31 times
April 4 times

So, it appears your wife is correct in her view of our historical snow seasons.

Twin Cities Almanac for March 8th:

The average MSP high temperature for this date is 34 degrees F (plus or minus 10 degrees F standard deviation), while the average low is 17 degrees F (plus or minus 11 degrees F standard deviation).

MSP Local Records for March 8th:

MSP weather records for this date include: highest daily maximum temperature of 69 degrees F in 2000; lowest daily maximum temperature of 10 degrees F in 1932; lowest daily minimum temperature of -8 F in 1877; highest daily minimum temperature of 47 F in 1878; and record precipitation of 0.94 inches in 1999; Record snowfall is 12.5 inches also in 1999.

Average dew point for March 8th is 15 degrees F, with a maximum of 57 degrees F in 2000 and a minimum of -17 degrees F in 1967.

All-time state records for March 8th:

The state record high temperature for this date is 84 degrees F at Amboy (Blue Earth County) in 2000. The state record low temperature for this date is -38 degrees F at McIntosh (Polk County) in 1908. State record precipitation for this date is 2.22 inches at Breckenridge (Wilkin County) in 1878; and the state record snowfall for this date is 14.5 inches at Spring Grove (Houston County) in 1961.

Past Weather Features:

March 8-10, 1892 brought a blizzard to northeastern Minnesota. Duluth and areas along the north shore saw over a foot of snow with blinding winds, and huge snow drifts. Dangerous windchill conditions prevailed as well as the temperature dropped over 40 degrees F in a short period of time.

Arctic cold prevailed in northern parts of the state over March 8-9, 1908. Over a dozen communities saw the thermometer drop below -20 degrees F. Fortunately it was a short-lived spell and temperatures to the more seasonable 40s F by March 11th.

Another Arctic cold snap gripped the state over March 7-8, 1943. At least two dozen cities saw overnight lows drop into the -20s F. Temperatures remained colder than normal the rest of the month leading to a very backward spring season.

March 8-9, 1961 brought a heavy snow storm to southeastern Minnesota counties. Observers there reported 10 to 20 inches of snow with poor visibility and huge drifts. This mid-week storm closed roads and schools for up to two days.

During a four-day warm spell (March 6-9) in 2000 Minnesota reported the hottest March 8th in state history. Over 60 communities reported daytime highs of 70 degrees F or higher, and several observers recorded highs of 80 degrees F. A strong cold front on March 10th brought snow and a dramatic drop in temperatures which fell off into the teens and twenties F.

Outlook:

Mixed precipitation on Saturday (rain, freezing rain possible, sleet, and snow), cooler temperatures on Sunday. More sun next week with temperatures slowly climbing back to normal and a generally dry pattern in place.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

<http://www.climate.umn.edu/weathertalk/>

For access to other information resources go to

<http://www.climate.umn.edu/Seeley/>

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Minnesota WeatherTalk Newsletter for Friday, March 15, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, March 15, 2013

HEADLINES

- Record snows continue in March
- New tool for gardeners and farmers
- An invitation
- Weekly Weather potpourri
- MPR listener questions
- Almanac for March 15th
- Past weather
- Outlook

Topic: Record snows continue in March

Following a snowy first week of the month for many, some observers reported significant additional snowfall on March 10th and 11th this week. In some cases new record daily amounts were observed. For example on March 10th (Sunday) new record daily values for snowfall included: Cass Lake 6.0 inches, Wright 5.9 inches, Lake Winnibigoshish Dam 5.1 inches, Grand Marais 5.0 inches, Wheaton 4.3 inches, Tower 4.1 inches, Grand Portage and Ottertail 4.0 inches. Then on Monday, March 11th persistent snow showers over southeastern Minnesota counties brought some record-setting daily amounts there, including: 9.0 inches at Spring Valley, 8.5 inches at Harmony, 8.4 inches at Preston, 8.20 inches at Lanesboro, 7.2 inches at Dodge Center, 6.3 inches at Theilman, 6.1 inches at Wabasha, and 6.0 inches at Albert Lea. Yet more snow, from 2 to 4 inches in central and northern counties, fell early Thursday morning (March 14) as another Alberta Clipper crossed the state.

Following a snowy month of February for most Minnesota observers, the first half of March has already produced well-above normal snowfall in many areas. Some locations already at 15 inches or greater for the month include: Duluth, Cass Lake, Chisholm, Orr, Pine River Dam, Blue Earth, Faribault, Harmony, Preston, Rochester, and Lake City. Ostrander (Fillmore County) reports 24.0 inches and Grand Meadow (Mower County) reports 20.3 inches to lead the state in March snowfall.

March has also been following the trend of February bringing us mostly colder than normal daily temperatures. In fact on March 8th (last Friday) two observers reported record low temperatures for the date, -13 degrees F at Wright (Carlton County) and -9 degrees F at Grand Meadow (Mower County). It appears that this St Patrick's Day (Sun) will be about 50-60 degrees F colder than last years.

Topic: New tool for gardeners and farmers

Greg Spoden, Minnesota State Climatologist has provided a new web-based climate tool to examine the probability of critical threshold temperatures (frost/freeze values among them) for any location in Minnesota during critical times of the spring and fall seasons. This tool allows anyone to examine location specific probabilities for the occurrence of various plant-sensitive low temperatures ranging from 36 degrees F down to 16 degrees F. The frame of reference for the data is 1981-2010, then new climate normals period used by the NOAA National Weather Service. An example using Chaska, MN shows that the date of April 28 is the 50 percent probability for a reading of 32 degrees F, while as late as May 11 still brings a 10 percent probability of 32 degrees F (frost) to that area. Similar dates for St Cloud are May 10th and May 29th. You can examine the data at our web site by going to the spring freeze/frost dates in the latest developments section:

www.climate.umn.edu

Topic: An invitation

For those who might be interested I will share my observations on what will become of Minnesota agriculture in a rapidly changing climate at the next Café Scientifique, Mar. 19 (Tue), 7 p.m., Bryant Lake Bowl, Minneapolis. Cost: \$5-\$12. The Bell Museum's monthly Café Scientifique series provides a happy hour program for adults that brings research from the U of M into Twin Cities bars and restaurants. For more information, you can google Bell Museum Cafe Scientifique.

Topic: Weekly Weather potpourri

The United Kingdom Meteorological Service released its quarterly Wind Review last week for Europe. It is tabular and graphical summary of wind measurements across the region that are relied upon for the assessment of wind power generated by wind turbines. The recent analysis showed that the Pamplona region of Spain recorded average wind speeds in 2012 that were more than 20 percent above normal. You can read more about this report at...

<http://www.metoffice.gov.uk/news/releases/archive/2013/wind-review-2012>

A winter storm brought some record cold temperatures and plenty of snow to parts of France, Belgium, and Germany on Tuesday (March 12) this week. Some observers reported up to 8 inches of new snow with single digit temperatures. The snow combined with wind to produce low visibility and some road closures and traffic jams. The Frankfurt airport endured many flight delays and some cancellations.

NOAA's Climate Monitoring Feature this month describes the importance of winter snow cover for water supplies in the western states. This informative video production, hosted by Deke Arndt, is available for viewing on the NOAA web site at...

<http://www.youtube.com/watch?v=fSpn7moPyvM&feature=youtu.be>

A paper released recently in Geophysical Research Letters documents the accelerated loss of glacial ice from Arctic Canada. Scientists from the Netherlands, Clark University (MA), and Colorado collaborated to evaluate imagery from NASA's Gravity Recovery and Climate Experiment satellite system. Their analysis shows that from 2004 to 2011 the loss of glacial ice in the Canadian Arctic Archipelago was 580 gigatons. Continued warming of the Arctic could raise the annual loss of glacial ice to 144 gigatons per year, an alarming pace. You can read more at....

<http://www.sciencedaily.com/releases/2013/03/130312134914.htm>

MPR listener question: With these cold March temperatures I am wondering what is the latest date for a recorded minimum temperature below zero F in the Twin Cities?

Answer: For the Twin Cities the latest date on the spring calendar when the minimum temperature has fallen below zero F is March 31, 1969 when the morning low was -1 degrees F (BTW the temperature warmed up to a high of 30 degrees F that day). On a statewide basis the latest spring date with a temperature reading below 0 degrees F was April 28, 1892 when St Vincent (Kittson County) reported a low of -2 degrees F. Incidentally Embarrass, MN has reported a low of -17 degrees F three time so far this month, most recently on Wednesday (March 13) this week.

Twin Cities Almanac for March 15th:

The average MSP high temperature for this date is 36 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 20 degrees F (plus or minus 12 degrees F standard deviation).

MSP Local Records for March 15th:

MSP weather records for this date include: highest daily maximum temperature of 69 degrees F in 1927; lowest daily maximum temperature of 8 degrees F in 1900; lowest daily minimum temperature of -7 F in 1897; highest daily minimum temperature of 42 F in 1927 and 2012; and record precipitation of 0.85 inches in 1945; Record snowfall is 5.0 inches in 1899.

Average dew point for March 15th is 20 degrees F, with a maximum of 52 degrees F in 2003 and a minimum of -11 degrees F in 1979.

All-time state records for March 15th:

The state record high temperature for this date is 80 degrees F at Waseca (Waseca County) in 1927. The state record low temperature for this date is -49 degrees F at Pokegama Dam (Itasca County) in 1897. State record precipitation for this date is 3.22 inches at Brimson (St Louis County) in 1971; and the state record snowfall for this date is 21.0 inches at Isabella (Lake County) also in 1971.

Past Weather Features:

On March 15, 1897, was the coldest in Minnesota history. Many observers reported minimum temperatures of -30 degrees F or colder. Detroit Lakes in Becker County reported a morning low of -43 degrees F, frightfully for any winter day. But by the next afternoon (March 16) the temperature was 45 degrees F, a rise of 88 degrees F in one and a half days! Typical March in Minnesota!

On March 15, 1941, one of the most sudden and severe blizzards in modern times struck North Dakota and Minnesota. The storm hit on a Saturday night while many were traveling, and thus claimed 71 lives (32 in Minnesota). Winds gusts were of hurricane force (74 mph or greater) were reported from several northern MN observers. Though snowfall amounts were generally modest, snow drifts twelve feet high were reported in some areas. Crookston caught the most snow recording 12 inches. The temperature dropped 18 degrees in 5 minutes when the storm hit the Duluth harbor. In the aftermath of this blizzard (and that of the Armistice Day Blizzard the previous November), the National Weather Service Office in Chicago relinquished forecast jurisdiction to the Minneapolis Office.

March 17, 2012 brought the warmest St Patrick's Day in state history. Over two dozen communities reported daytime high temperatures of 80 degrees F or higher, topped by 83 degrees F at St James. It was 79 degrees F as far north as Orr Minnesota. Between March 10th and March 22nd, International Falls set eleven new daily high temperature records. Last March (2012) overall was the warmest in state history as well.

Outlook:

Continued cooler than normal into the weekend. Mostly cloudy late Sunday with a chance for snow by late evening. Snow and mixed precipitation on Monday, then cooler yet on Tuesday and Wednesday. Generally dry next week with a modest warming trend on Thursday and Friday.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, March 22, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, March 22, 2013

HEADLINES

- Blizzard and more record snows
- New seasonal climate outlook
- St Patrick's Day contrast
- Weekly Weather potpourri
- MPR listener questions
- Almanac for March 22nd
- Past weather
- Outlook

Topic: Blizzard and more record snows

A strong winter storm moved across the state over Sunday night (Mar 17) through midday Tuesday (Mar 19) bringing widespread distribution of snowfall and high winds. Winds were so strong in northwestern and west central counties that blizzard conditions prevailed over March 18th, closing sections of Interstate 94 and Highway 10 for a time. Many places reported winds over 40 mph.

Some observers also reported new record snowfall amounts. On Monday, March 18th new record snowfall amounts were reported from Bemidji (6.0 inches), Rothsay (6.0 inches), Cass Lake (5.5 inches), Pelican Rapids (5.5 inches), Red Lake Falls (5.2 inches) and Collegeville (5.0 inches). Then on Tuesday, March 19th new daily snowfall records were set at Waskish (7.5 inches), Walker (5.0 inches), and Crookston (4.0 inches). The largest storm total values over the three days included 11.0 inches at Isabella, 9.0 inches at Embarrass, 8.5 inches at Kabetogama, 8.0 inches at Babbitt, Bemidji, and Ottertail, and 7.7 inches at International Falls.

The advance of the storm's warm front on Sunday, March 17th brought a 50 degrees F temperature rise at International Falls, from -28 degrees F in the morning to 22 degrees F just before midnight. Conversely, after the passage of the storm temperatures dropped significantly. A record low of -9 degrees F was tied at Thief River Falls on the 19th, while a new record low of 2 degrees F was set at Browns Valley. In addition some observers reported new record cold maximum temperatures for March 19th including 16 degrees F at Madison, 15 degrees F at Browns Valley, 14 degrees F at Artichoke Lake, and just 11 degrees F at Thief River Falls. These cold temperatures combined with higher winds to produce windchills that were well below zero.

You can read more about this storm on our web site at....

http://www.climate.umn.edu/doc/journal/blizzard130318_19.htm

Further Wednesday (Mar 20) and Thursday (Mar 21) mornings brought continued cold temperatures to many areas of the state. On March 20th a new record low of -4 degrees F was reported at Wheaton, while on March 21st both Wadena and Waskish reported record lows of -17 degrees F. Fortunately a modest warming trend is expected for the coming weekend, but still below normal temperatures for this time of year.

Topic: New Seasonal Climate Outlook

The NOAA Climate Prediction Center (CPC) released new seasonal climate outlooks on Thursday of this week. The outlook for April through June favors above normal temperatures in the southern parts of Minnesota and much of the eastern three-quarters of the country. The outlook also favors above normal precipitation for southeastern sections of Minnesota. Further the CPC drought outlook through June 30th favors improvement in the drought situation across the state due to melting snow pack and spring precipitation. You can read descriptions of these outlooks and see the mapped depictions at....

<http://www.cpc.ncep.noaa.gov/>

Topic: St Patrick's Day Contrast

Our friend Roland Fowler, weather observer at Embarrass, MN reported a significant contrast in St Patrick's Day temperatures for 2012 versus 2013. Last year his thermometer registered a high of 64 degrees F, while this year it was -29 degrees F, a 93 degrees F difference in St Patrick's Days. Whew! International Falls reported a St Patrick's Day record high of 77 degrees F in 2012 and this year they started out St Patrick's Day with a reading of -28 degrees F, a difference of 105 degrees F.

Topic: Weekly Weather potpourri

The World Meteorological Organization celebrated World Meteorological Day on March 21st this week. They hosted a Scientific and Technical Forum in Geneva, Switzerland to showcase advances in observation, communication, and forecasting technologies and procedures. You can read more about this at the WMO web site:

<http://www.wmo.int/worldmetday/>

On Wednesday this week a severe thunderstorm killed nine people and injured 272 in Dongguan City of south China's Guangdong Province. The strong thunderstorms brought torrential rain, strong winds, and large hail. Winds gusted to over 100 mph causing some structural damage to buildings.

Earlier in the week Texas State Climatologist John Nielsen-Gammon forecasted a hot year for Texas based on analysis from climate trends and dynamical models that use ocean temperatures. He said these trends are similar to global ones for temperature and as a result he caught a little

heat from fellow Texas citizens who deny that climate change is happening. Nielsen-Gammon was appointed as Texas State climatologist under then Governor George W. Bush back in 2000. You can read more about this at the Houston-Chronicle blog....

<http://blog.chron.com/sciguy/>

A paper published by the Niels Bohr Institute recently in Proceedings of the National Academy of Science finds that climate models show an increase in the strength of inland storm surges by hurricanes if the climate becomes 2 degrees C warmer as projected. Extreme storm surges like those measured during Hurricane Katrina may be up to ten times more frequent according to this analysis. You can read more at...

<http://www.sciencedaily.com/releases/2013/03/130318151519.htm>

MPR listener question: I've noticed that many of the record lows for the last few days were recorded in 1965, the same year we had major flooding on the Upper Mississippi. Does a late thaw correlate with greater flooding?

Answer: Not consistently, but there have certainly been episodes in our history when a late thaw period coupled with deep ground frost and an abundant snow cover have produced major flooding, especially on the Red River watershed. Such was the case in 1882, 1950, 1952, 1965, 1969, 1979, and 1997 when more rapid thaw periods occurred in April and produced a high volume of flow in a short period of time.

MPR listener question: I know this has been a colder March than we have been used to. How many Marches have not seen a 50 degree day? It looks like this year may be one!

Answer: For the Twin Cities climate record back to 1873 (140 years) only eleven percent of the time has March not produced a 50 degrees F temperature. So it is indeed unusual. The last two Marches that did not reach 50 F in the Twin Cities area were 2001 and 1979. With the forecast calling for cooler than normal temperatures through the balance of the month we may not see 50 degrees F here until April.

Twin Cities Almanac for March 22nd:

The average MSP high temperature for this date is 42 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 24 degrees F (plus or minus 10 degrees F standard deviation).

MSP Local Records for March 22nd:

MSP weather records for this date include: highest daily maximum temperature of 71 degrees F in 1945; lowest daily maximum temperature of 10 degrees F in 1888; lowest daily minimum temperature of -14 F in 1888; highest daily minimum temperature of 56 F in 2012; and record precipitation of 1.40 inches in 1952; Record snowfall is 13.7 inches also in 1952.

Average dew point for March 22nd is 23 degrees F, with a maximum of 60 degrees F in 2012 and a minimum of -10 degrees F in 1974.

All-time state records for March 22nd:

The state record high temperature for this date is 81 degrees F at Pipestone (Pipestone County) in 1939. The state record low temperature for this date is -30 degrees F at Pokegama Dam (Itasca County) in 1888. State record precipitation for this date is 3.00 inches at Elk River (Sherburne County) in 1865; and the state record snowfall for this date is 14.6 inches at Fairmont (Martin County) in 1952.

Past Weather Features:

Arguably the coldest March 22nd in state history was in 1888. St Paul reported a morning low of -14 degrees F, while St Vincent in the northern Red River Valley was -29 degrees F. Duluth was -13 degrees F, and as far south as Grand Meadow it was -15 degrees F. At Morris the temperature was -16 degrees F, a record low, and at Pokegama Dam it was -30 degrees F (a statewide record for the date) with a daytime high of -15 degrees F, also a record. Then the last week of the month brought 8 more inches of snowfall. The spring of 1888 was generally cool and wet leading to late planted crops.

The warmest March 22nd in history occurred in 1939 when over 20 Minnesota communities reported daytime highs in the 70s F. The spring warm spell lasted for 5 days allowing farmers to get a great deal of field work done.

March 22-23, 1952 brought a blizzard with heavy snowfall to many areas of Minnesota. Snowfall amounts of 10 to 18 inches were common. Many people were stranded along closed roads and travel was at a standstill for a day or two afterwards. The abundant snow of March that year melted rapidly in April causing spring flooding in many areas.

About 4:30 pm on March 21, 1953 an F-2 tornado (winds 113-157 mph) was on the ground for 11 miles across parts of Stearns and Benton Counties north of St Cloud. It destroyed a church, warehouse and laundromat, killing one and injuring three others. This was one of the earliest spring tornadoes in Minnesota history.

Outlook:

Somewhat warmer temperatures over the weekend, but still well below normal for this time of year. Slight chance of snow in southern counties on Monday and Tuesday. Mostly dry and gradually warmer next week, with an increasing chance for precipitation towards the end of next week.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, March 29, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, March 29, 2013

HEADLINES

- Preliminary climate summary for March
- Cold Twin's Home Opener
- Weekly Weather potpourri
- MPR listener questions
- Almanac for March 29th
- Past weather
- Outlook

Topic: Preliminary climate summary for March

Mean temperatures for the month ranged from 5 to 9 degrees F colder than normal for most observers in the state. This was the second consecutive month with below normal mean temperatures. In fact the February-March combined mean temperatures were the coldest since 2001 for most observers. Extremes for the month ranged from -29 degrees F at Embarrass on the 17th (St Patrick's Day) to 54 degrees F at Pipestone on the 28th.

Most observers reported above normal precipitation for the month. Many reported over 2 inches, while some exceeded three inches, including 3.42 inches at Waseca, 3.27 inches at St James, and 3.04 inches at Grand Meadow. Snowfall amounts were above normal as well for most, except in southwestern counties where amounts only ranged from 3 to 7 inches. Some locations reported more than 2 feet of snowfall during the month including 26.0 inches at Ottertail, 25.7 inches at Grand Meadow, 25.5 inches at Cass Lake and Duluth, and 25.1 inches at Chisholm. Maximum snow depth during the month exceeded 30 inches in portions of north-central (International Falls) and northeastern (Isabella) Minnesota. In the north the Kabetogama Lake ice road closed for the season on March 27th due to deep snow and slush conditions.

Topic: Cold Twin's Home Opener

According to historical analysis by Pete Boulay of the MN State Climatology Office it appears that the Minnesota Twins may open the season Monday (April 1st) with the coldest temperatures ever for this occasion, highs forecasted to be in the low-30s F. The coldest home opener in franchise history was on April 14, 1962 when the daytime high was 34 degrees F (Twins lost to the Angels 12-5 at the old Met). The Twins are scheduled to open against the Detroit Tigers at 3:10 pm on Monday, April 1st at Target Field with an expected temperature of 32 degrees F, and windchill in the high teens F to low 20s F. Long underwear under the uniform may be the common wardrobe that day. Incidentally the warmest ever home opener? On April 22, 1980,

again at the old Met against the Angels the temperature was 90 degrees F (Twins won 8-1). You can read more about the weather for Twin's Home Openers at...

http://www.climate.umn.edu/doc/journal/Twins_home_opener_weather.htm

Topic: Weekly Weather potpourri

The United Kingdom Meteorological Office reports that this March is the coldest for that country since 1962, about 3 degrees C colder than the long term average. It ranks as the 4th coldest over the country-wide period of record since 1910. They are expecting to see a colder than normal Easter Sunday. You can read more on their web site at...

<http://www.metoffice.gov.uk/news/releases/archive/2013/cold-march-statistics>

Conversely, the city of Sidney in Australia has just reported the hottest week for this time of year in 44 years. Daytime highs there rose to well over 90 degrees F and averaged near 84 degrees F for the entire week. Further to the south, Melbourne is on track to record their hottest March in history. Fortunately a cooler spell of weather is expected for the Easter weekend.

Highlights for the drought-monitoring period ending 7 am EDT on March 26 from Brad Rippey at the USDA World Agricultural Outlook Board include:

- Overall U.S. drought coverage decreased slightly (0.22%) to 51.64% of the contiguous U.S. In addition, drought coverage is down 9.45% from the beginning of 2013 and down 13.81% from the record-high of 65.45% on September 25, 2012.
- The portion of the contiguous U.S. in the worst category – D4, or exceptional drought – decreased nearly one-third of a percentage point (0.30%) to 5.10%. D4 coverage has ranged from 5 to 7% for 33 consecutive weeks (August 14, 2012 – March 26, 2013).
- For the second week in a row, there were no changes in hay in drought (51%), cattle in drought (62%), and winter wheat in drought (56%).

A paper published this week by researchers at North Carolina State University documents that certain scale insects that infest trees were far more abundant in the urban heat island micro-climates of cities. Pest abundance in the urban heat island is thought to be more related to species survivability and resilience than reproductive rates. The paper may provoke more studies of differential species abundance within urban areas as climate continues to change. You can read more at...

<http://www.sciencedaily.com/releases/2013/03/130327190544.htm>

Adaptation International is an organization dedicated to helping communities and business operations mitigate their risk and increase their resilience with respect to climate change. They provide technical knowledge and guidance for adaptation strategies for specific situations. They are currently involved in projects for Tucson, AZ and Seattle, WA. You can read more about them at...

<http://www.adaptationinternational.com/>

USDA survey released this week projected corn planting intentions of 97.3 million acres, most since 1936. In addition the corn stocks report was higher than expected putting downward pressure on corn prices which fell by 46 cents. Projected alleviation of drought conditions across the Midwest this spring may continue to put downward pressure on corn prices, but the situation is acknowledged to be volatile at least through the early spring planting season.

MPR listener question: After reaching 40 degrees F on January 20th this year at Waseca, we have not seen that temperature since. What is the latest calendar date for a 40 degree high in Waseca and other southern MN cities?

Answer: In 1970 Waseca did not see a 40 degrees F air temperature until March 25th. This was true for most of southern Minnesota. BTW in 1843 at Fort Snelling, the temperature reached 42 degrees F on January 20th, then did not reach 40 F again until April 4th.

Twin Cities Almanac for March 29th:

The average MSP high temperature for this date is 45 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 28 degrees F (plus or minus 10 degrees F standard deviation).

MSP Local Records for March 29th:

MSP weather records for this date include: highest daily maximum temperature of 83 degrees F in 1986; lowest daily maximum temperature of 13 degrees F in 1969; lowest daily minimum temperature of -5 F in 1969; highest daily minimum temperature of 57 F in 1910; and record precipitation of 0.98 inches in 1998; Record snowfall is 11.0 inches in 1924.

Average dew point for March 29th is 25 degrees F, with a maximum of 56 degrees F in 1910 and a minimum of -13 degrees F in 1969.

All-time state records for March 29th:

The state record high temperature for this date is 83 degrees F at numerous locations, including the Twin Cities and Gaylord, MN in 1986. The state record low temperature for this date is -23 degrees F at Itasca State Park (Clearwater County) in 1921. State record precipitation for this date is 2.88 inches at Lake City (Wabasha County) in 1998; and the state record snowfall for this date is 17.5 inches at Maple Plain (Hennepin County) in 1924.

Past Weather Features:

A strong winter storm crossed the state on March 29, 1864 bringing 4 inches of snow to parts of southern Minnesota and 17 inches of snowfall to Beaver Bay along the north shore of Lake Superior.

A large winter storm dominated the state over March 28-30, 1924 and brought one of the

heaviest spring snowfalls ever measured. Many communities in central and southern Minnesota received between 10 and 20 inches of snowfall. Canby in western Minnesota reported 22.5 inches, a record there, while Maple Plain in the Twin Cities area reported 21 inches. The streetcar system in the Twin Cities was shut down. The snow was welcome as many areas had been suffering from drought.

A Cold Wave dominated the state over March 28-31, 1969. The coldest March 29th in state history occurred in that year. Virtually every county in the state reported morning lows that were below zero degrees F. Albert Lea was the warm spot with plus 1 F. Morris, MN warmed up to a high of 1 degrees F, 41 degrees F colder than normal for the date and still a record value. Temperatures warmed into the 40s F again by April 2nd.

The warmest March 29th in state history occurred in 1986. Many observers reported daytime highs in the 70s F, and 16 communities saw their thermometers reach 80 degrees F or higher. Cedar located in Anoka County saw the temperature climb from a morning low of 32 degrees F to an afternoon high of 82 degrees F by 4:00 pm. A cool front swept through overnight and dropped temperatures by 25 to 35 degrees F the next day.

The worst March tornado outbreak in Minnesota history occurred on the afternoon of March 29, 1998 when 14 separate tornadoes touched down in southern counties of the state. One tornado, an F-4 (winds 207-260 mph) traveled for 67 miles, leaving a path of destruction. At least nine communities reported significant damages including Comfrey, Nicollet, St Peter, and Le Center. Two deaths and a few dozen injuries were reported with these storms.

Outlook:

Lingering rain Saturday morning in eastern Minnesota, but mostly cloudy elsewhere with temperatures in the 30s to low 50s F. Cooler and breezy Easter Sunday with a chance for snow showers in the north. Cooler yet on Monday and Tuesday, then warming on Wednesday and Thursday next week. Remaining mostly dry throughout the period.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

<http://www.climate.umn.edu/weathertalk/>

For access to other information resources go to

<http://www.climate.umn.edu/Seeley/>

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Minnesota WeatherTalk Newsletter for Friday, April 5, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, April 5, 2013

HEADLINES

- Cold Start to April
- Red River Valley flood risk pushed back
- Weekly Weather potpourri
- MPR listener questions
- Almanac for April 5th
- Past weather
- Outlook

Topic: Cold start to April

Many observers reported very cold temperatures for the first few days of April. In the central and northern counties overnight lows dipped into the single digits F. Embarrass, Kabetogama, Orr, International Falls, Tower, and Crane Lake reported overnight lows below 0 degrees F, with a -6 degrees F at Crane Lake on April 3rd. During the daytime hours on Wednesday (April 3) the winds shifted from the north to the south raising the temperature at Canby from a morning low of 25 degrees F to an afternoon high of 63 degrees F under sunny skies. Similarly Madison, MN (Lac Qui Parle County) rose from a morning low of 23 degrees F to an afternoon high of 61 degrees F.

Topic: Red River Valley flood risk pushed back on the calendar

With the cool start to April and expected cooler than normal temperatures into next week, the NWS-Grand Forks office issued an updated hydrological outlook this week for the Red River of the North which projected the flood risk on that watershed not to materialize until after April 16th. Further the northern end of the Red River Valley may not see flood volume flow until the last week of the month. The actual flow volume on this watershed will be highly dependent on how fast the thaw of the snow pack occurs and how much precipitation falls during the second half of the month. For those interested in following the day to day volume flow along the main stem of the Red River and its tributaries you can see the hydrographs for gage points on these watersheds at the "Puddles" section of our web site:

<http://climate.umn.edu/doc/journal/puddles.htm>

Topic: Weekly Weather potpourri

Heavy rains brought flooding to many parts of Argentina this week. Up to 16 inches of rainfall occurred near La Plata and Buenos Aires reported some of its worst flooding in a century. Thousands of people were displaced from their homes, and many more were without power. At

least 31 deaths were blamed on the storms and flooding.

The United Kingdom Meteorological Office announced this week that their WOW program (Weather Observations Website) has now received over 100 million weather reports from enthusiasts all over the world since its beginnings in 2011. The site shares measurement data, comments, and photos about the weather from all parts of the world. You can view this web site at....

<http://wow.metoffice.gov.uk/>

The latest national drought assessment from Brad Rippey of the USDA:

- Overall U.S. drought coverage increased slightly (0.28%) to 51.92% of the contiguous U.S. Despite the slight weekly increase, drought coverage is down 9.17% since the beginning of 2013 and down 13.53% from the record-high of 65.45% on September 25, 2012.
- The portion of the contiguous U.S. in the worst category – D4, or exceptional drought – increased one-tenth of a percentage point 5.20%. D4 coverage has ranged from 5 to 7% for 34 consecutive weeks (August 14, 2012 – April 2, 2013).
- Once again, there were no changes in hay in drought (51%), cattle in drought (62%), and winter wheat in drought (56%). Those numbers have remained unchanged since March 12.

Ohio State University researchers have retrieved ice cores from the Peruvian Andes that provide a high resolution of year to year climate for nearly 1800 years. In this record they can see from the signature of chemical composition within the ice layers an indication of El Nino activity in the equatorial Pacific Ocean, providing the longest known record of El Nino. These ice cores are being preserved to study other indicators of ancient climate fluctuations as well. You can read more about this at....

<http://www.sciencedaily.com/releases/2013/04/130404142417.htm>

MPR listener question: How deep is the frost right now and will much of the rain in the next couple of days soak into the ground?

Answer: With the loss of snow cover the soil is beginning to thaw from the surface downward more rapidly. In southern Minnesota and the Twin Cities area the top 5 to 8 inches of soil has thawed out, however there is still a frost layer between 8 and 20 inches in most places. Further west and north in the Red River Valley frost still extends down to 30-40 inches deep and there is relatively little surface thawing so far. The rainy pattern we expect to see develop for the weekend and extend into next week will help accelerate the thaw, and indeed some of the rainfall will go into the dry soil (at least in southern MN), but not too much depth. In the north the additional precipitation will likely add to the snow pack before it melts later this month.

Twin Cities Almanac for April 5th:

The average MSP high temperature for this date is 45 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 28 degrees F (plus or minus 10 degrees F standard deviation).

MSP Local Records for April 5th:

MSP weather records for this date include: highest daily maximum temperature of 80 degrees F in 1991; lowest daily maximum temperature of 29 degrees F in 1982; lowest daily minimum temperature of 12 F in 1979; highest daily minimum temperature of 60 F in 1921; and record precipitation of 0.91 inches in 1999; Record snowfall is 1.5 inches in 1964.

Average dew point for April 5th is 27 degrees F, with a maximum of 60 degrees F in 1929 and a minimum of -2 degrees F in 1979.

All-time state records for April 5th:

The state record high temperature for this date is 88 degrees F at Madison (Lac Qui Parle County) in 1991. The state record low temperature for this date is -18 degrees F at Warroad (Roseau County) in 1936. State record precipitation for this date is 2.95 inches at Pigeon River Bridge (Cook County) in 1933; and the state record snowfall for this date is 28.0 inches also at Pigeon River Bridge (Cook County) in 1936.

Past Weather Features:

Between 5:30 pm and 7:00 pm on April 5, 1929 an F-4 tornado (winds 207-260 mph) crossed portions of Hennepin, Anoka, Ramsey, Washington, and Chisago Counties and into western Wisconsin with an estimated path length of nearly 80 miles. It injured 40 people and killed two farm residents near Forest Lake. Many farm homes and farm buildings were destroyed by this storm.

The first week of April in 1979 continued a winter-long cold and snowy weather pattern in the Red River Valley. Several nights brought temperatures that were below 0 degrees F and measurable snowfalls occurred on the 4th and 5th. Many observers still reported over a foot of snow on the ground. Heavy rains combined with warm temperatures brought spring snow melt flooding to the Red River Valley during the third week of the month.

April 5-7, 1991 brought mid-summer heat to Minnesota, with over 40 communities reporting daytime high temperatures of 80 degrees F or higher. Temperatures even reached the low 90s F in some western counties and farmers were out planting small grain crops.

April 5-6, 1997 brought a late season blizzard to the Red River Valley, depositing 4-7 inches of fresh snowfall on top of an already snow laden landscape. Many communities along the Red River of the North were already sandbagging in the middle of a spring flood fight. The blizzard conditions brought heavy, wet snow, along with winds up to 65 mph, and dangerous windchill conditions. The snow melt flood that followed was the worst of the 20th Century for many points along the Red River watershed.

Outlook:

Mixed precipitation over the weekend, with chances for snow in the north and rain in the south. Temperatures will be near seasonal normals to cooler than normal. Generally a dry day on Sunday, then continued chances for precipitation on Monday, Tuesday, and Wednesday of next week. Drier and cooler by Thursday.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, April 12, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, April 12, 2013

HEADLINES

- Winter storm this week
- Snowfall and precipitation totals
- 11th Annual Larson/Allmaras Lecture
- New features on DNR web site
- Weekly Weather potpourri
- MPR listener questions
- Almanac for April 12th
- Past weather
- Outlook

Topic: Winter storm this week

A late winter storm brought a mixture of weather to the state over April 10-11 (Wed-Thu) this week. Rain, sleet, freezing rain, snow, thunder, lightning, and strong winds were all elements of this storm system, causing numerous power outages, traffic accidents, paralyzing communities in some cases, and cancelling many events. An ice storm knocked out power in many areas of SW Minnesota including Worthington where a good deal of tree damage was reported. Winds of 40-50 mph were reported from the Duluth area.

April 10 (Wed) brought record setting amounts of rainfall to many south-central and southeastern communities including a new statewide record for the date of 2.80 inches at Caledonia. Others setting records that day included 2.30 inches at Preston, 2.25 inches at La Crescent, 2.08 inches at Lanesboro, 2.07 inches at Minnesota City, 1.97 inches at Fairmont and Winnebago, 1.95 inches at Wells, 1.83 inches at Spring Valley, 1.64 inches at Waseca, 1.37 inches at Windom, and 1.35 inches at Worthington (much of this fell as freezing rains weighting down power lines). In addition Marshall received a new daily record snowfall amount of 5.0 inches.

Then overnight and early on April 11 (Thu) the colder air brought mostly snowfall which was predominately wet, and heavy with some observers reporting record-setting amounts, including a new statewide record for the date of 13.0 inches at Ortonville. Others reporting new daily record amounts for snowfall on April 11 included 10.5 inches at Marshall and Bird Island, 9.0 inches at Pipestone, 8.8 inches at Glencoe, 8.5 inches at Worthington, 8.2 inches at St Cloud, 7.2 inches at Montevideo, 7.1 inches at Fairmont, 7.0 inches at Willmar, Duluth, St James, and Windom, and 6.5 inches at Browns Valley. Many others reported record setting amounts as well, and the water content was high ranging from 0.75 inches to over 1.50 inches.

Topic: Snowfall and precipitation totals mounting up

This week's snowfall totals coupled with significant snowfalls over April 6-7 combined to produce some large monthly totals for several climate stations in the state. In northern areas many have reported over a foot of snow for the month so far, including Cass Lake, Tower, Embarrass, Two Harbors, and Babbitt. In many of these areas yet more snow is expected over the weekend and into early next week. Monthly total precipitation amounts range over 2 inches already in some southern communities including New Ulm, Faribault, Blue Earth, Redwood Falls, Windom, Worthington, Grand Meadow, and Zumbrota. Still others reported over 3 inches for the month (already a very wet April) including Waseca, Wells, Amboy, Springfield, Lanesboro, Caledonia, La Crescent, and Winnebago. The moisture surplus will help to recharge soils, lakes, and streams, though over two-thirds of the state remains in long term drought.

The 2012-2013 snowfall season (October 2012 to date) has produced some large seasonal totals in places. Detroit Lakes, Bemidji, Cass Lake, International Falls, Duluth, Kelliher, and Two Harbors observers report over 80 inches, while Orr, Cook, Chisholm, Wolf Ridge (near Finland), and Isabella report over 90 inches. And yet more snow is expected this month in northern counties.

Topic: 11th Annual Larson/Allmaras Lecture on April 18th

Please consider attending the Larson-Allmaras Lecture Series on Emerging Issues in Soil and Water hosted by the Department of Soil, Water, and Climate on April 18th, 1:00 pm in Rm 335 Borlaug Hall on the University of Minnesota St Paul Campus. We will be hosting two distinguished speakers for this event: Dr. Mark David from the University of Illinois and Dr. Ron Follett from the USDA-ARS. Dr. David's talk is entitled "Nitrate Losses in the Tile Drained Cornbelt: Why are Reductions so Difficult?" and Dr. Follett will speak on "Global Climate Change and Agriculture." Following the seminars, there will be a reception in celebration of our centennial year. A link with more details about the seminars and the centennial celebration along with online registration can be found at:

<https://cfans.wufoo.com/forms/larson-allmaras-lecture/>

Topic: New features on DNR web site

The MN-DNR web site now features an interactive map to examine lake ice-out data. You can find a map with a point and click feature to examine the earliest, latest, and median dates for lake ice-out on many of the states more popular lakes. Give it a try at....

http://www.dnr.state.mn.us/ice_out/index.html

Topic: Weekly Weather potpourri

A paper published recently in the Journal of Climate by researchers from the University of Edinburgh and the United Kingdom Hadley Centre documents detectable changes in the frequency of temperature extremes. The analysis shows that there are more frequent extremes of

warm temperatures in all seasons, and less frequency of cold temperature extremes. The researchers also note that climate models show a tendency to significantly overestimate changes in warm daytime extremes of temperature, as opposed to warm nighttime extremes, especially in the summer season. You can read more about this at...

<http://journals.ametsoc.org/doi/abs/10.1175/JCLI-D-11-00678.1>

Another study recently released by NOAA (Kunkel et al)-NCDC via Geophysical Letters documents an expected increase in intense rainfall events (thunderstorms) as the world continues to warm. "We have high confidence that the most extreme rainfalls will become even more intense, as it is virtually certain that the atmosphere will provide more water to fuel these events," according to co-author Dr. Ken Kunkel. Maximum possible 24-hour precipitation may increase by 20-30 percent over some Northern Hemisphere landscapes. You can read more about this study at...

http://www.noaanews.noaa.gov/stories2013/20130403_ncdcextremeprecipitationstudy.html

Tropical Cyclone Imelda was churning in the Southern Indian Ocean this week with winds approaching 80-90 mph. Warnings to shipping were posted as sea wave heights ranged from 20-30 feet. Imelda was on a course headed SE and away from any islands. It was expected to dissipate by April 16th.

Highlights from USDA meteorologist Brad Rippey's weekly US Drought Assessment include:

- Overall U.S. drought coverage decreased substantially (1.10%) to 50.82% of the contiguous U.S. Drought coverage is down 10.27% since the beginning of 2013 and down 14.56% from the record-high of 65.45% on September 25, 2012.
- The portion of the contiguous U.S. in the worst category – D4, or exceptional drought – fell significantly (1.82%) to 3.38%. This breaks a 34-week run of D4 coverage in the 5 to 7% range and represents the smallest D4 area since July 31, 2012.
- Winter wheat in drought was unchanged from last week at 56%. There were 1 percentage point declines in hay (50%) and cattle (61%) in drought (61%).

MPR listener question: Here in Perham, MN we are having one of the shortest ever spring high school sports seasons (softball, baseball, track and field) I can remember. Still a good deal of snow cover, and very cold temperatures. Is this one of the coldest Aprils on record so far?

Answer: Spells of cold and snowy early April weather occur in your county (Otter Tail) about once every five years. In Spring of 1935 cold and snow cover persisted there until May 2nd. So as cold and snowy as it is this year, it is not close to a record, unless it persists into May. Certainly April has brought above normal snowfall and precipitation so far this month, along with temperatures that are averaging 8 to 14 degrees F colder than normal in most places.

Twin Cities Almanac for April 12th:

The average MSP high temperature for this date is 55 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 35 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for April 12th:

MSP weather records for this date include: highest daily maximum temperature of 83 degrees F in 1931; lowest daily maximum temperature of 28 degrees F in 1950; lowest daily minimum temperature of 12 F in 1962; highest daily minimum temperature of 60 F in 1941; and record precipitation of 0.67 inches in 1983; Record snowfall is 6.0 inches in 1962.

Average dew point for April 12th is 31 degrees F, with a maximum of 61 degrees F in 1941 and a minimum of -1 degrees F in 1950.

All-time state records for April 12th:

The state record high temperature for this date is 90 degrees F at Beardsley (Big Stone County) in 1931. The state record low temperature for this date is -7 degrees F at Warroad (Roseau County) in 1924. State record precipitation for this date is 3.74 inches at Grand Meadow (Mower County) in 2001; and the state record snowfall for this date is 11.8 inches at Madison (Lac Qui Parle County) in 1995.

Past Weather Features:

The warmest April 12 in state history occurred in 1931. Most observers reported daytime highs in the 70s F, many reached 80 degrees F or greater. Both Beardsley and Canby reached 90 degrees F. The growing season of 1931 turned out to be an exceedingly warm and dry one in Minnesota.

The coldest April 12 on a statewide basis was in 1950 which brought a cold and snowy winter that lingered deep into the spring. On the morning of April 12th many observers reported single digit low temperatures and at least ten cities registered below zero F readings. Temperatures rebounded into the 60s and 70s F the next week.

April 11-12, 1962 brought a major winter storm to southern and central Minnesota, where snowfall amounts ranged from 5 to 11 inches. It was a delayed, wet spring that year as most Minnesota crops were planted later than usual.

Spring thunderstorms brought heavy rains to many parts of the state over April 11-12, 2001. Many areas of the state received 1-2 inches of rainfall, and several observers reported well over 2 inches. The storm was a precursor to even more wet weather as April of 2001 was the 2nd wettest in state history with many observers reporting 6-8 inches of rainfall for the month.

Outlook:

Some sun on Saturday with warmer temperatures. Increasing cloudiness on Saturday night with mixed precipitation into Sunday, snow in the north and rain in the south. Chance of snow continuing into Monday, then drier on Tuesday. The balance of next week looks to be cool and wet, with another chance for mixed precipitation on Wednesday and Thursday.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, May 3, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, May 3, 2013

HEADLINES

- April climate summary-many records broken
- May snowfall breaks records too
- Lake ice-out dates
- Weekly Weather potpourri
- MPR listener questions
- Almanac for May 3rd
- Past weather
- Outlook

Topic: April climate summary, many records broken

April 2013 was arguably the most anomalous month since March of 2012 when nearly 800 daily climate records were set (mostly for warmth). It was the third consecutive month that delivered colder than normal temperatures to the state. Mean monthly temperatures for April ranged from 6 to 12 degrees F colder than normal. Extremes for the month ranged from -14 degrees F at Embarrass on the 20th and 21st to 85 degrees F at St James on the 29th. On a statewide basis it was the 5th coldest April in state history. Many locations reported record-setting cold maximum temperatures or cold minimum temperatures over the 10th through the 14th and again over the 19th through the 24th. In total, over 240 new daily cold temperature records were set including a -11 degrees F reading at Babbitt and Tower, and -13 degrees F at Brimson on the 20th. The reading at Embarrass (-14 F) on the 21st was not only a new statewide record low for the date, but also the coldest temperature ever measured in Minnesota so late in the spring.

Except for western and northwestern counties, April 2013 delivered above normal precipitation to the state. On a statewide basis it was the 10th wettest April in state history. Many observers reported over 4 inches of precipitation. In the Twin Cities it was the 5th wettest April of all time (5.22 inches), and 2nd wettest at Rochester (6.79 inches). Elsewhere Babbitt reported the wettest ever April (5.36 inches), as did Jordan (6.05 inches), Faribault (6.48 inches), and Zumbro Falls (5.67 inches). Some observers in southeastern counties reported over 7 inches. Spring Grove (Houston County) set a new daily precipitation record on April 10th with 2.71 inches, as did La Crescent with 2.25 inches. Even more significant was the new statewide daily precipitation record set at Caledonia (Houston County) on the 10th as well with 2.80 inches (breaking the old record of 2.40 inches at Bricelyn in 1947). The frequency of precipitation was remarkable as well. Many observers reported measurable precipitation on 21-23 days during the month, and at Waseca they had 11 consecutive days with precipitation from the 5th to the 15th.

With the dominance of colder than normal temperatures much of April's precipitation fell as snow, and it was record setting at many locations. Isabella (Lake County) reported 25 inches of

snowfall on April 19th breaking the old statewide record of 24 inches (St Cloud in 1893). Many other observers reported record-setting daily amounts of snowfall on 7th, 11th, 19th, and 23rd. The frequency of snowfall added up to record monthly snowfall totals for many Minnesota observers, including 55.9 inches at Park Lake (Carlton County), 55.6 inches at Island Lake (St Louis County), 50.8 inches at Duluth Airport, 47.0 inches at Babbitt, 46.5 inches at Isabella, 45.5 inches at Two Harbors, and 41 inches at Cloquet. Several other observers reported record monthly totals of snowfall as well, exceeding 20 and 30 inches in most cases (24.4 inches at St Cloud for example was a new April record total). Peak snow depth during the month was over 30 inches in northern parts of the state. With the thaw at the end of the month maple sap flow was going gang busters in northern forests and being collected by maple syrup producers.

Topic: May snowfall breaks records too

May 1-2 brought snowfall to many parts of the state, especially southern counties. On Wednesday May 1st up to 2 inches of new snow was reported at New Ulm and Amboy. But the real intense snowfall began Wednesday night and lingered into Thursday (May 2nd) producing record amounts in southeastern Minnesota counties, where amounts of 6 to 14 inches were common. Some record daily amounts included 5.6 inches at Wabasha, 6.2 inches at Theilman, 6.4 inches at Lanesboro and Spring Valley, 7.0 inches at Albert Lea, 7.8 inches at Hastings, 8.4 inches at Zumbrota, 9.0 inches at Waseca and Grand Meadow, 10.0 inches at Austin, Owatonna, and Wells, 10.4 inches at Zumbro Falls, 14.0 inches at Rochester, 15.4 inches at Dodge Center, 17.5 inches at Goodhue, and 18 inches at Blooming Prairie. Many of these measurements were also all-time snowfall amounts for any day in May. The measurement at Dodge Center would be a new daily record snowfall amount for any NWS-COOP station during the month of May in Minnesota, surpassing 12 inches at St Cloud on May 17, 1890, at Windom on May 8, 1938, and at Leonard on May 3, 1954.

The storm presented a travel hazard and caused power outages in many places of southeastern Minnesota. There was also widespread reported tree damage. In addition Rochester, Faribault and Red Wing closed schools, giving students and teachers a rare May snow day. Even Friday morning (May 3rd) snow continued to fall in some southeastern Minnesota communities leaving additional measurable amounts including another 1.8 inches at Dodge Center, 3.9 inches at Wabasha, and 5.0 inches at Winona.

Snowfall in the east and southeast Metro area ranged from 3-5 inches, but most of the Metro Area was missed. The largest amount from a single May storm in the Twin Cities climate record (including Fort Snelling) is 3.0 inches which occurred in 1830, 1892, 1935, and 1946. The last year in that list, 1946 was especially notable because on June 1st of that year, Holman field in St Paul reported 38 degrees F with snow flurries from 2:24 am to 2:55 am, just barely into the month of June, but nevertheless the only documented observation of snow in the Twin Cities area during June. June of 1946 also brought snow flurries to Park Rapids, Willmar, and Gull Lake. More on historic May snowfalls can be found at....

http://www.climate.umn.edu/doc/journal/historic_may_snowstorms.htm

With the addition of April and May snowfall amounts, the 2012-2013 snow season totals for some parts of Minnesota now rank among the top five for many communities. Some of these include 96.5 inches at Cloquet, 99.2 inches at Cass Lake, 112.5 inches at Babbitt, 120.5 inches at Chisholm, 124.4 inches at Wolf Ridge (Lake County), 129.4 inches at Duluth, and 143.5 inches at Isabella.

Topic: Ice-Out Dates Are Late

In contrast to 2012 (earliest ever ice-out dates for many lakes) many Minnesota lakes are still holding onto ice cover. The Freshwater Society declared ice-out on Lake Minnetonka on Thursday morning (May 2nd) this week, only the 5th time in history the lake has lost ice cover in May. The last time was 1965. Many northern lakes are still holding ice, including the Fish Hook chain of lakes near Park Rapids (Hubbard County) where the Governor's Fishing Opener is to take place May 10-12. Perhaps the warm-up in temperatures next week will assist the ice-out progress on Fish Hook Lake.

Topic: Weekly Weather potpourri

High temperatures, low humidity and strong Santa Ana winds were contributing to a higher risk of wildfires in southern California this week, and indeed many fires broke out. The National Weather Service issued Red Flag Warnings, along with forecasts for near record-setting high temperatures in the mid 90s F for the Los Angeles Basin area. Winds on Thursday (May 2nd) afternoon were peaking in the 45 to 55 mph range and afternoon humidity ranged from the single digits to the teens.

A paper published recently by scientists from Manchester dissects strong mid-latitude cyclones to diagnose where what generates the strongest winds in the storm. They find that baroclinically strong descending air to the south or southeast of a low pressure system can become a so-called "sting jet" which is a band of strong winds that descends from aloft and reaches the surface bringing gale-force, destructive winds. This was their assessment of the storm structure associated with the famous October 1987 gale in the United Kingdom. You can read more about this paper at...

<http://www.sciencedaily.com/releases/2013/05/130501090653.htm>

The EPA and NOAA were promoting Air Quality Awareness week as the summer season approaches and more people spend time outdoors. Their web site offers tips on air pollutant sources, air quality monitoring and forecasts, and how to keep the air in your local community cleaner. If you want to visit their web site go to...

<http://www.airquality.noaa.gov/>

<http://www.epa.gov/airnow/airaware/local.html>

The Cloud Appreciation Society cloud of the month for April depicts towering castles of cumulonimbus over Brazil, photographed by a pilot. You can view this photo and others at their web site....

<http://cloudappreciationsociety.org/april-2013/>

MPR listener question: My kids stayed home from school today (Thursday, May 2nd) in the Rochester area. Good thing too because the roads were miserable. I cannot remember ever having a snow day in the month of May. Has this ever happened?

Answer: The only other documented snow day I can find in May occurred in 1954 when many northeastern schools (Itasca, St Louis, Lake, and Cook Counties) closed school for two days as a result of 7-8 consecutive days of snowfall. In that case a foot to a foot and a half of snow accumulated and along with 40 mph winds made travel very difficult there. But my guess is that this may be the first time that southeastern Minnesota schools have closed for snow in May.

Twin Cities Almanac for May 3rd:

The average MSP high temperature for this date is 65 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 43 degrees F (plus or minus 9 degrees F standard deviation).

MSP Local Records for May 3rd:

MSP weather records for this date include: highest daily maximum temperature of 93 degrees F in 1949; lowest daily maximum temperature of 35 degrees F in 1954; lowest daily minimum temperature of 18 F in 1967; highest daily minimum temperature of 65 F in 1959; and record precipitation of 1.72 inches in 1912; Record snowfall is 0.2 inches in 1954.

Average dew point for May 3rd is 39 degrees F, with a maximum of 66 degrees F in 1949 and a minimum of 12 degrees F in 2005.

All-time state records for May 3rd:

The state record high temperature for this date is 97 degrees F at Bird Island (Renville County) and Willmar (Kandiyohi County) in 1949. The state record low temperature for this date is 6 degrees F at Crookston and Fosston (Polk County) in 1967. State record precipitation for this date is 4.00 inches at Albert Lea (Freeborn County) in 1902; and the state record snowfall for this date is 12.0 inches at Leonard (Clearwater County) in 1954.

Past Weather Features:

May of 1902 started out very stormy with thunderstorms over the first four days of the month. Some record-setting daily rainfalls saturated farm fields and delayed planting. Many southern counties reported over 2 inches of rainfall over May 1-4, while Albert Lea reported 6.10 inches and Blooming Prairie 5.35 inches. For Caledonia, May of 1902 was the wettest ever with 11.13 inches of rainfall for the month.

At 7:00 pm on May 3, 1922 an F-2 tornado (winds 113-157 mph) moved 5 miles across the

landscape in Dakota County. Near Northfield two barns were swept away and a home was seriously damaged. In addition a bus was overturned injuring two people.

May 3-4 of 1949 brought an early Heat Wave to Minnesota. It was clearly the warmest May 3rd in state history with over 25 communities reporting afternoon high temperatures in the 90s F. The month remained relatively warm and wet throughout getting crops off to a good start for the growing season.

May of 1954 brought snow to many parts of the state. In fact at Duluth and International Falls snowfall was reported on the first eight days of the month. Snowfall was several inches over May 1-4 and disrupted traffic, caused power outages, and even school closures in northeastern Minnesota where 10 to 18 inches of snow accumulated. Tower reported 10 inches of snowfall on the third.

A Cold Wave ushered in the month of May in 1967 with temperatures averaging 25 to 30 degrees colder than normal over the first three days of the month. Over 80 communities reported overnight lows in the teens F, while severe fell into the single digits. As far south as Luverne (Rock County) the temperature dipped to just 9 degrees F, an all-time record for so late in the spring.

Outlook:

Cloudy with a chance for widespread rain and cooler than normal temperatures over the weekend. A warming trend will start on Sunday and carry over into next week bringing more seasonable temperatures to Minnesota. Chance of precipitation again by next Wednesday and Thursday.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

<http://www.climate.umn.edu/weathertalk/>

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<http://www.climate.umn.edu/Seeley/>

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Minnesota WeatherTalk Newsletter for Friday, May 10, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, May 10, 2013

HEADLINES

- More May records
- Record wet start to 2013
- Weekly Weather potpourri
- MPR listener questions
- Almanac for May 10th
- Past weather
- Outlook

Topic: More May Records

In addition to those recent early May climate records reported in Minnesota WeatherTalk Newsletter last week, some additional climate records were set during the start of May which I overlooked. May 3rd brought additional daily record snowfalls to Zumbro Falls (3.6"), Wabasha (3.9"), Minnesota City (4.0"), Winona Dam (5.0"), Theilman (5.3"), Lanesboro (6.4"), and Grand Meadow (9.0"). The storm total over May 2-3, 2013 of 17.2" at Dodge Center may have been a state record snowfall amount for a two-day may snow storm. The Minnesota State Climatology Office reports only one higher total May snowfall, that of 17.8 inches at Virginia (St Louis County) over the first 8 days of the month in 1954. Besides the snowfall records some new daily precipitation records were set as well, including 1.02" at Spring Valley on the 1st. On May 2nd even more daily precipitation records were set, including 2.12" at Red Wing, 2.06" at Austin, 1.87" at Dodge Center, 1.85" at Owatonna, 1.78" at Theilman, 1.70" at Hastings, and 1.45" at Waseca. On May 3rd La Crescent reported a record daily precipitation amount of 1.24" and Winona a record 1.20". Then on May 4th Spring Valley reported a record daily precipitation value of 0.74 inches. Through the first ten days of May a number of southeastern communities have already exceeded normal precipitation for the month of May, including Grand Meadow (5.43"), Minnesota City (4.99"), Rochester (3.86"), Theilman (4.39"), Wabasha (4.15"), and Winona Dam (4.35").

(A side note: the seasonal snowfall totals for 2012-2013 are now high ranking for several Minnesota climate stations: Island Lake (St Louis County) set a new seasonal snowfall record with 134.2 inches, Isabella (Lake County) set a new seasonal snowfall record with 143.5 inches, Babbitt (St Louis County) set a new seasonal snowfall record with 112.5 inches, and Hibbing-Chisholm Airport set a new seasonal snowfall record with 120.5 inches. Both Duluth (129.4") and Wolf Ridge (124.5") reported their 3rd highest seasonal snowfall totals).

Of further note, some cold temperature records were set during the first few days of May. New record cold daytime maximum temperature records were set on the 2nd of May at Rochester (33 F) and Brainerd (41 F). On May 3rd another cold maximum daily temperature record was set at Rochester (33 F), and on May 4th record cold daily maximum temperatures were reported from Brainerd (41 F) and Hibbing (40 F). These values are about 30 degrees F colder than normal.

Topic: Record wet start to 2013

The south-central and southeastern climate divisions of Minnesota are off to a record start in 2013 in terms of precipitation. For south-central Minnesota observers the average total precipitation received through the first 4 months of the year (Jan-Apr) is 11.17 inches, surpassing the previous record wet first four months from 2001 (10.27 inches). For southeastern Minnesota observers the first four months of 2013 show an average precipitation amount of 13.80 inches, surpassing the previous record wet starting four months from 2001 (10.50 inches). These amounts have restored the flow of many watersheds, raised lake levels, and replenished soil moisture. In fact tile lines are reported to be running in some area soils.

The weekly drought update continues to show improvement for much of the Minnesota landscape. Early in the spring up to 84 percent of the landscape was classified to be in severe or extreme drought. As of May 7th that area has shrunk to just 15 percent, as some areas of the state have seen precipitation values for the year exceed normal by 3 to 5 inches. Some southwestern Minnesota counties remain in severe drought.

Topic: Weekly Weather potpourri

The Joint Typhoon Warning Center was monitoring two cyclones in the Indian Ocean this week. One is expected to increase in strength and make landfall in Myanmar on Tuesday or Wednesday next week with strong winds, heavy rainfall, and high seas. The other cyclone was spinning in the Southern Indian Ocean well away from any land. It too was expected to strengthen over the weekend, then weaken by the middle of next week.

USDA-NRCS announced this week the release of a new Water Quality Index for agricultural runoff (labeled WQIag) which can be used by crop producers to assess how their management practices affect water quality measures in the runoff from their fields. USDA hopes that crop producers will use this tool to evaluate the effectiveness of their conservation practices (reduced tillage, precision placement of fertilizer, and reduced pesticide applications) on a field by field basis. You can read more about this new tool at.....

<http://www.agprofessional.com/news/Water-quality-index-for-ag-runoff-streamlined-and-accessible-204748211.html?llsms=195951&c=y>

A note issued from Brad Rippey, USDA meteorologist this week about the condition of pasture lands in the Great Plains:

"We are starting out 2013 in by far the worst shape on record, with respect to U.S. pasture and rangeland conditions. This is on the strength of continuing drought from California to the Great Plains. This part of the country accounts for a disproportionately large percentage of the nation's

rangeland. Of course, we're coming off a year (2012) when all sorts of pasture/rangeland condition records were set (see attached graph). Previous drought years that were surpassed by the Drought of 2012 – with respect to poor pasture and rangeland conditions – include 2000, 2002, and 2006. You can read more of Brad's detailed analysis of the situation at the USDA blog:

<http://blogs.usda.gov/tag/weather-update/>

Science teachers may be interested to know that the United Kingdom Meteorological Office has recently updated its Education Page with a U-tube product offering a daily forecast for grade school children (called "Rain or Shine"), as well as more web-based activities that are fun to use in engaging elementary school children about weather. You can learn more at...

<http://www.youtube.com/user/MetOfficeLearning>

<http://www.metoffice.gov.uk/education/>

Environment Canada release its new seasonal climate outlook products this week, examining the period from May through July. Their outlooks tend to favor above normal temperature and below normal precipitation for the southern Manitoba border with Minnesota. But you can examine these in more detail at their web site...

<http://weather.gc.ca/saisons/#forecasts>

Recent research by scientists from MIT documents the source of cirrus clouds in the high levels of Earth's troposphere. Their work shows that the vast majority of these cloud particles nucleate around mineral dust or metallic aerosols. You can read more about this work at....

<http://www.sciencedaily.com/releases/2013/05/130509142104.htm>

MPR listener question: With corn just started to be planted this week around the state, will this be the latest planting season in state history?

Answer: Certainly in the context of the past three decades, this year will be a very late planting season. We have had much of the state corn crop planted by the end of April in many recent years, including last year. In addition it appears there was a good deal of winter injury to alfalfa fields this year, so these will take a while to recover, and perhaps some will be replanted. Certainly the first crop of hay will be cut later than usual this spring.

Historically a combination of wet soils and cool temperatures have prevented farmers from timely planting of crops. Since the mid-20th Century the latest planting seasons in history for corn occurred in 1950, 1953, 1969, and 1979. In all of these years fully half of the state's corn acreage was not planted until the 4th week of May. With modern field equipment and other technologies today's farmers are capable of planting half of the state's corn acreage in a week if the weather affords them the opportunity. So it remains to be seen exactly how late planting will be this year.

Twin Cities Almanac for May 10th:

The average MSP high temperature for this date is 66 degrees F (plus or minus 10 degrees F standard deviation), while the average low is 45 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for May 10th:

MSP weather records for this date include: highest daily maximum temperature of 90 degrees F in 1987; lowest daily maximum temperature of 43 degrees F in 1902; lowest daily minimum temperature of 28 F in 1907; highest daily minimum temperature of 68 F in 1922; and record precipitation of 1.40 inches in 1986; Record snowfall is a trace in 1946 and 1966.

Average dew point for May 10th is 40 degrees F, with a maximum of 70 degrees F in 2011 and a minimum of 14 degrees F in 1981.

All-time state records for May 10th:

The state record high temperature for this date is 97 degrees F at Beardsley (Big Stone County) in 1928. The state record low temperature for this date is 11 degrees F at Pine River Dame (Crow Wing County) in 1905 and at Roseau (Roseau County) in 1981. State record precipitation for this date is 4.27 inches at Wheaton (Traverse County) in 1920; and the state record snowfall for this date is 6.0 inches at Pigeon River Bridge (Cook County) in 1927.

Past Weather Features:

A May Heat Wave brought 90 degrees F for three consecutive days (8th-10th) in 1887. Daytime temperatures reached the low to mid 90s F in western and southern counties. The only cool spot in the state was along the north shore of Lake Superior where daytime temperatures remained in the 50s and 60s F. May of 1887 turned out to be one of the warmest in state history.

A rare late spring snow storm passed across the northern parts of the state over May 10, 1902 delivering 1 to nearly 5 inches of snowfall. Duluth reported temperatures in the upper 30s F with 5.5 inches of snowfall.

May 10th, 1953 brought a tornado outbreak to our region, producing at least four well-documented storms in Minnesota between approximately 4:00 pm and 5:30 pm. The first tornado near Starbuck (Pope County) in western Minnesota was on the ground for 20 miles. An F-2 storm (winds 113-157 mph) this tornado destroyed many rural buildings and killed a number of livestock. Another F-2 tornado hit near Hollandale (Freeborn County) destroying a number of homes and killing 8 people. Later about 5:00 pm the same large thunderstorm system produced an F-3 tornado (winds 158-206 mph) that moved 18 miles across the landscape of Olmsted and Winona Counties, passing near St Charles. One person was killed and eleven injured by this storm which also snapped hundreds of trees in Whitewater State Park. The final tornado of the day, another F-3 struck in Fillmore County and damaged many farms near Wycoff and Chatfield, completely destroying one rural school. It was on the ground for 40 miles, killing one person and injuring 5 others.

Strong thunderstorms brought heavy rains, hail, and high winds to the state over May 9-10, 1979. Hail the size of golf balls caused extensive damage in Cokato, while flash floods closed roads and flooded basements in some central and southern Minnesota communities. Two day rainfall totals ranged from 3-4 inches in many areas, and left many agricultural fields underwater.

Two of the coldest May 10ths in state history were in 1966 and 1981. In both cases early morning temperatures fell into the teens and twenties on a statewide basis, causing some frost damage to newly emerged crops. In 1966 temperatures fell into the teens F as far south as Preston and Caledonia, while in 1981 a state record low was set at Roseau with a mid-winter temperature of just 11 degrees F.

The warmest May 10th in state history occurred in 1987 when over 50 Minnesota communities reported daytime highs of 90 degrees F or greater. That May was so warm and dry that crop producers were able to plant corn and soybean crops especially early. First cutting of alfalfa hay was exceptionally early as well.

Outlook:

Cooler temperatures over the weekend. Windy on Saturday with a chance for showers in the northeast. Then chance of frost early Sunday morning, warming into the 50s F by afternoon. Stronger warming on Monday and Tuesday as temperatures rise well above normal. There will be a chance for showers late on Tuesday and into Wednesday.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

<http://www.climate.umn.edu/weathertalk/>

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Minnesota WeatherTalk Newsletter for Friday, May 17, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, May 17, 2013

HEADLINES

- Cold Mother's Day for some
- Record Hot Tuesday (May 14)
- Lake ice-out dates
- Rochester climate trivia
- Weekly Weather potpourri
- MPR listener questions
- Almanac for May 17th
- Past weather
- Outlook

Topic: Cold Mother's Day for some

A strong low pressure system and associated cold front brought high winds for the Fishing Opener (Saturday, May 11), then some record low temperature readings for Mother's Day (Sunday, May 12th). Among those setting record low temperature readings on May 12th were International Falls (22 degrees F tied record low), Lake Kabetogama (23 degrees F), Orr (21 degrees F), Agassiz Refuge (20 degrees F), New York Mills (22 degrees F), and Wells (28 degrees F). Afternoon high temperatures remained cold as well at some northeastern locations including Babbitt (38 F) and Tower (38 F), while elsewhere they reached the more comfortable 50s F. Crane Lake set a new low temperature record on Monday (May 13) with a reading of just 19 degrees F, and Hibbing tied their low temperature record for the date with 21 degrees F. Then, with southeast winds and bright sunshine temperatures warmed into the 50s and 60s F by 6:30 pm that day.

Topic: Record hot on Tuesday (May 14)

Very hot, dry air invaded the state on Tuesday, bringing extraordinary temperatures and humidity readings to southern counties. Many climate observers reported daytime highs that broke their own May 14th maximum temperature records, but also broke the statewide maximum temperature for the date (99 degrees F at Milan and Redwood Falls in 1932, and again at Milan in 2001). Blue Earth, Sherburn, St James, Amboy, New Ulm, Fairmont, Mankato, Hutchinson, Owatonna, Waseca, Winnebago, Albert Lea, Austin, and Jackson were among those locations that hit the century mark in temperature, topped by 103 degrees F at Winnebago and Sherburn (Blue Earth too if you count the Mn/DOT automated station there). Hutchinson, MN rose from a low of 48 degrees F at 6:00 am to an afternoon high of 100 degrees F at 2:00 pm (8 hours later). The MSP Airport set a new Twin Cities record high for May 14th of 98 degrees F (old record 95

F set in 1932). Other cities that reported new record highs for May 14th include St Cloud (95 F), Rochester (97 F), Brainerd (93 F), Hibbing (87 F), and Alexandria (93 F tied their record). In addition dewpoints in the 20s and 30s F produced desert-like relative humidity values ranging from 7 to 16 percent, equivalent to the readings in Arizona on Tuesday. More narratives about this recording setting day can be found at both the NWS and MN-State Climatology Office web sites:

http://www.crh.noaa.gov/images/mpx/NewsStory_2013May14.pdf
http://www.climate.umn.edu/doc/journal/hot_140513.htm

The warm, dry air along with moderate winds increased the fire danger around the state, placing many counties in the "very high" risk category and some northeastern counties in the "extreme" risk category. The National Weather Service issued Red Flag warnings

You can keep abreast of the fire danger and read postings about current wild fires in the state at the following web sites:

http://www.dnr.state.mn.us/forestry/fire/firerating_restrictions.html
<http://mnics.org/wpress/>

Topic: Lake ice-out dates

Many central and northern Minnesota lakes only recently lost their ice cover. For some it was the latest ice-out date since 1950, and in a few cases it was record-setting for lateness. The NASA-MODIS satellite "Image of the Day" web site shows the changes in lake ice cover over Minnesota this week in a very effective set of images. You can view this at...

<http://earthobservatory.nasa.gov/IOTD/view.php?id=81179>

Topic: Rochester climate trivia

For the 8th time in history (back to 1886), the month of May has brought to Rochester, MN record-setting daily maximum temperatures that both span extreme cold to extreme hot or vice versa in the same month (that is record cold and record hot daytime maximum temperatures). On May 2nd and 3rd Rochester reported record-setting daytime highs of just 33 degrees F (cold), followed by a record -setting daytime high of 97 degrees F (hot) on May 14th. This range of 64 degrees F between extreme daytime highs for the month is an all-time record for that location in the month of May. Other wide variations in daytime record maximum temperatures at Rochester occurred in the following years.

May 10, 1887 daytime high 89 F
May 31, 1887 daytime high 55 F
May 12, 1914 daytime high 42 F
May 27, 1914 daytime high 93 F
May 8, 1916 daytime high 84 F
May 16, 1916 daytime high 45 F

May 1, 1940 daytime high 36 F
May 12, 1940 daytime high 89 F
May 2, 1959 daytime high 90 F
May 14, 1959 daytime high 46 F
May 1, 1992 daytime high 89 F
May 25, 1992 daytime high 46 F
May 15, 2001 daytime high 89 F
May 23, 2001 daytime high 46 F

It is obvious that in some years the month of May allows Minnesota citizens to wear clothes from their entire wardrobe!

Topic: Weekly Weather potpourri

Crane Lake, MN which still has ice cover, reported a low of 27 degrees F on Thursday (May 16) this week. This tied the record low for the date from 1967.

The first named storm of the 2013 Tropical Storm season in the Eastern Pacific Ocean appeared this week. Tropical Storm Alvin was being monitored and tracked by the National Hurricane Center. Alvin is expected to track well out to sea from the west coast of Mexico with winds from 50 to 60 mph producing sea wave heights of 12 feet or more. It is expected to dissipate by early next week.

NOAA's Storm Prediction Center reported at several tornadoes were spotted in north Texas on Wednesday (May 15) this week. The largest (up to a mile wide) was reported in Granbury, southwest of Fort Worth, where six deaths and a number of injuries were reported. Elsewhere many homes were damaged and there were a number of power outages.

May 14 (Tue) brought a record warm overnight low to Las Vegas, NV,,reported by the NWS Office there as the following....

RECORD EVENT REPORT

NATIONAL WEATHER SERVICE LAS VEGAS, NV

840 AM PDT TUE MAY 14 2013

...DAILY RECORD HIGH MINIMUM TEMPERATURE SET AT LAS VEGAS...

THE LOW TEMPERATURE THIS MORNING AT MCCARRAN INTERNATIONAL AIRPORT -

THE OFFICIAL CLIMATE STATION FOR LAS VEGAS - ONLY FELL TO 80 DEGREES. THIS BROKE THE PREVIOUS DAILY RECORD FOR THE HIGHEST MINIMUM - OR WARMEST LOW - TEMPERATURE ON RECORD OF 77 SET IN 1997. THIS ALSO SETS A RECORD FOR THE EARLIEST LAS VEGAS HAS RECORDED A DAILY LOW TEMPERATURE OF 80 DEGREES. THE PREVIOUS RECORD WAS 80 DEGREES SET ON MAY 19TH 2006.

OFFICIAL RECORDS FOR LAS VEGAS DATE BACK TO JANUARY 1937.

The Quad-City Times newspaper reported this week that Iowa has set a new record for the longest period without a tornado. Iowa has not seen a report of a tornado since May 24, 2012, a period of 360 days. This breaks the old record for absence of tornadoes, May 5, 1955 to April 26, 1956 (355 days). Overall, the USA has seen reduced numbers of tornadoes since April of 2012.

NOAA's National Climatic Data Center offered a web-based briefing this week on the national climate features of April, 2013. They point out that ND reported its coolest April in history, while for SD it was the 2nd coolest. With respect to April's precipitation both Iowa and Michigan reported their wettest April in history, and WI and MI are both reporting the wettest first four months (Jan-Apr) in their climate records. Other Midwestern states, including MN are also reporting one of the wettest first four months of the year as well. You can see more of these NOAA-NCDC highlights at....

<http://www.ncdc.noaa.gov/sotc/briefings/201305.pdf>

The International Council for Local Environmental Initiatives (ICLEI)-Local Governments for Sustainability recently named Minneapolis as one of the top 20 cities or counties leading in resilience to disruption from energy availability, economic, or climatic events and episodes. Specifically Minneapolis is recognized for its proactive response to Heat Waves and to adapting for more extreme storm water runoff events (intense thunderstorms). You can read more about this at....

<http://www.icleiusa.org/library/documents/earth-day-fact-sheet-2013-20-resilient-cities>
<http://www.icleiusa.org/blog/earth-day-focus-20-cities-counties-leading-on-climate-resilience>

MPR listener question: What are the largest day-to-day temperature swings - both hotter and colder - for the Twin Cities and for Minnesota?

Answer: The largest daily temperature range in the Twin Cities record is from December 26, 1903 when the 24-hour difference in temperature (max-min) was 51 degrees F (high of 34 F and low of -17 F). On Tuesday, May 14th this week, the daily temperature range at MSP was 44 degrees F (high 98 F, low 54 F). On a statewide basis, Lamberton (Redwood County) holds the record with a temperature range of 71 degrees F on April 3, 1982 (high of 78 F, low of 7 F).

Twin Cities Almanac for May 17th:

The average MSP high temperature for this date is 70 degrees F (plus or minus 10 degrees F standard deviation), while the average low is 49 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for May 17th:

MSP weather records for this date include: highest daily maximum temperature of 93 degrees F in 1987; lowest daily maximum temperature of 46 degrees F in 1890; lowest daily minimum temperature of 31 F in 1915; highest daily minimum temperature of 69 F in 1911; and record precipitation of 1.17 inches in 1938; No snow has been recorded on this date.

Average dew point for May 17th is 45 degrees F, with a maximum of 69 degrees F in 1996 and a minimum of 17 degrees F in 2009.

All-time state records for May 17th:

The state record high temperature for this date is 100 degrees F at New Ulm (Brown County) and Pipestone (Pipestone County) in 1934. The state record low temperature for this date is 14 degrees F at St Vincent (Kittson County) in 1888. State record precipitation for this date is 4.43 inches at Blue Earth (Faribault County) in 2000; and the state record snowfall for this date is 12.0 inches at St Cloud (Stearns County) in 1890.

Past Weather Features:

May 17, 1934 was the hottest in state history, with over 30 communities reporting daytime highs in the 90s F. The second half of May that year brought many readings of 100 degrees F to the state, along with severe drought and crop failures that required replanting.

Between 6:00 pm on May 17 and 1:30 am on May 18, 1937 a tornado outbreak brought five different storms to Minnesota. The first tornado occurred between North Mankato and St Peter, damaging a number of farm buildings in its path. This F-2 storm (winds 113-157 mph) was on the ground for 20 miles. The other tornadoes, all F-2 intensity, occurred after dark in western counties. They destroyed farms and farm buildings near Canby, Marshall, Tracy, Slayton, and Fulda. Fortunately there were no fatalities and only a few injuries.

May 14-17, 1890 brought four consecutive days with snow to the Duluth area, and 1 to 4 inches across northern Minnesota counties. Temperatures over those days averaged 20-30 degrees F colder than normal. Another episode of mid-May snow occurred on May 17, 1968 when 1 to 3 inches of snowfall occurred across northern Minnesota. It was followed by frost and a 3-day cold spell before temperatures recovered into the 60s and 70s F.

Perhaps one of the coldest third weeks of May occurred in 1983. Over the period from May 15-18, overnight lows dropped into the 20s F as far south as Preston and Zumbrota. Temperatures in the north dropped into the teens F, setting some record lows there. Fortunately crops had just been planted and were not susceptible to frost damage.

May 17-18, 2000 brought heavy thunderstorms to southern Minnesota communities with rainfall amounts ranging from 2 to 5 inches in many places. Lanesboro, Rochester, and Blue Earth reported over 5 inches of rainfall. Hail, strong winds, and flash flooding caused some widespread damages, including urban flooding and a mudslide in Winona County. Some crops were underway for a period to two days following the storm. For many areas the rain was needed following a prolonged dry spell.

Outlook:

A wet and stormy period is coming up, already indicated by reports on Friday morning (May 17) of thunderstorm rainfall amounts over 1 inch across southern counties. Sherburn reported a

record 1.51 inches on Friday. Thunderstorms and rain showers will dominate the Minnesota landscape this weekend and into Monday and Tuesday of next week. Temperatures will generally be a few degrees warmer than normal, but vary considerable depending on cloud cover. Cooler than normal temperatures by mid-week, then drier weather is expected by Thursday.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

<http://www.climate.umn.edu/weathertalk/>

For access to other information resources go to

<http://www.climate.umn.edu/Seeley/>

NOTE: News releases were current as of the date of issue. If you have a question on older releases, use the news release search (upper left-hand column of the [News main page](#)) or the main Extension search (upper right of this page) to locate more recent information.

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Minnesota WeatherTalk Newsletter for Friday, May 24, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, May 24, 2013

HEADLINES

- Wet week
- Wet month
- Wet spring
- Weekly Weather potpourri
- MPR listener questions
- Almanac for May 24th
- Past weather
- Outlook

Topic: Wet week

Many Minnesota observers, especially those in southern counties, have reported 6 to 7 consecutive days with rain over the past week. Over the period from May 17 to May 21 a number of observers reported new daily record rainfall amounts. Dozens of daily records were set, too many to list here. But some examples are:

May 17: 1.51" at Sherburn

May 18: 1.87" at Dodge Center, 1.78" at Spring Valley, 1.51" at Long Prairie, and 1.43" at Milaca

May 19: 1.46" at Jordan, 2.07" at Rochester, and 1.31" at Rothsay

May 20: 4.47" at Spring Valley, 4.01" at Thief River Falls, 2.75" at Grand Meadow, 2.21" at Grand Portage, and 2.01" at Roseau

May 21: 1.40" at Wadena and 1.15" at Walker

The wet week was dominated by high dewpoints. Just before 5:00 pm on Sunday, May 19th, the Twin Cities (MSP Airport) reported a dewpoint of 66 degrees F, tying the all-time highest value for the date set in 2004. Other observation sites reported dewpoints in the low to mid 60s F as well, very high values for this time of year.

Topic: Wet month

The month of May has brought measurable rainfall on many days. Of the first 24 days of the month many observers report rainfall on 15 or 16 days, a very high frequency. Accumulated rainfall for the month is already record-setting at many southern Minnesota locations, with a week to go in the month. Some of those already reporting record rainfall amounts for the month include:

12.13 inches at Grand Meadow, 9.16 inches at Spring Valley, 9.03 inches at Austin, and 8.63

inches at Rochester. The all-time maximum rainfall for the month of May in Minnesota is 15.79 inches at St Francis (Anoka County) in 2012. If Grand Meadow (Mower County) has a wet last week of May, they may threaten that state record this month.

For southeastern Minnesota counties May of 2013 already ranks as the 5th wettest May in history, averaging nearly 7 inches of rainfall. This number is likely to increase over the next week before the month concludes next Friday.

Topic: Wet spring

Since March 1st, the area of the Minnesota landscape designated to be in severe to extreme drought has shrunk from 70 percent to less than 7 percent. This is the result of abundant precipitation. The period since March 1st (meteorological spring) has been one of the wettest in history for many areas of the state. Across southern Minnesota many communities have reported over 12 inches of precipitation since March 1st. Some southeastern observers like Preston, Rochester, Winona, Spring Valley, and Lanesboro have reported over 15 inches, while Grand Meadow has reported nearly 22 inches of precipitation this spring. In fact southeastern Minnesota counties have already reported their wettest spring in history, with one week to go in May. Lakes, rivers, and streams have seen a great deal of recharge. In addition dry soils have been recharged and in some cases saturated so that tile lines have been running this month to discharge the surplus moisture.

The pattern of wetness for the year 2013 is expected to continue into the first week of June, with more frequent and sometimes heavy showers, especially in southern Minnesota.

Topic: Weekly Weather potpourri

In its 2013 Atlantic hurricane season outlook issued Thursday (May 23), NOAA's Climate Prediction Center forecasted an active or extremely active Atlantic hurricane season this year. For the six-month hurricane season, which begins June 1, NOAA's Atlantic Hurricane Season Outlook says there is a 70 percent likelihood of 13 to 20 named storms (winds of 39 mph or higher), of which 7 to 11 could become hurricanes (winds of 74 mph or higher), including 3 to 6 major hurricanes (Category 3, 4 or 5; winds of 111 mph or higher). These ranges are well above the seasonal average of 12 named storms, 6 hurricanes and 3 major hurricanes. You can read more about this outlook at....

<http://www.noaa.gov/>

The powerful tornado (EF-5) that hit Moore, OK (near Oklahoma City) was the 7th such storm since 1950 to hit that state. The only other state to report 7 EF-5 level tornadoes since 1950 is Alabama. Minnesota has reported just 2 EF-5 tornadoes over the same period (June 13, 1968 at Tracy, and June 16, 1992 at Chandler). Paul Huttner, MPR chief meteorologist posted a good deal of information about the Oklahoma tornado on his Updraft blog this week. You can read more at....

<http://minnesota.publicradio.org/collections/special/columns/updraft/>

The United Kingdom Meteorological Office reported this week that their country has experienced the coldest meteorological spring (March-May) since 1979, and the 6th coldest of all-time. Cold spells and widespread frosts were evident in many places. You can read more at...

<http://www.bbc.co.uk/weather/features/22631057>

For auto racing fans, the Indianapolis Office of the National Weather Service has posted on their web site the history of environmental conditions for the Indianapolis 500 event, scheduled this year for Sunday, May 26th. This year race day is expected to see temperatures in the 60s F with a chance for showers. The wettest race in history was in 2004 when nearly 4 inches of rain fell. You can read more about the past climate for the race at...

http://www.crh.noaa.gov/ind/print_localdata.php?loc=txtdat&data=Indy500.txt

MPR listener question: Has it ever snowed on Memorial Day in Minnesota?

Answer: Yes, our state climate database shows this has happened at least twice. Memorial Day prior to 1967 was always observed on May 30th, then it became the last Monday in the month of May. On May 30, 1897 it snowed at Bemidji (0.1 inches), and on May 25, 1992 it snowed in New Ulm (1.3 inches). It was also cold on Memorial Day in 1992 with many observers reporting morning lows in the 20s F.

MPR listener question: I farm in Redwood County (southwestern Minnesota) where soil moisture values were extremely depleted last fall (2012). How much have conditions improved lately relative to stored soil moisture?

Answer: Stored soil moisture values have improved significantly this month. The University of Minnesota Research and Outreach Center at Lamberton reported a stored soil moisture value of 5.33 inches in the top 5 feet of soil on May 15th. This is the highest measured stored soil moisture there since mid-June of last year. It is still below normal for this time of year, but showing improvement.

Twin Cities Almanac for May 24th:

The average MSP high temperature for this date is 71 degrees F (plus or minus 9 degrees F standard deviation), while the average low is 51 degrees F (plus or minus 7 degrees F standard deviation).

MSP Local Records for May 24th:

MSP weather records for this date include: highest daily maximum temperature of 95 degrees F in 2010; lowest daily maximum temperature of 49 degrees F in 1893; lowest daily minimum temperature of 32 F in 1925; highest daily minimum temperature of 72 F in 2010; and record precipitation of 1.27 inches in 1937; There was a trace of snow on this date in 1924.

Average dew point for May 24th is 48 degrees F, with a maximum of 71 degrees F in 1989 and a minimum of 20 degrees F in 1934.

All-time state records for May 24th:

The state record high temperature for this date is 98 degrees F at Beardsley (Big Stone County) in 1928. The state record low temperature for this date is 18 degrees F at Mora (Kanabec County) in 1988. State record precipitation for this date is 3.60 inches at Long Prairie (Todd County) in 1939; and the state record snowfall for this date is 1.0 inches at Pigeon River Bridge (Cook County) in 1930.

Past Weather Features:

Between 4:00 and 4:30 pm on May 24, 1908 F-2 (winds 113-157 mph) tornadoes touched down in Martin and Blue Earth Counties of southern Minnesota. The first tornado was east of Fairmont and on the ground for 3 miles, destroying a number of farm buildings and a farmhouse. Five people were injured and a horse was killed. The second tornado was on the ground for 20 miles and passed north of Mapleton and over Lake Ballentine, where it became a waterspout for a brief period. It destroyed one home and many farm buildings.

May 24, 1925 was probably the coldest in Minnesota history with over 30 communities reporting frost. It was unexpected as two days before temperatures had soared into the 90s F. On May 22, 1925 Fairmont reported an afternoon high of 100 degrees F, then 36 hours later on the morning of the 24th they reported 33 degrees F. There was frost as far south as Zumbrota (Goodhue County). In many areas morning temperatures fell into the 20s F. Corn fields showed signs of severe frost damage and many fields had to be replanted.

May 24, 1928 brought temperatures in the 90s F to a dozen Minnesota counties, setting daily record highs in many communities. The warm spell was short-lived as the last week of the month brought cooler than normal temperatures in the 50s and 60s F.

May 24-28, 1939 brought a very wet spell of weather to Minnesota. Many observers reported 2 to 5 inches of rainfall, during one of the wettest periods of the Dust Bowl Era.

Of the 113 tornado reports in Minnesota in 2010 (an all-time record number), two occurred on May 24th. A tornado touched down in Marshall County just before 3:00 pm and carved a 4-mile path through the rural countryside without inflicting any damage. Then just before 4:00 pm a second tornado touched down briefly near Halstad in Norman County, again not causing any serious damage. These were the first two tornadoes in the state during the one year that Minnesota reported the most tornadoes in the nation.

Outlook:

A mostly cloudy and unsettled Memorial Weekend with temperatures a bit cooler than normal and daily chances for showers and thunderstorms. Showery conditions will prevail well into next

week, adding to already high rainfall totals for the month. Temperatures will warm closer to normal by Wednesday and Thursday.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

<http://www.climate.umn.edu/weathertalk/>

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Minnesota WeatherTalk Newsletter for Friday, May 31, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, May 31, 2013

HEADLINES

- Some record-setting rains this week
- Preliminary climate summary for May 2013
- Weekly Weather potpourri
- MPR listener questions
- Almanac for May 31st
- Past weather
- Outlook

Topic: Some record-setting rains this week

Widespread rainfall was reported around the state this week, adding to an already wet month. Warm, moist air (dewpoints from 66 F to 70 F) produced strong thunderstorms which brought heavy rainfall to parts of northwestern and southeastern Minnesota overnight from May 29-30. In some cases new daily record amounts were set, including: 2.22 inches at Hokah, 2.59 inches at La Crescent, 2.32 inches at Spring Grove, 2.85 inches at Moorhead, 3.00 inches at Browns Valley, and 3.77 inches at Fargo, ND. As a result of these heavy rains the National Weather Service issued flash flood watches for some areas.

Topic: Preliminary climate summary for May 2013

For the 4th consecutive month Minnesota observers reported monthly mean temperatures that were cooler than normal. Most reports ranged from 1 to 3 degrees F cooler than normal for May. Combined with the temperature data for March and April, the overall spring temperatures (March-May) were the third coldest in state history, trailing only 1907, and 1950. Extremes for the month ranged from 103 degrees F at Sherburn (Martin County) and Winnebago (Faribault County) on the 14th to just 15 degrees F at Camp Norris (Lake of the Woods County) on the 12th.

Most observers reported above normal precipitation for the month of May, ranging from 4 to 6 inches. In many southern counties monthly precipitation was well above normal, and in some areas record-setting. Those reporting a new record wet May included: Austin (10.98"), Grand Meadow (14.64"), La Crescent (10.91"), Rochester (11.03"), Spring Valley (12.23"), Dodge Center (9.03"), Lanesboro (9.91"), and Theilman (10.58"). Fargo, ND reported its 2nd wettest May in history with 7.06 inches. In addition, many observers reported precipitation on over 22 days during the month.

Combined with the precipitation for March and April, the overall spring season (March-May) was the wettest in history for southeastern Minnesota, saturating soils, and putting streams and rivers near bank full. Statewide this spring is likely to end up among the top ten wettest in history.

The snow storm over the first few days of May established some records in southeastern Minnesota as well. Dodge Center reported a statewide daily record snowfall for May with 15.4 inches on the 2nd. Observer reports for snow totals ranged from 9 inches (Albert Lea) to 17.3 inches (Ellendale) across many areas of southern Minnesota in one of the snowiest Mays in state history.

Winds of 50-60 mph associated with strong thunderstorms over May 19-20 caused some damage in southern Minnesota to trees.

Topic: Weekly Weather potpourri:

From Omaha.com this week there was a statement from Iowa State Climatologist Harry Hillaker, "the average rainfall of 16.4 inches during the months of March, April, and May is the most (statewide) in 141 years of records." The previous statewide record value for the spring months was 15.5 inches in 1892, while normal is about 10 inches. Rains were pounding Iowa much of this week, preventing farmers from planting and bringing most rivers and streams to bank full, and some to moderate and major flood stage, including the Cedar and Iowa Rivers. Many Iowa observers report over a foot of rain this May.

USDA Meteorologist Brad Rippey's comments on drought this week:

-Overall U.S. drought coverage fell 1.73 percentage points to 44.34%, and has decreased during 27 of the last 35 weeks. Drought coverage is down 16.75 percentage points since the beginning of 2013 and down 21.11 points from the record high of 65.45% on September 25, 2012.

- The portion of the contiguous U.S. in the worst category – D4, or exceptional drought – decreased slightly (0.20%) to 4.74%. Compared to a week ago, there were slight increases in D4 coverage noted in Kansas (22%) and Oklahoma (11%). D4 coverage was unchanged or decreased slightly in New Mexico (45%), Texas (16%), Colorado (16%), and Nebraska (4%). More information can be found at.....

<http://www.usda.gov/oce/weather/Drought/AgInDrought.pdf>

News from overseas included a story about a tornado that struck near Milan, Italy this week causing some damages and surprising morning commuters. The same storm system produced some late season snows in the Alps. The United Kingdom Meteorological Office reported that country has recorded their coldest spring since 1962 and 5th coldest of all-time.

NOAA unveiled a new look to its "climate.gov" web site this week. It offers more features, a global climate dashboard to view data, and several additional links to other information. If you want to try it out go to....

<http://www.climate.gov/>

Environment Canada has reported two tornadoes in Ontario this May. The average annual number of tornadoes reported in Ontario is 12. Earlier this week they reported severe thunderstorms, but no tornadoes.

MPR listener question: What is the northern most weather reporting station in Minnesota and what is the southern most? How many miles apart are they?

Answer: At 49 degrees 32 minutes north latitude, Flag Island on the Northwest Angle in Lake of the Woods is the most northerly climate station in Minnesota. The most southerly stations are Harmony in Fillmore County and Spring Grove in Houston County. Both are located at 43 degrees and 34 minutes north latitude. The distance from Spring Grove to Flag Island is roughly 500 miles. Obviously, Flag Island is a much colder place on average than either Spring Grove or Harmony, with many more below 0 F readings in the winter.

Twin Cities Almanac for May 31st:

The average MSP high temperature for this date is 74 degrees F (plus or minus 9 degrees F standard deviation), while the average low is 54 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for May 31st:

MSP weather records for this date include: highest daily maximum temperature of 106 degrees F in 1934; lowest daily maximum temperature of 55 degrees F in 1962; lowest daily minimum temperature of 33 F in 1889; highest daily minimum temperature of 75 F in 1934; and record precipitation of 2.39 inches in 1965; No snow has been recorded on this date.

Average dew point for May 31st is 50 degrees F, with a maximum of 73 degrees F in 1961 and a minimum of 27 degrees F in 2009.

All-time state records for May 31st:

The state record high temperature for this date is 112 degrees F at Maple Plain (Hennepin County) in 1934. The state record low temperature for this date is 19 degrees F at Pokegama Dam (Itasca County) in 1889. State record precipitation for this date is 4.92 inches at Maple Plain (Hennepin County) in 1888; and the state record snowfall for this date is 4.6 inches at Virginia (St Louis County) in 1946.

Past Weather Features:

Widespread frost occurred around the state on May 31, 1889 causing some farmers to replant crops. Temperatures fell into the 20s and low 30s F in many northern and central counties.

Another damaging frost occurred on May 31, 1897 when temperatures fell into the upper 20s and low 30s F. Corn had to be replanted in many spots, though some was left to cut for silage.

Morning low temperatures fell to 28 degrees F as far south as Pleasant Mound and Grand Meadow.

May 31, 1934 brought the highest temperature ever recorded in May (112 degrees F at Maple Plain). Afternoon relative humidity that day was just 13 percent, and relative humidity of less than 20 percent was recorded on 15 days that month. Most places received less than an inch of rain during the (some less than 0.20"). Some of the worst dust storms ever recorded in the state occurred, depositing up to 6 inches of soil across many Minnesota roads. Western and northern areas were also plagued with brush, forest and peat fires.

May 31, 1946 brought snow to many communities in northeastern Minnesota, including Babbitt, Tower, Two Harbors, and Virginia. A trace of snow was reported as far south as Willmar. The snow was short-lived as temperatures climbed into the 50s F on June 1st.

May 31, 1959 brought thunderstorms to parts of Minnesota. These storms produced heavy rains and strong winds. Lakefield reported an unofficial rainfall of 5.60 inches, but many other areas received 2-3 inches of rainfall which caused some flash flooding. Winds of 50 mph and higher blew down some trees and electrical poles causing power outages in Blue Earth and Hennepin Counties. This storm brought an end to one of the wettest June's in state history, as many southern Minnesota observers reported over 9 inches for the month (10.41 inches at Fairmont)

At 3:30 pm on the afternoon of May 31, 1971 an F-2 tornado (winds 113-157 mph) passed 4 miles southwest of Lakefield, MN (Jackson County). It destroyed a barn and left several dead cattle before dissipating after being on the ground for 2 miles.

Outlook:

Cooler than normal temperatures under cloudy skies into the weekend with a chance for rain on Saturday. Mostly dry Sunday and Monday, then a chance for showers Tuesday and Wednesday next week. Warming temperatures towards the end of the week.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, June 7, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, June 7, 2013

HEADLINES

- Some record cold temperatures June 2-3
- Continued wet, wettest ever for some
- Weekly Weather potpourri
- MPR listener questions
- Almanac for June 7th
- Past weather
- Outlook

Topic: Some record cold temperatures

The first few days of June started out following the trend of the past four months.....cooler than normal. Many observers reported overnight lows in the 30s F over the first several days of the month. There were also a few new record daily low temperatures reported, including the following: on June 2nd 28 F at Crane Lake, 30 F at Orr and International Falls, and 31 F at Kabetogama; on June 3rd 28 F at Orr, 29 F at Kabetogama, and 31 degrees F at Grand Marais; and on June 7th 32 degrees F at Crane Lake and 33 degrees F at Babbitt (tied record low from 1934). Embarrass went down to 26 degrees F on June 3rd but it was not a record for them. Overall temperatures are averaging about 5 to 8 degrees F cooler than normal during the first week of the month.

Topic: Continued wet, wettest ever for some

Following a wet spring June has started out that way as well. Thunderstorms brought over an inch of rain to Garrison, Brainerd, and Little Falls on Tuesday this week. For some observers each day has brought a bit of rainfall and kept farmers from finishing their planting. High humidity values have not permitted much field drying. Late planting is especially problematic for alfalfa growers who had to replant many fields because of winter injury (drought, ice-sheeting and lethal soil temperatures). Later planted alfalfa fields may only yield one or two cuttings of hay this season. MPR reporter Elizabeth Baier did an excellent story this week about the alfalfa crop. You can read it and listen at...

<http://minnesota.publicradio.org/display/web/2013/06/05/news/alfalfa-drought-winterkill>

The National Weather Service also announced a record wet start to the year for Rochester, MN with 24.30 inches of precipitation since January 1, 2013. This is over 11 inches above normal. Other southeastern Minnesota observers reporting a record wet start to 2013 are: 25.29 inches at Minnesota City, 23.35 inches at Lanesboro, 23.82 inches at Preston, 24.90 inches at Spring Valley, 22.64 inches at Theilman, 22.10 inches at Austin, 27.46 inches at Grand Meadow, 22.41

inches at Harmony, and 24.12 inches at La Crescent. The precipitation at Grand Meadow (Mower County) so far in 2013 (27.46 inches) represents nearly 78 percent of the normal annual precipitation (35.42 inches) for that location, a remarkably high fraction for less than half a year.

Topic: Weekly Weather potpourri:

The National Weather Service announced this week that the observer at Osage officially set a new May snowfall record for Iowa back on May 2-3 with 13 inches reported there. This surpassed the previous record for May of 10 inches at Le Mars in 1947.

The first Tropical Storm (Andrea) of the 2013 North Atlantic Hurricane Season was being tracked by the NOAA Hurricane Center this week. Andrea brought strong winds and heavy rainfall to parts of Florida, then moved up through the Carolinas bringing additional rains of 3-6 inches.

The United Kingdom Meteorological Office announced the creation of the Climate Services UK branch this week, a new organized effort to provide broader and more comprehensive climate services to support "climate-smart decision" in energy, food, and water management. You can read more about this effort at...

<http://www.metoffice.gov.uk/climate-service-uk>

The USDA Drought Update this week offered the following highlights: Drought continued to shift west, as heavy rain in eastern portions of the primary drought area contrasted with increasingly hot, dry weather in the west. Overall U.S. drought coverage decreased slightly (-0.23%) to 44.11%, and has decreased during 28 of the last 36 weeks. Drought coverage is down nearly 17 percentage points since the beginning of 2013 and down 21.34 points from the record high of 65.45% on September 25, 2012. Exceptional drought remained firmly entrenched across the southern High Plains and central New Mexico. The sharp gradient between drought and non-drought areas has been verified by field reports as well as remote-sensing imagery. Further information can be found at...

<http://www.usda.gov/oce/weather/Drought/AgInDrought.pdf>

The first week of June brought heavy rains and flooding to parts of Austria, Hungary, Germany, and the Czech Republic this week. Some areas received 8-9 inches of rainfall which brought many major rivers to flood stage. Large numbers of people along flood plains had to be evacuated. Some areas were expected to get yet more rainfall this weekend.

A recent study of the historic Irish Annals (431-1649) was published in Environmental Research Letters this week. It shows a relationship between 38 volcanic eruptions and 37 extreme cold weather and climate events in Irish history. These events played out as unusual snowfalls, frosts, and ice cover on lakes. You can read more about this study at....

<http://www.sciencedaily.com/releases/2013/06/130605230801.htm>

MPR listener question: Our weather this month seems to be more like March or April than June. I wondered what has been the coldest month of June in Minnesota and what was it like?

Answer: On a statewide basis, the coldest June was in 1969, when the average temperature was less than 58 degrees F (the statewide average temperature for June is about 64 degrees F). In 1969, the month started off with snow up north and high temperatures just in the 40s F under mostly cloudy skies. Since June is a month of long days and high sun elevation, cool Junes are dominated by abundant and persistent cloud cover, which holds the daily maximum temperatures down. In 1969 overcast or partly cloudy skies dominated the weather, along with a higher than normal frequency of fog. Average percent possible sunshine was only 40 percent (compared to an average of 65 percent). June of 2013 has been dominated by cloud cover, rain, and fog so far causing temperatures to average 5 to 8 degrees F colder than normal, somewhat similar to the climate features of 1969. The first week of June has also seen the lowest amount of solar radiation ever measured for this time of year at the St Paul Campus Climate Observatory (records back to 1963).

Twin Cities Almanac for June 7th:

The average MSP high temperature for this date is 75 degrees F (plus or minus 9 degrees F standard deviation), while the average low is 55 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for June 7th:

MSP weather records for this date include: highest daily maximum temperature of 103 degrees F in 2011; lowest daily maximum temperature of 55 degrees F in 1901; lowest daily minimum temperature of 35 F in 1998; highest daily minimum temperature of 78 F in 2011; and record precipitation of 2.91 inches in 1984; No snow has been recorded on this date.

Average dew point for June 7th is 54 degrees F, with a maximum of 72 degrees F in 1914 and a minimum of 30 degrees F in 1938.

All-time state records for June 7th:

The state record high temperature for this date is 103 degrees F at MSP Airport in 2011. The state record low temperature for this date is 22 degrees F at Tower (St Louis County) in 1897. State record precipitation for this date is 4.33 inches at Springfield (Brown County) in 1962; and no snow has fallen on this date.

Past Weather Features:

Widespread frost damaged emerging crops on June 7, 1897. Many northern and western areas of the state reported overnight lows in the 20s F. As far south as Fairmont and Lake City the temperature dipped into the low 30s F causing some ground frost to be observed. Several corn fields had to be replanted due to frost damage.

June 5-7, 1941 brought consistent and substantial rainfall to many parts of the state, disrupting the first harvest of hay. In the Red River Valley rainfall exceeded 5 inches and flooded some farm fields.

Perhaps the wettest start to June occurred in 1968 when rainfall occurred on 8 consecutive days from June 4-11. Many observers reported 4-6 inches of rainfall over this period and there was virtually no opportunity for farmers to do any field work.

Between 1:00 pm and 2:30 pm on June 7, 2007 three tornadoes were spotted over western Minnesota, one in Wilkin County (near Foxhome), and two in Otter Tail County (near Elizabeth and Pelican Rapids). Fortunately these tornadoes were weak and did little damage. Associated thunderstorms brought 1-2 inches of rainfall and some hail to these areas.

A short 2-day Heat Wave prevailed across the state over June 6-7, 2011, bringing the hottest June 7th in state history. Over 90 communities reported temperatures into the 90s F, and several saw the thermometer reach or exceed 100 degrees F. Many observers also reported overnight lows that did not fall below 75 degrees F. Fortunately temperatures fell back into the 60s F by June 9th bringing some relief from the heat.

Outlook:

Some sunshine on Saturday, but increasing cloudiness later in the day with a chance for showers and thunderstorms. Continued cloudy with scattered showers and thunderstorms on Sunday, then drier Monday and Tuesday with warmer temperatures. Chance for showers again by Wednesday.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

<http://www.climate.umn.edu/weathertalk/>

For access to other information resources go to

<http://www.climate.umn.edu/Seeley/>

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Minnesota WeatherTalk Newsletter for Friday, June 14, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, June 14, 2013

HEADLINES

- High frequency of cloud cover and showers
- Weekly Weather potpourri
- MPR listener questions
- Almanac for June 14th
- Past weather
- Word of the Week
- Outlook

Topic: High frequency of cloud cover and showers

June has kept up the weather trend from May, producing day after day of cloud cover and periodic shower activity. A few sunny days have prevailed in the north, but much of the state has seen most days dominated by cloud cover, fog, mist, or showers. Some observers have already reported over 50 percent of normal rainfall for June, including 2.09 inches at Kabetogama, 2.17 inches at Dawson and Tracy, 2.41 inches at Milan, 2.37 inches at Montevideo, 3.13 inches at Jordan, 3.27 inches at Rice, 2.55 inches at Chanhassen, 2.06 inches at Milaca, 2.38 inches at Moose Lake, 2.58 inches at Luverne, 2.82 inches at Minneota, 2.52 inches at Pipestone, 2.45 inches at Caledonia, and 2.76 inches at Minnesota City.

Thunderstorms brought some near record or record-setting daily rainfalls to the central part of the state on Wednesday (June 12), including 2.28 inches at Green Isle, 3.30 inches at Arlington, 2.83 inches at Carver, 2.99 inches at Shakopee, 1.90 inches at Chanhassen, and 1.75 inches at Winthrop. The severe weather reports on Wednesday were more numerous in Iowa and the eastern Corn Belt with reports of strong winds, hail, and tornadoes (18 reports).

The rainfall and wet soils have resulted in prevented planting for some corn fields, where producers will be able to collect crop insurance payments if they don't plant corn. Others may opt to plant corn, but not for grain, just for silage to feed livestock. Some soybeans are still being planted late, along with some late planting of alfalfa fields which were so adversely affected by winter stress. Alfalfa hay cutting has progressed very slowly with little of the hay harvest completed.

Topic: Weekly Weather potpourri:

A Centennial Celebration is planned for next month at the Furnace Creek Visitor Center in Death Valley, CA. On July 10, 2013 there will be a celebration of the 100th birthday of the world-

record high temperature measurement that occurred at Greenland Ranch in Death Valley on the afternoon of July 10, 1913 when the thermometer registered 134 degrees F. The National Park Service at Furnace Creek, along with the National Weather Service at Las Vegas, NV are co-hosting this event. Attendees will learn why Death Valley is the hottest place on Earth and how to endure such conditions. Several prominent scientists will speak on the occasion. You can read more at...

<http://www.wrh.noaa.gov/vef/deathvalley/>

Environment Canada announced this week a new weather safety tool available on their web site. It is designed to show where lightning strikes are occurring and it is called the lightning danger map. It may be useful to Minnesota citizens as well because the mapped warnings overlap into Minnesota and the Great Lakes states. Their theme is "when thunder roars, go indoors." You can view the map at...

<http://weather.gc.ca/lightning/>

The Danube River in Germany, Austria, and Hungary began to slowly fall this week after reaching record flood crests in many places. Serbia will see the Danube crest there by the weekend. In Germany parts of the Danube had reached the highest flood levels since 1501. Some areas had received 7-9 inches of rainfall earlier this month, while parts of the Alps reported several feet of snow from an unusual June weather pattern. Estimated damages from these floods according to insurance estimates may run into several billions of dollars.

The Black Forest fire northeast of Colorado Springs, CO continued to burn this week provoking further evacuations. Colorado Governor John Hickenlooper signed Executive Orders to declare disaster emergencies associated with the Black Forest fire, the Royal Gorge fire, and the Klickus fire. All these fires were wind-driven and affected by widespread dry conditions. Afternoon relative humidity readings have ranged from just 2-3 percent in some of the fire areas, with wind gusts of 30 to 50 mph.

MPR listener question: What is the average duration of rainfall from a thunderstorm over any particular spot on the landscape? Only a few sunny days have prevailed up north this spring and much of our rain has come from heavy thunderstorms.

Answer: Good question. Studies from the Storm Prediction Center in Oklahoma suggest that the average duration of single cell thunderstorm rainfall ranges from 20-30 minutes. Mesoscale thunderstorm complexes and supercells can bring intense rainfalls that last on average from 1 to 3 hours. In extreme cases they may last for 5-6 hours. There is a latitude effect as well. Thunderstorms at lower latitudes, subtropical or tropical in origin tend to form into larger cells, both vertically and horizontally. Therefore they have greater longevity before they disperse. Thunderstorm cells at higher latitudes tend to be smaller in size and move faster across the landscape, so that they tend to run their course more rapidly.

Twin Cities Almanac for June 14th:

The average MSP high temperature for this date is 75 degrees F (plus or minus 9 degrees F standard deviation), while the average low is 59 degrees F (plus or minus 7 degrees F standard deviation).

MSP Local Records for June 14th:

MSP weather records for this date include: highest daily maximum temperature of 98 degrees F in 1987; lowest daily maximum temperature of 60 degrees F in 1917; lowest daily minimum temperature of 44 F in 1927; highest daily minimum temperature of 73 F in 1893; and record precipitation of 2.48 inches in 1924; No snow has been recorded on this date.

Average dew point for June 14th is 56 degrees F, with a maximum of 74 degrees F in 1981 and a minimum of 33 degrees F in 1961.

All-time state records for June 14th:

The state record high temperature for this date is 105 degrees F at Montevideo (Chippewa County) in 1979. The state record low temperature for this date is 27 degrees F at Albion (St Louis County) and Little Fork (Koochiching County) in 1927. State record precipitation for this date is 5.70 inches at Fosston (Polk County) in 1921; and no snow has fallen on this date.

Past Weather Features:

Perhaps the coldest June 14 occurred in 1927 when many northern and central Minnesota climate observers reported frost. Temperatures fell into the 30s F causing some crop damage, but most crops recovered, and the month finished with numerous days in the 80s and 90s F.

The hottest June 14 in state history occurred in 1979. During a 3-day Heat Wave from June 13-15 over 20 Minnesota communities reported daytime high temperatures of 100 degrees F or higher, mostly in central and western parts of the state. Thankfully a cold front brought thunderstorms later in the day on the 15th and temperatures cooled down into the 70s and 80s F for the next several days.

Between 3:00 pm and 4:00 pm on June 14, 1981 an F-3 tornado (winds 158-206 mph) crossed the Twin Cities area from Edina to Lake Owasso, a 16 mile track. It caused the most damage to Roseville, especially near the Har-Mar Mall where the storm took the roof off the State Farm Insurance building. More than 80 people were injured by the storm which caused over \$47 million in damages.

One of the wettest June periods in state history occurred over June 10-16, 2001. Large thunderstorms brought strong winds, tornadoes, hail, and flooding rains to many parts of the state over that period. At least 36 tornado reports were filed over that period, the worst ones causing injuries to several people and homes near Benson, MN on the 11th. Hail and high wind reports were widespread, with winds up to 70 mph near Fergus Falls. Rains of 3 to 4 inches were common, and a few places reported 5-6 inches of rainfall with associated street flooding, especially near Wells which received 6.18 inches.

June 14-15, 2012 brought strong thunderstorms to Dakota and Goodhue Counties in southeastern Minnesota. Rainfall of 6-8 inches brought a record flood crest to the Cannon River, closing roads and causing a great deal of erosion. Cannon Falls reported a record 8.83 inches, Northfield 7.13 inches, and Red Wing 6.37 inches.

Word of the Week: Gandiegow

I was reminded of this Scottish term for a heavy shower when an observer from Shakopee called to report a heavy thunderstorm on Wednesday this week (June 12) and used this term to describe it. BBC meteorologists in the United Kingdom still sometimes use this word to describe heavy showers.

Outlook:

Cloudy with showers on Saturday, perhaps a few heavy thunderstorms. Warmer on Sunday with a chance for scattered showers by evening. Continued chances for showers on Monday, then drier on Tuesday and Wednesday of next week. Temperatures will warm to near seasonal averages.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, June 21, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, June 21, 2013

HEADLINES

- Severe weather episode June 20-21
- New Seasonal Climate Outlook
- 90s F Return
- June 21st Summer Solstice Frost of 1992
- Weekly Weather potpourri
- MPR listener questions
- Almanac for June 21st
- Past weather
- Outlook

Topic: Severe weather episode June 20-21

A Mesoscale Convection System (MCS) brought severe weather to the state overnight during Thursday and Friday this week (June 20-21). This complex of thunderstorms produced some hail that ranged from 1 inch to one and three-quarter inch diameter, along with some wind gusts from 60-85 mph, especially in western and central parts of the state where many trees were damaged. There were numerous power outages reported, along with some very heavy rainfalls that caused flash flooding in several Minnesota counties. Many roads were closed for a time. Some of the rainfall amounts reported included:

- 3.56" at Hawley
- 3.41 inches at Sandstone
- 3.73 inches at Little Falls
- 2.63 inches at Brainerd
- 2.57 inches at Cloquet
- 2.25 inches at Staples

Yet more rain with warm air and high dewpoints is forecasted for the upcoming weekend across Minnesota.

Topic: New Seasonal Climate Outlook

The NOAA Climate Prediction Center released a new seasonal climate outlook on Thursday this week, covering the period from July through September. The western USA is expected to be warmer than normal while much of the rest of the country, including Minnesota sees equal chances of being warmer or cooler than normal during the ENSO neutral period. The southeastern USA is expected to be wetter than normal over this period, while the northwest and

parts of west Texas and Oklahoma are expected to be dry. For much of the country, including Minnesota, the outlook shows equal chances for wetter or drier than normal. Certainly our recent summer climate trends suggest we'll see both wetter and drier than normal conditions prevail, but in different parts of the state.

Topic: 90s F Return

Thursday, June 20 brought plenty of heat and moisture to the state as dewpoints rose into the low to mid 60s F and late afternoon temperatures reached 90 degrees F at many locations including Red Wing, Luverne, Marshall, Worthington, Mankato, Olivia, and Jackson. The Twin Cities, along with St James and Willmar reported a high temperature of 91 degrees F. This was the second episode of 90s F in 2013 for many southern Minnesota observers, and the warmest day since the record-setting high temperatures of May 14 last month. The high dewpoints provided fuel for thunderstorm development and some of the state was under a flash flood watch going into Friday, June 21st. Some of these Minnesota cities under a flash flood watch were Duluth, Cloquet, and Two Harbors, all of which suffered from the devastating floods of almost exactly one year ago.

Topic: June 21st Summer Solstice Frost of 1992

This date is a memorable one in Minnesota history as the only summer solstice that brought damage frost to the state's corn and soybean crops. The Mt Pinatubo eruption in the Philippines during 1991 was later attributed to be one of the causes of this event which turned out to a singularity in Minnesota's climate history. Temperatures as cold as 25 degrees F (Brimson) were reported in the north, but even as far south as Preston, Theilman and Zumbrota reported 33 degrees F with frost in low spots. Some corn fields were severely damaged and later only harvested for silage. Soybeans leaves mostly burned by the frost recovered and produced even pods and beans for harvest, but the yields were not very good.

Topic: Weekly Weather potpourri:

Tropical Storm Barry was producing heavy rainfall amounts over parts of central Mexico this week. Some areas had received 3 to 5 inches of rainfall in a short period of time. But Barry was slowly dissipating by Friday of this week.

Tropical Storm Bebinca was tracking toward Vietnam this week packing 50-60 mph winds and producing sea wave heights of 15 to 20 feet. It was expected to bring heavy rains to Hanoi over the weekend as it dissipates over land.

Calgary, Canada was hit with a major flooding this week of nearby rivers and streams as a large scale storm system brought six or more inches of rainfall to some areas. It was some of the worst flooding there in a decade and caused the evacuation of up to 75,000 citizens due to the threat of high water.

MPR listener question: Since this week was the one-year anniversary of the devastating flash floods in Duluth, Two Harbors, and Moose Lake I wondered how the maximum rainfall intensity

of that storm compared to the famous Twin Cities flash flood of July 23, 1987 (10 inches in 6 hours)?

Answer: The USGS has just finished a thorough report of the flash flood in northeastern Minnesota over June 19-20, 2012. It is available online at

<http://pubs.usgs.gov/sir/2012/5283/>

Comparing maximum rainfall rates of the two storms is approximate, not precise. But the data suggest that the maximum intensity during the Twin Cities flash flood of July 23, 1987 ranged from 2.5 to 3.0 inches per hour. Analysis of the overnight rainfall rates from the June 19-20, 2012 flash flood in the Duluth area last year suggest that maximum rainfall rates ranged from 2 to 4 inches. These are remarkable intensities, perhaps on the order of once in 100 or 200 year rainfall rates, and certainly analogous to those measured during powerful tropical storms.

Twin Cities Almanac for June 21st:

The average MSP high temperature for this date is 79 degrees F (plus or minus 8 degrees F standard deviation), while the average low is 60 degrees F (plus or minus 7 degrees F standard deviation).

MSP Local Records for June 21st:

MSP weather records for this date include: highest daily maximum temperature of 95 degrees F in 1910; lowest daily maximum temperature of 59 degrees F in 1906; lowest daily minimum temperature of 39 F in 1992; highest daily minimum temperature of 74 F in 1943; and record precipitation of 2.95 inches in 2002; No snow has been recorded on this date.

Average dew point for June 21st is 56 degrees F, with a maximum of 75 degrees F in 1986 and a minimum of 26 degrees F in 1992.

All-time state records for June 21st:

The state record high temperature for this date is 107 degrees F at Browns Valley (Traverse County) in 1988. The state record low temperature for this date is 25 degrees F at Sawbill Camp (Cook County) in 1936 and at Brimson (St Louis County) in 1992. State record precipitation for this date is 6.25 inches at West Union (Todd County) in 1941; and no snow has fallen on this date.

Past Weather Features:

June 21, 1988 was the hottest in Minnesota history bringing temperatures of 90 degrees F or greater to over 100 cities in the state. Many observers reported record-setting high temperatures of 100 degrees F or greater, including nearly all the climate observers in southwestern counties. June of 1988 proved to be the 2nd warmest in state history, with numerous days over 90 degrees F.

June 21, 2009 brought three tornadoes to Faribault County and one to Freeborn County. These tornadoes occurred between 7:00 pm and 8:30 pm and all were on the ground for less than 2 miles. Little damage was reported. These four were among only 24 tornadoes reported that year in Minnesota.

Outlook:

Warmer than normal temperatures with high dewpoints over the weekend along with chances for showers and thunderstorms, some of which could be heavy. Continued warm and humid into early next week with chances for thunderstorms.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, June 28, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, June 28, 2013

HEADLINES

- Preliminary June Climate Summary
- July 4th climatology
- Weekly Weather potpourri
- MPR listener questions
- Almanac for June 28th
- Past weather
- Outlook

Topic: Preliminary June Climate Summary

Most observers reported a near normal June mean temperature this year, with a few northern locations reporting slightly cooler than normal values. The highest temperature for the month occurred on the 20th with 91 degrees F at MSP, Amboy, and Madison. The lowest temperature for the month was 26 degrees F at Embarrass on the 3rd.

Like previous months this year, June turned out to be wetter than normal for most Minnesota observers. Exceptions were some areas of northern Minnesota which received less than normal rainfall for June. For some Minnesota communities it was a very wet month indeed. Among those reporting over 9 inches for the month were Morris, Albert Lea, Wells, Caledonia, Preston, and Spring Grove. The June rainfall of 12.13 inches at Spring Grove is a new record total for the month surpassing 11.70 inches in 2000, while the 12.58 inches reported from Wells, MN is also a new June record for them.

As a precursor to the abundant rainfall this month, the first week of June was the cloudiest in over 50 years with very little sunshine. Heavy rains, high winds and hail occurred in southern Minnesota on June 12th, with baseball size hail reported near Wells. Similar weather occurred across east-central Minnesota over Father's Day weekend (June 15-16), and again over southwestern Minnesota on June 18th. Heavy rains with high winds swept across central portions of the state over June 20-22, causing street flooding, tree damage, and widespread power outages, especially around the Twin Cities Metro Area. Lastly, over June 25-26 heavy thunderstorms over northern Wilkin County and southern Clay County brought 6-8 inches of rainfall and sent a flood crest down the Red River. You can read about this storm at

http://www.crh.noaa.gov/news/display_cmsstory.php?wfo=mpx&storyid=95623&source=0

Topic: July 4th climatology

For the Twin Cities area rain has occurred on this holiday 49 times since 1891, the highest frequency of precipitation for all major holidays of the year. The longest streak of rainy Independence Days was six consecutive years from 1900 to 1905, with July 4th, 1900 being the wettest ever as 2.27 inches of rain fell from a thunderstorm. The holiday was rain-free for six consecutive years from 1939 to 1944 and again from 1952 to 1957.

In terms of temperature, the average high temperature for the date is 82 F and the average low 62 F. The average dew point is 59 F, but has been as high as 79 F (1999). The Heat Index (derived from temperature and humidity or dew point) has been uncomfortably high on the 4th of July a number of times. HI values above 90 F have occurred on 22 occasions since 1891. There have been eight July 4th holidays when the HI value exceeded 100 F, most recently 2012 when it hit 108 degrees F (with a record high temperature of 101 degrees F). The worst case was a Heat Index of 112 F in 1949. This was the cause of 12 heat related fatalities that year in the Twin Cities. The coldest daytime temperature on July 4th was just 58 degrees F in 1967. Early indications are we might be cooler than normal for this coming July 4th.

Topic: Weekly Weather potpourri:

The NOAA National Weather Service Forecast Office in Las Vegas, NV is putting out an interesting forecast for that area of the country this weekend. Here are the weekend forecasted highs:

Las Vegas, NV 113 degrees F

Kingman, AZ 110 degrees F

Death Valley, CA (Furnace Creek) 129 degrees F

Needles, CA 125 degrees F

Bullhead, AZ 124 degrees F

These are near record values for this time of year.

Earlier this week NOAA released estimates of the economic impact of weather and climate events during 2012. Super Storm Sandy inflicted damage costs estimated at \$65 billion, while yearlong drought conditions resulted in approximately \$30 billion. The total bill for 2012 was estimated to be \$110 billion, the 2nd costliest year in terms of weather and climate related disasters since such record keeping started in 1980. You can read more at...

<http://www.ncdc.noaa.gov/news/ncdc-releases-2012-billion-dollar-weather-and-climate-disasters-information>

Earlier this week President Obama presented a plan for dealing with climate change, most of which does not require the approval of Congress. He ask for actions to curb emissions and to find ways to adapt to climate change. He also said he has no patience for those who deny it is happening. You can read the full text of his speech at the White House web site....

<http://www.whitehouse.gov/the-press-office/2013/06/25/remarks-president-climate-change>

MPR listener question: Did we see the highest dewpoints of the year so far this week? It was very hot and sticky on Wednesday as I drank over a gallon of water while pouring a new concrete sidewalk in Wayzata.

Answer: Yes indeed. Dewpoints ranged between 70 and 76 degrees F on Wednesday (June 26) this week, making the outside air feel like the mid to upper 90s F. In fact the Twin Cities reported four consecutive days this week, June 23-26, when the dewpoint hit 70 degrees F or higher, topping out at 74 degrees F on Wednesday. Though not quite record daily values, these are still very high for this time of year in Minnesota.

Twin Cities Almanac for June 28th:

The average MSP high temperature for this date is 81 degrees F (plus or minus 8 degrees F standard deviation), while the average low is 61 degrees F (plus or minus 7 degrees F standard deviation).

MSP Local Records for June 28th:

MSP weather records for this date include: highest daily maximum temperature of 102 degrees F in 1931; lowest daily maximum temperature of 64 degrees F in 1923; lowest daily minimum temperature of 47 F in 1924; highest daily minimum temperature of 82 F in 1931; and record precipitation of 3.60 inches at Moorhead (Clay County) in 1897; No snow has been recorded on this date.

Average dew point for June 28th is 59 degrees F, with a maximum of 77 degrees F in 1996 and a minimum of 33 degrees F in 1925.

All-time state records for June 28th:

The state record high temperature for this date is 108 degrees F at Canby (Yellow Medicine) in 1931. The state record low temperature for this date is 24 degrees F at Sawbill Camp (Cook County) in 1936. State record precipitation for this date is 5.70 inches at Fosston (Polk County) in 1921; and no snow has fallen on this date.

Past Weather Features:

A Heat Wave prevailed over the state during June 26-30, 1931. The hottest June 28th in state history brought high temperatures of 100 degrees F or greater to over 24 Minnesota communities, topped by 108 degrees F at Canby. In fact Canby, Montevideo, Willmar, Tracy, and Winona all reported 5 consecutive days with afternoon highs of 100 degrees F or greater. Thankfully a cold front swept in over July 1-2 and dropped temperatures by 25 to 35 degrees F.

Heavy rains rescued Minnesota crops from drought over June 25-28, 1959. Rainfall amounts from 2 to 5 inches fell that week just as crops were withering from drought conditions. Some observers reported record-setting amounts of rain on the 28th, including Winnebago with 3.51 inches (still a record today).

June 28, 1983 brought record cold to northeastern Minnesota counties where a number of observers reported overnight lows of 27 to 31 degrees. There were many frosted gardens.

Outlook:

Cooler over the weekend with a chance for widely scattered showers on Saturday. Mostly dry Sunday and Monday, then another chance for showers by Wednesday and Thursday next week. Temperatures will be near normal on most days.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, July 5, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, July 5, 2013

HEADLINES

- Best days of the summer this week
- New ice-in data set
- Global upper air stations
- Weekly Weather potpourri
- MPR listener questions
- Almanac for July 5th
- Past weather
- Outlook

Topic: Best days of the summer this week

Weatherwise, we are experiencing perhaps one of the best starts to July in recent years. Low temperatures have been in the 50s and 60s F with daytime highs in the upper 70s to low 80s F and plenty of sunshine. Little rainfall so far this month following a generally wet June and wet spring. Thankfully dewpoints have remained in the comfortable 50s F providing near perfect weather for outdoor activities. Even at Embarrass, MN overnight lows have not dropped below 41 degrees F, while daytime highs have risen to 82 degrees F.

The July 4th weekend will bring some warmer than normal temperatures that will linger through Monday. On July 4th MSP, Wheaton, Fergus Falls, Browns Valley, Montevideo, Milan, Wheaton, Moorhead, and Ortonville all reached 90 degrees F. This marked the 22nd time the Twin Cities has recorded at least 90 degrees F on Independence Day since 1871.

Topic: New ice-in data set for Minnesota lakes

The DNR-State Climatology Office has developed a web-based climatology for ice-in dates on Minnesota lakes to match the popular and widely utilized ice-out data set that has been in play for years. The period of record varies by lake but users can look at average dates in the fall when lakes freeze up, as well as what the historical extreme dates (early and late) have been. For access and further information you can go to the web site at...

http://www.dnr.state.mn.us/ice_in/index.html?year=median

Topic: Global Upper Air Stations

Under the jurisdiction of the World Meteorological Organization (WMO) and the Global Observing Systems Information Center (GCOS) a worldwide network of upper air observations provides government weather services and the atmospheric and climate science research

communities with profile measurements (temp, dewpoint, pressure, wind speed and direction) of the Earth's atmosphere. Many of these measurements are done on a 12 hourly basis to initialize numerical forecast models. The instrumented balloons, called radiosondes, are launched from a variety of land-based and ship-based stations. The Twin Cities radiosonde data are depicted graphically at the following web site.....

http://www.ametsoc.org/amsedu/dstreme/images/stuv_MPX.gif

The WMO has a list of over 1700 such stations worldwide, with most of them located in the countries of the northern hemisphere. There is great disparity in data coverage, with North America and Europe having a relatively large number of radiosondes launched each day, and Africa having very few. There is a good article on the NOAA web site this week highlighting the value of these measurement systems, both in weather forecasting and in atmospheric research. You can find it at...

<http://www.ncdc.noaa.gov/news/picture-climate-balloons-aren%E2%80%99t-just-birthdays>

Topic: Weekly Weather potpourri:

Weatherwise magazine features an article by Sean Potter about July, 1776 in Philadelphia, PA where Thomas Jefferson was taking part in deliberations that eventually produced the Declaration of Independence. During that month he kept daily weather records and observers. It was somewhat hot and humid outside and even more stifling in the chamber where the 2nd Continental Congress was meeting. You can read more about this article at....

<http://www.weatherwise.org/Archives/Back%20Issues/2011/July-August%202011/retrospect-full.html>

Hurricane Dalila was churning in the Eastern Pacific Ocean southwest of Puerto Valarta, Mexico this week. It was expected to slowly dissipate out to sea and not be a threat to Mexico. Maximum winds were ranging from 85 to 95 mph producing sea wave heights of 30-35 feet. Tropical Storm Erick was spinning off the west coast of Mexico further south. It was expected to strengthen over the weekend.

For southeastern Minnesota crop producers many acres remain unplanted due to the wet spring conditions. Weeds are prolific and large in these fields and pose a long term concern due to the amount of their seed production. According to Dr. Jeff Gunsolus, weed specialist with Extension control of these weeds by mowing or tillage would be a good strategy to deploy at this time. You can read more on this topic in the Crop Newsletter at...

<http://blog.lib.umn.edu/efans/cropnews/2013/07/weed-management-in-prevented-p.html>

Well-known Japanese water scientist Masaru Emoto will be in the Twin Cities to give two programs this month on the unique properties of water relative to wave and sound. You can read more about him and these events at the following web sites:

<http://www.masaru-emoto.net/english/index.html>
<http://www.theconnectingspirit.com/CSC/Events.html>

MPR listener question: Having started July so sunny and dry here in the Twin Cities we were wondering what the monthly rainfall extremes are for the month? Also what is the historical range in the number of rainy days during the month?

Answer: For the Twin Cities climate record, 1871-2012, the driest July was in 1894 when only 0.20 inches of rain fell. The wettest was in 1987 when 17.90 inches fell (10 inches fell on July 23rd in six hours that year). The fewest days with rain occurred in 1895 with just 3 days, while the most rainy days were recorded in 1972 and 1987 with 16 days.

Twin Cities Almanac for July 5th:

The average MSP high temperature for this date is 83 degrees F (plus or minus 7 degrees F standard deviation), while the average low is 62 degrees F (plus or minus 6 degrees F standard deviation).

MSP Local Records for July 5th:

MSP weather records for this date include: highest daily maximum temperature of 100 degrees F in 1982; lowest daily maximum temperature of 66 degrees F in 1905; lowest daily minimum temperature of 45 F in 1967 and 1972; highest daily minimum temperature of 78 F in 1982; and record precipitation of 1.62 inches in 1994; No snow has been recorded on this date.

Average dew point for July 5th is 59 degrees F, with a maximum of 77 degrees F in 1949 and a minimum of 40 degrees F in 1972.

All-time state records for July 5th:

The state record high temperature for this date is 108 degrees F at Pipestone (Pipestone County) in 1936. The state record low temperature for this date is 27 degrees F at Tower and Embarrass (St Louis County) in 2001. State record precipitation for this date is 6.25 inches at Albert Lea (Freeborn County) in 1943; and no snow has fallen on this date.

Past Weather Features:

Baseball size hailstones fell overnight on July 5, 1966 at Detroit Lakes (Becker), MN. These were some of the largest hailstones every observed in the area, one was nearly a foot in circumference. Strong winds up to 48 mph damaged some buildings in the area and thunderstorms brought nearly 2 inches of rain.

July 5-6, 1978 brought heavy thunderstorms to southeast Minnesota from Dodge to Winona Counties. The heaviest band of 6-7" occurred just south and east of the Rochester area. The Zumbro River and it's tributaries (Bear Creek, Silver Creek, Cascade Creek) went into flood through Rochester causing extensive damage. The July 6 crest at the Rochester river gage

established an all-time record of 23.36 ft and 30,500 cfs. This flood and yet another in September prompted the construction of a major flood control project by the U.S. Army Corps of Engineers and the Natural Resources Conservation Service in and around Rochester. The project was completed in 1995, at a cost amounting to \$92 million and protects the city against a 200-year recurrence interval flood event.

July 5, 1988 was arguably the warmest in state history with nearly every observer in the state reporting a daytime high in the 90s F. Even International Falls reached a high of 96 degrees that day. Over 20 communities reported afternoon temperatures of 100 degrees F or higher.

July 4-5, 1999 brought a destructive "derecho" to northern counties, especially across the BWCA where millions of trees were blown down by 70-90 mph straight-line winds. Heavy thunderstorms brought 4 to 8 inches of rainfall to parts of St Louis, Lake, and Cook Counties. Some roads were closed for a time due to flooding and washouts. The Hibbing Airport reported 7.81 inches of rainfall, a record amount there.

July 5, 2001 brought a rare July frost to northern Minnesota communities. Hibbing, Embarrass, Tower, Brimson, and Kelliher, reported morning low temperatures that ranged from 27 to 32 degrees F. After starting the day at 28 degrees F Kelliher warmed all the way up to 73 degrees F by mid-afternoon.

Outlook:

Partly cloudy over the weekend with warmer than normal daily temperatures. Dewpoints will slowly creep into the 70s F in some southern counties making for some uncomfortable days. Chance for scattered showers and thunderstorms each day through Wednesday, then drier and cooler towards the end of the week.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

<http://www.climate.umn.edu/weathertalk/>

For access to other information resources go to

<http://www.climate.umn.edu/Seeley/>

NOTE: News releases were current as of the date of issue. If you have a question on older releases, use the news release search (upper left-hand column of the [News main page](#)) or the main Extension search (upper right of this page) to locate more recent information.

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Minnesota WeatherTalk Newsletter for Friday, July 12, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, July 12, 2013

HEADLINES

- First significant rainfall of the month
- Comparing Twin Cities Heat Waves of 1936 and 1995
- Weekly Weather potpourri
- MPR listener questions
- Almanac for July 12th
- Past weather
- mPING
- Outlook

Topic: First significant rain of the month

July 9th (Tuesday) brought thunderstorms to Minnesota and the first significant rainfall of the month for many. Several observers in northern, east-central, and southeastern Minnesota reported amounts ranging from 0.50 inches to over 1 inch. Some of the larger amounts included 1.11 inches at Hallock, 1.72 inches at Waskish, 1.25 inches at Montevideo, 1.07 inches at Gaylord, and 1.00 inches at Vesta. Yet more rainfall is expected over the weekend and into next week, coming at a key time for the state's rapidly growing corn and soybean crops, and newly seeded alfalfa fields.

Topic: Comparing the Twin Cities Heat Waves of 1936 and 1995

The two hottest July 12th dates in Minnesota state history occurred in 1936 and 1995. They were both associated with multi-day Heat Waves, but there was a distinctive difference in their character. In 1936, a serious drought had a grip on the state too, as the month of July brought only 0.11 inches of rainfall following a dry spring. The core period for the Heat Wave was 13 days long, from the 6th to the 19th. Daytime highs were 95 degrees F or greater each day, peaking at 108 degrees F on the 14th. On 7 consecutive nights (the 7th to the 13th) the overnight lows never dropped below 80 degrees, peaking with a low of 86 degrees F on the 13th. Without air conditioning many Twin Cities residents slept on screen porches, in city parks, or along lake shorelines. Dewpoints ranged from the upper 50s to mid 60s F, not high enough to inflate the Heat Index (combination of temperature and humidity). Nevertheless the persistent heat caused approximately 180 deaths in the Twin Cities (estimated by the coroners of Hennepin and Ramsey Counties), with the peak loss of life on July 13 and 14. Statewide, officials estimated 759 lives lost due to the Heat Wave, the most in Minnesota history. By the end of the month wildfires plagued the northern counties and navigation was suspended on the Mississippi River due to very

low flow volume. More modest heat prevailed the rest of the month, resulting in the hottest month of July in Minnesota's history.

The Heat Wave in 1995 lasted from July 11 to 14 and was primarily the result of unusually high dewpoints (some observers reported 80 degrees F DP values) which inflated the Heat Index. Heat Index values over the four days ranged from 97 degrees F to 115 degrees F, while the daytime maximum temperatures ranged from 90 degrees F to 101 degrees F. The overnight low on the 12th never dropped below 80 degrees F. This Heat Wave did not produce high mortality in the Twin Cities, but did contribute to nearly 500 deaths in Chicago, IL. The Minnesota Heat Wave did produce high turkey loss in central Minnesota as hundreds of thousands of birds died, and some pregnant dairy cows aborted as a result of the heat stress. Thankfully after the 15th of the month air temperatures moderated in the 80s F during the day and 60s F at night for most of the balance of the month.

Topic: Weekly Weather potpourri:

Last month (June, 2013) the International Journal of Climatology published an excellent and comprehensive review article title "Land cover changes and biogeophysical effects on climate." This was written by several well know climate scientists and presents a great deal of evidence for the size and magnitude of climate change brought on by land cover changes. It is a good read in helping us understand how climate change is proceeding at a different pace in different places. You can read the paper online at...

<http://onlinelibrary.wiley.com/doi/10.1002/joc.3736/abstract>

The Minnesota State Climatology Office has done a mid-season compilation of 2013 severe weather. So far only 5 tornadoes have been confirmed in the state, but we have seen plenty of heavy rains, high winds and hail associated with thunderstorms. A synopsis of the season can be found at the web site.....

<http://www.climate.umn.edu/doc/journal/Tornado2013.htm>

Monday afternoon and evening (July 8th) brought heavy thunderstorms to parts of Ontario, Canada. Toronto saw record-setting rainfall amounts exceeding 4 inches in 4 hours in some areas . This caused flash flooding closing down bus and train commuter services and overflowing the capacity of the city storm sewer system. There were also several power outages in the area. Media reported many road closures and reports of basements flooding. More information was available at...

<http://www.ctvnews.ca/canada/dramatic-photos-show-parts-of-toronto-underwater-1.1358806>

Powerful Typhoon Soulik in the Western Pacific Ocean was heading for the island nation of Taiwan as the weekend approached. Typhoon Soulik packed winds from 110-130 mph, producing wave heights of over 40 feet. It was expected to weaken and dissipate over the weekend as it made landfall in China, bringing heavy rains to coastal areas.

On Wednesday this week (July 10th) the National Park Service and the NOAA National Weather Service hosted a 100th Anniversary celebration at the Furnace Creek Visitor's Center in Death Valley, CA in honor of the planet Earth's warmest temperature ever measured, 134 degrees F on July 10, 1913. The celebration took place during the day with temperatures ranging from 112 degrees F to 117 degrees F after an overnight low of 94 degrees F. I did not hear an estimate of attendance there. More at...

<http://www.usatoday.com/story/weather/2013/07/10/death-valley-temperature-record-anniversary-134-degrees/2505333/>

MPR listener question: I riding the MS TRAM from International Falls, MN to Duluth, MN next week (July 15-19). What kind of weather do you think we'll encounter?

Answer: I see this year's TRAM has stops in Orr, Chisholm, Biwabik, and Two Harbors before arriving in Duluth on Friday, July 19th. It appears the weather each day will bring near normal temperatures (upper 70s to low 80s F during the day and upper 50s to low 60s F at night), but each day will have a chance for showers and thunderstorms. So I would recommend taking some rain gear just in case.

Twin Cities Almanac for July 12th:

The average MSP high temperature for this date is 84 degrees F (plus or minus 7 degrees F standard deviation), while the average low is 64 degrees F (plus or minus 7 degrees F standard deviation).

MSP Local Records for July 12th:

MSP weather records for this date include: highest daily maximum temperature of 106 degrees F in 1936; lowest daily maximum temperature of 67 degrees F in 1926; lowest daily minimum temperature of 48 F in 1941; highest daily minimum temperature of 83 F in 1936; and record precipitation of 2.93 inches in 1912; No snow has been recorded on this date.

Average dew point for July 12th is 61 degrees F, with a maximum of 80 degrees F in 1995 and a minimum of 39 degrees F in 1926.

All-time state records for July 12th:

The state record high temperature for this date is 111 degrees F at Canby (Yellow Medicine County) in 1936. The state record low temperature for this date is 27 degrees F at Tower (St Louis County) in 1975. State record precipitation for this date is 5.45 inches at Buffalo (Wright County) in 1961; and no snow has fallen on this date.

Past Weather Features:

Mid-July frosts though rare in Minnesota have occurred even in the vicinity of the Twin Cities. On the mornings of July 11-14, 1863 many residents in and around the Twin Cities reported

damaging frost as temperatures dropped into the 30s F. Corn, potatoes, pumpkins, cucumbers, and tomatoes were all reported to be "seriously damaged" by the frosts. Later in the month wildfires caused the air to be smoke filled on many days as well. So all in all it was a rather disagreeable month.

Thunderstorms brought heavy rain, hail, and strong winds to parts of west central and south central Minnesota over July 11-12, 1972. Wind gusts were reported to range from 55 mph to 80 mph, damaging farm buildings and knocking down trees. Heaviest rainfall amounts ranged from 4 to 7 inches over an area from Fergus Falls southeast to Melrose. Many roads and ditches flooded. Farmers reported moderate crop damage from hail, and some cattle were killed by lightning strikes in Redwood County.

July 12, 1975 was one of the coldest in state history, with some ground frost reported in northeastern Minnesota where morning minimum temperatures ranged from the upper 20s to mid 30s F. A dry, cool Canadian air mass descended on the state and even kept daytime highs in the 60s F (20-25 degrees F cooler than average). The high at Babbitt was only 66 degrees F, Grand Marais was 63 degrees F, and both Tower and Two Harbors topped out at just 62 degrees F as Mother Nature's air conditioning system brought a respite from the normal July heat. Tower was back in the 90s F by the 16th.

Topic: mPING

This acronym stands for Meteorological Phenomena Identification Near the Ground, a mobile app and computer data base the is a combined effort of the NOAA-National Severe Storms Lab, University of Oklahoma, and Cooperative Institute for Mesoscale Meteorological Studies. The mPING app provides a mechanism for filing a report on severe or unusual weather that automatically enters the database with notation about place and time. Both past and real-time reports across the nation can be viewed using the web site....

<http://www.nssl.noaa.gov/projects/ping/display/>

This system is used to verify severe or hazardous weather reports and radar interpretations of weather. The App can be found at Itunes or Google Play. You can read about it at...

<http://www.nssl.noaa.gov/projects/ping/>

Outlook:

Warmer than normal temperatures across southern Minnesota into the weekend with a chance for widely scattered showers and thunderstorms. Near normal temperatures in northern areas with a better chance for showers and thunderstorms. Warm temperatures will prevail in central and southern counties well into next week with higher dewpoints producing some Heat Index values near 100 degrees F. There will be continued chances for showers and thunderstorms much of next week as well.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

<http://www.climate.umn.edu/weathertalk/>

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Minnesota WeatherTalk Newsletter for Friday, July 19, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, July 19, 2013

HEADLINES

- Record rainfall on July 13
- Record rainfall in NE on July 18-19
- July Heat
- Weekly Weather potpourri
- MPR listener questions
- Almanac for July 19th
- Past weather
- Outlook

Topic: Record Rainfall on July 13

For some Minnesota citizens the early morning hours (4 am to 8 am) on Saturday, July 13th were quite noisy, with thunder, high winds, and very heavy rainfall. The rainfall amounts ranged from 1 to 3 inches across many east-central counties, and were even higher in parts of Scott, Rice, Steele, and Waseca Counties. Some National Weather Service observers reported new daily record amounts for July 13th, including 3.80 inches at Wells, 3.02 inches at Chanhassen, 2.79 inches at MSP Airport, 2.75 inches at Rosemount, 2.44 inches at Brainerd, 2.30 inches at Faribault, 2.23 inches at Rockford, and 1.82 inches at Owatonna.

These rains caused the National Weather Service to issue a number of flood warnings for areas along the Vermillion, Straight, and Cannon Rivers, and flash flood warnings for many communities, including Wells, Faribault, Northfield, New Market, Dundas, and Shakopee. You can read more about this storm at...

http://www.climate.umn.edu/doc/journal/flash_floods/ff130713.htm

Further, the Midwest Climate Center informs us that the first six months of 2013 (January-June) has been the wettest in history for Michigan (20.80" statewide average), Iowa (24.93" statewide average), Wisconsin (21.85" statewide average), and Illinois (29.11" statewide average). In Minnesota it has been the 3rd wettest first six months of the year averaging 16.93 inches statewide (this trails only 17.31 inches in 1908 and 17.83 inches in 1896). Harmony, MN (Fillmore County) has reported nearly 35 inches of precipitation so far this year and their annual normal is 34.63 inches!

Topic: Record rainfall in NE MN on July 18-19

Late in the day on Thursday, July 18th and overnight into Friday, July 19th strong thunderstorms trained over far northeastern Minnesota bringing damaging winds, hail, and intense rainfall. Flood warnings had to be issued by the National Weather Service for a number of rivers, as well as for the city of Grand Marais. Among the observers reporting record amounts of rainfall were International Falls with 2.15 inches, Kabetogama with 1.63 inches, Gunflint Lake with 3.23 inches, and Grand Marais with 3.53 inches. The amount of rainfall at Grand Marais was the 5th highest 24-hour total ever measured there.

Topic: July Heat

Tuesday, July 16 through Thursday, July 18 brought numerous 90 degrees F readings to southern Minnesota counties, and widespread Heat Advisories issued by the National Weather Service. Dewpoints were very high as well touching 70 degrees F or higher on 5 consecutive days and helping to push the Heat Index values near 100 F or higher. On Tuesday, July 16 at least 20 cooperative observers reported highs in the 90s F, Wednesday (July 17) that number jumped to 56 observers, and Thursday (July 18) at least 65 cooperative observers reported high temperatures of 90 degrees F or greater. Fortunately a cold front brought relief from the heat on Friday, and further relief was expected into the weekend.

Topic: Weekly Weather potpourri:

A recent paper in the International Journal of Climatology documents how tropical storms can intensify even after they make landfall when the surrounding soil is wet enough to provide evaporative fuel (latent heat) for the storm. Under such conditions "the land essentially mimics the moisture-rich environment of the ocean, where the storm originated," says Theresa Andersen from the University of Georgia, one of the paper's co-authors. You can read more about this study of tropical storms at...

<http://www.sciencedaily.com/releases/2013/07/130716173807.htm>

This week NASA's Earth Observatory is showing images of the melt season on the Greenland ice sheet as the ponds forming across the ice have accelerated in recent days. The melt season did not start as early as it did in 2012, nor is it expected to be as intense, but it is still on a faster pace than average for the period from 1981-2010. You can see more and read more about this at...

<http://earthobservatory.nasa.gov/IOTD/view.php?id=81569>

MPR listener question: As a life long resident of the Twin Cities I wondered if there is a day of the year that has seen significantly less frequency of precipitation than any other day of the year. If so, what day is it?

Answer: That is an interesting question I had never considered. Our State Climatology Office examined the Twin Cities climate record back to 1871 (142 years) and found that February 8th has brought precipitation the fewest number of times (17 percent) just 24 days, while November 6 is a close second with (18 percent) just 26 days. The day of the year which has recorded the highest precipitation frequency is June 14 with 48 percent, or 68 days.

As a sidebar to this answer the State Climatologist in California informs me that June 21st has never brought a rain to Fresno (133 years of record), and that July 7th has never brought a rain to San Francisco (164 years).

Twin Cities Almanac for July 19th:

The average MSP high temperature for this date is 84 degrees F (plus or minus 8 degrees F standard deviation), while the average low is 64 degrees F (plus or minus 6 degrees F standard deviation).

MSP Local Records for July 19th:

MSP weather records for this date include: highest daily maximum temperature of 100 degrees F in 1940 and 1977; lowest daily maximum temperature of 63 degrees F in 1877 and 1902; lowest daily minimum temperature of 46 F in 1873; highest daily minimum temperature of 79 F in 1977; and record precipitation of 1.75 inches in 1957; No snow has been recorded on this date.

Average dew point for July 19th is 61 degrees F, with a maximum of 82 degrees F in 2011 and a minimum of 41 degrees F in 1958.

All-time state records for July 19th:

The state record high temperature for this date is 108 degrees F at Canby (Yellow Medicine County) in 1932 and at Redwood Falls (Redwood County) in 1934. The state record low temperature for this date is 29 degrees F at Tower (St Louis County) in 2000. State record precipitation for this date is 8.97 inches at Fosston (Polk County) in 1909; and no snow has fallen on this date.

Past Weather Features:

Strong thunderstorms in northern Minnesota brought flash flooding to some areas over July 19-20, 1909. Bagley and Beaulieu reported over 10 inches of rain, while Fosston reported 9 inches and Walker 6 inches. In some areas the small grain harvest was delayed because of wet ground.

On July 19, 1912 ground frost was reported at a number of northern Minnesota locations, including Bagley, Roseau, Pokegama Dam, Cloquet, Virginia, and Littlefork. Overnight lows were in the low to mid 30s F, while daytime highs were in the 60s and 70s F during the week.

July 19th brought high temperatures of 100 degrees F or greater to parts of Minnesota in 1926, 1932, and 1934. In 1926 a 7-day Heat Wave prevailed in southern MN bringing 90 plus F temperatures each day over July 15-21. In 1932 an 11-day Heat Wave prevailed over July 12-22. In 1934 a Heat Wave began on July 19th and lasted until the 27th, bringing consecutive days with 100 degrees F or greater to many western and southern Minnesota communities.

July 17-21, 1999 was extremely wet in southern Minnesota counties with daily thunderstorms and large rainfalls. Austin, Preston, Spring Grove, Hokah, Winnebago, Wells, Harmony, and

Albert Lea all reported 5 to 6 inches of rainfall. Grand Meadow reported nearly 8 inches. July of 1999 was the wettest in history for southeastern counties with total monthly rainfall averaging nearly 9 inches among all observers.

Some of the highest Heat Index values ever measured in our region occurred on July 19, 2011. Temperatures were primarily in the 90s F with dewpoints in the 80s F. Some of the more remarkable Heat Index readings that day included: 107 F at Montevideo, 110 F at Morris, 111 F at Fergus Falls, 112 F at Olivia and Appleton, 113 F at Redwood Falls, 114 F at New Ulm, 115 F at Marshall and Ortonville, 116 F at Fargo, ND, 117 F at Willmar, St Cloud, and Benson, 119 F at MSP, and 130 F at Moorhead. These were the warmest spots in North America that day.

Outlook:

Cooler and less humid over the weekend, with daytime temperatures falling back into the 70s and 80s F. Chance of widely scattered showers late in the day on Saturday and Sunday. Warmer by the middle of next week.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

<http://www.climate.umn.edu/weathertalk/>

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Minnesota WeatherTalk Newsletter for Friday, July 26, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, July 26, 2013

HEADLINES

- Roller coaster temperatures
- Unusual tornado on July 22nd
- Thunderstorms on July 25th
- Preliminary July climate summary
- Weekly Weather potpourri
- MPR listener questions
- Almanac for July 26th
- Past weather
- Outlook

Topic: Roller coaster temperatures July 18-21

Thursday, July 18th brought very warm temperatures, oppressive dewpoints and high Heat Index Values (ranging from 98 F to 107 F) across southern Minnesota counties. Record tying and record setting warm overnight low temperatures were also noted by some observers including MSP Airport with 80 degrees F (tied 2011), and Thielman, Melrose, and Isle with 73 degrees F (new record warm lows). If you want to read more about some of the history of warm nights in the Twin Cities when the temperature does not fall below 80 degrees F the Minnesota State Climatology Office has posted a narrative on their web site.....

http://www.climate.umn.edu/doc/journal/min_above_80.htm

Just 3-days after July 18th, on Sunday (July 21st), a cool, dry Canadian air mass brought some near-record setting low temperatures to northern Minnesota observers, with many readings in the low to mid 40s F. International Falls tied a record low on Sunday with 41 degrees F (matching 1947), while Crane Lake reported a new record low of 39 degrees F. Such remarkable swings in temperature values are more common in late summer than mid-summer in Minnesota.

Topic: Unusual tornado on July 22nd

The NOAA-National Weather Service Grand Forks Office reported on an unusual tornado earlier this week that struck between Mahnomen and Zerkel (Mahnomen County). This storm was unusual in several aspects: firstly it struck between 1:50 AM and 2:30 AM on July 22nd (Monday), a very rare time of day for tornadoes in our region (less than 2 percent of all tornadoes occur at that time of day); second, wind speeds were estimated to range from 110-120 mph (EF-2 strength), unusually strong for an overnight storm; thirdly, the storm path was nearly

18 miles in length (though intermittently on the ground), a relatively long storm path for an overnight storm. Thankfully this tornado did not cause any deaths or injuries, but it did damage a home, a number of farm structures, along with some farm equipment. It also caused a good deal of tree damage, especially around Roy Lake. This was the 6th confirmed tornado of the year so far in Minnesota. You can read more about the 2013 tornado season in Minnesota at the MN State Climatology Office web site.....

<http://www.climate.umn.edu/doc/journal/Tornado2013.htm>

Topic: Thunderstorms on July 25th

Strong thunderstorms visited parts of the state on Thursday, July 25th and overnight into Friday. There were numerous reports of damaging winds, hail (0.25 to 1.50 inches in diameter), and heavy rainfalls in some northern and southeastern counties. Some observers reported near record or record-setting rainfall amounts for July 25th including 2.47 inches at Spring Valley, 2.23 inches at International Falls (a record amount), 2.11 inches at Lanesboro (a record amount), 1.94 inches at Flag Island, 1.87 inches at Babbitt (a record amount), 1.62 inches at Long Prairie, and 1.55 inches at Grand Meadow. Some farmers were disappointed to see the rain fall on fresh cut hay fields, and a few in Fillmore County reported hail damage to crops.

Topic: Preliminary July climate summary

July's mean temperature for most observers in Minnesota was near normal or warmer than normal. The middle part of the month was very warm with many observers reporting daytime temperatures in the 90s F. Extremes for the month ranged from 96 degrees F at Little Falls, Gaylord, and Forest Lake on the 18th to just 38 degrees F at Brimson (St Louis County) on July 2nd. Even low temperatures in the mid to high 30s F may occur this Saturday morning (July 27) in northeastern counties. Several observers reported dewpoints in the 70s F which pushed the daytime Heat Index Values from 95 F to 105 F on some days. The warm temperatures produced higher than normal Growing Degree Days which boosted crop development, allowing late planted fields to catch up in their growth, and most corn fields went through the silking and pollen shed phase of development during the 3rd and 4th week of the month.

Precipitation for July was high variable around the state. Many observers in southwestern Minnesota counties reported less than normal precipitation. But for many locations intense thunderstorms brought heavy rainfall and these places finished the month with above normal precipitation totals. In the north International Falls and Gunflint Lake reported nearly 7 inches, Grand Marais over 7 inches, and Tofte nearly 5 inches. In central counties a number of observers reported over 5 inches, while in the south Wells and Dundas reported over 6 inches. Soil moisture reserves were adequate to surplus in most places as the month wraps up.

Topic: Weekly Weather potpourri:

Colleagues at the Midwest Regional Climate Center have collaborated to produce a nice feature on their web site, called "Weather on the Day You Were Born." You can find out what the

weather was like on your birth date and print out a certificate verifying it. Of course this can likely be verified by your parents as well! If you are interested in this feature go to.....

<http://mrcc.isws.illinois.edu/MACS/birthday/newbirthday2.jsp>

Tropical Storm Flossie in the Eastern Pacific Ocean is headed towards Hawaii. By early next week it is expected to bring some heavy rain, 45-55 mph winds, and 15-20 foot seas to the islands. Flossie is the 6th named storm of the Eastern Pacific Tropical Storm season. In the Atlantic Ocean the National Hurricane Center was also tracking Tropical Storm Dorian, not expected to approach the Bahamas until the middle of next week.

Drought has taken a strong grip on southwest China this month, drying up lakes and reservoirs and causing some water rationing in other others. The rice crop has been negatively affected and some farmers have had difficulty keeping livestock fed and watered. The Chinese Meteorological Service says that some areas of seen their driest month of July since 1961. You can read more at...

<http://english.cntv.cn/program/newshour/20130725/103410.shtml>

A recent paper by scientists from Oregon State University published in the journal Nature explains the dynamical mixing of ocean waters in the central Pacific Ocean and how the sea surface temperature fluctuations influence large scale atmospheric patterns. You can read more about their work at...

<http://www.sciencedaily.com/releases/2013/07/130725125420.htm>

MPR listener question: With the cool temperatures expected for Saturday morning and some daytime highs forecasted to only reach the 60s F I was wondering what the coolest July daytime high has been for the Twin Cities area, and also on a statewide basis?

Answer: The coolest daytime high for July in the Twin Cities climate record (1872-2012) is 58 degrees F on July 4, 1967. It was completely cloudy that day, all day, and with a low cloud ceiling. Winds were from the north and it was definitely jacket weather. On a statewide basis the north shore along Lake Superior usually records the coldest temperatures in July. On July 2, 1950 Grand Marais reported a morning low of 36 degrees F and an afternoon high of 49 degrees F, more November-like temperatures, but occurring in July. That day was dominated by wind off the lake, low overcast and light rainfall, again a definite jacket day.

Twin Cities Almanac for July 26th:

The average MSP high temperature for this date is 84 degrees F (plus or minus 7 degrees F standard deviation), while the average low is 64 degrees F (plus or minus 6 degrees F standard deviation).

MSP Local Records for July 26th:

MSP weather records for this date include: highest daily maximum temperature of 100 degrees F in 1894 and 1955; lowest daily maximum temperature of 68 degrees F in 1903 and 1972; lowest daily minimum temperature is 45 degrees F in 1962; highest daily minimum temperature of 76 F in 1931; and record precipitation of 2.44 inches in 1990; No snow has been recorded on this date.

Average dew point for July 26th is 60 degrees F, with a maximum of 77 degrees F in 2003 and a minimum of 37 degrees F in 1974.

All-time state records for July 26th:

The state record high temperature for this date is 107 degrees F at Maple Plain (Hennepin County), Wheaton (Traverse County), and Beardsley (Big Stone County) in 1931. The state record low temperature for this date is 27 degrees F at Tower (St Louis County) in 1980 and at Kelliher (Beltrami County) in 2001. State record precipitation for this date is 5.24 inches at Rochester (Olmsted County) in 1949; and no snow has fallen on this date.

Past Weather Features:

July 26, 1931 was the hottest in history as 30 Minnesota cities reported daytime highs of 100 degrees F or greater. The Heat Wave lasted from the 24th to the 28th and caused crops to wilt and die in many fields, especially in western parts of the state. Overnight temperatures finally fell back into the 50s and 60s F on July 29th.

July 24-28, 1949 brought a very wet period, flooding many farmer's fields. Many areas of the state received several inches of rainfall, while Chaska and Rochester received over 5 inches. On a statewide basis it was the 3rd wettest July in history with most observers reporting over 6 inches of rainfall, and some reporting over 10 inches. In the wet fields some corn crops suffered from lodging, blown over by strong winds.

July 26, 1980 was one of the coldest in history up north with many observers reporting morning low temperatures in the 30s F and three communities reporting temperatures in the upper 20s F.

On July 26, 2000 the residents of Granite Falls, MN were cleaning up from an F-4 tornado (winds from 207-260 mph) the previous afternoon. The storm killed one person, injured 15, and caused nearly \$20 million in damages, the worst such storm in the history of the city.

Outlook:

Below normal temperatures over the weekend and early next week with a chance for widely scattered shower activity. Some overnight temperatures over the weekend may approach record lows. A warming trend will start during the middle of next week and bring temperatures back closer to normal. Chance for showers Tuesday and Wednesday.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

<http://www.climate.umn.edu/weathertalk/>

For access to other information resources go to

<http://www.climate.umn.edu/Seeley/>

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Minnesota WeatherTalk Newsletter for Friday, August 9th, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, August 9th, 2013

HEADLINES

- Significant rains
- Cooler weather pattern
- Meet us at the State Fair
- Weekly Weather potpourri
- MPR listener questions
- Almanac for August 9th
- Past weather
- Outlook

Topic: Significant rains

August 5-6 brought wind, hail, and heavy rains to some parts of the state, for many the first significant rainfall of the month. At least 20 counties reported large hail (nickel size to tennis ball size) for brief periods of time, while another four counties reported strong winds which damaged trees. Fast moving thunderstorms brought record setting rainfall amounts in some places. Among those setting new daily rainfall records were: Wells (1.95"), Winnebago (1.62"), Milan (1.42"), Vesta (1.34"), Montevideo (1.15"), and Litchfield (1.02"). Many other observers reported from 1 to 2 inches of rainfall, but did not set daily records. Albert Lea, Blue Earth, and Hutchinson observers reported over 2 inches. You can read a brief report on these storms at the State Climatology Office web site:

http://www.climate.umn.edu/doc/journal/08062013_storm.htm

Topic: Cooler than normal temperature pattern

The cooler than normal temperature pattern from the last week of July has carried over into the first 9 days of August. Some observers have reported near record cold daytime highs in the 60s F. Overnight lows on August 4-5 in northern Minnesota dropped to the mid to upper 30s F, near record low values. International Falls tied the record coldest minimum temperature on Wednesday, August 7th with a reading of 40 degrees F (tied 1926), then on the morning of Thursday, August 8th several new record low temperature readings were set, including 37 degrees F at International Falls, 34 degrees F at Silver Bay and Wadena, and 39 degrees F at Crane Lake. In some southern Minnesota communities it is the coolest start to August since 2004. According to NOAA's Climate Prediction Center the cooler than normal temperature trend across the Great Lakes Region is expected to dominate through the first three weeks of August, then warmer than normal temperatures may dominate the rest of the month.

Topic: Meet us at the State Fair

MPR presents will be hosting a weather show on August 27th at noon, from the 2013 Minnesota State Fair Public Radio Booth at the corner of Judson and Nelson on the State Fairgrounds. Cathy Wurzer will serve as host with Paul Huttner and I in the booth to answer weather questions and put the past year's weather in perspective. Please consider this an invitation to drop by if you are at the Fair. Otherwise the hour-long broadcast will be carried by Minnesota Public Radio News and Information stations.

Topic: Weekly Weather potpourri:

NOAA announced this week their 23rd Annual State of the Climate Report (for 2012), based on measurements, monitoring, and analysis of global scale climate data sets (not model projections). It includes a summary of temperature and precipitation trends and patterns, as well as descriptions of notable climate events. You can read a brief synopsis or the full report online at....

<http://www.ncdc.noaa.gov/bams-state-of-the-climate/2012.php>

The NOAA National Hurricane Center was monitoring Hurricane Henriette in the Eastern Pacific Ocean. It was spinning over a thousand miles east of Pearl Harbor, Hawaii with winds up to 110 mph. The track of Hurricane Henriette is expected to be well south of the Hawaiian Islands and it is expected to weaken considerably over the weekend. It was producing sea wave heights over 30 feet and expected to perhaps bring some rainfall to the islands.

The United Kingdom Meteorological Office launched a new web site this month called "My Climate & Me." It enables British citizens to put questions about weather and climate to leading experts using an online video magazine and roving reporter. The Met Office hopes that it will serve to educate citizens about climate and its effects on our quality of life and allow for better understanding of climate change and its implications. You can view the web site at...

<http://www.myclimateandme.com/>

NASA's Visisble Earth provides a visualization of the planet "breathing" through seasonal animations of ice/snow cover, as well as vegetative greenness. It makes for an interesting view. You can see it at the following web site....

<http://uxblog.idvsolutions.com/2013/07/a-breathing-earth.html>

Brad Rippey, USDA meteorologist assigned to the World Agricultural Outlook Board provided the following highlights in the drought briefing this week:

- Recent heavy rain has taken a bite out of exceptional drought (D4) across the central Plains and the Southwest, reducing the nation's D4 coverage to 2.77%. That is down nearly one-half percentage point (0.40%) from a week ago, and represents the nation's smallest D4 area since April 23. In the last week, D4 coverage fell from 25 to 21% in New Mexico; from 15 to 8% in

Colorado; and from 4 to 1% in Nebraska.

- Overall U.S. drought coverage decreased slightly in the last week. Drought coverage is nearly twenty percentage points (19.96 points) below the peak coverage of 65.45% in late-September 2012.

- Drought returned to western Iowa, with 16.51% of the state covered by moderate drought (D1) on August 6. Similarly, D1 has recently returned to northern Missouri, with drought currently covering 15.42% of the state.

- The portion of the U.S. corn production area in drought has been edging upward in recent weeks, from 17 to 22% between July 9 and August 6. The increase has been largely due to resurgent drought in the western Corn Belt, including northern Missouri, eastern Nebraska, and western Iowa. Soybeans in drought have also increased in the last four weeks, from 8 to 14%.

Some parts of MO, AR, and TN received 6-8 inches of rainfall over Wednesday and Thursday this week, creating some flash flooding and washed out farm fields in some areas. The National Weather Service in Nashville, TN posted a summary of the rainfall, along with some photos of the flash flooding there. You can find those at...

<http://www.srh.noaa.gov/bna/>

The American Geophysical Union published a revised Statement on Climate Change recently and posted it on their web site. It is based on a synthesis of research and data analysis from recent years and clearly advocates for a set of policy priorities that include both climate adaptation and mitigation planning and activity. You can read it at....

http://www.agu.org/sci_pol/pdf/position_statements/AGU_Climate_Statement_new.pdf

MPR listener question: From a farmer attending FarmFest in Morgan, MN this week...."I have some corn fields that are just tasseling now. Do you think the temperatures will warm enough so that my crop matures before the first autumn frost?"

Answer: Yes, beginning towards the end of this month temperatures are expected to warm and remain above normal as we enter the month of September. This will help to boost crop maturation. I think there is a good chance that most of the state's corn crop will reach maturation (black layer) before the first widespread frost.

Twin Cities Almanac for August 9th:

The average MSP high temperature for this date is 81 degrees F (plus or minus 7 degrees F standard deviation), while the average low is 62 degrees F (plus or minus 6 degrees F standard deviation).

MSP Local Records for August 9th:

MSP weather records for this date include: highest daily maximum temperature of 95 degrees F in 1947 and 2010; lowest daily maximum temperature of 60 degrees F in 1994; lowest daily minimum temperature is 46 degrees F in 1888 and 1972; highest daily minimum temperature of

76 F in 2010; and record precipitation of 3.34 inches in 1914; No snow has been recorded on this date.

Average dew point for August 9th is 59 degrees F, with a maximum of 79 degrees F in 1992 and a minimum of 37 degrees F in 1927.

All-time state records for August 9th:

The state record high temperature for this date is 104 degrees F at Canby (Yellow Medicine County) in 1947. The state record low temperature for this date is 28 degrees F at Tower (St Louis County) in 1994. State record precipitation for this date is 5.25 inches at Two Harbors (Lake County) in 1939; and no snow has fallen on this date.

Past Weather Features:

Persistent rains and occasional thunderstorms brought some flooding to many northern Minnesota communities over August 7-9, 1939. Many areas received over 3 inches of rainfall, while Virginia received over 4 inches and Two Harbors reported nearly 5 inches. In fact August of 1939 was the wettest in history for Two Harbors, totaling 10.86 inches for the month.

1947 brought the hottest August 9th in state history with over 40 communities reporting daytime highs in the 90s F. Seven western Minnesota cities hit 100 degrees F or higher. The cool spot that day was Grand Marais which reported a high of only 61 degrees F. For western counties the August Heat Wave of 1947 was one of the longest in history, lasting from the 1st to the 13th of the month.

Perhaps the coldest August 9th occurred in 1972. A cool Canadian high pressure system brought overnight lows in the 30s F to over 20 Minnesota communities. It was just 39 degrees F as far south as Pipestone and Zumbrota. In the north observers at Bigfork, Karlstad, Wannaska, Tower, and Thorhult reported frost. Temperatures warmed into the 80s F two days later.

An F-0 tornado (winds 40-72 mph) touched down at 1:35 am on August 9, 1993 in Littlefork, MN. It was only a brief touchdown (about 1 mile in length) but it turned over a mobile home, killing both people inside. Earlier that evening another tornado had touched down near Roseau, MN damaging a warehouse there.

Outlook:

Mixed weather over the weekend with cooler than normal temperatures. Generally sunny and pleasant on Saturday, then increasing clouds with chances for showers overnight and into Sunday. Dry on Monday and Tuesday with near normal temperatures and another chance for showers by Thursday of next week in southern counties.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, August 16th, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, August 16th, 2013

HEADLINES

- Cooler than normal temperature pattern continues
- New seasonal climate outlook
- Climate Change Adaptation Conference planned
- Remembering Bill Larson
- Meet us at the State Fair
- Weekly Weather potpourri
- MPR listener questions
- Almanac for August 16th
- Past weather
- Outlook

Topic: Cooler than normal temperature pattern continues

Over the past three weeks cooler than normal temperatures have dominated our region quite consistently. In fact International Falls, MN has reported 28 consecutive days with cooler than normal temperature readings. Some overnight lows have dipped to record setting values. On August 10th International Falls tied their record low of 38 degrees F. Then on Wednesday, August 14th several northern Minnesota communities reported record low values, including Ely (36 F), Orr (35 F), Crane Lake (34 F) Kabetogama (37 F), Grand Marais (32 F), Silver Bay (32 F) Brimson (30 F tied 2004), and International Falls again (35 F tied 1997). On Thursday (August 15) some additional low temperature records were set at Embarrass (32 F), Kabetogama (38 F), and Orr (35 F). Further, on Friday morning there were a few more reports of lows in the 30s F including Crane Lake and Orr (39 F) and Embarrass (36 F).

The cooler than normal temperature pattern will come to an end this weekend as a broad area of above normal temperatures settles over the Western Great Lakes region. It appears that the above normal temperature pattern may prevail for the rest of the month of August as well.

Topic: New Seasonal Climate Outlook

The NOAA-Climate Prediction Center released a new seasonal climate outlook on Thursday of this week. The outlook for September through November suggests a higher probability of warmer than normal temperatures for the Great Lakes Region, including eastern portions of Minnesota. The outlook also favors above normal precipitation for the Great Lakes area, including southern Minnesota. Further the CPC sees no development of an El Nino episode in the equatorial Pacific Ocean during the coming fall and winter season.

Topic: Climate Change Adaptation Conference at the Science Museum on November 7, 2013

Several organizations are partnering to host the first statewide conference on Climate Change Adaptation, Planning and Practice. It will take place at the Science Museum of Minnesota in downtown St Paul on November 7, 2013. Registration for the all day program is only \$50. Sessions will be devoted to city planning, agriculture, transportation, natural resources (including watershed management), and public health. You can read more about the conference and register at.....

<http://wrc.umn.edu/news/index.htm>

Topic: Remembering Bill Larson

Bill Larson passed away last month, just a few weeks shy of his 92nd birthday. He was my boss from 1982 to 1989 when he served as Head of the Department of Soil, Water, and Climate at the University of Minnesota. I remember him as both an outstanding soil scientist and university administrator. Early in his career he was a promoter of soil conservation and evaluating soil health. His scientific achievements were widely recognized, as he won the Siehl Prize for Agricultural Research, was awarded an honorary doctorate by the University of Nebraska, and he was inducted into the USDA-ARS Science Hall of Fame. Bill advised many outstanding graduate students and expanded the department's expertise into the areas of water and climate with new faculty hires. I think he was one of the most respected scientists I have known, as well as an effective administrator. I consider myself lucky to have known him.

Topic: Meet us at the State Fair

MPR presents will be hosting a weather show on August 27th at noon, from the 2013 Minnesota State Fair Public Radio Booth at the corner of Judson and Nelson on the State Fairgrounds. Cathy Wurzer will serve as host with Paul Huttner and I in the booth to answer weather questions and put the past year's weather in perspective. Please consider this an invitation to drop by if you are at the Fair. Otherwise the hour-long broadcast will be carried by Minnesota Public Radio News and Information stations.

Topic: Weekly Weather potpourri:

Earlier this month four former EPA Heads under Republican administrations voiced their concern for doing something about climate change in a New York Times opinion piece. It is worth a read and can be found at the NYTimes web site under archives....

http://www.nytimes.com/2013/08/02/opinion/a-republican-case-for-climate-action.html?_r=0

After bringing heavy rains to the Philippines Typhoon Utor hit southern China and parts of Hong Kong on Wednesday this week with winds of 90 mph and heavy rains. Tens of thousands of residents were evacuated, schools and businesses were closed as well, along with ferry services. Some areas received over 4 inches of rainfall on Wednesday, and yet more rainfall is expected into the weekend adding to the flooding risk for many areas. Elsewhere the National Hurricane

Center was issuing advisories on Tropical Storm Erin in the Eastern Atlantic Ocean near Cape Verde. It is expected to remain a tropical storm as it slowly crosses the Atlantic Ocean this weekend.

A study from Potsdam Institute for Climate Impact Research was published this week in the journal Environmental Research Letters and finds that Heat Waves will increase globally in frequency and amplitude regardless of emission scenarios. With mitigation efforts to curb global greenhouse gas emissions the study finds that the frequency chance in Heat Waves could stabilize by 2040. You can read more about this study at....

<http://www.sciencedaily.com/releases/2013/08/130815084845.htm>

The Australian Bureau of Meteorology announced earlier this month the formation of a new National Centre for Extreme Weather. This new center will be staffed by 8 special meteorologists who will collaborate with other offices to deploy and coordinate new next generation flood forecasting models and Tropical Storm surge prediction schemes. The new centre will also work closely with emergency managers and the media to see that urgent messages are immediately and widely distributed when necessary. You can read more about this at....

<http://www.bom.gov.au/governmentresponse/doc/munro-response-factsheet-2.pdf>

MPR listener question: Why do clouds tend to have flat bottoms and round tops?

Answer: There are of course a wide range of cloud types, but most have flat bottoms. The bottom of the cloud represents a layer that meteorologists call the Lifted Condensation Level (LCL), the height in the atmosphere where a rising plume of air will cool enough to reach saturation (100 percent humidity) and droplets will form. The LCL is related to the difference between air temperature and dewpoint (temperature at which condensation will occur) at the surface. Where the difference is large, the LCL tends to be at a higher elevation. Given that air temperature and dewpoint are typically similar over geographic areas that are several miles across, the rising air from the surface reaches a geographically uniform LCL, condensation occurs and the bottom layer of the cloud appears to be relatively flat with little variation in height. Conversely within the cloud plumes of microscopic water droplets may continue to rise or disperse due to strong updrafts and wind shear. This type of movement within the cloud will tend to give the perimeter edges and the top of the cloud a more rounded or lumpy appearance. These are the usual atmospheric motions that create clouds. Under some circumstances, especially with temperature inversions (increasing temperature with altitude) fog will form at the surface, and the top of the fog layer will be uniform, representing a warm enough layer of air that the atmosphere is no longer saturated, so from above it looks like the Earth is covered by a white blanket.

You can find almost every type of cloud depicted at the Cloud Appreciation Society web site, one of my favorites.....go to.....

<http://cloudappreciationsociety.org/>

Twin Cities Almanac for August 16th:

The average MSP high temperature for this date is 82 degrees F (plus or minus 7 degrees F standard deviation), while the average low is 61 degrees F (plus or minus 6 degrees F standard deviation).

MSP Local Records for August 16th:

MSP weather records for this date include: highest daily maximum temperature of 99 degrees F in 1988; lowest daily maximum temperature of 64 degrees F in 1943; lowest daily minimum temperature is 47 degrees F in 1962; highest daily minimum temperature of 77 F in 1988; and record precipitation of 1.97 inches in 2002; No snow has been recorded on this date.

Average dew point for August 16th is 59 degrees F, with a maximum of 76 degrees F in 1908 and a minimum of 40 degrees F in 1924.

All-time state records for August 16th:

The state record high temperature for this date is 107 degrees F at Madison (Lac Qui Parle County) in 1988. The state record low temperature for this date is 27 degrees F at Tower (St Louis County) in 1976. State record precipitation for this date is 4.21 inches at Willmar (Kandiyohi County) in 1926; and no snow has fallen on this date.

Past Weather Features:

August 16 was the middle of a Heat Wave in both 1922 and 1988. In 1922 an August Heat Wave visited the state from the 14th to the 18th and was very detrimental to crops. Over 35 Minnesota communities reported highs in the 90s F and six stations reached the century mark on their thermometers. In 1988 a Heat Wave prevailed from August 15 to 17 as over 40 Minnesota communities saw afternoon temperatures reach 100 degrees F or higher. The heat dissipated little at night as several observers reported overnight lows in the 80s F. Finally a cold front brought relief on the 19th, dropping the temperatures by 30 degrees F or more.

About 6:00 pm on August 16, 1926 an F-2 tornado (winds 113-157 mph) touched down in Becker County near Detroit Lakes. It destroyed a church and move along for 12 more miles, damaging some farms and homes along the way before lifting off to the east of the lake.

August 15-16, 1972 brought a flash flood to some north shore communities. Frequent lightning strikes accompanied the thunderstorms that dropped 1.5 to 4.5 inches of rainfall along a stretch of Highway 61 from Duluth to Castle Danger. There was widespread flooding of some basements and roads.

The coldest August 16th in state history occurred in 1976 when over 80 Minnesota communities reported morning low temperatures in the 30s F. Several northern observers reported minimum values in the 20s F. As far south as Grand Meadow (Mower County) frost was reported with a reading of just 30 degrees F.

About 6:00 pm on August 16, 2006 an EF-0 tornado (winds 40-72 mph) moved three miles across the Minnesota landscape in Roseau County near the town of Ross. It did little damage, but it was the 3rd tornado reported in Roseau County that summer, very unusual for that far north. Statewide there were only 25 tornado reports in 2006.

Outlook:

Further Information:

Significant warming trend over the weekend with daytime temperatures pushing into the 80s in many places, and perhaps a few 90s by Sunday. Increasing cloudiness on Sunday, especially in northern counties, with a chance for showers or thunderstorms, continuing into Monday. Generally warmer than normal next week, with high humidity and another chance for showers and thunderstorms by thursday.

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Minnesota WeatherTalk Newsletter for Friday, August 30th, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, August 30th, 2013

HEADLINES

- Meet and Greet at the State Fair
- August Heat Wave
- Preliminary August Climate Summary
- Climate Change Adaptation Conference
- Weekly Weather potpourri
- MPR listener questions
- Almanac for August 30th
- Past weather
- Outlook

Topic: Meet and Greet at the State Fair

For those who would like to visit about the weather I will be at the University of Minnesota CFANS Alumni Lounge in the Agriculture/Horticulture Building on the State Fairgrounds this Saturday from 4:00 to 5:00 pm. If you plan to attend the State Fair on Saturday, please drop by and say hello.

Topic: August Heat Wave

According to the Mayo Clinic when the Heat Index reaches 91 degrees F or higher, people should take precautions to avoid heat exhaustion, especially young people, elderly people, or those suffering from certain chronic illness (COPD, MS, etc) that require medications. This is the reason the National Weather Service issues heat advisories (Heat Index values in the 90s F to 100 F) and excessive heat warnings (Heat Index Values above 100 F), with other modifiers to take into account how little overnight cooling occurs.

The longest Heat Wave of 2013 occurred this week in southern Minnesota, starting mid-afternoon on Saturday (Aug 24) with a Heat Index of 96 degrees F in the Twin Cities and continuing through Thursday evening (Aug 29). Many high temperature records were set around the state for both daytime maximum values and nighttime minimum values. MSP reported overnight low temperatures from the 25th to the 27th of 80 F, 80 F, and 79 F. The 80 F readings were only the 5th and 6th occurrences of such high minimum temperatures in the history of August back to 1872.

Reported Heat Index Values from MSP included: Sat (Aug 24) 96 F; Sun (Aug 25) 105 F; Mon (Aug 26) 106 F; Tue (Aug 27) 107 F; Wed (Aug 28) 92 F; Thursday (Aug 29) 100 F

In addition, on Tuesday August 27th the dewpoint reached a daily record tying value of 77 degrees F, also tying the mark for the highest value measured during a run of the State Fair (tied August 28, 1955 and August 27, 1990). Perhaps more importantly, the Heat Index values in the Twin Cities from 3:00 pm on Saturday (Aug 24) to 11:00 pm on Wednesday (Aug 28) rarely fell below 83 degrees F during any given hour. Thus the persistence of heat lasted well over 100 consecutive hours. This was problematic for the opening of the school year in many school districts, especially those buildings without air conditioning, and for Minnesota State Fair goers and workers who had to worry about staying hydrated in such stressful conditions.

Keeping children hydrated and attentive for school classroom and playground activities was a challenge, not just in Minnesota but in Iowa and Nebraska as well. Many schools took precautions to avoid any health risks to their students, such as giving them more breaks, shortening recess activities or athletic activities, and taking water breaks. In the end, some school districts simply cancelled school later in the week, a smart choice and somewhat analogous to school cancellations that have occurred historically for extreme cold in the winter season (when Wind Chill Index values have ranged below -35 F), a more well known health risk to school aged children. Perhaps modifying schools to make them useful even on warm days is a good idea as our climate behavior continues to change bringing more frequent and extreme warm spells.

The high of 92 degrees F on Thursday (Aug 29) marked the 6th day with daytime highs of 90 F or greater during the run of the 2013 Minnesota State Fair, surpassing the record of 5 days with 90 F or higher that occurred in 1922, 1931, 1960, and 1991. Undoubtedly the 2013 State Fair will go down as the warmest or one of the warmest in history (back to 1885). With a possibility of 90 F or higher again on Friday (Aug 30) or Saturday (Aug 31), then the new State Fair record for 90 F days may go to seven.

Topic: Preliminary August Climate Summary

As August wraps up this Saturday, a look back reveals a highly variable month climatically. Average temperatures for August will end up ranging from 1 to 4 degrees F above normal for most observers. The month started cooler than normal through the first half of the month, with relatively low dewpoints, then above normal temperatures, record-setting in some cases took over for the rest of the month. Extremes for the month ranged from 98 degrees F at Forest Lake on the 27th to just 31 degrees F at Embarrass on the 14th. Browns Valley set a new record low on the 14th as well with a reading of 39 degrees F. Conversely, over the period from August 20-27 as many as 30 new daily maximum temperature records were set around the state, along with 67 new daily warm minimum temperatures. The above normal temperatures help crops "catch up" a bit and move more rapidly toward maturity.

Moisture wise, the month of August was generally dry, but highly variable too. With few exceptions Minnesota observers are reporting a drier than normal month of August. Driest areas were in northwestern counties, some central counties, and the far northeast (Cook County) where total monthly precipitation was less than 1 inch. Only a handful of reported monthly rainfall totals over 3 inches. Some of the higher amounts in the state included: 4.20 inches at Windom and Albert Lea, 3.77 inches at St James, and 3.71 inches at Blue Earth. Thunderstorms brought record-setting daily rainfall at 9 locations on the 5th of the month including 1.95 inches at Wells,

1.62 inches at Winnebago, and 1.42 inches at Milan. Again on the 11th a strong thunderstorm brought a record 2.11 inches to Windom.

The drier than normal August follows a drier than normal July which has produced a combined rainfall deficiency for the two months that ranges from 5 to 7 inches below normal in many areas. The consequence of this is a re-emergence of moderate drought in over half of the state's landscape. You can read more about this at our web site.....

http://climate.umn.edu/doc/journal/drought_2013.htm

There were three noteworthy weather features in August. On the 6th a supercell thunderstorm brought high winds and large hail to many areas south of the I94 corridor. Many communities reported hail from 1.5 to 2.0 inches in diameter, with some crop damage. Three inch diameter hail was reported in parts of Kandiyohi County. In addition winds up to 60 mph damaged trees in Dakota, Wilkin, and Hennepin Counties.

About 8:15 pm on Tuesday, August 27 a tornado, the 7th of the season for Minnesota, touched down briefly northwest of Wadena, MN near the intersection of highways 10 and 75. No serious damage was reported. And finally on Thursday, August 29th, strong thunderstorms brought hail and damaging winds to portions of northeastern Minnesota, including a measured wind of 68 mph near Castle Danger along the north shore of Lake Superior. Further the 8th Minnesota tornado of 2013 was spotted between Remer and Hill City, fortunately with little damage associated.

http://www.crh.noaa.gov/news/display_cmsstory.php?wfo=dlh&storyid=96886&source=0

Topic: Climate Change Adaptation Conference at the Science Museum on November 7, 2013

Several organizations are partnering to host the first statewide conference on Climate Change Adaptation, Planning and Practice. It will take place at the Science Museum of Minnesota in downtown St Paul on November 7, 2013. Registration for the all day program is only \$50. Sessions will be devoted to city planning, agriculture, transportation, natural resources (including watershed management), and public health. You can read more about the conference and register at.....

<http://wrc.umn.edu/news/index.htm>

Topic: Weekly Weather potpourri:

The RIM fire around Yosemite Valley in California has burned for nearly two weeks, charring more than 200,000 acres and costing nearly \$40 million to fight (ranking among California's worst fires historically). Smoke from the fire made the air quality around Lake Tahoe very poor for many days. Though Mother Nature has not brought rain to help contain the fire, cooler temperatures are expected over the Labor Day weekend which will assist firefighters in making better progress in cutting fire breaks.

In the Western Pacific Ocean Tropical Storm Kong-Rey was expected to bring heavy rains to Japan over the weekend, and in the Eastern Pacific Ocean Tropical Storm Juliette was dissipating, though bringing the threat of rain to portions of Baja California as well.

Comments from the Brad Rippey of the USDA-Office of the Chief Economist during the drought briefing this week include:

Highlights for the drought-monitoring period ending 7 am EDT on August 27 include:

-Overall U.S. moderate to exceptional (D1 to D4) drought coverage increased more than four percentage points (up 4.43 points) to 50.04%. It was the first time that drought covered more than half of the contiguous U.S. since April 9, 2013. Hot, dry weather in the western Corn Belt led to sharp increases in drought coverage. According to the U.S. Drought Monitor, drought coverage in the nine-state Midwestern region increased from 8 to 25% during the week ending August 27. Coverage increased from 35 to 60% in Iowa; 10 to 55% in Minnesota; 15 to 31% in Missouri; 2 to 21% in Wisconsin; and 0 to 21% in Illinois. The portion of the U.S. corn production area in drought surged from 25 to 45% during the week ending August 27. Soybeans in drought also increased sharply in the last week, from 16 to 38%. Corn and soybeans in drought bottomed out last month at 17 and 8%, respectively.

MPR listener question: With the late August run of 90 F days in the Twin Cities I wondered how common it is to have more such days in August than any other month of the year? Also, how frequently does August bring zero 90 F days?

Answer: Over the Twin Cities climate record since 1872 (142 years), there have been only 25 years (18 percent) when the month of August brought the most 90 F days. This year August and July are tied with each bringing 7 days of at least 90 F high temperatures. Coincidentally there have been only 25 years (18 percent) when August brought zero 90 F days as well, the most recent was 2011.

Twin Cities Almanac for August 30th:

The average MSP high temperature for this date is 77 degrees F (plus or minus 8 degrees F standard deviation), while the average low is 58 degrees F (plus or minus 6 degrees F standard deviation).

MSP Local Records for August 30th:

MSP weather records for this date include: highest daily maximum temperature of 96 degrees F in 1941; lowest daily maximum temperature of 60 degrees F in 1965; lowest daily minimum temperature is 45 degrees F in 1935 and 1974; highest daily minimum temperature of 77 F in 2010; and record precipitation of 7.28 inches in 1977; No snow has been recorded on this date.

Average dew point for August 30th is 58 degrees F, with a maximum of 75 degrees F in 1951 and a minimum of 34 degrees F in 1931.

All-time state records for August 30th:

The state record high temperature for this date is 103 degrees F at Minneota (Lyon County) in 1976. The state record low temperature for this date is 26 degrees F at Sawbill Camp (Cook County) in 1935. State record precipitation for this date is 7.28 inches at the MSP airport in 1977; and no snow has fallen on this date.

Past Weather Features:

Strong thunderstorms brought flooding rains to parts of Minnesota over August 29-30, 1902. Many areas reported over 2 inches, while Lake Winnie, Pipestone, and Faribault received well over 3 inches. Farm fields in Wabasha County were flooded as over 5 inches of rain fell there.

August of 1921 ended with a heat wave across southern and western Minnesota, as over 20 communities reported temperatures from 90 to 100 degrees F. The heat wave last from August 28th to September 2nd and rapidly dried out crops. Temperatures dropped off into the 40s and 50s F by the second week of September.

Widespread and damaging frost occurred on perhaps the coldest August 30 in state history, that of 1931. Temperatures in the low 30s prevailed nearly statewide with a reading of just 33 degrees F as far south as Rochester and Zumbrota. Farmers reported frost damage to potatoes, corn, and garden vegetables, virtually ending the growing season.

On the evening of August 30, 1977 dark clouds appeared on the horizon. An intense thunderstorm began about 8:30 pm and brought 4-5 inches of rainfall to the State Fairgrounds by midnight. The maximum rainfall rate occurred between 9:00 and 10:00 pm with over 2.5 inches falling. The storm total of 7.36 inches at the MSP airport remains the 2nd greatest in Twin Cities history, surpassed only by the 10 inches that fell on July 23-24 of 1987. Hundreds of homes in the Twin Cities reported water damage. Evening events, including the Grandstand Show at the State Fair were cancelled.

Outlook:

Diminishing temperatures and humidity over the weekend, with a chance for showers on Saturday, mostly west and north. Continued cooler into the middle of next week as temperatures fall back closer to normal. Dry conditions will prevail much of next week as well.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

<http://www.climate.umn.edu/weathertalk/>

For access to other information resources go to

<http://www.climate.umn.edu/Seeley/>

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Minnesota WeatherTalk Newsletter for Friday, September 6, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, September 6, 2013

HEADLINES

- September starts cool and dry
- DNR fall color web site
- Climate Change Adaptation Conference
- Weekly Weather potpourri
- MPR listener questions
- Almanac for September 6th
- Past weather
- Sough
- Outlook

Topic: September starts cool and dry

The first five days of September have started drier than normal (just as July and August did), while temperatures have been averaging 1 to 3 degrees F cooler than normal in most places. Many observers have already reported morning lows in the 30s including just 33 degrees F at Embarrass, and 34 degrees F at Bigfork, Crane Lake, and Chisholm. Temperatures as cold as 39 degrees F were reported as far south as Byron and Grand Meadow in southeastern Minnesota. Marshall, MN reported the state high of 92 degrees F on the 1st, while a few locations also reported some spotty rainfall on that date.

Rainfall deficits continue to mount in many parts of the state. The U.S. Drought Monitor now shows that over 53 percent of the state landscape is in moderate to severe drought. Severe drought is now designated for parts of Stearns, Sherburne, Benton, Wright, Meeker, and Kandiyohi Counties in central Minnesota. These counties and others had been drought-free since mid-May. Volume flow on many Minnesota watersheds is down as well, in some cases well below average for this time of year. Unfortunately the outlook favors warm and dry weather through the third week of September for most of the state.

Topic: DNR Fall Color Web Site

The DNR Fall Color web site is up and running with frequent updates on fall colors around the state. It is a good resource to plan trips for viewing the beautiful autumn foliage in our state. So far, even in the far northeast vegetation color change is less than ten percent, but more nighttime temperatures in the 30s F may accelerate this process. Visit their web site for updates on a daily basis if you like at...

http://www.dnr.state.mn.us/fall_colors/index.html

Topic: Climate Change Adaptation Conference at the Science Museum on November 7, 2013

Several organizations are partnering to host the first statewide conference on Climate Change Adaptation, Planning and Practice. It will take place at the Science Museum of Minnesota in downtown St Paul on November 7, 2013. Registration for the all day program is only \$50. Sessions will be devoted to city planning, agriculture, transportation, natural resources (including watershed management), and public health. You can read more about the conference and register at.....

<http://wrc.umn.edu/news/index.htm>

Topic: Weekly Weather potpourri:

NOAA released a report this week titled "Extreme Events of 2012 From A Climate Perspective." The scientific analysis of extreme climatic events in 2012 reveals that some of the attribution, especially the North American warm temperature signal and the loss of Arctic sea ice can be ascribed to anthropogenic climate change (human induced). The full text of this paper can be found at....

<http://www.ametsoc.org/2012extremeeventsclimate.pdf>

The NOAA National Hurricane Center was issuing warnings this week about Tropical Storm Lorena as it was expected to bring high winds and heavy rains (3-6 inches) to Baja California and SW Mexico into the weekend. It is not expected to reach hurricane status.

NOAA's Storm Prediction Center reported only 34 tornadoes in the past month of August on a nationwide basis. This is less than half of the average number for August and continues to trend of below normal tornado activity this year. The total tornado reports in the USA for 2013 so far (a little over 700) represents about two-thirds of the historical average number for this time of year.

The National Wildlife Federation released a new report this week about climate change impacts on freshwater fisheries. It is a very interesting report with relevance to Minnesota's freshwater fish populations. You can access it and read more at....

<http://www.nwf.org/News-and-Magazines/Media-Center/Reports/Archive/2013/09-04-13-Freshwater-Fish-Climate-Change-Report.aspx>

Peru and portions of other South American countries have suffered from severe cold and snow this past week, causing some villages to be isolated, and a good deal of livestock mortality. A state of emergency was declared in nine Peruvian provinces as temperatures plummeted to single digits and below zero F values.

Public statement from the National Weather Service Forecast Office in Chanhassen, MN on Wednesday, September 5, 2013 about a change in the radiosonde program:

PUBLIC INFORMATION STATEMENT
NATIONAL WEATHER SERVICE TWIN CITIES/CHANHASSEN MN
1110 AM CDT WED SEP 04 2013

...CHANHASSEN MINNESOTA NATIONAL WEATHER SERVICE OFFICE BEGINS
USING
NEW LMS-6 RADIOSONDES FOR UPPER AIR SOUNDINGS...

SINCE 2005 THE RADIOSONDE REPLACEMENT SYSTEM /RRS/ HAS BEEN USED TO
COLLECT...PROCESS AND DISSEMINATE UPPER AIR DATA USING MODERN
GROUND
TRACKING EQUIPMENT AND GPS RADIOSONDES. UNTIL RECENTLY ALL RRS
SITES
USED THE MARK IIA GPS RADIOSONDES TO TAKE SOUNDINGS.

IN 2013...THE NATIONAL WEATHER SERVICE /NWS/ SUCCESSFULLY DEPLOYED
AND TESTED THE NEW LOCKHEED MARTIN SIPPICAN LMS-6 GPS RADIOSONDES
AND SUPPORTING RRS SOFTWARE AT SELECTED NWS OFFICES. THE LMS-6 IS
LIGHTER THAN THE MARK IIA AND USES DRY-CELL BATTERIES. IT ALSO
PROVIDES IMPROVED ACCURACY OF THE RH DATA. THE NWS IS NOW READY TO
IMPLEMENT THE LMS-6 RADIOSONDE ACROSS THE UPPER AIR NETWORK. THE
TWIN CITIES NWS OFFICE IN CHANHASSEN MINNESOTA BEGAN UTILIZING THE
LMS-6 RADIOSONDE TODAY...SEPTEMBER 4 2013 AT 12Z.

MPR listener question: In recent years we have experienced some significant flash flooding around the state due to severe thunderstorm rainfalls (Duluth last year for example). What has been the worst storm this year and where was it?

Answer: Right around the summer solstice (June 20-21) a line of thunderstorms moved across the state with heavy rainfall, hail, and damaging winds. The heaviest rainfall caused flash flooding in several central Minnesota communities, including 7.75 inches at Breezy Point (Crow Wing County), 6.69 inches at Lake Park (Becker County), and 5.60 inches at Morris (Stevens County). That remains the heaviest thunderstorm of the year so far.

Twin Cities Almanac for September 6th:

The average MSP high temperature for this date is 75 degrees F (plus or minus 10 degrees F standard deviation), while the average low is 57 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for September 6th:

MSP weather records for this date include: highest daily maximum temperature of 98 degrees F in 1922; lowest daily maximum temperature of 55 degrees F in 1911; lowest daily minimum temperature is 35 degrees F in 1885; highest daily minimum temperature of 75 F in 1913; and record precipitation of 1.61 inches in 1881; No snow has been recorded on this date.

Average dew point for September 6th is 55 degrees F, with a maximum of 75 degrees F in 1970 and a minimum of 33 degrees F in 1956.

All-time state records for September 6th:

The state record high temperature for this date is 105 degrees F at New Ulm (Brown County) in 1922. The state record low temperature for this date is 23 degrees F at Park Rapids (Hubbard County) in 1885. State record precipitation for this date is 8.44 inches at Cloquet (Carlton County) in 1990; and no snow has fallen on this date.

Past Weather Features:

Four consecutive nights with frost ended the growing season in 1885, as over September 4-7 the morning lows ranged from 28 to 35 degrees F around the state. Indian Summer settled in for the second half of the month bringing some daytime highs in the 70s and 80s F.

One of the worst ever September Heat Waves in state history occurred from the 3rd to the 7th of 1922. Daily high temperatures ranged from 90 degrees F to 100 degrees F over 75 percent of the state landscape. The cool spot in the state was Grand Marais with a daytime high of 74 degrees F, while New Ulm sweltered in 105 degrees F. Many Minnesota citizens slept by lakes or on outdoor porches.

Strong thunderstorms over September 5-6, 1990 brought flash flooding to portions of St Louis and Carlton Counties. Rainfall totals ranged from 3 inches to over 8.50 inches, washing out roads and flooding out Jay Cooke State Park, where campers were evacuated. The Cloquet High School was flooded and suffered over \$150,000 in damages. Strong winds uprooted trees as well and hail as large as 2 inches in diameter was reported from the Kettle River area.

Word of the Week: Sough (soff)

An old Scottish term, still occasional used it refers to a whisper of wind, perhaps the difference between calm and a measurable amount of wind (2 mph). A sough wind is just barely enough to feel on the face and hands, like a soft touch from Nature.

Outlook:

Warm temperatures going into the weekend under mostly sunny skies. Increasing cloudiness on Sunday with a chance for showers and thunderstorms late. Continuing chance for widely scattered showers Monday and early Tuesday in northern areas, spotty elsewhere. Warmer than normal temperatures with a cool off by Tuesday and Wednesday.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, September 13, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, September 13, 2013

HEADLINES

- Continued warm and dry pattern
- Salute to Steve and Nancy Potter
- Lyle Schaller retires
- Climate Change Adaptation Conference
- Weekly Weather potpourri
- MPR listener questions
- Almanac for September 13th
- Past weather
- Outlook

Topic: Continued warm and dry pattern

Despite the recent cool down temperatures so far this month are averaging from 3 to 6 degrees warmer than normal in most places. A brief respite occurred on Thursday and Friday this week (Sept 12-13) as a cool, dry Canadian air mass brought many overnight lows in the 30s F with much lower dewpoints. Perhaps we have seen the last of the 90 F temperatures, though it looks like next week daytime highs in the 80s F could return briefly with higher dewpoints and chances for thunderstorms.

Most of the state has seen drier than normal weather continue to prevail this month, especially in southern counties where rainfall totals are mostly less than a quarter of an inch. A few scattered spots in the north report above normal rainfall thanks to heavy, but widely scattered thunderstorms, including 3.64 inches at Fergus Falls, 3.08 inches at Long Prairie, 3.00 inches at Kabetogama, 2.83 inches at Ottertail, 2.32 inches at Grand Portage, and 2.30 inches at Brainerd.

The dry pattern has amplified and extended drought on the Minnesota landscape. Moderate or severe drought now extends over 55 percent of the state, and severe drought has been extended down along the bluff country in the Mississippi River Valley from Lake City to Winona. Some southern and central Minnesota communities have seen rainfall totals that are 6-7 inches below normal since July 15th. Further, according to the NOAA-Climate Prediction Center the extent of drought is expected to expand across southern parts of Minnesota over the remainder of September. You can always catch up on the latest assessment of drought each Thursday on our web site at...

http://climate.umn.edu/doc/journal/drought_2013.htm

Topic: A salute to Coop observers Steve and Nancy Potter of Long Prairie, MN

The "Senior Perspective" a monthly news publication serving 35 counties in west-central Minnesota recently highlighted the activities and contributions of Steve and Nancy Potter, Cooperative weather observers for the National Weather Service near Long Prairie, MN (Todd County). Not only do they make daily weather observations on their farm, but they also contribute to the National Phenology Network, taking observations of lilacs, maples, and basswoods to assess seasonal variability as it might relate to climate change. Congratulations to Steve and Nancy on this recognition. The article can be found at...

<http://www.srperspective.com/2013/08/living-on-the-edge-monitoring-prairie-forest-dynamics/>

Topic: Lyle Schaller retires

A long time colleague, Lyle Schaller of the National Weather Service in Chanhassen, MN retired this month after 51 years of federal service, most of which was with NOAA. He was a hydrometeorological technician responsible for measurement systems and data management, including instrumented balloon launches (radiosondes). He was especially generous with his time when I took groups of teachers through the National Weather Service and asked him to explain their operations. Lyle transferred from Sault St-Marie, MI to MSP National Weather Service Forecast Office in 1975, and later made the move to Chanhassen with the rest of the NWS staff. He has probably launched more weather balloons than anybody in the history of the National Weather Service. I am sure he will be missed and wish him all the best in his retirement. Thanks for your service Lyle.

Topic: Climate Change Adaptation Conference at the Science Museum on November 7, 2013

Several organizations are partnering to host the first statewide conference on Climate Change Adaptation, Planning and Practice. It will take place at the Science Museum of Minnesota in downtown St Paul on November 7, 2013. Registration for the all day program is only \$50. Sessions will be devoted to city planning, agriculture, transportation, natural resources (including watershed management), and public health. You can read more about the conference and register at.....

<http://wrc.umn.edu/news/index.htm>

Topic: Weekly Weather potpourri:

From Brad Rippey of the USD World Agricultural Outlook Board: Highlights for the drought-monitoring period ending 7 am EDT on September 10 include:

- Overall U.S. moderate to exceptional (D1 to D4) drought coverage increased (up 0.60 percentage point) to 50.69%. Exceptional drought (D4) was affecting 1.25% of the continental U.S., unchanged from week ago.
- Hot, mostly dry weather in the Corn Belt led to further increases in drought coverage. Drought coverage in the nine-state Midwestern region increased from 8 to 32% during the 3-week period ending September 10. Drought currently covers 72% of Iowa, 55% of Minnesota, 43% of Wisconsin, 40% of Illinois, and 31% of Missouri.
- In the 3-week period ending September 10, corn in drought more than doubled from 25 to 55%.

During the same period, soybeans in drought nearly tripled from 16 to 45%, hay in drought increased from 33 to 41%, and cattle in drought rose from 46 to 55%. With winter wheat planting underway (5% complete nationally by September 8), it's useful to note that nearly half (45%) of the production area was in drought on September 10.

Humberto, the 8th named Tropical Storm of the Atlantic Hurricane Season became the first real hurricane of 2013 this week when its wind speeds increased to 85 mph. It remains far to the east of any islands or mainland areas. The NOAA NHC is also monitoring a low pressure area in the Gulf of Mexico which may become a tropical storm this weekend and bring heavy rains to Mexico. In the Western Pacific Ocean Tropical Storm Man-yi is expected to bring some heavy rain to portions of Japan early next week.

Thunderstorms late Wednesday night (Sept 11th) and early Thursday (Sept 12) brought heavy rains and flash flooding to parts of Colorado. The NWS had to issue numerous flash flood warnings as observers scattered from Fort Collins to Colorado Springs reported rainfall totals ranging from 4 inches to over 10 inches by Friday morning. Many creeks and rivers were overflowing and causing damages to roads and residences. The University of Colorado campus in Boulder was closed down. Scattered showers and thunderstorms were expected to prevail throughout the weekend as well.

Disparities in the climate change signals of Western Europe are documented in a paper published in Environmental Research Letters this week. Researchers from the London School of Economics and the University of Warwick analyzed temperature data sets from 1950 to the present and found regional differences in the rates of warming. The hottest part of the year, summer, has warmed the fastest in southern England, northern France, and Denmark. Conversely, there has been little warming detected in daytime summer temperatures in Norway and Sweden. The authors attempt to show regional differences in the temperature trends by season as well. You can read more at....

<http://www.sciencedaily.com/releases/2013/09/130911120752.htm>

MPR listener question: How many hours was the dewpoint at 70 degrees F or higher this year in the Twin Cities? I have heard you talk about this and how it often leads the National Weather Service to issue a Heat Advisory.

Answer: So far, and this is likely to be close to the final number, MSP has reported 246 hours in 2013 with a dewpoint of 70 degrees F or higher. This is well above the historical average and over the past 68 years (since 1945) ranks as the 15th highest annual value (the highest being 512 hours in 2002). What is unusual about this year is that the majority of hours with such high dewpoints (including a record setting value of 77 degrees F on August 27th) occurred later in the year (late August and early September), and not in late June to early August as normally happens.

Twin Cities Almanac for September 13th:

The average MSP high temperature for this date is 70 degrees F (plus or minus 9 degrees F standard deviation), while the average low is 53 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for September 13th:

MSP weather records for this date include: highest daily maximum temperature of 95 degrees F in 1939; lowest daily maximum temperature of 51 degrees F in 1873; lowest daily minimum temperature is 33 degrees F in 1890; highest daily minimum temperature of 72 F in 1939; and record precipitation of 1.29 inches in 1921; No snow has been recorded on this date.

Average dew point for September 13th is 49 degrees F, with a maximum of 71 degrees F in 1939 and a minimum of 22 degrees F in 1923.

All-time state records for September 13th:

The state record high temperature for this date is 100 degrees F at Redwood Falls (Redwood County) in 1939. The state record low temperature for this date is 17 degrees F at Roseau (Roseau County) in 1975. State record precipitation for this date is 4.10 inches at Theilman (Wabasha County) in 1978; and no snow has fallen on this date.

Past Weather Features:

Frost on September 13, 1923 brought an end to the growing season in many agricultural areas of the state. Many observers reported overnight lows in the 20s F, even in southern counties of the state. Red River Valley areas fell into the teens. Some crops were damaged by the early frost.

A 3-day Heat Wave prevailed from September 13-15, 1939, producing the some of the hottest mid-September temperatures in state history. The vast majority of observers reported record-setting highs in the 90s F, and at least 10 Minnesota cities reported daytime highs of 100 degrees F or greater. Even Two Harbors along the shores of Lake Superior reached a high of 94 degrees F.

September 14, 1964 is the earliest fall date when a measurable amount of snowfall was reported in the state. This happened at International Falls, though it was very short-lived as the daytime high rose to 59 degrees F the next day.

Thunderstorms brought record-setting rainfalls to many parts of the state over September 12-13, 1978. Rainfall totals ranged from 3 to 6 inches, with the heavier amounts in southeastern counties, where the Zumbro River went beyond flood stage. Many roads were flooded. It was the 8th and last major flash flood of the year 1978. Golf ball size hail fell in some areas and lightning started a large fire in Alexandria, MN.

Outlook:

Near normal temperatures over the weekend with a chance for scattered showers, especially on Saturday night. Generally unsettled weather next week with frequent chances for showers (Tue-Thu) and a warming trend in temperatures by Wednesday. Cooler again by next weekend.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

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Minnesota WeatherTalk Newsletter for Friday, September 20, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, September 20, 2013

HEADLINES

- New seasonal climate outlook
- Cool up north
- Drought Update
- Climate Change Adaptation Conference
- Weekly Weather potpourri
- MPR listener questions
- Almanac for September 20th
- Past weather
- Outlook

Topic: The NOAA-Climate Prediction Center released the new seasonal climate outlook on Thursday (Sept 19) this week.

The new climate outlooks released by NOAA-CPC on Thursday (Sept 19) favor a warmer than normal October across all of the Great Lakes Region, including Minnesota. Then the balance of the autumn and early winter shows equal chances for warm or colder than normal conditions to prevail. Though the precipitation outlook does not favor below normal values of precipitation during the balance of autumn the CPC drought outlook shows that many parts of Minnesota are expected to remain in drought through the month of December. You can see the various climate outlooks at the CPC web site.....

<http://www.cpc.ncep.noaa.gov/>

Topic: Cool up north

Since last Saturday (September 4) many northern observers have reported multiple frosts and the lowest temperatures since the middle of last May. Some lows reported this week included:

- 31 degrees F at Grand Rapids and Little Fork
- 30 degrees F at Roseau, Leech Lake, Kabetogama, and Wright
- 29 degrees F at International Falls, Ely, and Floodwood
- 28 degrees F at Brimson, Hibbing, and Tower
- 27 degrees F at Isabella, Orr, and Crane Lake
- 26 degrees F at Embarrass

Further north at Thompson, Manitoba they reported a new record low temperature on September 15th of 21 degrees F. The cool temperatures in the north helped accelerate fall leaf color change

with is reported to be about 25 percent in play now and will perhaps reach peak in some areas up north next week.

Topic: Drought Update

Spotty, but significant thunderstorms visited the state over September 15-16 (Sun-Mon) this week bringing 1-2 inches of rain to some areas. Among those reporting new daily record amounts of rainfall for September 15th were Ottertail with 1.92 inches, Rothsay with 1.52 inches, Milaca with 1.25 inches, and Mora with 1.12 inches. Though not record-setting other significant 2-day rainfall totals included 1.85 inches at Moorhead and 2.23 inches at Pelican Rapids. As a result of these rains the Minnesota landscape designated to be in drought shrunk by 4 percent from 55 percent last week to 51 percent his week. Another round of thunderstorm rains on Thursday (Sept 19) brought significant rainfall to parts of western and southern Minnesota with 1-2 inch amounts common and wind gusts ranging from 40 to 60 mph (77 mph in Renville County) which flattened some corn fields. Among those observers reporting over an inch of rainfall were Madison, Marshall, Princeton, Hutchinson, Montevideo, Rush City, La Crescent, and Bird Island. At Big Lake in Sherburne County a rainfall total over 3 inches was reported.

Elsewhere in the USA the largest drought improvement from last week to this occurred in the state of Colorado, where September 9-15 brought 10-21 inch rains to many parts of the front range. Many cities reported flooded roads, basements, and significant damage to infrastructure. A number of towns were isolated by flood waters. Among these cities were Aurora (15 inches), Boulder (up to 21 inches), Golden (nearly 12 inches), and Loveland (11 inches). Because of the rains the area of the Colorado landscape in severe to extreme drought shrunk from 58 percent to 17 percent this week. The official Coop observer at Boulder, CO reported the wettest month in history (17.08 inches) and wettest year in history (30.14 inches) shattering all records back to 1893.

Topic: Climate Change Adaptation Conference at the Science Museum on November 7, 2013

Several organizations are partnering to host the first statewide conference on Climate Change Adaptation, Planning and Practice. It will take place at the Science Museum of Minnesota in downtown St Paul on November 7, 2013. Registration for the all day program is only \$50. Sessions will be devoted to city planning, agriculture, transportation, natural resources (including watershed management), and public health. You can read more about the conference and register at.....

<http://wrc.umn.edu/news/index.htm>

Topic: Weekly Weather potpourri:

In the Western Pacific Ocean Super Typhoon Usagi was taking aim at Taiwan and Hong Kong for the coming weekend. As of Friday wind speeds ranged up to 175 mph and sea wave heights were approaching 50 feet with this storm. This moderately large and extremely strong storm will bring heavy rains to Taiwan and Hong Kong over the next 72 hours. Both storm surge and wind damage is expected when the system makes landfall.

Tropical Storms Manuel and Ingrid pounded Mexico with heavy rains earlier this week causing the death of at least 47 people and flooding many areas. More rains are expected due to the development of another Tropical Storm in the Gulf of Mexico over the weekend and into early next week.

Dmitry Kiktev, Deputy Director of the Russian weather agency is predicting near normal temperatures and generally favorable conditions for the Winter Olympic Games to be held in Sochi over February 6-23, 2013. As a precaution, organizers have stored nearly half a million cubic meters of snow in huge refrigerated reservoirs for deployment across the ski slopes should Mother Nature not provide an adequate amount of snow by the start of the Olympic Games. You can read more at...

<http://en.rian.ru/sports/20130917/183520007/Russian-Meteorologist-Predicts-Cold-Weather-for-Sochi-Olympics.html>

MPR listener question: Earlier this year I heard you and Cathy talk about southeastern Minnesota (Grand Meadow specifically) as one of the wettest spots in the state. What are currently the wettest and driest spots in the state for 2013?

Answer: Fillmore County is probably still the wettest county in the state for 2013 as Ostrander reports over 40 inches of precipitation this year. Nearby Grand Meadow and Harmony have reported over 37 inches of precipitation for the year. The northwest is among the driest areas of the state. Both Warroad and Roseau report less than 15 inches for the year so far.

Twin Cities Almanac for September 20th:

The average MSP high temperature for this date is 69 degrees F (plus or minus 10 degrees F standard deviation), while the average low is 50 degrees F (plus or minus 9 degrees F standard deviation).

MSP Local Records for September 20th:

MSP weather records for this date include: highest daily maximum temperature of 94 degrees F in 1937; lowest daily maximum temperature of 47 degrees F in 1875; lowest daily minimum temperature is 28 degrees F in 1962; highest daily minimum temperature of 75 F in 1895; and record precipitation of 1.82 inches in 1902; A trace of snow fell in 1927 on this date.

Average dew point for September 20th is 48 degrees F, with a maximum of 72 degrees F in 1970 and a minimum of 22 degrees F in 1930.

All-time state records for September 20th:

The state record high temperature for this date is 99 degrees F at Fairmont (Martin County) in 1891 and at Montevideo (Chippewa County) in 1984. The state record low temperature for this date is 14 degrees F at Karlstad (Kittson County) in 1973. State record precipitation for this date

is 4.97 inches at Harmony (Fillmore County) in 1983; and state record snowfall for this date is 0.4 inches at International Falls (Koochiching County) in 1945 and again at Thief River Falls (Pennington County) in 1954.

Past Weather Features:

An 8-day Heat Wave prevailed over September 16-23, 1891. At least 13 Minnesota communities reported consecutive days with highs in the 90s F, and Montevideo topped out at 101 degrees F before cooling off to a high of only 68 degrees F on the 24th. September of 1891 proved to be the 4th warmest in state history.

A widespread hard-freeze ended the growing season for most parts of Minnesota on September 20, 1962. Many observers reported morning lows in the teens and twenties F. It was 28 degrees F as far south as Preston and Waseca. Indian summer came in October that year with a run of days with afternoon highs in the 70s and 80s F.

Another season ending hard frost and freeze came on September 20, 1973 with many observers reporting lows in the teens and twenties. Indian summer brought many days in the 70s F during October.

September 20, 1983 was extremely wet in southeastern Minnesota as strong thunderstorms brought 2-3 inches of rain to most places. Preston and Harmony were hit with nearly 5 inches of rain which caused a great deal of street flooding in those communities.

September 19-20, 1984 brought a brief September Heat Wave to the state with temperatures showing into the 90s F in 50 communities. Following the short Heat Wave temperatures plummeted on September 26th bringing a hard freeze to most areas.

A brief, small tornado (EF-0 winds 65-85 mph) touched down near Woodbury (Washington County) about 6:30 pm on September 20, 2007. No damage was reported as the funnel was on the ground for less than half a mile. Heavy rains and lightning strikes were reported from surrounding counties.

Outlook:

Mostly dry over the weekend with near average temperatures. Increasing cloudiness and stronger winds on Sunday. Warming temperatures next week with a chance for showers late Monday into Wednesday. The month should end very warm by next weekend as well.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

<http://www.climate.umn.edu/weathertalk/>

For access to other information resources go to

<http://www.climate.umn.edu/Seeley/>

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Minnesota WeatherTalk Newsletter for Friday, September 27, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, September 27, 2013

HEADLINES

- Preliminary September Climate Summary
- September of 1807
- October is a favorite month
- Climate Change Adaptation Conference
- Weekly Weather potpourri
- MPR listener questions
- Almanac for September 27th
- Past weather
- Outlook

Topic: Preliminary Climate Summary for September

Average September temperatures reported by observers around the state ranged from 2 to 5 degrees F above normal. Several days early in the month hit 90 degrees F or higher, with high dewpoints (70 F) pushing the Heat Index Values between 98 F and 102 F on September 9th. The highest temperature for the month was 97 degrees F at Preston on the 7th, while the lowest was 26 degrees F at Embarrass on the 17th and at Brimson on the 22nd. Numerous frosts occurred in northeastern and north-central counties, while the rest of the state escaped a September frost, which was good for crop maturation and drying. Corn harvesting had begun in some areas of the state.

Precipitation for September was below normal for most observers, especially the northwestern and southern counties which reported just 5 or less days with rainfall. Most observers reported between 1 and 2 inches. Some of the driest spots in the state were Argyle (Marshall County) with just 0.11 inches (their driest September ever surpassing 0.16 inches in 1948), Roseau with 0.18 inches (2nd driest September to 0.07 inches in 2012), Blue Earth (Faribault County) with 0.58 inches (2nd driest September to 0.55 inches in 2000), Winnebago (Blue Earth County) with 0.76 inches (4th driest September), and Austin with 0.82 inches (9th driest September). Thanks to some widely scattered but intense thunderstorms a few spots reported above normal rainfall for the month including 4.44 inches at Grand Portage, 4.04 inches at Kabetogama, 5.03 inches at Ottertail, 5.65 inches at Fergus Falls, 4.67 inches at Pelican Rapids, 5.14 inches at Long Prairie, and 4.49 inches at Big Lake. Thunderstorms brought large hail and strong winds (50-75 mph) to parts of central Minnesota on the 19th.

With September being the 3rd consecutive drier than normal month for the state, many more counties returned to the drought status of earlier in the year, with over half the state landscape designated to be in moderate to severe drought by month's end.

Topic: September 1807 in Minnesota

Alexander Henry was an explorer and trapper for the old Northwest Fur Trade Company at the beginning of the 19th Century. He explored and lived in the Red River Valley of Minnesota and North Dakota from 1800 to 1808, establishing camps and building temporary forts in many places along the river, including near Pembina and Drayton, ND as well as Warren, Oslo, and Red Lake Falls, MN. Thanks to his daily weather journal, one of the oldest in our region, we have a daily written record of the weather in northwestern Minnesota for the period from September 1807 to June 1808.. September, 1807 according to Henry was highly variable. Very sunny and warm early in the month with several days in the 80s F. Then it turned cool and showery by mid-month with a number of frosts and a hard freeze on the 16th (28 F). Fall coloration and leaf drop came about mid-month, and he observed the migration of geese and swans heading south. September 18th brought every kind of weather according to Henry's journal...."strong winds, heavy rain, hail, and even two inches of snow!" This was followed by another hard freeze on the 20th (27 F). The month concluded with yet another freeze on the 28th, followed by light showers and foggy weather through the end of the month.

Henry's journal is a treasure to a historian or climatologist as it is one of the few written records of the daily weather from such an early time period, before settlement of the Red River Valley. He documents a number of spring snow melt floods in the region and remarks about how the floods used to drown hundreds of buffalo which would graze the numerous islands. The 1800-1808 period is still encompassed by the northern hemisphere's Little Ice Age that extended to roughly 1850. In this context it is not unexpected to find that Alexander Henry recorded snows in September and winter snow cover persisting well into the month of May in northern Minnesota.

Topic: Coming up, October a favorite month for many

I came across this commentary about October's weather in an 1895 edition of the Minneapolis Journal...."October is generally a kingly month in Minnesota. It opens with the usual affluence of sunshine and quickening, bracing air, which [is} stimulating to the senses. Day after day, the transformation of summer greenery into the royal and gorgeous tones of autumn will go on and summer's silent fingering will be overwoven with pageantry of color which no human art can call into being. The recessional of the year is grander than the processional...."

From numerous conversations with weather observers and other friends, I have drawn the conclusion that many of us cherish October as a favorite month. Some of the memories shared include:

A pageantry of landscape color for outdoor weddings, harvest festivals, Octoberfest dinners...visits to the apple house and glasses of fresh cider...picking out pumpkins...song-filled hay rides...filling the pantry with the garden harvest including homemade pickles and apple sauce...frosty morning bike rides under clear, blue skies...wearing handmade sweaters and embroidered sweatshirts...a bonfire rally...the last boat trip...migrating bird formations...drying and arranging the last of the cut flowers...football and soccer games...and of course MPR's fall pledge drive (which starts October 10).

Topic: Climate Change Adaptation Conference at the Science Museum on November 7, 2013

Several organizations are partnering to host the first statewide conference on Climate Change Adaptation, Planning and Practice. It will take place at the Science Museum of Minnesota in downtown St Paul on November 7, 2013. Registration for the all day program is only \$50. Sessions will be devoted to city planning, agriculture, transportation, natural resources (including watershed management), and public health. You can read more about the conference and register at.....

<http://wrc.umn.edu/news/index.htm>

Topic: Weekly Weather potpourri:

The highly anticipated AR5 report from the IPCC was partly released on Friday (September 27th), the remainder of the report will be released on Monday (Sept 30). IPCC scientists emphasized that confidence about the human fingerprint on climate change has grown to 95 percent. Specific environmental features that are clearly related to human activity include increasing frequency of severe thunderstorms and heat waves, as well as continued loss of Arctic sea ice and sea level rise. The summary for policymakers and the final AR5 report will be available for reading at...

<http://www.ipcc.ch/>

Researchers from the University of Missouri this week published a study of the fossil evidence recovered from Tanzania representing the Late Cretaceous Period (90 million years ago) and determined that when the Earth's atmosphere contained up to 1000 ppm of carbon dioxide there were no continental ice sheets present. You can read more about this study at...

<http://www.sciencedaily.com/releases/2013/09/130924153956.htm>

Another study from Stanford researchers and published in the Proceedings of the National Academy of Science suggests that continued climate change will lead to a higher frequency of severe thunderstorms across the USA. Models of the future changes in climate show an increase in convective available potential energy (CAPE), a measure of energy correlated with the development of severe thunderstorms. You can read more about this study at....

<http://www.sciencedaily.com/releases/2013/09/130923155542.htm>

Portions of Vietnam, Thailand, and Laos, already plagued by flooding and heavy rains this month are expected to see even heavier rainfall from Tropical Storm Wutip in the Western Pacific Ocean. This storm is expected to make landfall late in the weekend and early next week bringing several inches of rain to the area.

NOAA National Weather Service expects the first significant autumn snowfall to occur in portions of WY, MT, and ID Friday and Saturday, with up to a foot of snow in the Wind River

Range of western Wyoming. It will be short-lived as temperatures warm into the 40s and 50s F later in the weekend.

Some drought notes this week from Brad Rippey with the USDA World Agricultural Outlook Board:

-During the drought-monitoring period ending September 24, U.S. severe to exceptional drought (D2 to D4) coverage fell from 28.35 to 25.33%; extreme to exceptional drought (D3 to D4) coverage fell from 6.85 to 4.33%; and exceptional (D4) drought coverage fell from 0.43 to 0.31%. In all three cases (D2 to D4, D3 to D4, and D4), drought coverage stood at its lowest level since June 2012.

- For the week ending September 24, corn and soybeans in drought [across the USA] were down one percentage point, with 54 and 44% of the respective production areas categorized as being in moderate drought (D1) or worse. There were two percentage point decreases apiece in drought coverage for cattle (51% in drought) and hay (37%). Forty percent of the U.S. winter wheat production area was in drought on September 24, down three percentage points from a week ago.

MPR listener question: I haven't heard you talk about stored soil moisture values in a long time. With this recent sequence of dry months and return of drought how much moisture is stored in the soil this fall?

Answer: Good question, and of course the answer varies with geography. In southwestern Minnesota at Lamberton a measurement made last week showed just 1.49 inches of moisture available in the top 5 feet of soil. That's very dry (average for this time of year is about 4 inches) but not as low as last year at this time (0.72 inches). At Waseca, in south-central Minnesota, a recent measurement shows over 7 inches of stored moisture remaining in the top 5 feet of the soil profile (slightly above normal for this time of year), and well above last year when only about 2 inches was stored. Elsewhere estimate ranging from 2 to 4 inches are pretty common.

Twin Cities Almanac for September 27th:

The average MSP high temperature for this date is 66 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 46 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for September 27th:

MSP weather records for this date include: highest daily maximum temperature of 88 degrees F in 1987; lowest daily maximum temperature of 40 degrees F in 1942; lowest daily minimum temperature is 29 degrees F in 1942 and 1991; highest daily minimum temperature of 64 F in 1891; and record precipitation of 0.54 inches in 1947; and no snow has fallen on this date.

Average dew point for September 27th is 45 degrees F, with a maximum of 67 degrees F in 1905 and a minimum of 24 degrees F in 1951.

All-time state records for September 27th:

The state record high temperature for this date is 97 degrees F at Beardsley (Big Stone County) in 1894, at Hallock (Kittson County) and Wheaton (Traverse County) in 1952, and at Canby (Yellow Medicine County) in 1956. The state record low temperature for this date is 13 degrees F at Beardsley (Big Stone County) in 1893. State record precipitation for this date is 3.50 inches at Wolf Ridge Environmental Learning Center (Lake County) in 1996; and state record snowfall for this date is 6.0 inches at Benson (Swift County) in 1942.

Past Weather Features:

September 27-28, 1894 brought a fall Heat Wave to many parts of Minnesota with low to mid 90s F. A strong cold front caused temperatures to plummet into the 30s by the evening of the 29th.

September 26-27, 1942 brought an early season snow storm to Minnesota. A heavy wet storm made travel difficult in rural areas. Bird Island reported 8 inches, Long Prairie 7.5 inches, Detroit Lakes, Benson and Willmar reported 6 inches, New Ulm 5.5 inches, and Grand Meadow 5 inches. The snow was short-lived as temperatures warmed into the 50s and 60s F by the end of the month.

Thunderstorms brought heavy rain to northern Minnesota communities on September 27, 1996. Lutsen Mountain received nearly two inches of rain and many other areas reported well over an inch. Wolf Ridge Environmental Learning Center near Finland on the North Shore reported an all-time September rainfall record of 3.50 inches.

Outlook:

Mostly cloudy and showery on Saturday with somewhat cooler temperatures and strong winds. Dry and sunny on Sunday and Monday with warmer temperatures. Generally dry and warm next week with a chance for showers and thunderstorms by late Thursday and Friday.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

<http://www.climate.umn.edu/weathertalk/>

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Minnesota WeatherTalk Newsletter for Friday, October 4, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, October 4, 2013

HEADLINES

- Dry air to start October
- Wet period starts
- Climate Change Adaptation Conference
- Weekly Weather potpourri
- MPR listener questions
- Almanac for October 4th
- Past weather
- Outlook

Topic: Very dry air to start October

The first two days of October were dominated by a warm and dry air mass. How dry was it? Well afternoon relative humidity fell off into the teens and twenties on both October 1st and 2nd, with very low dewpoints (in the 20s and 30s F). Some extremely low afternoon relative humidity values included 12 percent at St James, 17 percent at Luverne, 18 percent at Tracy, and 19 percent at Fairmont. Such low values of relative humidity are somewhat common in October, especially in dry years and after the state crop acreage has matured and dried out. The first week of October in 2011 brought similar values of relative humidity with many readings in the teens, and back in October of 1999 places like Faribault and Litchfield reported relative humidity of just 7 and 8 percent, respectively.

Combined with gusty winds the dry weather produced some rather high evaporation rates for this time of year, ranging from 0.2 to 0.3 inches per day.

Topic: Wet period starts

Following the dry start to the month, thunderstorms roared across portions of the state later in the day on October 2nd and into October 3rd, bringing hail to southwestern Minnesota (1.75 inch diameter size near Worthington), and heavy rains to parts of south-central and southeastern Minnesota. Some observers reported new daily rainfall records, including 0.90 inches at MSP airport on the 2nd. Those reporting new daily record rainfall amounts for October 3rd included: 2.76 inches at Pine Island; 2.45 inches at Zumbro Falls; 1.79 inches at North Mankato; 1.45 inches at Gaylord; 1.40 inches at the University of Minnesota St Paul Campus; 1.39 inches at Worthington; and 1.32 inches at Faribault. You can read more about the rainfall from this storm and see maps of the distribution on our web site at...

http://www.climate.umn.edu/doc/journal/131002_03_rain.htm

The rains were very welcome, especially in areas of the state where drought had taken hold. In fact, the overall areas of the state landscape designated to be in moderate to severe drought shrunk by over six percent over the past week. Yet more rainfall is expected around the state through Sunday of this weekend, and further out the National Weather Service expects a wetter than normal weather pattern over the state through October 17th.

Topic: Climate Change Adaptation Conference at the Science Museum on November 7, 2013

Several organizations are partnering to host the first statewide conference on Climate Change Adaptation, Planning and Practice. It will take place at the Science Museum of Minnesota in downtown St Paul on November 7, 2013. Registration for the all day program is only \$60. Sessions will be devoted to city planning, agriculture, transportation, natural resources (including watershed management), and public health. You can read more about the conference and register at.....

<http://wrc.umn.edu/news/index.htm>

Topic: Weekly Weather potpourri:

News from the MN Senate Environment and Energy Committee: Help us kick off a statewide conversation on Minnesota's energy future! On Tuesday, October 22, in the Science Museum Auditorium, the Minnesota Department of Commerce is sponsoring a day-long workshop (<https://www.eventbrite.com/event/8390733911>) to kick-off a statewide discussion on how Minnesota can transition to a fossil fuel-free economy. The findings from the workshop will be used to inform a study to map-out the path to a sustainable energy system in Minnesota. What do you think should be considered as we create a plan to build a new energy future? Participation is free, and you can have an impact just by your presence (demonstrating interest from sustainable energy advocates.) Technical expertise is not required but your creativity and strategic thinking are welcomed! The day will start with some interesting presentations by Rocky Mountain Institute (<http://www.rmi.org/>), followed by group discussion and Q&A. To register go to:

<https://www.eventbrite.com/event/8390733911#>

Typhoon Fitow was churning across the East China Sea in the Western Pacific Ocean this week heading towards the China mainland by this weekend. Winds were over 100 mph, producing 30 to 40 foot seas waves, and heavy bands of rainfall that were expected to drench parts of Taiwan before moving onto the China coast. With landfall in China Typhoon Fitow is expected to rapidly weaken. And Tropical Storm Danas is moving in behind Typhoon Fitow and is expected to take a track towards southern Japan next week.

In the Gulf of Mexico, the NOAA Hurricane Center is tracking Tropical Storm Karen (the 11th named storm of the Atlantic Hurricane Season). Karen may reach hurricane strength this weekend before making landfall along the MS, AL, FL coastlines Saturday night. Some coastal areas of those states may expect to see total rainfall amounts of 3 to 6 inches through Sunday, causing local flooding.

According to the BBC, Wednesday, October 2nd brought a very rare tornado to County Galway in western Ireland. The storm was somewhat short-lived but it knocked down a number of trees and damaged the Clonfert Cathedral, producing hail and heavy rainfall across the county as well.

National Weather Service offices reported this week that a strong storm off the Pacific Ocean brought heavy rain to the state of Washington, and some snowfall to parts of Idaho and Montana. Some parts of Montana reported 6 inches or more of snowfall. The strong low pressure system caused the NWS to issue a blizzard warning for western SD and the Rapid City area for Friday through early Saturday, and early Friday morning observers in western SD were already reporting snowfall amounts of 2 to 6 inches.

MPR listener question: With all of this rain expected I was wondering what is the daily record and monthly record rainfall for the Twin Cities during the month of October?

Answer: Actually the daily record rainfall in the Twin Cities for October occurred on today's date, the 4th, in 2005 with 4.61 inches. That's also the one and only time in the Twin Cities climate record (1871-present) that it has rained over 3 inches in one day during October. The wettest month of October in the Twin Cities record occurred in 1911 when a total of 6.42 inches was measured. October of 1911 also brought some snowfall to the Twin Cities area.

Twin Cities Almanac for October 4th:

The average MSP high temperature for this date is 65 degrees F (plus or minus 10 degrees F standard deviation), while the average low is 45 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for October 4th:

MSP weather records for this date include: highest daily maximum temperature of 89 degrees F in 1922; lowest daily maximum temperature of 41 degrees F in 1885; lowest daily minimum temperature is 24 degrees F in 1935; highest daily minimum temperature of 68 F in 1922; and record precipitation of 4.61 inches in 2005; and a trace of snow fell on this date in 1935.

Average dew point for October 4th is 42 degrees F, with a maximum of 69 degrees F in 2005 and a minimum of 13 degrees F in 1952.

All-time state records for October 4th:

The state record high temperature for this date is 94 degrees F at Albert Lea (Freeborn County), Amboy (Blue Earth County), and Theilman (Wabasha County) in 1997. The state record low temperature for this date is 10 degrees F at Ada (Norman County) in 1935 and at Argyle (Marshall County) in 1989. State record precipitation for this date is 4.25 inches at Farmington (Dakota County) in 1900; and state record snowfall for this date is 1.5 inches at Ashby (Grant County) in 1903.

Past Weather Features:

Perhaps the wettest start to October historically occurred in 1900 when daily thunderstorms over the 2nd through the 6th brought heavy amounts of rainfall to many parts of the state. Many observers reported a total of 2 to 4 inches of rain over that 5-day period. A few places like Wabasha and Farmington received over 5 inches. Fortunately most crops had already been harvested that year.

October 4, 1903 brought snow to many northern Minnesota communities, including Moorhead and Bemidji. It was the only snowfall that occurred that month.

October 4, 1935 was one of the coldest in state history. Many places started out that day in the teens F and warmed up little during the day. It was as cold as 15 degrees F at Waseca and just 10 degrees F at Ada in the Red River Valley. Daytime temperatures never warmed out of the 20s F at many locations.

October 3-4, 1997 brought one of the hottest ever spells of October weather to Minnesota. Over 25 communities reported daytime highs of 90 degrees F or greater. The other shoe dropped the next week with cool temperatures and many days of consecutive rainfall.

Persistent and heavy rains over October 4-6, 2005 caused serious flash flooding in many parts of eastern Minnesota. Rainfall totals over 4 inches were common, and some areas received from 5 to 7 inches. An observer near Rush City reported nearly 9 inches. Many home basements were flooded, street flooding was widespread, and portions of Interstate 35E had to be closed for a time. Historically, flash floods are very uncommon in October, but this was one of the worst.

Outlook:

Cooler than normal temperatures over the weekend with widespread occasional showers through Sunday. Cool and humid for the start of the Twin Cities Marathon on Sunday morning. Drier on Monday. Warming trend begins on Tuesday with a chance for showers returning by late next week.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, October 11, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, October 11, 2013

HEADLINES

- Warm and wet start to October, with more record rains
- Kuehnast Lecture, October 17th
- Climate Change Adaptation Conference
- Weekly Weather potpourri
- MPR listener questions
- Almanac for October 11th
- Past weather
- Outlook

Topic: Warm and wet start to October

Most observers are reporting a warm, wet start to October. Average temperature for the first ten days of the month is ranging from 3 to 6 degrees F warmer than normal in most places. In fact 9 of the first 10 days of the month have recorded above normal daily temperatures with many afternoon highs in the 70s F. Most agricultural counties in Minnesota have yet to report an autumn killing frost, extending the growing season. The warm temperatures have also helped reduce the harvest moisture of crops, lessening farmer drying costs prior to storage.

Many Minnesota climate observers are already reporting above normal rainfall for the month of October, some as a result of record-setting daily amounts on October 3rd (reported in last week's WeatherTalk newsletter). Several communities have reported 2 or more inches this month including Browns Valley, Brainerd, Mora, Worthington, Albert Lea, Mankato, New Ulm, Waseca, and Rochester. In southeastern counties slow moving thunderstorms Friday night and into Saturday (Oct 4-5) brought more record-setting daily rainfall amounts including 2.00 inches at Austin, 3.80 inches at Caledonia, 4.15 inches at Chatfield, 5.30 inches at Grand Meadow, 2.31 inches at Houston, 3.35 inches at La Crescent, 4.34 inches at Lanesboro, 4.35 inches at Rushford, 5.85 inches at Preston, and 4.10 inches at Spring Valley. The consequences of these heavy rains last weekend in SE Minnesota included flooded basements, road washouts and closures, stranded vehicles, and even mudslides. The 5.85 inches of rainfall reported at Preston (Fillmore County) establishes a new statewide record amount for October 5th, beating the old record of 4.95 inches at St Francis in 2002. It was also the 2nd highest daily amount of rainfall ever measured at Preston, trailing only 7.30 inches on July 11, 1981, and represents about a once in 30 year occurrence according to NOAA Atlas 14. More detailed descriptions of the storm over October 4-5 can be found at....

<http://www.crh.noaa.gov/arx/?n=oct42013heavyrain>

Topic: Kuehnast Lecture, October 17th

The 21st Annual Kuehnast Endowment Lecture will take place at 2:00 pm in the North Star Ballroom of the University of Minnesota St Paul Campus Student Center next Thursday, October 17th. Our speaker this year is Dr. Piers Sellers, Deputy Director of the NASA-Goddard Space Flight Center, and former Space Shuttle astronaut. Dr. Sellers participated in three Space Shuttle missions and did numerous space walks. He is a biometeorologist by training and will present a lecture titled "The Race to Understand a Changing Planet." The event is free and open to the public. Refreshments will be served afterwards.

Topic: Climate Change Adaptation Conference at the Science Museum on November 7, 2013

Several organizations are partnering to host the first statewide conference on Climate Change Adaptation, Planning and Practice. It will take place at the Science Museum of Minnesota in downtown St Paul on November 7, 2013. Registration for the all day program is only \$60. Sessions will be devoted to city planning, agriculture, transportation, natural resources (including watershed management), and public health. You can read more about the conference and register at.....

<http://wrc.umn.edu/news/index.htm>

Topic: Weekly Weather potpourri:

The Los Angeles Times newspaper editorial policy prohibits publication of of op-ed letters that deny climate change. This may be a first among major newspapers. A quote from Paul Thornton, the Times letters editor appeared in the Huffington Post this week as, "simply put, I do my best to keep errors of fact off the letters page; when one does run, a correction is published," he explained. "Saying 'there's no sign humans have caused climate change' is not stating an opinion, it's asserting a factual inaccuracy."

In the Western Pacific Ocean, Typhoon Nari is expected to bring heavy rain, high seas, and strong winds to the Philippines this weekend. Maximum wind gusts were ranging up to 125 mph causing 30-40 foot sea waves. It is a dangerous and powerful storm. Typhoon Nari is expected to cross the Philippines north of Manila and then proceed towards Southeast Asia early next week. In the northern Indian Ocean even more powerful Cyclone Phailin was churning in the Bay of Bengal and gaining strength. Winds were expected to peak near 160-170 mph, producing seas of 50-60 feet before it makes landfall in India later in the weekend. It is expected to be a very dangerous storm with high winds, storm surge, and heavy rains that will likely displace many people from their homes.

A recent study from the University of Hawaii and published this week in the journal Nature suggests that climate change will be so pronounced by 2047 that even "the lowest monthly dips in temperatures will be hotter than we've experience in the past 150 yearss....." The researchers used climate model output from 39 Earth System Models and examined the projected temperature distributions of the future. They further noted that the temperature changes will

emerge with more dramatic departures from the historical records in the tropics than in other latitudes. You can read more about this paper at...

<http://www.sciencedaily.com/releases/2013/10/131009133216.htm>

Estimates on the consequences of last week's blizzard and heavy snowfall in WY and western SD suggest that upward of 70,000 cattle may have perished in the storm. Many areas received over 20 inches of snow, and several reported 30 or more inches. Records for the most snowfall so early in the month of October were shattered in both WY and SD. More information on that storm can be found at the Rapid City National Weather Service web site.....

http://www.crh.noaa.gov/news/display_cmsstory.php?wfo=unr&storyid=97462&source=0

MPR listener question: Most of southern Minnesota has yet to experience a season ending frost this fall. We have certainly been enjoying late season vegetables from our garden in Waseca. When do you think the first frost will arrive?

Answer: We have certainly had a prolonged and warm fall season so far. Forecast models suggest that you may get a frost in the Waseca area next Wednesday or Thursday, October 16-17. So that may be the end of your growing season. Those dates are about 16 days later than normal as your median autumn frost date at Waseca is October 1st. This kind of makes up for the late spring frost you had at Waseca on May 12 this year which was about 13 days later than your median last date for frost in the spring.

Twin Cities Almanac for October 11th:

The average MSP high temperature for this date is 61 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 42 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for October 11th:

MSP weather records for this date include: highest daily maximum temperature of 84 degrees F in 1930; lowest daily maximum temperature of 39 degrees F in 1875 and 1959; lowest daily minimum temperature is 22 degrees F in 1876; highest daily minimum temperature of 63 F in 1997; and record precipitation of 1.36 inches in 1881; and a record 0.5 inches of snow fell on this date in 1977.

Average dew point for October 11th is 41 degrees F, with a maximum of 67 degrees F in 1962 and a minimum of 15 degrees F in 2009.

All-time state records for October 11th:

The state record high temperature for this date is 92 degrees F at Canby (Yellow Medicine County) in 1928. The state record low temperature for this date is 10 degrees F at Ada (Marshall County) in 1935. State record precipitation for this date is 3.28 inches at Litchfield (Meeker

County) in 1983; and state record snowfall for this date is 10.0 inches at Mt Iron (St Louis County) in 1909.

Past Weather Features:

October 11-15, 1909 brought an early snowfall to many Minnesota communities. Mt Iron (St Louis County) reported a foot of snow, while Kelliher recorded nearly six inches and International Falls reported 4 inches. As far south as Winona they received nearly 2.5 inches. The snow was short-lived as temperatures warmed into the 40s and 50s F the next few days.

On a statewide basis one of the warmest October 10s occurred in 1910. Scores of communities reported sunny skies, south winds, and afternoon high temperatures in the 80s F. It was 82 degrees F as far north as Detroit Lakes. Temperature of 90 degrees F or higher occurred at Pipestone, Albert Lea, Windom, and St Peter. The first two weeks of October 1910 were dominated by days with temperatures in the 70s and 80s F, before temperatures fell to below normal levels for the second half of the month.

October 10-11, 1928 brought a brief two day period of summer heat to many western and southern Minnesota communities. Canby, Beardsley, Willmar, Redwood Falls, Tracy, Worthington, Fairmont, Winnebago, and Bird Island all hit 90 degrees F or higher. It was the last 90 F reading of the year. Heavy rains and cool temperatures dominated the next week.

October 11, 1935 was one of the coldest in history for many Minnesota communities. The morning low was just 10 degrees F at Ada, while Roseau, Warroad, Big Falls, Beardsley, and Campbell reported lows in the teens F. As far south as Marshall the morning temperature was just 20 degrees F. The afternoon high temperature struggled to reach 38 degrees at Brainerd. Daytime temperatures rebounded into the 70s F two days later.

Late season thunderstorms brought heavy rains to parts of the state on October 11, 1961, with many areas reporting well over 1 inch. Halstad and Red Lake Falls received over 2 inches. It was the last of the thunderstorm rainfalls for that year.

Outlook:

Cooler with near normal temperatures over the weekend, and some chance for widely scattered showers on Saturday. Then more sun on Sunday. Increasing cloudiness on Sunday night with a chance for showers on Monday. Showers continuing into Tuesday with cooler than normal temperatures. Drier and cooler on Wednesday and Thursday next week, then wetter towards the weekend.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

<http://www.climate.umn.edu/weathertalk/>

For access to other information resources go to

<http://www.climate.umn.edu/Seeley/>

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Minnesota WeatherTalk Newsletter for Friday, October 18, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, October 18, 2013

HEADLINES

- New Seasonal Climate Outlooks
- A missed forecast
- wet October, getting wetter
- Comments on the Kuehnast Lecture
- Climate Change Adaptation Conference
- Weekly Weather potpourri
- MPR listener questions
- Almanac for October 18th
- Past weather
- Outlook

Topic: New Seasonal Outlook from NOAA-Climate Prediction Center

The NOAA-CPC released new seasonal climate outlooks on Thursday this week, covering the period from November through January. Their forecast tools are still giving no strong evidence for above or below normal categories of temperature or precipitation to dominate in Minnesota. Some of their models favor an above normal temperature pattern in parts of southern Minnesota over the calendar period, but not elsewhere in the state. Thus it appears that the models are very uncertain on what type of winter weather pattern we may have. They also released a drought outlook for the period through January 31st and although their models see continued alleviation of drought due to above normal precipitation in October, they also favor persistence of drought in some areas of Minnesota through January.

Topic: A missed forecast

Last Friday I spoke on Morning Edition with Cathy Wurzer about the prospect for widespread frost that would end the agricultural growing season for Waseca and other places by October 16-17 of this week. I was informed by several listeners that this turned out to be incorrect, as frost occurred earlier in many places, notably over October 13-14 (Sunday-Monday). Indeed places like Waseca, Zumbrota, Preston, Theilman, Windom, Willmar, Browns Valley, and Montevideo did get a season ending frost over those dates. Since Monday, numerous other locations have reported frosts this week, but there are still a few agricultural counties where it has not yet occurred. However, widespread frost is likely for this weekend and will probably affect all of the state. The coldest temperature observed so far this month has been 24 degrees F at Embarrass and at International Falls.

Topic: Wet October, getting wetter

After a relative dry start to the month, this October is turning into a wetter than normal month with over two weeks yet to go. Significant rainfall totals this week in combination with those that fell earlier in the month have added up to over a month's worth at several locations. Normal October precipitation values (1981-2010) generally range from 2.0 to 2.5 inches, but many observers are already reporting over 4 inches, including Moorhead, Fergus Falls, Pelican Rapids, Melrose, Willmar, Cloquet, Isle, Moose Lake, Zumbrota, and Austin. Some observers have already had over twice normal monthly precipitation including Browns Valley (5.23"), Onamia (5.46"), Caledonia (5.55"), Chatfield (6.10"), Preston (6.73"), and Grand Meadow (7.08"). 2013 is the 4th wettest October in history (back to 1887) at Grand Meadow already.

Topic: Comments on the Kuehnast Lecture, October 17th

Dr. Piers Sellers, former Space Shuttle astronaut for NASA and now Deputy-Director of the Goddard Space Flight Center gave a terrific presentation for the 21st Annual Kuehnast Endowment Lecture at the University of Minnesota on October 17th this week. A veteran of three Space Shuttle Missions and numerous space walks, he provided a perspective of planet Earth that few can voice. He talked about how the sixteen Earth System satellites of NASA have greatly amplified our knowledge of both climate behavior and trends over the last several decades, providing us with improved understanding of climate change and its impact on the land and oceans. He also pointed out that all but two of the Earth System satellites are now working beyond the scope of their designed longevity in space and are in urgent need of replacement. His presentation was recorded and will soon be posted on our web site at.....

www.climate.umn.edu

Topic: Weekly Weather potpourri:

A study published this week in Proceedings of the National Academy of Science by Princeton University scientists documents that since the mid 20th Century the plants in Earth's abundant ecosystems have absorbed 186-192 billion tones of carbon, significantly constraining the levels of carbon in the atmosphere and their effect on global temperature. This study is acknowledged to be the first to estimate the extent to which plants have prevented even more climate change from occurring. You can read about this paper online at....

<http://www.sciencedaily.com/releases/2013/10/131016145646.htm>

In the Western Pacific Super Typhoon Francisco was growing in strength over the open ocean waters southeast of Japan. Winds were already measured at over 130 mph and were expected to increase to over 140 mph, producing sea waves of 40-50 feet. This typhoon may impact parts of southern Japan by the middle of next week, but hopefully in a weakened state. Earlier in this week Typhoon Wipha brought strong winds, heavy rains, and landslides to parts of Japan, closing roads, damaging buildings, and killing at least 18 people.

The Bureau of Meteorology reports that numerous wild fires have broken out in New South Wales (earlier than normal on the calendar), notably outside Sidney as a result of a prolonged dry, warm weather pattern. Some weather observers in New South Wales reported their hottest

winter on record (June-August), followed by their warmest September in history, and only about half of normal precipitation during this period. Recent daytime temperatures have peaked between 95-99 degrees F before the bush fires started. A recent cool spell with diminished winds have helped firefighters there gain more control over the situation.

Highlights from the weekly drought update from the Drought Mitigation Center in Lincoln, NE include:

- After a wet week across much of the central and eastern United States, drought receded to its smallest spatial extent since May 2012 on the Oct. 15 U.S. Drought Monitor. Drought in the western states was mostly unchanged.
- The weekly drought map shows just 36.71 percent of the contiguous United States in moderate drought or worse, compared with 38.59 percent a week earlier. The last time drought coverage was this low was May 29, 2012, at 37.37 percent.
- Drought eased incrementally across the Midwest, Great Plains and South, including parts of Minnesota, Wisconsin, Nebraska, South Dakota, North Dakota, Texas, Louisiana, Mississippi and Arkansas. Colorado and Wyoming also had areas of improvement.
- The area of Minnesota's landscape in moderate to severe drought declined from 38 percent last week to just 28 percent this week.

MPR listener question: The recent blizzard in western South Dakota made me wonder if anyone in Minnesota has ever reported over a foot of snow during early October?

Answer: Officially, October 18 is the earliest date in Minnesota history for any observation of a foot or more of snowfall. This occurred at Baudette, MN on October 18, 1916 when they reported 16 inches of snow. Actually that year a winter storm brought 10-20 inches of snowfall to several northern Minnesota locations. Few official measurements were noted from the famous October 16-18, 1880 blizzard which started the Laura Ingalls Wilder "Long Winter" and shut down southwestern Minnesota. It was noted by some pioneer families at the time that snow piled into 20 foot drifts, isolating many settlers and closing down the railroads for days.

Twin Cities Almanac for October 18th:

The average MSP high temperature for this date is 58 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 40 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for October 11th:

MSP weather records for this date include: highest daily maximum temperature of 87 degrees F in 1950; lowest daily maximum temperature of 30 degrees F in 1930; lowest daily minimum temperature is 18 degrees F in 1972; highest daily minimum temperature of 61 F in 1950; and record precipitation of 1.05 inches in 1979; and a record 1.3 inches of snow fell on this date in 1976.

Average dew point for October 11th is 37 degrees F, with a maximum of 65 degrees F in 1971 and a minimum of 9 degrees F in 1972.

All-time state records for October 11th:

The state record high temperature for this date is 87 degrees F at MSP, St Peter, Chaska, and Farmington in 1950. The state record low temperature for this date is 5 degrees F at Crookston (Polk County) in 1992. State record precipitation for this date is 3.25 inches at Deep Portage (Cass County) in 1994; and state record snowfall for this date is 16.0 inches at Baudette (Lake of the Woods County) in 1916.

Past Weather Features:

An early winter storm brought rain and snow to the state over October 16-18, 1873. Observers reported 1 to 3 inches of rainfall, some mixed with snowfall and low temperatures in the 20s F. This storm was a precursor to even more snowfall later that month as temperatures fell into the single digits and teens F.

In back to back years, 1916 and 1917, October 18-19 brought heavy snows to northern Minnesota communities and blizzard conditions in some places. Many observers reported 10-20 inches of snowfall from these storms bringing an early start to winter.

October 17-19, 1950 brought a return of summer to much of Minnesota. At least 25 communities saw the thermometer reach into the 80s F under bright sunny skies. Only in far northern Minnesota did the temperatures remain in the 50s and 60s F.

Bitter cold gripped the state on October 18, 1992. Low temperatures in the teens F were reported as far south as Rochester (17 F). In northern communities lows dropped into the single digits F and high temperatures could only climb into the 30s F, reaching just 32 degrees F at Crookston. Temperature rebounded into the 60s and 70s F the last week of October.

Words of the Week: Ice Plow

Before refrigeration, in the Pioneer settlement era and even the early 20th Century, ice plows were used to cut grooves in the ice over rivers, lakes, and ponds. These were sharp-bladed plows pulled by teams of horses that cut checker-board patterns across the ice. The ice blocks were sawed out, then floated to shore and taken by wagons or sleds to ice houses and caves. The abundance and longevity of refrigeration was clearly linked to the severity of Minnesota winters.

Outlook:

A significantly cooler period coming up with below normal temperatures over the weekend and into next week. After a partly sunny sky on Saturday, clouds will dominate the skies, with occasional rain and even mixed in with snow in some places. Widespread frosts will also occur over the next week. A warm up is not seen until next weekend.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

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Minnesota WeatherTalk Newsletter for Friday, October 25, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, October 25, 2013

HEADLINES

- Cold week
- New climate service
- Weekly Weather potpourri
- MPR listener questions
- Almanac for October 25th
- Past weather
- Outlook

Topic: Cold week

Since last Sunday (Oct 20) temperatures around the state have been averaging from 8 to 12 degrees F cooler than normal, with many daytime high temperatures remaining in the 30s F. Brainerd tied a record cold maximum temperature value on the 21st with a reading of just 35 degrees F, while Grand Rapids tied their record cold maximum temperature value for that date with a reading of just 33 degrees F. In fact over the 22nd and 23rd some observers reported high temperatures that remained below freezing including 31 degrees F at Isabella, Bemidji, and Embarrass, and just a 30 degrees F high at Grand Marais Airport. Embarrass reported back to back lows of just 20 degrees F on the 21st and 22nd, and then just 19 degrees F on the 25th. Surprisingly, the state's lowest temperatures this week came from southeastern Minnesota where Zumbrota and Preston reported just 19 degrees F on the 22nd, while Byron reported 18 degrees F on the 23rd, setting a new record low reading for that date. Also on October 22nd Theilman (Wabasha County) tied their record low with a reading of 20 degrees F.

The cold temperatures also produced some reports of snowfall across the state. Most observers reported a trace, and several reported over 1 inch. International Falls reported at least a trace of snowfall everyday since October 18th (7 consecutive days), while other observers reported over 1 inch of accumulation. Ottertail reported a new daily record snowfall amount of 2.5 inches on October 20th and a total of 4 inches for the week. Isabella, along the north shore of Lake Superior reported 5 inches this week, as did Askov in Pine County.

Topic: New climate data service

The Midwest Climate Center in Illinois recently introduced a new data service called cli-MATE. It allows access to most of Minnesota's climate data, along with growing season tools (frost date and growing degree days), maps, and graphics. Most importantly it is all free of charge. If interested you can set up a new user account there. Give it a try at...

<http://mrcc.isws.illinois.edu/CLIMATE/>

Topic: Halloween weather

Halloween weather is usually pleasant in Minnesota with temperatures commonly in the 40s and 50s F. Precipitation occurs slightly less than a third of the time. For the Twin Cities and further south snow is unlikely for Halloween, occurring only about one year in ten. Of course many remember the famous Halloween Blizzard of 1991, when 3 to 10 inches of snowfall was measured across eastern parts of the state, and then the bulk of the snowfall occurred over November 1-2, leaving many observers with over 2 feet (28.4" in the Twin Cities and 36.9" in Duluth). The all-time temperature records for Halloween include a reading of 86 degrees F at Worthington in 1950, and a reading of -4 degrees F at Hallock in 1913. For this year's Halloween (next Thursday) it looks like temperatures may be cooler than normal and there will be a chance for mixed precipitation (rain or snow), but too early to tell how much.

Topic: Weekly Weather potpourri:

Comments from Brad Rippey of the USDA on the weekly drought assessment across the USA: "In recent weeks, abundant precipitation has fallen in nearly all of the nation's drought-affected areas. As a result, only 35.00% of the contiguous U.S. remained in drought on October 22, down from 45.46% just three weeks ago..... Thirty-five percent represents the smallest U.S. drought area since May 15, 2012. For the three-week period ending October 22, all crops and commodities in drought were down sharply. Only 38% of the U.S. corn production area was in drought on October 22, down from 54% on October 1 and a late-summer peak of 55%. Similarly, 29% of the soybean production area was in drought, down from 43% three weeks ago and a late-summer high of 45%. With the return of dry weather in recent days, harvest of U.S. summer crops has accelerated. The corn harvest was 39% complete by October 20, while the soybean harvest was 63% complete.

Tropical Storm Francisco was spinning in the Western Pacific Ocean southeast of Japan. It was producing winds of 50-65 mph with sea waves of 15-25 feet this week, but was not expected to be a weather threat to Japan. It is expected to dissipate over the weekend. Yet further southeast of Japan was Typhoon Lekima, producing winds of 135 mph and sea waves of 40-50 feet. It too was expected to remain out to sea and dissipate by early next week. In the eastern Pacific Ocean Tropical Storm Raymond was moving out to sea further away from the coast of Mexico. It was expected to strengthen (to perhaps hurricane status) but not be a threat to make landfall.

The United Kingdom Meteorological Office announced this week that Oxford University has joined in with University of Reading, University of Exeter, and University of Leeds in forming the Met Office Partnership (MOAP) to accelerate the study of extreme weather and changing climate. Researchers from these institutions will be joining together to enhance knowledge and understanding of the Earth's climate system, its extreme weather, and modeling the future climate of the planet as well.

MPR listener question: We live on the Mesabi Range near Chisholm and had snow this week,

not especially unusual for late October. But we were wondering what is the snowiest October in history?

Answer: The snowiest October in Minnesota history occurred in 1951 when the observer at Hibbing reported 18.9 inches of snowfall. This total came from three separate snow storms on the 22nd, the 28th, and the 30th. With the abundant snow fall in October, Virginia reported a seasonal total over 65 inches by the spring of 1952. Interestingly enough, October of that year started with temperatures in the 70s and 80s F.

Twin Cities Almanac for October 25th:

The average MSP high temperature for this date is 55 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 37 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for October 25th:

MSP weather records for this date include: highest daily maximum temperature of 82 degrees F in 1989; lowest daily maximum temperature of 30 degrees F in 1887; lowest daily minimum temperature is 12 degrees F in 1887; highest daily minimum temperature of 62 F in 2000; and record precipitation of 0.67 inches in 2010; and a record 0.2 inches of snow fell on this date in 1942.

Average dew point for October 25th is 35 degrees F, with a maximum of 63 degrees F in 2000 and a minimum of 8 degrees F in 1962.

All-time state records for October 25th:

The state record high temperature for this date is 87 degrees F at New Ulm (Brown County) in 1927. The state record low temperature for this date is -10 degrees F at St Vincent (Kittson County) in 1887. State record precipitation for this date is 3.22 inches at Lake City (Wabasha County) in 1963; and state record snowfall for this date is 15.0 inches at Sandy Lake Dam (Aitkin County) in 1942.

Past Weather Features:

By far the coldest October 25th in state history occurred in 1887. Following a widespread snow storm on October 23rd and passage of a cold front, a cold polar air mass invaded the state pushing the thermometer to a state record low of -10 degrees F at St Vincent, -8 degrees F at Argyle, and -6 degrees F at Albert Lea. Many other observers reported lows in the single digits with daytime highs only in the 20s to low 30s F. October 1887 was one of the coldest in state history.

October 23-27, 1927 brought the warmest spell of late October weather to southern Minnesota. Skies were sunny and the wind was strong from the south. Over 25 communities reported

daytime highs in the 80s F, while Chatfield on the border of Olmsted and Fillmore Counties reached a state record 93 degrees F on October 23rd.

October 24-25, 1942 brought heavy snowfall to some areas of the state. Observers in northern Minnesota reported 5-11 inches, and Sandy Lake Dam in Aitkin County reported a state record 15.0 inches.

October 24-25, 1963 brought thunderstorms to southeastern Minnesota. Many observers reported between 1 and 2 inches of rainfall, while Lake City reported over 3 inches, flooding portions of Highway 61.

Outlook:

For the weekend partly cloudy skies with a chance for rain or snow in the north and temperatures slightly warmer, but still below normal for this time of year. Pretty breezy on Saturday. Continued cooler than normal temperature readings through the middle of next week with a chance for widespread precipitation on Tuesday and then again Thursday (rain or snow).

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, November 1, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, November 1, 2013

HEADLINES

- October climate summary
- Blood pressure and the onset of winter
- Late leaf fall
- Weekly Weather potpourri
- MPR listener questions
- Almanac for November 1st
- Past weather
- Outlook

Topic: October climate summary

A very warm first half of October gave way to a cooler than normal second half of the month. The second half brought multiple season ending frosts to virtually all areas of the state. Mean temperatures for the month ranged from plus or minus 1 degrees of normal among most observers. Extreme temperatures for the month ranged from 8 degrees F at Camp Norris in Lake of the Woods County (Oct 29) to 86 degrees F at Madison in Lac Qui Parle County (Oct 1).

Precipitation for the month was near normal to above normal at most places. Many observers reported measurable precipitation on 15 or more days. There were some drier than normal spots in the north, and a few in the west. Several observers reported over 5 inches for the month including Browns Valley, Wheaton, Ottertail, Melrose, Cloquet, Isle, Lanseboro, La Crescent, and Spring Valley. Mora reported its 5th wettest October with 6.04 inches, while Grand Meadow reported its 4th wettest October in history with 7.21 inches.

Snow visited much of the state during October, bringing slight amounts ranging from a trace to less than one inch. The observer at Askov reported 5 inches, while the observer from Isabella reported 6 inches for the month. By the end of the month northern lakes were starting to show a thin layer of ice on the surface and soil temperatures had dropped below 50 degrees F so farmers could apply forms of nitrogen fertilizer without the risk of leaching or denitrification.

Topic: Blood pressure and the onset of winter

My wife Cindy noticed an article this week by Dr. Sheldon Sheps, emeritus doctor from the Mayo Clinic who writes educational pieces. As winter type weather settles in this month it might be worth paying attention to your blood pressure, especially if you take medication to control it, or you are over 65 years old. Dr. Sheps writes:

"

Blood pressure generally is higher in the winter and lower in the summer. That's because low temperatures cause your blood vessels to narrow which increases blood pressure because more pressure is needed to force blood through your narrowed veins and arteries. In addition to cold weather, blood pressure may also be affected by a sudden change in weather patterns, such as a weather front or a storm. Your body and blood vessels may react to abrupt changes in humidity, atmospheric pressure, cloud cover or wind in much the same way it reacts to cold. These weather-related variations in blood pressure are more common in people age 65 and older. Other seasonal causes of higher blood pressure include weight gain and decreased physical activity in winter. If you have high blood pressure already, continue to monitor your blood pressure readings as the seasons change and talk to your doctor. Your doctor may recommend changing the dose of your blood pressure medication or switching to another medication. Don't make any changes to your medications without talking to your doctor." Good advice worth noting. More information on blood pressure care at...

<https://store.mayoclinic.com/products/books/details.cfm?mpid=38&trkid=21242S89455390>

Topic: Late leaf fall

Many citizens have remarked about the late leaf fall this autumn. Phenologists and arborists tell us that the two key factors leading to late autumn leaf fall this year were the very late spring and delayed leafing out of trees, combined with a very warm and sunny September. Many trees, at or past peak color are still holding their leaves. A strong wind is forecasted for this Sunday (Nov 3) which should accelerate leaf drop in many parts of Minnesota. Unfortunately a rain and snow forecast for Tuesday and Wednesday may mean that these freshly dropped leaves will be mixed with a wet, slushy snowfall and may plug up storm sewer inlets and present more of a challenge to clean up.

Topic: Weekly Weather potpourri:

Earlier this week (Monday, Oct 28) the BBC and the Hadley Centre reported on a strong storm system that battered western Europe with high winds and heavy rainfall. Wind gusts over 90 mph were reported from the south coast of England and power was knocked out for over 300,000 customers. Thousands of trees were knocked over blocking roads and railways and there was a good deal of coastal erosion in England and France as a result of large waves. The U.K. Met Office attributed the wind damage to a "sting jet" produced by rapidly descending air on the backside of the storm system. You can read more at...

<http://www.cnn.com/2013/10/28/world/europe/uk-severe-weather/index.html?iref=allsearch>
<http://www.bbc.co.uk/weather/feeds/24744462>

Typhoon Krosa battered the northern Philippines this week with high winds, heavy rains and high seas. Wind gusts on Luzon Island ranged up to 67 mph with rainfall reports ranging up to a foot. The storm is expected to strengthen over the South China Sea before bringing high winds and heavy rains to parts of southern China and Vietnam over the weekend and early next week. Maximum winds over 110 mph and sea waves of 30-35 feet were projected for this storm system.

Scientists at NCAR reported earlier this week on a new study that linked North America summer Heat Waves with a distinct upper air pattern in the Northern Hemisphere that produces 5 wave numbers (in the pressure pattern). With such a tool in play it is possible to forecast a coming summer Heat Wave with lead times of 15-20 days, allowing communities to better prepare. You can read more about this paper at...

<http://www.sciencedaily.com/releases/2013/10/131027185020.htm>

Another study by the University of Exeter scientists released this week in Environmental Research Letters documents a link between the loss of Arctic Sea Ice and southern displacement of the Polar Jet Stream. This is important for the United Kingdom and Northwestern Europe because the more southerly jet stream has brought them much wetter summers than typical. You can read about this study at...

<http://www.sciencedaily.com/releases/2013/10/131028205410.htm>

Highlights from the weekly drought update issued by Brad Rippey of the USDA this week:

-With more precipitation falling in recent days across the nation's mid-section, the portion of the U.S. in drought continues to shrink. Only 34.70% of the contiguous U.S. remained in drought on October 29, down from a late-summer (September 10) peak of 50.69%. The last time a smaller area was in drought...was May 15, 2012. On October 27, USDA/NASS reported that 59% of the U.S. corn and 77% of the soybeans had been harvested. Thus, the 2013 growing season effectively has ended with 38% of the U.S. corn production area and 28% of the soybean area in drought, down from late-summer peaks of 55 and 45%, respectively. Still, there are pockets of lingering drought in the Midwest. On October 27, USDA/NASS rated topsoil moisture more than half very short to short in Illinois (60%), Missouri (58%), and Iowa (53%).

Residents of Rjukan, Norway are benefiting from the mountain top installation of three large mirrors (183 square feet) above this valley town. These mirrors are used to reflect the low winter sun and bring light to the valley below. It appears that they are working well and may serve as a model for other towns. You can read more about this at...

http://www.huffingtonpost.com/2013/10/30/rjukan-norway-sun-mirror_n_4177006.html

MPR listener question: Please settle an argument that occurred in our weekly Bridge Club. Two of our keenly observant card players remember that November of 2009 brought only a trace of snow to the Twin Cities (Nov 29), and they said that was a record for the least snow in November. But the Twin Cities records suggest other Novembers have seen just a trace as well. So were they correct?

Answer: According to the climate record of the Twin Cities Novembers of 1928, 1939, 1963, and 2009 all brought just a trace of snow. But your card playing friends are technically correct about 2009 from the standpoint of frequency of daily snowfall. In 2009 a trace of snow was observed on only one day (Nov 29) while in those other years a trace of snow was observed on several days. So give them a bonus point for being technically correct!

Twin Cities Almanac for November 1st:

The average MSP high temperature for this date is 50 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 33 degrees F (plus or minus 9 degrees F standard deviation).

MSP Local Records for November 1st:

MSP weather records for this date include: highest daily maximum temperature of 77 degrees F in 1933; lowest daily maximum temperature of 25 degrees F in 1951; lowest daily minimum temperature is 10 degrees F in 1951; highest daily minimum temperature of 57 F in 2000; record precipitation of 1.85 inches in 1991; and a record 18.5 inches of snow fell on this date in 1991.

Average dew point for November 1st is 33 degrees F, with a maximum of 62 degrees F in 2000 and a minimum of -4 degrees F in 1984.

All-time state records for November 1st:

The state record high temperature for this date is 84 degrees F at Winona (Winona County) in 1950. The state record low temperature for this date is -10 degrees F at Campbell (Wilkin County) in 1919. State record precipitation for this date is 3.28 inches at Winona (Winona County) in 1991; and state record snowfall for this date is 24.1 inches at Duluth (St Louis County) in 1991.

Past Weather Features:

Late October of 1873 brought 11 inches of snowfall to the Twin Cities area and very cold temperatures to start the month of November. For five consecutive nights temperatures fell into the teens F while daytime highs remained in the 30s F. Overnight lows were below 0 F by mid month and November of 1873 proved to be one of the coldest in state history.

On a statewide basis, November 1-2, 1935 may have been the coldest ever start to the month, as over dozen communities reported overnight low temperatures below 0 degrees F. A cold front brought snowfall to much of the state to start the month, and then ushered in a cold polar air mass. The daytime maximum temperature only reached 22 degrees F at Fergus Falls and 28 degrees F at Marshall.

The hottest November 1st in state history came in 1950 (following the warmest Halloween in state history), when ten Minnesota communities reported afternoon highs in the 70s F, and five communities saw the mercury climb into the 80s F under bright, sunny skies. Temperatures went downhill the rest of the month reaching the single digits and even below zero F readings during the second half of November.

Far and away the wettest November 1st occurred in 1991 during the middle of the Halloween Blizzard. The entire day was dominated by a large scale storm system that brought continuous rain and snow to many parts of the state, mostly in the eastern half. A mixture of rain and snow

prevailed across many southern counties where precipitation totals ranged from 2 to 3 inches in many places. Elsewhere in central and northern counties snow was falling, with low visibility (less than a quarter mile), increasing winds (30-40 mph), and falling temperatures. Many roads became impassable, motorists were stranded, schools closed, and power outages were reported. Snowfall totals for the day ranged from 1 to 2 feet in several counties. The storm lingered for another day and then most residents dug out on November 3rd. It was a precursor to a record-setting snowy November for many parts of Minnesota as observers at MSP, Hinckley, Cambridge, Young America, Lutsen, Eveleth, and Gunflint Lake reported over 40 inches for the month, while Duluth, Two Harbors, and Bruno reported over 50 inches.

Word of the Week: SIMA

Another acronym.....not one used by meteorologists, but one very related to the weather. SIMA stands for Snow and Ice Management Association. It is the professional association for those working in snow and ice management, whether in the public or private sector. SIMA also publishes the magazine Snow Business and they offer educational materials on snow and ice control, especially for property managers and, public works departments, and snow plow operators. They offer training in snow removal safety, fuel efficiency tips, and advanced snow management.

Their web site is <http://www.sima.org>

Outlook:

Warming temperatures over the weekend under partly cloudy skies. Chance for flurries in the north. Very windy with increasing temperatures and cloud cover on Sunday and a chance for rain, possibly mixed with snow by Monday. Continued chance for rain and snow on Tuesday and Wednesday, then drier and cooler on Thursday next week.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

<http://www.climate.umn.edu/weathertalk/>

For access to other information resources go to

<http://www.climate.umn.edu/Seeley/>

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Minnesota WeatherTalk Newsletter for Friday, November 8, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, November 8, 2013

HEADLINES

- Highlights of Statewide Climate Adaptation Conference
- Significant snowfall this week
- Remembering storm of 1943
- Weekly Weather potpourri
- MPR listener questions
- Almanac for November 8th
- Past weather
- Outlook

Topic: Highlights of MN Climate Adaptation Conference, November 7th, Science Museum of Minnesota

- over 250 people attended, representing state agencies, local units of government, NGOs, academic institutions, industries, and others
- participants discussed climate impacts on transportation, agriculture, public health, energy use, urban planning, watershed management, forestry, and the insurance industry
- climate change is already having an impact on insurance, Minnesota was the only Midwestern state among the top 3 states with the highest insured catastrophic losses in both 2007 and 2008. Homeowners claims related to severe weather like hail and wind damage are up, as are average homeowner insurance premiums. Minnesota ranks 14th highest among states in homeowners insurance premiums and has seen a rise of over 267 percent in these costs since 1997. Not all of this is related directly to climate change, but some features of severe weather threats are changing and have at least partially had an effect.
- Minnesota DOT is quite concerned about climate change in the context of severe weather. Damage to roads and highways from the flash flood in Duluth, Cloquet, and Two Harbors in June of 2012 totaled over \$50 million.

Topic: Significant snowfall this week

A winter storm brought a mixture of precipitation to the state over November 5-6 this week. Sections of southeastern SD and southwestern MN reported snowfall amounts of 5-10 inches, while southeastern Minnesota reported some significant rainfall amounts, well over 1 inch in some cases. The precipitation shadow from this storm covered much of the southern two-thirds of the state, with a snow swath spreading from SW counties through central and east central counties overnight. New daily snowfall records were set for November 6th at some locations including:

9 inches at Marshall

7 inches at Pipestone
6.2 inches at Redwood Falls
4.2 inches at Litchfield
4.0 inches at Slayton, Cambridge, Lakefield, and Kimball
3.8 inches at Windom
3.5 inches at Granite Falls

In southeastern Minnesota several observers reported over 1 inch of precipitation, including some locations that set new daily rainfall records for November 6th such as Spring Valley (1.12"), Chatfield (1.23"), Grand Meadow (1.27"), Caledonia (1.40"), La Crescent (1.45"), Preston (1.45"). These rains continued the wetness trend of this autumn which has brought a great deal of recharge to southern Minnesota soils that were considerably dried out by the late summer drought.

Topic: Remembering November 8, 1943

For many Minnesota citizens the most vivid memories of November blizzards are associated with the 1940 Armistice Day Blizzard (November 11) or the 1991 Halloween Blizzard (October 31-November 2). However, from a climatological perspective there is a third November episode of great significance associated with the ice storm and heavy snowfall of November 6-8, 1943. This storm produced heavier snowfalls than the Armistice Day and Halloween Blizzard for many parts of the state and caused significant shoreline damage to the Lake Superior area. Coming from the south, this storm started out as rain, changing to freezing rain and sleet, then finally heavy snow. Because it occurred over a weekend (Saturday through Monday), the storm stranded many Minnesota duck hunters in the countryside, though it did not result in many fatalities because the temperature drop was modest (about 8-10 degrees F) compared to those of the Armistice Day and Halloween Blizzards (over 40 degrees F drop). A total of five storm-related fatalities were reported across the state.

This weather system produced a great deal of ice, up to 3 inches thick on some power lines in central Minnesota. Over 1700 power and telephone poles fell down as a result. The ice also caused numerous accidents and put a stop to train, plane, and streetcar traffic. When the temperature dropped sufficiently to produce snow on the 8th, great amounts piled up across southern and central counties. Some of the larger amounts, and still records for the date, include 22 inches at Faribault, 20 inches at Bird Island, 20 inches at Redwood Falls, 22 inches at Marshall, and 18 inches at Springfield. Strong winds of 30 to 40 mph produced enormous drifts in some areas. In Cottonwood County, 15 ft drifts closed state highways 71 and 30, and near Windom an Omaha bound train was completely buried in a snow drift.

Duluth and other cities along the north shore of Lake Superior reported enormous waves and erosion damage. Winds from the northeast gusted to near 45 mph. Sixty-five ore carriers took refuge in Duluth-Superior harbor. Fortunately, following the storm, relatively dry, mild weather took hold and soon dissipated the snow cover.

Topic: Weekly Weather potpourri:

Weekly drought assessment remarks from Brad Rippey of the USDA World Agricultural Outlook Board:

-Widespread precipitation continued to chip away at drought across the Great Plains and Midwest. On November 5, overall U.S. drought coverage stood at 32.24%, down 2.46 percentage points from a week ago. This represents the smallest areal extent of drought in the contiguous U.S. since January 3, 2012.

- Based on the definitions of drought employed in the production the U.S. Drought Monitor, historical U.S. drought coverage should average near 20%. The last time contiguous U.S. drought coverage was below 20% was December 14, 2010. On November 3, USDA/NASS reported that 73% of the U.S. corn and 86% of the soybeans had been harvested. Lingering drought remains a concern in a few Midwestern States, including Iowa (68% in drought on November 5), Illinois (38%), Wisconsin (27%), Missouri (26%), and Minnesota (26%).

NOAA announced this week a new data visualization tool available on the web for examining archived or recent environmental data sets using the NOAAVIEW system. This system allows access and viewing of wind data, precipitation, ice cover, vegetation, and other parameters. It is worth checking out by going to.....

http://www.nesdis.noaa.gov/news_archives/noaa_view_release.html

Super Typhoon Haiyan developed in the Western Pacific Ocean this week southeast of the Philippines. Its peak winds exceeded 195 mph, producing sea waves of over 50 feet. High winds, heavy rains, and storm surge were causing a great deal of damage to the Philippines on Friday and expected to continue into Saturday. This mammoth storm will move towards Vietnam early next week. Another strong tropical storm was developing in the Indian Ocean off the horn of Africa.

Sunday, November 3rd brought some rare tornadoes to parts of the Netherlands in Western Europe. Tornadoes in Arnheim and Utrecht damaged a number of buildings, tearing off shingles and breaking windows, and bringing down mature trees. In addition some heavy rainfalls of 2-3 inches were reported in places.

A huge winter storm was bringing high winds, rains, and heavy seas to Western Alaska this week. The National Weather Service reported sea waves of 25-30 feet in the Bering Sea and 80 mph winds in the Aleutian Islands. Rain and snow was expected to spread across southern Alaska towards the weekend.

MPR listener question: What do the climate statistics for freezing rain in Minnesota show? How often? Peak time of year? Peak hour of the day?

Answer: We lack comprehensive statistical analysis of freezing rain events for all locations in Minnesota, but for those we have the average number of annual hourly reports showing freezing rain and/or freezing drizzle in Minnesota ranges from about 45 hours in northeastern counties (Lake, Cook, and St Louis) to less than 30 hours in southwestern counties. The most common months for the occurrence of freezing rain or freezing drizzle in Minnesota (listed by frequency of reports) are December, January, November, and March, respectively. The most common time

of day for this type of precipitation is from 6:00 am to 9:00 am, while the fewest reports can be found from 2:00 pm to 4:00 pm. The most recent November freezing rain episode was November 18, 1996 when southwestern counties suffered from ice buildup and power outages.

Twin Cities Almanac for November 8th:

The average MSP high temperature for this date is 44 degrees F (plus or minus 10 degrees F standard deviation), while the average low is 29 degrees F (plus or minus 9 degrees F standard deviation).

MSP Local Records for November 8th:

MSP weather records for this date include: highest daily maximum temperature of 77 degrees F in 1999; lowest daily maximum temperature of 25 degrees F in 1991; lowest daily minimum temperature is 1 degrees F in 1991; highest daily minimum temperature of 53 F in 1977 and 2006; record precipitation of 1.51 inches in 1932; and a record 8.5 inches of snow fell on this date in 1943.

Average dew point for November 8th is 28 degrees F, with a maximum of 54 degrees F in 1977 and a minimum of -3 degrees F in 1991.

All-time state records for November 8th:

The state record high temperature for this date is 81 degrees F at Canby (Yellow Medicine County) in 1931 and at Benson (Swift County) in 1999. The state record low temperature for this date is -14 degrees F at Mankato in 1991. State record precipitation for this date is 3.45 inches at Winona (Winona County) in 1945; and state record snowfall for this date is 16.0 inches at Vesta (Redwood County) in 1943.

Past Weather Features:

A strong low pressure system brought high winds and a mixture of rain and snow to the state on November 8-9, 1932. Many observers reported precipitation that ranged from 1 to 2 inches, and several had record-setting amounts. Duluth, Two Harbors, Pigeon River, Pokagama Dam, Grand Rapids, Cloquet, and Mora reported well over two inches.

November 6-8, 1943 brought a memorable winter storm to the state with blizzard conditions and huge drifts blocking roads and highways. See the write-up above.

Nearly a week after the Halloween Blizzard of 1991, a polar air mass brought record-setting cold temperatures to the state on November 8th. Over 60 Minnesota communities reported morning low temperatures below 0 degrees F. Many daytime highs only reached the teens F, establishing new record cold maximum temperatures as well.

November 8, 1999 was perhaps the warmest in state history with record-setting high temperatures reported from 48 communities in the state. Five observers reported daytimes highs

of 80 degrees F or higher and it was 72 degrees F as far north as International Falls. By the 11th the overnight temperatures had fallen into the 20s F, but a second surge of warmth brought temperatures back into the 70s F by mid-month as 1999 brought the 4th warmest November in state history.

Outlook:

Cooler than normal temperatures over the weekend with a chance for snow in the north. Generally a cool and dry week coming up with a warming trend towards the end of next week.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

<http://www.climate.umn.edu/weathertalk/>

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Minnesota WeatherTalk Newsletter for Friday, November 15, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, November 15, 2013

HEADLINES

- Coldest temperatures of the season
- Lake ice forming
- Weekly Weather potpourri
- MPR listener questions
- Almanac for November 15th
- Past weather
- Outlook

Topic: Coldest temperature of the autumn season

Monday and Tuesday, November 11-12, this week brought the coldest temperatures of the autumn season so far. Thief River Falls reported a low of just 0 degrees F on the 11th, while Fosston (Polk County), Lakefield, and Pipestone reported their first readings of 0 degrees F on the morning of the 12th (Tue). Windom reported the state low on Tuesday the 12th with -1 degrees F. Many other observers reported lows in the single digits F. On Monday, November 11th Fosston reported a daily maximum temperature of just 16 degrees F, while Bemidji reported a new cold maximum temperature record of just 14 degrees F. Fortunately, the arctic cold was short-lived and temperatures warmed by 35-40 degrees F by Wednesday (Nov 13), then moderated the rest of the week.

Topic: Lake ice forming, then thawing

With the colder than normal temperatures dominating from November 5-12 some observers were reporting surface ice on ponds and shallow lakes. Even the shallow bays of lakes like Vermilion and Mille Lacs were showing ice earlier this week. Water temperatures along the western shores of Lake Superior had fallen in the range of 34-36 degrees F. With a return of 40 degrees F air temperatures some of the ice in shallow lakes was melting or shrinking in coverage. Moderating temperatures near normal and above normal will probably keep ice cover from fully developing until much later this month, perhaps after the Thanksgiving holiday.

Topic: Weekly Weather potpourri:

Somalia was hit by a Tropical Cyclone last Sunday which brought high winds and heavy rains to many parts of the country. Some reports indicated rainfall amounts of 4-8 inches were common, and in a few cases rainfall may have approached 12 inches. Winds were also estimated to range from 30-60 mph. Flooding was widespread and reports indicated that the death toll from the storm may have been close to 300, with many thousands of people displaced by flooding waters.

Several thousand livestock were lost in flood waters and a major highway bridge was washed away. This was only the 5th Tropical Cyclone to strike Somalia since 1966.

On the heels of the Minnesota Climate Adaptation Conference held last week at the Science Museum in St Paul, an article appeared last week in the journal Science advocating for more attention to climate adaptation science and its practice. The article is based on a presentation made at the Aspen Institute last year and is written by Richard Moss of the DOE's Pacific Northwest National Laboratory. He says "science for adaptation starts with understanding decision-making processes and information needs, determining where the vulnerabilities are, and then moves to climate modeling....[and] tracks whether adaptation is effective,"
A description of the article can be found at....

<http://www.sciencedaily.com/releases/2013/11/131107142526.htm>

Remarks from USDA meteorologist Brad Rippey at this week's drought briefing:

-U.S. drought coverage continued its downward trend, with just 31.76% of the Lower 48 States in drought on November 12. This represents the lowest U.S. drought coverage since December 27, 2011.

-Based on the definitions of drought employed in the production the U.S. Drought Monitor, historical U.S. drought coverage should average near 20%. The last time contiguous U.S. drought coverage was below 20% was December 14, 2010.

-However, most of the eastern U.S. has trended dry during the last two to three months, allowing for recent development of abnormal dryness (D0) and some moderate drought (D1). By November 12, dryness (D0) had expanded to cover 38% of the Southeast and 30% of the Northeast...

-On November 10, USDA/NASS reported that 84% of the U.S. corn and 91% of the soybeans had been harvested. Lingering drought remains a concern in a few Midwestern States, including Iowa (54% in drought on November 12), Minnesota (25%), Illinois (25%), Missouri (24%), and Wisconsin (23%).

MPR listener question: I have heard you speak about the erratic precipitation pattern this year, wet to start the year, then dry in the summer, and finally wet again this fall. Which areas of the state have had the most and least precipitation this year?

Answer: By far the wettest area of the state has been the southeastern counties. Caledonia (Houston County), Grand Meadow (Mower County), and Ostrander (Fillmore County) have all reported over 46 inches of precipitation so far this year, about 30-35 percent above normal. The far northwest has been the driest for the year with places like Crookston, Hallock, and Roseau reporting less than 20 inches. Warren in Marshall County has reported less than 16 inches, less than 75 percent of normal. With 7 weeks left in the year some of these numbers could change considerably.

Twin Cities Almanac for November 15th:

The average MSP high temperature for this date is 41 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 27 degrees F (plus or minus 11 degrees F standard deviation).

MSP Local Records for November 15th:

MSP weather records for this date include: highest daily maximum temperature of 69 degrees F in 1953; lowest daily maximum temperature of 13 degrees F in 1932; lowest daily minimum temperature is 1 degrees F in 1940; highest daily minimum temperature of 55 F in 1930; record precipitation of 1.58 inches in 1996; and a record 5.1 inches of snow fell on this date in 1956.

Average dew point for November 15th is 29 degrees F, with a maximum of 54 degrees F in 2001 and a minimum of 0 degrees F in 1940.

All-time state records for November 15th:

The state record high temperature for this date is 76 degrees F at Madison (Lac Qui Parle County) in 1953. The state record low temperature for this date is -36 degrees F at Angus (Polk County) in 1911. State record precipitation for this date is 2.68 inches at Stillwater (Washington County) in 1944; and state record snowfall for this date is 11.1 inches at Duluth (St Louis County) in 1956.

Past Weather Features:

A large, slow moving winter storm brought 6 to 18 inches of snowfall to the state over November 13-16, 1909. The heavy snow was a precursor to a very snowy Thanksgiving that year.

An Arctic air mass gripped the state over November 12-16, 1911 bringing extreme cold temperatures. Temperatures reported by most of Minnesota's weather observers were well below 0 degrees F on several mornings. Ten northern communities reported morning lows of -20 degrees F or colder, with Angus (Polk County) reporting -36 degrees F on the 15th, the coldest ever reading for so early in the fall. On some days the temperature never rose above 10 degrees F.

November 13-19 brought one of the most memorable mid November warm ups in state history. Temperatures average 18 to 22 degrees warmer than normal across the state. Over 50 Minnesota communities saw daytime temperatures reach 70 degrees F or higher. Many workers took their lunch outside to enjoy the last warm days of the fall season.

November 16, 1931 brought very warm temperatures to the state with readings in the 60s F. Some afternoon thunderstorms developed, producing strong winds and heavy rains which lingered into the evening hours. With this storm system came the latest autumn tornado ever documented in Minnesota. It was on the ground for 5 miles near Maple Plain shortly after 8:00 pm and destroyed a barn and some other buildings on a nearby farm.

Warm temperatures, along with thunderstorms visited the state over November 14-15, 1944. Many observers reported total rainfall between 1 and 2 inches. Observers at Hallock, Maple Plain, and Stillwater reported over 2 inches of rainfall.

A winter storm brought rain, sleet, freezing rain, and snow to the state over November 14-16, 1951. Ice-coated power lines and trees were knocked down in southeastern Minnesota, causing widespread power outages. There were scores of traffic accidents and many roads were closed. Gonvick in northwestern Minnesota saw 26 inches of snow accumulate.

An unusual mid-November thunderstorm brought heavy rain to southern Minnesota counties on November 15, 1973. Many observers reported over an inch of rainfall in just one hour. Total rainfall exceeded two inches at Bricelyn and Blue Earth.

Outlook:

Generally a cloudy weekend with above normal temperatures. Chances for rain in the south and snow in the north each day. Chance of snow mostly Sunday night with cooler temperatures on Monday. Moderating above normal temperatures and dry during the middle of next week with an increasing chance for showers towards the weekend.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

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Minnesota WeatherTalk Newsletter for Friday, November 22, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, November 22, 2013

HEADLINES

- New seasonal outlook
- Tornadoes on November 17th in the Midwest
- 2013 Tornado tally for Minnesota
- Snow and cold spreading over the state
- Weekly Weather potpourri
- MPR listener questions
- Almanac for November 22nd
- Past weather
- Outlook

Topic: New Seasonal Climate Outlook

On Thursday, November 21, the NOAA-Climate Prediction Center released new seasonal outlooks covering meteorological winter, from December through February. The new outlooks favor below normal temperature conditions Dec-Feb for North Dakota, Northern portions of South Dakota, and many parts of western and northern Minnesota. Outlooks do not distinctly favor above or below normal precipitation for Minnesota during the winter season.

Topic: Tornadoes in the central USA on November 17, 2013

Last Sunday, November 17 was a dramatic and traumatic day weatherwise for citizens in IL, IN, KY, TN, MI, and OH. Between 11:00 am and 6:00 pm over 110 tornado reports were filed with the NOAA-Storm Prediction Center, as were over 500 strong wind reports and over 30 large hail reports. Two EF-4 tornadoes (winds 166-200 mph) and at least one EF-3 (winds 136-165 mph) tornado struck in Illinois killing six people, injuring scores of people, and damaging or destroying hundreds of homes. According to Dr. Jeff Masters of the Weather Underground this outbreak of November tornadoes ranks among the top four or five worst in USA history (Novembers 1987, 1992, 2001, 2002, and 2005 brought numerous tornadoes too), but it is especially notable for bringing these storms so far north. Such storms this time of year are more commonly in the southern plains states or the southeastern states. You can read more from Dr. Masters at...

<http://climatecrocks.com/2013/11/20/midwest-storms-wrap-from-jeff-masters/>

And more from the Central Illinois National Weather Service in Lincoln, IL.....

<http://www.crh.noaa.gov/ilx/?n=17nov13>

Topic: Minnesota's final tornado tally in 2013

Todd Krause, Warning Coordination Meteorologist with the NOAA-National Weather Service in Chanhassen reported this week that Minnesota saw just 15 tornadoes this year, the fewest since 1990 when there were only 12. The tornado reports by month were: 2 in May; 4 in June; 2 in July; 5 in August; 1 in September; and 1 in October. The strongest tornado was rated at EF-2 (winds 111-135 mph) and occurred from 1:50 am to 2:30 am across Mahnomen and Clearwater Counties, near the town of Zerkel. It was on the ground for over 21 miles and did some tree damage, but there were no deaths or injuries. In fact on a statewide basis there were no deaths or injuries reported due to tornadoes this year.

Topic: Snow and cold spreading across the state

A low pressure system passing over Lake Superior brought plenty of clouds and mixed precipitation (rain, freezing drizzle, and snow) to Minnesota on Thursday (Nov 21). Hallock (Kittson County) reported 4 inches of snowfall by noon, which tied the daily record amount for snowfall there on November 21st. Elsewhere in the north Red Lake Falls and Warroad reported 1.5 inches of snow, while in the southeast Rosemount and Rochester reported 1 inch of new snow. Slushy roads and icy patches were slowing traffic in north-central and southeastern counties by afternoon, with many spinouts and accidents reported.

Topic: Weekly Weather potpourri:

Pete Boulay of the MN State Climatology Office has posted the complete climatology for the Thanksgiving Holiday in the Twin Cities area (1872-2012). The warmest Thanksgiving Day was in 1914 and 1922 when the afternoon temperature reached 62 degrees F. The most recent mild Thanksgiving was just last year when the temperature hit 60 degrees F in the Twin Cities. The coldest Thanksgiving Day temperature was a morning minimum of -18 degrees F on November 25, 1880. You can read more fun Thanksgiving weather facts from Pete Boulay at...

http://www.climate.umn.edu/doc/journal/thanksgiving_climatology.htm

The Weather Channel web site has posted an interesting piece on the largest 24-hour snowfalls recorded in each of the 50 states. Some of the numbers may startle you. For example on March 6, 1954 parts of the Florida panhandle recorded 4 inches of snowfall. Granted it did not last too long. Further north in South Carolina the town of Society Hill recorded 18 inches of snowfall on February 25, 1914. BTW for Minnesota Wold Ridge Environmental Learning Center near Finland (Lake County) holds the record with 36 inches of new snow on January 7, 1994. You can read more at the Weather Channel web site....

<http://www.weather.com/sports-rec/ski-conditions/50-states-biggest-snow-days-20130112>

Highlights from the USDA Weekly Drought Update given by the World Agricultural Outlook Board:

-U.S. drought coverage reversed its recent downward trend, with 32.45% of the Lower 48 States in drought on November 19 (up more than 2 percentage points from last week). This represents

the first increase in U.S. drought coverage since September 10, 2013.

- Out west, Extreme Drought (D3) in California jumped from 11.36% to 27.59% over the past week. In California's San Joaquin Valley, the city of Bakersfield moved completely to ground water supplies due to the dry conditions and lack of surface water. Reservoirs are approaching 70% of average capacity. According to local National Weather Service experts, this level has historically been one of the measures of statewide drought, especially with precipitation being historically low for the calendar year.

-For the third week in a row, a little more than one-fifth (22%) of the U.S. hay production area was in drought. Although most of the wheat crop is growing well – rated 63% good to excellent on November 17 – dryness remains a concern on the southern High Plains.

A new study recently published in Quarterly Journal of the Royal Meteorological Society shows that the Arctic region is warming at about 8 times the pace of the rest of planet Earth. This study authored by Kevin Cowtan of the University of York and Robert Way of the University of Ottawa also suggests that the slowed pace of warming in recent years detected by some global observation data is incorrect probably because of sampling error. You can read more about this study at...

<http://www.sciencedaily.com/releases/2013/11/131113092217.htm>

MPR listener question: Which month has the highest frequency of fog in the Twin Cities?

Answer: The statistical distribution of fog keeps changing slightly with each passing decade in the Twin Cities climate record. In the 1990s December showed the highest frequency of fog, followed by January and February. The more recent data show that the highest incidence of heavy fogs occurs in March, followed by February, and December. Winter inversions (increasing temperature with height) are more common during these months keeping moist air trapped near the ground. Fog can more easily form at night under these conditions. By the way, the month with the lowest frequency of fog is July. Often times the conditions that support fog formation also lead to poor air quality in the Twin Cities.

Twin Cities Almanac for November 22nd:

The average MSP high temperature for this date is 35 degrees F (plus or minus 10 degrees F standard deviation), while the average low is 21 degrees F (plus or minus 9 degrees F standard deviation).

MSP Local Records for November 22nd:

MSP weather records for this date include: highest daily maximum temperature of 59 degrees F in 1998; lowest daily maximum temperature of 12 degrees F in 1880 and 1921; lowest daily minimum temperature is -6 degrees F in 1880; highest daily minimum temperature of 45 F in 2009; record precipitation of 0.58 inches in 1898; and a record 5.5 inches of snow fell on this date in 1898.

Average dew point for November 22nd is 29 degrees F, with a maximum of 53 degrees F in 1963 and a minimum of -7 degrees F in 1970.

All-time state records for November 22nd:

The state record high temperature for this date is 72 degrees F at Preston (Fillmore County) in 1990. The state record low temperature for this date is -26 degrees F at Ada (Norman County) in 1896. State record precipitation for this date is 2.18 inches at Willow River (Pine County) in 1898; and state record snowfall for this date is 13.0 inches at Pokegama Dam (Itasca County) in 1898.

Past Weather Features:

A strong Arctic cold front passed across the state over November 21-22, 1896 dropping temperatures by 40-50 degrees F. Ada dropped 52 degrees F from plus 26 F to minus 26 F. Many other communities saw the thermometer drop to -20 degrees F or colder including Crookston, Tower, Moorhead, Detroit Lakes, and Park Rapids. November of 1896 remains the coldest in state history, averaging nearly 12 degrees F colder than normal.

November 21-22, 1898 brought a strong winter storm to Minnesota, with strong winds and mixed precipitation. Many southern and eastern Minnesota observers reported 6 to 12 inches of snowfall. In addition temperatures dropped dramatically during the storm falling from the 30s and 40s F into the single digits and below zero F range. The rest of that November remained quite cold with a number of nights below 0 degrees F.

November 22, 1990 was the warmest in state history with over 20 Minnesota communities reporting daytime highs in the 60s F. It was 64 degrees F as far north as Grand Rapids, and some observers in southeastern Minnesota saw the thermometer reach 70 degrees F or higher, including the towns of Preston, Grand Meadow, Red Wing, and Winona.

A winter storm brought 3 to 6 inches of snowfall to many parts of Minnesota over November 21-22, 1997. A mixture of precipitation made driving conditions difficult in some areas.

Outlook:

Breezy, sunny, and cold on Saturday with highs in the single digits and teens F. Moderating temperatures on Sunday, climbing into the 20s and 30s F, and chance for light snow in the north. Generally cooler than normal with dry weather leading up to Thanksgiving next week.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

<http://www.climate.umn.edu/weathertalk/>

For access to other information resources go to

<http://www.climate.umn.edu/Seeley/>

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Minnesota WeatherTalk Newsletter for Friday, November 29, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, November 29, 2013

EARLY EDITION HEADLINES

- Preliminary November climate summary
- Testing the 20/20 rule for December
- Weekly Weather potpourri
- MPR listener questions
- Almanac for November 29th
- Past weather
- Outlook

HAPPY THANKSGIVING

Topic: Preliminary November climate summary

Cold and dry describe the climate for November this year. Most observers report average monthly temperatures that range from 1 to 3 degrees F colder than normal. Extreme temperatures for the month ranged from 66 degrees F at Wheaton on the 14th to -11 degrees F at Roseau, Thief River Falls, and Orr on the 24th. General absence of full, sunny days, abundant cloud cover, and a high frequency of fog prevented daytime maximum temperatures from getting very high.

Most observers reported a drier than normal month as well, with less than a half inch being a common amount. In the western part of the state places like Milan and Madison reported less than a tenth of an inch. Northeastern and southeastern counties reported some above normal monthly precipitation with amounts ranging from 1 to 2 inches. Some wet spots in the state included Caledonia with 2.19 inches, Cannon Falls with 2.65 inches, La Crescent with 2.09 inches, and Preston with 1.90 inches. Most observers reported some snowfall as well, though usually just small amounts. Some of the larger monthly snowfall amounts were 9.0 inches at Marshall and Pipestone, 7.4 inches at International Falls, 7.9 inches at Kabetogama, 7.6 inches at Cook, 6.4 inches at Lamberton, and 6.0 inches at Hutchinson.

By the end of the month most areas soils were frozen to a depth of 4 inches, and many area lakes were showing thin ice on the surface.

Topic: Testing the 20/20 rule for December in the Twin Cities

Some older Minnesota citizens have told me about something they call the 20/20 rule. It goes like this, whenever you get 20 inches of snow during a winter month (Dec-Feb) you will likely also see a reading of at least -20 degrees F. I tested this idea with the Twin Cities climate record for the month of December, and sure enough it works pretty well. For the period from 1820 to 2012, I examined all Decembers when at least 20 inches of snowfall was measured or estimated. This has happened 14 times over the past 193 years (some of these are estimated in the Pioneer records)..

Year December snowfall lowest temperature

total (inches) in degrees F

1830 20.0 -26 F on the 21st

(15 days with snow)

1849 30.0 -22 F on the 29th

1865 26.1 -26 F on the 21st

1879 20.0 -39 F on the 25th

1880 22.0 -27 F on the 28th

1902 24.0 -20 F on the 26th

1927 22.8 -15 F on the 31st

(Maple Plain reported -22 F in Dec 1927)

1950 25.0 -20 F on the 27th

1968 28.7 -19 F on the 31st

(Stillwater reported -28 F and Forest Lake -31 F in Dec 1968)

1969 33.2 0 F on the 27th

(-10 F at Stillwater, Farmington and Forest Lake, but otherwise a cloudy month)

1983 21.0 -29 F on the 19th

1996 23.7 -27 F on the 26th

2001 30.2 -24 F on the 25th*

2010 33.6 -8 F on the 13th

(Stillwater reported -17 F on Dec 14th)

*data taken from NWS headquarters at Chanhassen

With two exceptions, 1969 and 2010, the 20/20 rule appears to hold up pretty well. In the modern era the urban heat island of the Twin Cities is probably disrupting this rule.

Topic: Weekly Weather potpourri:

A strong winter storm with high winds and mixed precipitation disrupted Thanksgiving travel plans for many Americans along the East Coast on Wednesday this week. There were many airport cancellations and delays, along with snarled traffic patterns. With the additional rainfall from this storm, Asheville, NC set a new annual precipitation record with 65.66 inches in 2013.

Tropical Cyclone Lehar was bringing heavy seas and rains the eastern coastal regions of Indian this week. It was expected to dissipate over the weekend.

The weekly USA drought update from Brad Rippey of the USDA World Agricultural Outlook Board included these highlights:

-Well-placed storm systems continued to reduce the coverage of U.S. drought, with just 30.57% of the Lower 48 States in drought on November 26. This is a decline of 1.88 percentage points from a week ago and represents the smallest U.S. drought coverage since December 27, 2011.

-Based on the definitions of drought employed in the production the U.S. Drought Monitor, historical U.S. drought coverage should average near 20%. The last time contiguous U.S. drought coverage was below 20% was December 14, 2010.

MPR listener question: What are the all-time records for extreme temperature in Minnesota during the month of December?

Answer: The warmest ever in December was 73 degrees F at Beardsley and Milan on December 6, 1939. The last time 70 degrees F was reported in the state during December was December 1, 1998 when Chaska reported a 70 F reading. The coldest temperature ever reported in December was -57 degrees F at Pokegama Dam on New year's Eve, 1898. The most recent bitterly cold December temperatures were in 1993 (-50 F at Tower).

Twin Cities Almanac for November 29th:

The average MSP high temperature for this date is 31 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 17 degrees F (plus or minus 12 degrees F standard deviation).

MSP Local Records for November 29th:

MSP weather records for this date include: highest daily maximum temperature of 62 degrees F in 1998; lowest daily maximum temperature of -4 degrees F in 1875; lowest daily minimum temperature is -25 degrees F in 1875; highest daily minimum temperature of 50 F in 1998; record precipitation of 1.38 inches in 1991; and a record 12.6 inches of snow fell on this date in 1991.

Average dew point for November 29th is 18 degrees F, with a maximum of 57 degrees F in 1998 and a minimum of -24 degrees F in 1958.

All-time state records for November 29th:

The state record high temperature for this date is 68 degrees F at Albert Lea (Freeborn County) in 1999. The state record low temperature for this date is -39 degrees F at Tower (St Louis County) in 1896. State record precipitation for this date is 2.85 inches at Farmington (Dakota County) in 1934; and state record snowfall for this date is 16.0 inches at Cambridge (Isanti County) in 1991.

Past Weather Features:

A strong winter storm brought snow and high winds to the state the last week of November in 1875. With fresh snow cover and Arctic high pressure over the state on November 29 temperatures plummeted to as low as -25 (Twin Cities) to -35 degrees F. Many observers also reported that daytime highs did not rise above 0 F on the 29th.

Following the famous Thanksgiving snow storm of 1896 cold temperatures gripped the state again, this time even more severely. At least 9 northern Minnesota communities saw the thermometer drop to -30 degrees F or colder on November 29th. The daytime high at Crookston and Roseau only reached -15 degrees F. As far south as St Peter, the temperature fell to -20 degrees F.

A very deep low pressure system crossed Lake Superior on November 29, 1960 producing strong winds (up to 73 mph) and 20 to 40 foot waves on the big lake. Over 3 feet of water flooded downtown Grand Marais, while in the highlands away from the lake over a foot of new snow fell. There was a good deal of coastal erosion as thousands of cords of pulpwood washed into the lake in Cook County.

Perhaps the most widespread and heaviest snow storm to strike the east central Minnesota on November 29 happened in 1991. Many areas from St Cloud north to Aitkin reported 12 to 16 inches of snowfall, closing some roads and making Black Friday shopping very difficult for customers.

By far the warmest November 29th in state history occurred in 1998 (a strong El Nino year), when over 40 communities in central and southern counties recorded daytime highs in the 60s F. Some citizens took advance of the Thanksgiving holiday weekend to have a Sunday afternoon cook-out or walk in the park.

Outlook:

Somewhat near normal temperatures with little precipitation over the weekend, though mostly cloudy skies will prevail. Chance for snow on Monday, Tuesday, and Wednesday next week with warmer temperatures. Cooler again by next weekend.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

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Minnesota WeatherTalk Newsletter for Friday, December 6, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, December 6, 2013

HEADLINES

- Heavy snow opens the month of December
- Article on climate change in Minnesota in Source magazine
- Weekly Weather potpourri
- MPR listener questions
- Almanac for December 6th
- Past weather
- Outlook

Topic: Heavy snow opens the month of December

Most of the state reported measurable snowfall during the first week of December. Monday through Wednesday of this week (Dec 2-4) brought almost continuous snow to many areas of northeastern Minnesota, especially the north shore along Lake Superior. The greatest amount of snowfall reported by a National Weather Service observer came from 7 miles north of Two Harbors where 35.3 inches was recorded. The Duluth Weather Service Office reported a storm total of 23.3 inches, and Duluth public schools were cancelled two consecutive days over the 3rd and 4th. Tofte reported 25 inches and Wolf Ridge reported 20.7 inches for the week. Many other areas of the state accumulated 5 to 10 inches of snowfall this week, while areas of southeastern Minnesota received mostly rain and drizzle.

Several observers reported some new daily snowfall records for dates this week: On December 2nd, Grand Rapids reported a new daily snowfall record of 9.5 inches (and new daily precipitation record of 0.59 inches); on December 3rd new daily snowfall records were reported from Wadena (9.0"), Sandy Lake Dam (7.5"), and Brainerd (5.5", plus record precipitation of 0.60"); on December 4th new daily record snowfall amounts were reported from International Falls (8.5") and St Cloud (5.0" tied 1926); and on December 5th new daily record snowfall amounts were reported from Itasca State Park (5.0") and Grand Portage (8.2").

Following the snowfall an Arctic air mass spilled into the state from the north causing overnight lows to drop below 0 degrees F in many places. Of further note, the National Weather Service forecast models suggest that cold and snowy weather will

dominate the state throughout the first three weeks of December. Some of the coldest December temperatures since 2008 are expected around southern portions of the state.

You can read more about the week's snowfall at the State Climatology Office and NWS-Duluth web sites:

http://www.climate.umn.edu/doc/journal/snow131202_04.htm

http://www.crh.noaa.gov/news/display_cmsstory.php?wfo=dlh&storyid=98635&source=0

Topic: Follow-up on Source Magazine Article

Many WeatherTalk Newsletter readers and others have been asking to read the article about climate change in Minnesota which was published this fall in Source Magazine produced by the University of Minnesota Extension. Indeed climate change is real in our state, and already having measurable consequences. You can read the entire article on-line by going to

<http://www1.extension.umn.edu/source/fall-2013/mark-seeley-charts-a-changing-climate/>

Topic: Weekly Weather potpourri:

A significant tropical cyclone was forming in the Bay of Bengal off the southeast coast of India this week. It was expected to bring high winds and heavy rains to portions of the east India coastline.

Highlights from the weekly drought assessment by Brad Rippey at the USDA World Agricultural Outlook Board:

- There was negligible change in U.S. drought coverage during the seven-day drought-monitoring period, as tranquil weather prevailed in the wake of a pre-Thanksgiving storm across the South and East.
- Parts of the six-state Southeast region experienced a beneficial boost in soil moisture from the pre-Thanksgiving storm. As a result, Southeastern coverage of abnormal dryness (D0) dipped to 42.99% on December 3, down from 56.87% two weeks ago.
- Since the current drought-monitoring period ended (7 a.m. EST on December 3), a new winter storm has begun to unfold across the U.S. Improvements related to this storm will be reflected in next week's U.S. Drought Monitor, to be released on December 12.

The NOAA web site offers a brush-up on winter weather advisories, watches, and

warnings, including criteria used for such information and some winter driving tips. Given our recent change over to winter it might be worth reviewing for yourself at...

http://www.noaa.gov/features/03_protecting/winter.html

MPR listener question: With an Arctic air mass expected to visit us, our family was wondering what is the coldest ever December temperature in Minnesota? An what about the coldest windchill conditions in December?

Answer: The coldest temperature measured in December is -57 degrees on New Years Eve at Pokegama Dam in 1898. Incidentally the high warmed all the way up to -10 degrees F that day. The worst December windchill conditions were on December 23, 1983 when windchill values in the northern Red River Valley ranged from -55 to -60 degrees F.

Twin Cities Almanac for December 6th:

The average MSP high temperature for this date is 29 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 14 degrees F (plus or minus 12 degrees F standard deviation).

MSP Local Records for December 6th:

MSP weather records for this date include: highest daily maximum temperature of 63 degrees F in 1939; lowest daily maximum temperature of -2 degrees F in 1972; lowest daily minimum temperature is -19 degrees F in 1972; highest daily minimum temperature of 37 F in 1951; record precipitation of 0.53 inches in 1935; and a record 4.1 inches of snow fell on this date in 1969.

Average dew point for December 6th is 13 degrees F, with a maximum of 42 degrees F in 1951 and a minimum of -28 degrees F in 1972.

All-time state records for December 6th:

The state record high temperature for this date is 73 degrees F at Beardsley (Big Stone County), Marsall, and Milan in 1939. The state record low temperature for this date is -34 degrees F at Ft Ripley (Crow Wing County) in 1873. State record precipitation for this date is 2.00 inches at Worthington (Nobles County) in 1917; and state record snowfall for this date is 23.2 inches at Duluth (St Louis County) in 1950.

Past Weather Features:

A slow moving heavy snow storm brought the state to a standstill over December 5-7, 1950. Many observers reported over a foot of snowfall. Some of the heaviest amounts included 33.1 inches at Duluth, 24.2 inches at Cloquet, 14 inches at Faribault, and 12.7 inches at Rochester.

December 6-7, 1972 brought an Arctic air mass which set several low temperature records across the state of Minnesota. Nearly all portions of the state saw the thermometer drop to -20 degrees F or colder, with dangerous windchill conditions. For many communities temperatures never rose above zero F over those two days.

December 6, 1939 was arguably the warmest December day in Minnesota history. Over 40 state weather observers reported high temperatures in the 60s F, with 6 communities exceeding 70 degrees F under bright, sunny skies. The entire month was warm with many days over 50 degrees F. It turned out to be the warmest December in state history.

Outlook:

Sunny and cold on Saturday, then increasing clouds on Sunday with a chance for snow. Continued chance for snow on Monday with cold temperatures. Generally dry and cold next Tuesday and Wednesday, then a warming trend starts on Thursday pulling temperatures back up to the teens and twenties, with a chance for snow towards next weekend.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, December 20, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, December 20, 2013

HEADLINES

- Winter Solstice
- Reports of heavier snow
- Spell of temperatures below 32 F ends
- Weekly Weather potpourri
- MPR listener questions
- Almanac for December 20th
- Past weather
- Outlook

MERRY CHRISTMAS AND HAPPY NEW YEAR TO MINNESOTA WEATHERTALK READERS!

Topic: HAPPY WINTER SOLSTICE!

The winter solstice will occur Saturday morning (Dec 21), officially, at 11:11 am CST. At that time, the earth's spin axis will be oriented so that the sun appears to be the farthest south in the local sky (midday over the Tropic of Capricorn in the Southern Hemisphere). While most of us consider this event to be the start of astronomical winter, the British call this day the "Midwinter Day", as the apparent sun will begin its northward climb again, back toward the equator. For essentially all locations in the Northern Hemisphere, Saturday night will be the longest of the year. On a brighter note, starting Monday the length of darkness will begin to shrink as we head toward the summer solstice on 21 June 2014.

Topic: Some reports of heavy snow this month

Snowfall has been both frequent and heavy for many observers in Minnesota this month. Both International Falls and Duluth report snowfall on 12 of the first 20 days. Many northern observers have recorded over 20 inches of December snowfall so far, including International Falls, Cass Lake, Grand Rapids, Leech Lake, Babbitt, Chisholm, Floodwood, Grand Marais, Grand Portage, Bruno, Cloquet, and Wright. Areas around Two Harbors have reported over 40 inches of snowfall. According to the DNR areas along the north shore of Lake Superior are reporting snow depths in excess of two feet.

Topic: Spell below 32 degrees F ends in the Twin Cities

The cold and snow dominated Minnesota over the December 4-17 period, producing 13 consecutive days of temperatures below the freezing mark (32 F) in the Twin Cities. Though somewhat troublesome for not melting the snow on our roads and highways this spell of below freezing temperatures was no where near a record for the month of December. In both 1972 and 2000 December brought 26 consecutive days with temperatures below 32 degrees F, while in December of 1983 the thermometer never reached the 32 degrees F mark in the Twin Cities.

Besides prolonged cold temperatures, some nights have brought temperatures of -30 degrees or colder to several communities in the north, including Cass Lake, International Falls, Cook, Babbitt, Hill City, Ely, Floodwood, Gunflint Lake, Hibbing, Orr, Tower, Brimson, and Embarrass. A reading of -38 degrees F at Brimson on the 8th is the coldest for the month so far. Minnesota has seen the coldest temperature in the nation on at least four dates during the month and a number of new daily low temperature records have been set. Some of the more notable ones have been:

- 38 degrees F at Brimson on the 8th
- 32 degrees F at International Falls on the 15th
- 29 degrees F at Cass Lake on the 8th
- 27 degrees F at Itasca State Park on the 12th
- 19 degrees F at Browns Valley on the 7th
- 17 degrees F at Windom on the 12th

In addition on both December 13th and December 15th strong winds combined with the cold temperatures to produce dangerous Windchill values that ranged from -30 to -40 degrees F. And finally, most observers are reporting average monthly temperatures so far that are 6 to 12 degrees colder than normal, marking the coldest December since 2000.

Topic: Weekly Weather Potpourri

NOAA features a report on the Arctic weather and climate conditions of 2013 on their web site this week. Continued trends toward a greener and warmer Arctic landscape were in play during 2013. You can read more about this at...

http://www.noaanews.noaa.gov/stories2013/20131212_arcticreportcard.html

If you like you can also stay on the NOAA web site and read about the climatology associated with a White Christmas. A complete geographical depiction of the chances for a White Christmas are mapped and described there in great detail. Just go to....

<http://www.climate.gov/news-features/featured-images/what-are-your-chances-white-christmas>

The United Kingdom Meteorological Office announced this week the results of a new study which shows that in many areas of the globe the frequency of river flooding will increase with climate change. In addition some peak flow volumes may change as well. The study combined the results of both climate models and river flow simulations models for a number of different regions. You can read more about it at...

<http://www.metoffice.gov.uk/news/releases/archive/2013/river-flooding-increase>

Among other the weather stories of 2013 the impact of Super Typhoon Haiyan on the Philippines was voted the top story of the year by the BBC. The Australian Heat Wave and Wildfire season was also voted among the top weather stories of 2013. You can see the BBC program on these storms and others at...

<http://www.bbc.co.uk/weather/features/25405770>

Two strong tropical cyclones formed in the Southern Indian Ocean this week. Cyclone Bruce, southeast of Diego Garcia, was producing winds well over 130 mph and sea wave heights of 30-35 feet. It was expected to remain at sea and dissipate by Christmas Day. East of La Reunion Island Cyclone Amara was spinning and producing sea wave heights of 30-35 feet with winds over 120 mph. It too was expected to remain at sea and dissipate by Christmas Day.

This week there was further revelation about the EPA Climate Policy Expert (John Beale) who committed nearly a decade of fraud. He was sentence to 32 months in prison. This is an embarrassing story for the EPA and who it relied on for climate policy advise. You can read more at...

<http://www.wunderground.com/news/epa-climate-policy-expert-sentenced-32-months-fraud-20131219>

MPR listener question: Last spring when the cold seemed to go forever, it was partly blamed on global warming (climate change) breaking down whatever weather mechanisms hold cold weather to the north. Is that what's going on now? I seem to recall that it also had something to do with changes in the jet stream.

Answer: Indeed, an unusual jet stream pattern prevailed last spring which kept temperatures cooler than normal and brought frequent and heavy precipitation (record-setting in southeastern MN). A somewhat similar pattern prevailed for the first 2.5 weeks this month, but the jet stream has recently flattened out (more west to east

orientation), bringing us more moderate temperature conditions. It is an oversimplification to ascribe this jet stream pattern solely to climate change in the Arctic latitudes. It may have something to do with the jet stream configurations we are experiencing, but it is likely more complicated than that involving oscillating behaviors in the pressure patterns and sea surface temperatures of mid to high latitude positions.

Twin Cities Almanac for December 20th:

The average MSP high temperature for this date is 26 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 10 degrees F (plus or minus 14 degrees F standard deviation).

MSP Local Records for December 20th:

MSP weather records for this date include: highest daily maximum temperature of 51 degrees F in 1967; lowest daily maximum temperature of -11 degrees F in 1916; lowest daily minimum temperature is -24 degrees F in 1916; highest daily minimum temperature of 39 F in 1923; record precipitation of 0.74 inches in 1902; and a record 4.6 inches of snow fell on this date in 2010.

Average dew point for December 20th is 9 degrees F, with a maximum of 44 degrees F in 1967 and a minimum of -30 degrees F in 1963.

All-time state records for December 20th:

The state record high temperature for this date is 69 degrees F at Faribault (Rice County) in 1923. The state record low temperature for this date is -49 degrees F at Tower (St Louis County) in 1983. State record precipitation for this date is 1.50 inches at Worthington (Nobles County) in 1902; and state record snowfall for this date is 13.0 inches at Le Sueur (Le Sueur County) in 1887.

Past Weather Features:

December 20, 1887 brought heavy snowfall to many parts of Minnesota. In fact it was a very snowy December, with over half the days bringing snowfall. On the 20th many observers in southern Minnesota reported snowfall amounts ranging from 8 to 12 inches.

A strong winter storm brought significant precipitation to most parts of the state over December 20-21, 1902. A mixture of snow, sleet, and rain prevailed. Many observers reported 1 to 1.5 inches of precipitation, setting new daily record amounts.

December of 1923 was one of the warmest in state history. Over the 19th and 20th many Minnesota communities reported daytime temperatures in the 50s and 60s F, especially in southern counties where there was an absence of snow cover. The month was very sunny as well, but turned quite wintry for New Year's Eve.

The coldest December 20 in state history occurred in 1983. Over 60 Minnesota communities reported -30 degrees F or colder, and ten communities were -40 degrees F or colder. Brainerd reported -41 degrees F, while Faribault was -35 degrees F. It was a somewhat windy day as well producing Windchill values of -40 to -50 degrees F. December of 1983 proved to be the coldest of the 20th Century.

Outlook:

Cooler over the weekend with a chance for snow on Sunday. Continued cool with another chance for snow on Tuesday and Wednesday, then cooler and drier towards the end of next week.

Further Information:

For older versions of the "Minnesota WeatherTalk" newsletter go to

<http://www.climate.umn.edu/weathertalk/>

For access to other information resources go to

<http://www.climate.umn.edu/Seeley/>

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Minnesota WeatherTalk Newsletter for Friday, December 27, 2013

To: MPR's Morning Edition

From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate

Subject: Minnesota WeatherTalk Newsletter for Friday, December 27, 2013

HEADLINES

- Preliminary climate summary for December 2013
- 2013 weather and climate highlights for Minnesota
- Weekly Weather potpourri
- MPR listener questions
- Almanac for December 27th
- Past weather
- Outlook

Topic: Preliminary climate summary for December 2013

Clearly the coldest month of December statewide since 2000, this month brought average temperatures across the state that were 7 to 13 degrees F colder than normal, with many nights well below 0 degrees F. Some communities will report average monthly temperatures for December that fall within the coldest ten historically. Some of these locations include:

International Falls 3rd coldest

Mankato 4th coldest

Grand Rapids 5th coldest

St Cloud 6th coldest

Duluth 8th coldest

For the Twin Cities, an area greatly affected by the urban heat island, December of 2013 will rank 17th coldest (back to 1871), and for Rochester it will rank 14th coldest. On a statewide basis it appears that December 2013 will be ranked as the 7th coldest in history (back to 1895). Extreme values for the month ranged from 48 degrees F at Pipestone on the 3rd to -35 degrees F at Embarrass and Babbitt on the 24th and at Hibbing on the 8th.

December was also a wet, snowy month. Many northeastern Minnesota communities reported over 2 inches of precipitation, and some reported over 3 inches. Two Harbors recorded its snowiest December in history with nearly 55 inches of snowfall. The observer at Wright (Carlton County) also reported a December record with over 30

inches. Though not record setting many other observers reported well above normal snowfall amounts. Duluth reported over 40 inches, their 3rd snowiest December historically. Snowfall was also persistent in many places. Some observers reported that 20 or more days during the month brought snowfall. By month's end snow depths were well over 15 inches in the northern half of the state.

Topic: 2013 climate highlights for Minnesota

Besides the exceptionally cold December, other climate aberrations captured our attention in 2013. For southwestern Minnesota residents the memory of the April 9-10 ice storm will remain for the rest of their lives. The ice storm closed roads and took out power to many communities for days. Certainly many Minnesota citizens will also remember the prolonged winter that brought record May snowfall amounts, delayed planting, and record late ice-out dates on many northern lakes. The storm over May 1-3, 2013 brought record-setting snowfall amounts for 1-day, 2-day, and total monthly snowfall amounts (over 17 inches at Dodge Center and Ellendale). Prevented planting claims by many farmers were the largest in several decades, and some corn fields were actually not planted until the last days of May. A complex of thunderstorms brought severe weather over the Summer Solstice weekend (June 21-23) with damaging hail, strong winds, and flooding rains. Thousands of insurance claims were filed as a result of these storms. And lastly 2013 brought a very warm State Fair, overall the 3rd warmest in history. On Tuesday, August 27, Cathy Wurzer, Paul Huttner, and I endured a Heat Index of 112 degrees F to broadcast a show from the MPR stage on the fairgrounds. Many bottles of water and other beverages were consumed that day.

Pete Boulay of the DNR-Minnesota State Climatology Office has posted the top five Minnesota weather/climate stories of the year on our web site. These were voted as the top stories by our community of media, meteorologists, and observers. You can view it at...

www.climate.umn.edu

Topic: Weekly Weather Potpourri

Heavy rains plagued many parts of the United Kingdom this holiday week. At one time there were over 50 flood warnings in effect, especially in southern portions. The weather caused a great deal of travel delays for airports and the highway system. Many communities also suffered through power outages over the holidays. You can read more at...

<http://www.bbc.co.uk/news/uk-25517504>

Scientists from the National Snow and Ice Data Center reported earlier this month that satellite measurements from the NASA Aqua satellite and Landsat 8 satellite show that temperatures on the high plateau of Antarctica go well below the coldest temperatures previously measured on Earth. They have measured temperatures there of -134 to -137 degrees F along the highest elevations of the eastern ice divide. You can read more about this at....

<http://www.sciencedaily.com/releases/2013/12/131210111039.htm>

Environment Canada reported that Winnipeg set a new record low on December 23rd this month with a reading of -32 degrees F. That city too is reporting one of its coldest Decembers historically.

MPR listener question: With the end of the year upon us, how will 2013 rank statewide for temperature and precipitation?

Answer: 2013 climate data through December 26, 2013 suggest the year will go down as cooler than normal and wetter than normal for most Minnesota observers. The statewide average annual temperature in 2013 will be about 40.3 degrees F, or about 2 degrees F cooler than normal. The statewide total precipitation for 2013 will be about 28.32 inches or about 1.5 inches more than normal. The temperature for 2013 runs counter to the trend which clearly shows mostly warmer than normal years recently. The precipitation value for 2013 supports the trend of recent decades for wetter than normal conditions.

Twin Cities Almanac for December 27th:

The average MSP high temperature for this date is 24 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 8 degrees F (plus or minus 13 degrees F standard deviation).

MSP Local Records for December 27th:

MSP weather records for this date include: highest daily maximum temperature of 46 degrees F in 1959; lowest daily maximum temperature of -9 degrees F in 1924; lowest daily minimum temperature is -24 degrees F in 1872 and 1886; highest daily minimum temperature of 38 F in 2003; record precipitation of 0.70 inches in 1959; and a record 6.0 inches of snow fell on this date in 1971.

Average dew point for December 27th is 11 degrees F, with a maximum of 46 degrees F in 1959 and a minimum of -34 degrees F in 1924.

All-time state records for December 27th:

The state record high temperature for this date is 54 degrees F at Canby (Yellow Medicine County) in 1994. The state record low temperature for this date is -50 degrees F at Tower (St Louis County) in 1993. State record precipitation for this date is 2.50 inches at Fort Ridgely (Nicollet County) in 1856; and state record snowfall for this date is 18.0 inches at Montgomery (Le Sueur County) in 1968.

Past Weather Features:

A large snow storm on December 27, 1904 brought 6 to 14 inches of snow to many parts of the state. Many residents could not travel for New Years celebrations and trains were seriously delayed.

December 27, 1928 brought a warm respite from winter as many communities saw afternoon temperatures climb into the 40s F. At least 7 western communities reported highs of 50 degrees F or greater under mostly sunny skies. Temperatures remained mild until New Years Eve when the thermometer fell below 0 degrees F again.

December 27, 1933 was one of the coldest in state history with dozens of Minnesota communities reporting lows of -30 degrees F or colder. Several northern observers reported -40 degrees F or colder and it was -30 degrees F as far south as Rochester. Albert Lea reported a high temperature of only -3 degrees F, but it warmed up to 40 degrees F for New Years Eve.

Outlook:

Chance for snow, especially in the north, with strong winds on Saturday, then turning sharply colder on Sunday west to east. Windchill values will be a concern on Saturday night and early Sunday. Bitterly cold Sunday night through Wednesday with some occasional snow flurries. Milder temperatures by next Thursday and Friday but still cooler than normal.

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